# Horticulture Innovation Australia

## **Final Report**

Coordinated Knowledge and Industry Development Program

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AUSVEG Ltd

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#### VG12071

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## **Summary**

The National Vegetable Levy funds valuable research and development projects which aim to deliver tangible benefits to Australian vegetable growers and their business operations, with levy funds invested in work to protect biosecurity, improve soil health, and further a wide range of other initiatives.

Modern vegetable farming is more than just growing vegetable crops – it involves business management skills and an active engagement with R&D in order to remain competitive in an ever-changing market. The Coordinated Knowledge and Industry Development Program ("CKAIDP") was created and managed by AUSVEG, and overseen by Horticulture Australia Limited ("HAL")/Horticulture Innovation Australia ("HIA") to develop the industry by ensuring that the results of levy-funded R&D were communicated comprehensively to growers.

Over the three-year life of the project, the CKAIDP provided a consolidated channel of regular analysis and communications for vegetable growers. It targeted activities to promote increased use of the vegetable industry Knowledge Management System, known as InfoVeg; it improved the usability of InfoVeg and added new features, including a mobile/tablet compatible version of the database and an improved process for uploading R&D outputs to InfoVeg; and it provided ongoing briefings to agronomists and service providers about InfoVeg.

The project also used a range of communication channels to promote greater adoption of R&D to levy payers, including through providing ongoing communications support for the Consumers and Markets Program for the Vegetable Industry and by delivering enhanced economics coverage and analysis for the vegetable industry.

Importantly, the CKAIDP was also responsible for the continued maintenance and refinement of InfoVeg, which made levy-funded R&D projects (including final reports, fact-sheets, and technical papers) available to growers.

The information produced through the CKAIDP covered industry economics, consumer and market trends, and the latest R&D outputs from vegetable levy-funded projects. Communications outputs included:

- 12 quarterly R&D e-newsletters, showcasing and summarising the results of vegetable levy-funded R&D;
- 12 info-sheets communicating R&D outputs in a concise, eye-catching format;
- 18 articles in *Vegetables Australia* by the AUSVEG Economist, communicating economic analysis in the most widely circulated magazine in Australian horticulture;
- 6 discussion papers written by the AUSVEG Economist, providing in-depth analysis of economic trends and issues of concern to vegetable growers;
- 89 media releases disseminating consumer research, economic analysis and other industry development related R&D outputs;
- 5 episodes of the InfoVeg Radio podcast, interviewing researchers and academics about industry R&D;
- 9 briefings to leading suppliers and service providers in the Australian vegetable supply chain about the InfoVeg database; and
- 3 annual surveys conducted by AUSVEG to evaluate and obtain feedback about the program.

Throughout the CKAIDP, AUSVEG communicated the results of levy-funded R&D to growers and ensured that the benefits of levy investment continued to reach Australia's levy payers. It is recommended that to

capitalise on the work performed by the CKAIDP and to ensure that the value of InfoVeg and the project's other outputs are not wasted, future industry development projects should build on the foundation laid by the CKAIDP, including by continuing the AUSVEG Economist's function, maintaining the R&D focus of the project's communications outputs, and upgrading the platforms provided to growers to access R&D online.

## **Keywords**

Industry development; economics; research and development; database; consumer research; market research; Horticulture Innovation Australia; communications; vegetable industry; InfoVeg.

#### Introduction

In mid-2011, a review of the previous Vegetable Industry Development Program ("VIDP") was conducted by Consulting and Implementation Services ("CIS"). The review analysed the effectiveness of the VIDP, and identified that the core benefit of the program's approach was its potential to foster a cohesive effort toward common goals. However, the report concluded that the size and structure of the VIDP, including the decision to grant the national coordination contract to an industry service provider, significantly increased the difficulty of the VIDP achieving its required outputs. CIS recommended that any future extension—related programs of this nature should be managed by the Peak Industry Body (AUSVEG) and that oversight should be provided by HAL (later HIA, following HAL's transition to a grower-owned corporation).

The CKAIDP was proposed with a view to enabling:

- Coordinated program management undertaken by AUSVEG, with feedback obtained from growers as needed to improve the program on an ongoing basis;
- Targeted communications to promote increased use of InfoVeg and encourage greater adoption of R&D on-farm;
- Ongoing briefings with agronomists and service providers to promote the benefits of the National R&D Database as a valuable resource and tool that they can use when communicating information to vegetable growers;
- The use of a range of channels to communicate information to levy payers to promote greater adoption of R&D;
- Improvements to the usability of InfoVeg involving its speed, layout and functionality and the addition of new features;
- Uploads of new R&D reports into InfoVeg once approved by HAL/HIA, as well as the sourcing of tools and other resources, and investigation of a new method to improve the R&D upload process implemented by the previous service provider;
- Enhanced economics coverage and industry analysis including regular commentary to the IAC and
  Design Teams, as well as the industry generally, on the implications for vegetable growers of changes
  in consumer and business confidence, interest rates, and trends in production and financial
  performance data; and
- Ongoing communications support for the Consumer and Markets Program for the Vegetable Industry, which was delivered by Colmar Brunton following the commencement of the CKAIDP.

Importantly, the CKAIDP responded to key elements in the *Vegetable Industry Strategic Investment Plan 2012-17*, with particular reference to Section 6.5 *Industry Development Drive Train*: "There are a number of enduring capabilities that need to be sustained by the vegetable industry to both maximize the benefits of levy funded projects and to cover capability areas that are not research and development projects. Specifically the vegetable industry requires ongoing capabilities in the areas of communications, knowledge management and industry analysis."

## Methodology

#### Communications and Program Management

Over the life of the project, AUSVEG undertook extension activities to support access to, and awareness of, InfoVeg and the R&D information available through the R&D database:

- Delivery of info-sheets communicating R&D outputs drawn from various industry development related R&D projects, distributed with editions of *Vegetables Australia* and made available at the annual AUSVEG National Convention. These info-sheets were produced quarterly.
- Distribution of media releases relating to the program or promoting new R&D outputs, distributed
  using the AAP Medianet service (to around 700 journalists) as well as AUSVEG's own media contact
  database (with over 400 contacts). These media releases were generally proactive rather than
  reactive, creating stories which appealed to media outlets and their audiences, and ensured
  publication in both metropolitan and regional areas.
- Production of R&D e-newsletters to highlight the results of levy-funded R&D, featuring prominent
  links to the InfoVeg database, new R&D, and promotion of the benefits of both the database and the
  CKAIDP program as a whole. The production process included selecting R&D outputs which would be
  of the most relevance and interest to growers, as a strategy to increase the newsletters' effectiveness
  as a promotional tool for levy investment overall as well as an informative document.
- Creation of the InfoVeg Radio podcast, a digital audio initiative that interviewed researchers and academics about R&D being undertaken in the vegetable industry (both levy-funded and through voluntary contributions) and distributed the recordings online to growers through the SoundCloud service, the AUSVEG website and iTunes.
- Briefings with leading suppliers and service providers in the Australian vegetable supply chain about
  the InfoVeg database to increase its overall use over the life of the project. These briefings, which
  included step-by-step walkthroughs of how to make use of the database, publicised the information
  available on InfoVeg and ensured that trusted intermediaries in the supply chain who regularly deal
  with growers would be in a position to pass along their knowledge of the database.
- Articles for Vegetables Australia promoting new R&D made available on the InfoVeg database or, where this was not feasible due to a lack of new reports, discussing the results of previous levyfunded R&D and promoting other CKAIDP outputs.

#### Knowledge Management Program

Greater use of the InfoVeg database by levy payers was a key focus of the CKAIDP. AUSVEG conducted several initiatives to drive traffic to the website and increase its uptake among growers:

- Carrying out focused media campaigns combined with the use of trusted intermediaries, such as
  agronomists, to encourage further uptake of InfoVeg. Anecdotal evidence suggests that these
  intermediaries are best-placed to communicate relevant R&D findings to the growers, and the
  continued growth in members registered to InfoVeg reflects this.
- Updating and refining the InfoVeg database to increase its usability for growers, especially
  considering the overall level of technological capability within the industry.

- Developing a mobile-friendly version of the InfoVeg database to enable growers to access information while in the field or otherwise away from a computer.
- Delivering a major overhaul of the previous database upload system, which streamlined the system to make it quicker and simpler for research to be made available through InfoVeg.
- Increasing the level of multimedia content on the website, including the InfoVeg Radio podcast and
  the amount of content on the AUSVEG YouTube channel, to introduce new streams of communicating
  R&D to growers beyond simply making reports available.

#### Industry Economics and Analysis Program

By ensuring the AUSVEG Economist played a more active role in the provision of statistics, economic information and policy analysis to levy payers, the CKAIDP increased the role of the economist within the Australian vegetable industry and facilitated a deeper understanding of current business conditions.

As part of the role's core functionality, the AUSVEG Economist:

- Wrote articles for Vegetables Australia on trends and issues of relevance to Australian vegetable
  growers, analysing data taken from a variety of sources (including the Australian Bureau of Statistics,
  the Australian Bureau of Agricultural and Resource Economics and the Global Trade Atlas) to identify
  and communicate key findings.
- Gave regular updates to industry across a range of formats and media, including giving briefings/presentations to the Design Teams and the IAC, regularly updating the AUSVEG website with the latest information, and fulfilling industry and media requests for economic data on an ad hoc basis.
- Produced discussion papers providing in-depth analysis on contemporary and ongoing economic trends and issues. These discussion papers synthesized data from a range of sources, as well as using the economist's own modelling, to produce insights and commentary for levy payers and the broader vegetable industry and supply chain.
- Delivered the "Veggie Stats" info-sheet series, using data from several sources to highlight key
  production, economic and trade statistics about individual crop commodities. These info-sheets were
  distributed with Vegetables Australia.

#### 1800 Agronomist Pilot Project

The 1800 Agronomist service was a free levy-funded service for vegetable levy payers which aimed to link growers with the latest research and development via AUSVEG's database. A specialist agronomist was resourced to manage the 1800 phone line and used the information available through the InfoVeg database, as well as their expertise and experience, to respond to calls from levy-paying growers and answer their questions.

Between 13 May 2013 and the end of May 2014, there were a total number of 96 calls made to the hotline. The majority of calls were responded to by a specialist agronomist within 24 hours, apart from those placed by growers of non-levy paying crops, which were declined. After an initial surge in calls during the first month, there were 4-6 calls placed per month on average.

AUSVEG undertook a range of promotional efforts to raise the profile of the 1800 Agronomist service, including distributing digital and hard-copy promotional communications and holding a field day. Grower

uptake of the service remained below a level which would have justified the continuation of the program though, and after discussions with AUSVEG the Vegetable IAC determined that the pilot should not be renewed. It was concluded that agronomy needs were being sufficiently met by private enterprise.

A full final report on the 1800 Agronomist program is included as Appendix 8 of this report.

#### **Outputs**

Outputs are listed in this section under the categories in which they were laid out in the original project proposal.

#### Communications and Program Management

Over the life of the CKAIDP, AUSVEG ensured sound management and accountability to industry for the running and the outputs of the program, including approving all program outputs and completing all tasks on time and within the specified budget.

Other outputs under this category included:

**12 double-sided hard copy info-sheets** communicating R&D outputs drawn from various industry development related R&D projects in a concise, eye-catching format. These info-sheets covered the following topics:

- 1800 Agronomist, raising awareness of the newly launched agronomist hotline;
- <u>InfoVeg</u>, using a Captain Agronomy comic strip to increase awareness of the re-launched InfoVeg and encouraging users to access the web-app version;
- <u>Project Harvest/Interactive Data Tool</u>, promoting the findings from Project Harvest reports and encouraging growers to access the IDT;
- <u>Annual economic snapshot (2012/13)</u>, summarising economic trends and commenting on the economic outlook in the vegetable industry;
- <u>InfoVeg</u>, using a Captain Agronomy comic strip to raise awareness of InfoVeg and encouraging users to access the online R&D database;
- Annual economic snapshot (2013/14), summarising economic trends and commenting on the economic outlook in the vegetable industry;
- <u>Energy saving tips</u>, highlighting energy-saving techniques Australian growers can employ on-farm to reduce costs;
- InfoVeg Radio, promoting the podcast and increasing awareness of its production among growers;
- <u>Project Harvest consumer segmentation report</u>, promoting the report and presenting snapshots of the segments identified in the report;
- <u>InfoVeg</u>, promoting how to access the InfoVeg R&D database with an emphasis on its usability on mobile devices;
- <u>InfoVeg Radio</u>, promoting the InfoVeg Radio podcast as a source of R&D information and exploration of levy investment; and
- <u>Annual economic snapshot (2013/14)</u>, summarising economic trends and providing a more in-depth look at key data points from the 2013/14 financial year.

For digital copies of each information sheet, please see Appendix 1.

**89 media releases** relating to the program or promoting new industry development related R&D outputs, including consumer research, economic analysis and other areas. All media releases distributed by AUSVEG are available on the AUSVEG website (<a href="http://ausveg.com.au/news/mediareleases.htm">http://ausveg.com.au/news/mediareleases.htm</a>). For a selection of media releases produced by the CKAIDP showcasing the areas covered by the CKAIDP's communications activities, please see Appendix 2.

**12 R&D e-newsletters**, showcasing and summarising the results of levy-funded R&D to drive increased traffic to the InfoVeg Database and highlight the value proposition it presents to levy payers and industry members. These e-newsletters were released in the following months:

- June 2013;
- August 2013;
- December 2013;
- February 2014;
- June 2014;
- November 2014;
- February 2015;
- July 2015;
- August 2015;
- November 2015;
- December 2015; and
- February 2016.

For the full text of each e-newsletter, please see Appendix 3.

**Digital communications and social media content**, including use of the AUSVEG Twitter account to broadcast consumer and market information and economic updates, and use of SMS updates to levy payers as required to promote new program outputs or announcements.

**5 episodes of the InfoVeg Radio podcast**, an initiative introduced by AUSVEG during the project to extend the CKAIDP's digital communications. The podcast incorporated researchers and academics discussing industry R&D and was made available online to growers via the AUSVEG website, iTunes and SoundCloud. These were released on:

- June 2014;
- October 2014;
- December 2014;
- June 2015; and
- December 2015.

To access all editions of the InfoVeg Radio podcast, please visit <a href="http://ausveg.com.au/infovegradio">http://ausveg.com.au/infovegradio</a> or <a href="http://ausveg.com.au/infovegradio">click</a> here.

**Monitoring of vegetable levy payer uptake of the InfoVeg database**, working alongside the Knowledge Management Program to improve accessibility and adoption of the system. The results of this monitoring can be found in the section *Outcomes*.

**9 briefings with leading suppliers and service providers** in the Australian vegetable supply chain about the InfoVeg database to increase the awareness and communication of R&D information to growers:

- AgVita Analytical (August 2013);
- AgNova Technologies (September 2013);

- Visy (December 2013);
- Yara (July 2014);
- Bayer (February 2015);
- Syngenta (March 2015);
- Watermark (September 2015);
- Boomaroo (September 2015); and
- Solargain (November 2015).

**3 annual surveys** conducted by AUSVEG to evaluate and obtain feedback about the program, including any improvements which could be made. For discussion of the results of these surveys, please see the section *Evaluation and Discussion*.

**5 articles for** *Vegetables Australia*, promoting aspects of the CKAIDP. These articles were an initiative by AUSVEG to further raise the profile of the InfoVeg database and the broader CKAIDP program, as well as increase the value of the database and the project for growers, and included:

- "The four consumer groups purchasing vegetables" (May/June 2015);
- "The freshest vegetable R&D" (September/October 2015);
- "The freshest vegetable R&D" (November/December 2015);
- "Robotics and automation: The farms of the future" (January/February 2016); and
- "New meal occasions on the Horizon" (March/April 2016).

**An annual booth at the AUSVEG Convention,** promoting the InfoVeg database and industry development related R&D, as well as providing growers with the opportunity to meet and speak with the AUSVEG Economist about economic issues of concern and interest to them and the industry.

#### Knowledge Management Program

Outputs under this program included:

The development of a mobile-compatible version of the InfoVeg database, created to encourage use by growers on tablets and smartphones on and off farm.

**Ongoing maintenance of the InfoVeg database**, including uploading new R&D reports as they became available. The InfoVeg database now contains over 1,600 files.

**Further refinements to the InfoVeg database**, including: implementing a "flip-page" function for archived versions of AUSVEG publications online and making these publications searchable on the AUSVEG website; refining the navigation of the database to ensure easier access for growers; and improvements to the speed and load time of the database.

**A major overhaul of the previous database upload system**, resulting in the implementation of a streamlined system which uses a simple web form through which R&D reports can be uploaded to the InfoVeg database.

An investigation of the technical feasibility of implementing automatic notifications for InfoVeg when R&D content related to a user's crop preferences is uploaded to the database. This has been explored

as an option but is not technically feasible using the Business Catalyst Program. The redevelopment of the InfoVeg database is recommended to be undertaken in the near future.

**Further integration of the AUSVEG website with AUSVEG social media**, with industry development tweets now published live on the AUSVEG website (<a href="http://www.ausveg.com.au/social-media/twitter/twitter">http://www.ausveg.com.au/social-media/twitter/twitter</a>).

**Increased level of multimedia content on the website**, including the InfoVeg Radio podcast (see above under *Communications and Program Management*) and increasing the amount of industry development content on the AUSVEG YouTube channel.

The creation and regular updating of a page on InfoVeg documenting useful existing smartphone and tablet applications, for growers to consult when looking to discover the best applications to use on their mobile device (<a href="http://ausveg.com.au/resources/smart-phone-apps.htm">http://ausveg.com.au/resources/smart-phone-apps.htm</a>).

**Ongoing development of InfoVeg using a dedicated website coordinator**, ensuring greater control by AUSVEG and cost efficiencies for the industry.

#### Industry Economics and Analysis Program

Outputs under this program included:

**18 articles in Vegetables Australia by the AUSVEG Economist**, communicating economic analysis in the most widely circulated magazine in Australian horticulture. The following articles appeared in **Vegetables Australia** over the life of the project:

- "Summing up: The results of the ABARES Annual Grower Survey" (May/June 2013);
- "Summing up: The Federal Budget outcomes for agriculture" (July/August 2013);
- "Summing up: Key drivers of growth for the vegetable industry" (September/October 2013);
- "Australian vegetable export opportunities in Asia" (November/December 2013);
- "Economic outlook: An economy in transition" (January/February 2014);
- "Report casts spotlight on farm finance" (March/April 2014);
- "Fluid economics" (May/June 2014);
- "Economics of scale: Size matters" (July/August 2014);
- "Vegetable exports: Capitalising on the dining boom" (September/October 2014);
- "Emerging technologies and their impact on productivity" (November/December 2014);
- "Rising debt and rising costs swallow Aussie grower profits" (January/February 2015);
- "New report highlights export opportunities to the Middle East and Asia" (March/April 2015);
- "A state-by-state analysis of vegetable growers' financial performance" (May/June 2015);
- "2015 Federal Budget provides opportunity and relief to vegetable growers" (July/August 2015);
- "New trade figures show increase in vegetable exports" (September/October 2015);
- "The importance of understanding the consumer" (November/December 2015);
- "The link between labour productivity and investment" (January/February 2016); and
- "Tips on risk management and planning for vegetable growers" (March/April 2016).

For a selection of the articles produced by the AUSVEG Economist, please see Appendix 4. To access archived editions of *Vegetables Australia* containing other articles written by the AUSVEG Economist, please access the

archive on the AUSVEG website by visiting <a href="http://ausveg.com.au/intranet/publications/va.htm">http://ausveg.com.au/intranet/publications/va.htm</a>.

**Regular briefings/presentations for the Design Teams and the IAC as required**, on topics including economic trends and the state of the industry – these briefings were maintained until the transition away from this investment model.

Regular updating of the AUSVEG website with the latest statistical information concerning the vegetable industry, including data on production, financial performance of growers and trade.

Maintaining and sourcing data through the World Trade Atlas.

Fulfilling media requests regarding industry data relating to production, financial performance or trade.

Analysing relevant R&D policies and providing feedback to AUSVEG.

**6 discussion papers written by the AUSVEG Economist**, providing in-depth analysis on the following economic trends and issues of concern to vegetable growers:

- Australian Vegetable Export Opportunities (September 2013)
- Costs of production for Australian vegetable growers (February 2014)
- Exporting Australia's vegetables to the Middle East & Asia (January 2015)
- Analysing vegetable growers' financial performance by state (February 2015)
- Analysing Australian vegetable growers' financial performance by farm size (November 2015)
- Total factor productivity in the Australian vegetable industry (March 2016)

For the full text of each discussion paper, please see Appendix 5.

**The "Veggie Stats" info-sheet series**, delivering snapshots of the financial performance of particular vegetable crop commodities. 11 of these documents have been published, with 5 more planned:

- Lettuce (July/August 2014);
- Carrots (September/October 2014);
- Broccoli (November/December 2014);
- Pumpkin (January/February 2015);
- Cabbage (March/April 2015);
- Cauliflower (May/June 2015);
- Sweet corn (July/August 2015)
- Green peas (September/October 2015);
- Beans (November/December 2015);
- · Chillies (January/February 2016); and
- Celery (March/April 2016).

For digital copies of each Veggie Stats document, please see Appendix 6.

#### 1800 Agronomist Pilot Project

Outputs under this project included:

A 12-month pilot of the 1800 Agronomist service, providing general technical advice to growers

nationally by phone. CKAIDP management of this pilot included a logbook of calls made to this service, including information on the nature of a call, the time and the date of calls, the call length and how the call was resolved.

**A final report at the end of the 12-month pilot** documenting the use of the service and its usefulness to callers, as well as a list of recommendations for the future of the service. The final report summarising this pilot project is included in this report as Appendix 8.

#### **Outcomes**

As agreed in the original project proposal, AUSVEG has monitored and reported against the following factors to evaluate the impact of the CKAIDP on industry adoption of R&D outputs.

#### Traffic to the AUSVEG website

The amount of traffic to the AUSVEG website is a clear indicator of the positive results of CKAIDP efforts to increase levy-payer uptake of the InfoVeg database, as well as uptake of the other online industry development resources made available through the AUSVEG website.

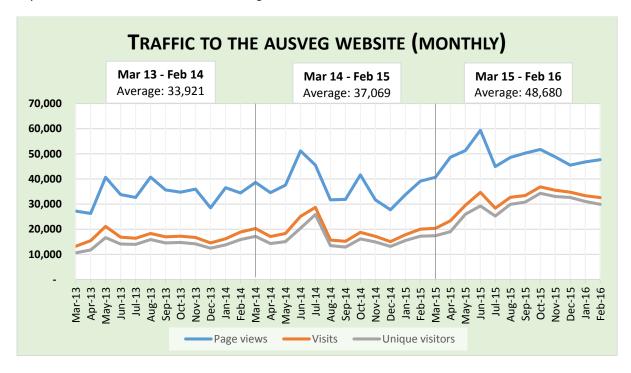


Figure 1: Monthly traffic to the AUSVEG website, March 2013 – February 2016, with average monthly page views per project year (*Note: data becomes available at the end of the month*)

As shown in the above chart, there has been a significant positive trend in the monthly amount of page views recorded to the AUSVEG website, the amount of visits made to the AUSVEG website, and the amount of unique visitors to the AUSVEG website. This clearly indicates an increase in overall levy-payer engagement with the resources available on the AUSVEG website.

This positive trend is even more pronounced on an annual level (defining a year of the program as March-February):

				% increase over life of
	First year	Second year	Third year	project
Page views	407,056	444,831	584,159	44%
Visits	201,648	229,069	375,261	86%
Unique visitors	168,439	195,783	338,200	101%

#### Registrations to the KMS

The ongoing positive trend in traffic to the AUSVEG website has directly contributed to the consistent growth in the number of registrations for the InfoVeg database maintained by AUSVEG.

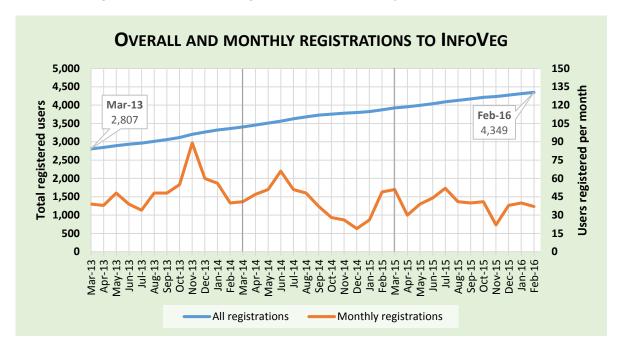


Figure 2: Overall number of registrations to InfoVeg and monthly registrations to InfoVeg, March 2013 – February 2016 (Note: data collected at the end of each month)

Overall, there has been an increase of 1,542 registered users to the InfoVeg database (or an increase of 55% from the start of the project) with an average of 43 users added every month. The consistent growth in the number of registered users is a clear indicator of the success of the CKAIDP in promoting the value of the database over the entire life of the program.

There are two notable peaks in the first two years of the program: November 2013, which coincides with the release of the first Captain Agronomy info-sheet promoting the InfoVeg Database; and June 2014, which coincides with CKAIDP staff releasing an edition of InfoVeg Radio, an e-newsletter, and hosting a booth at the National Convention to promote the program to growers face-to-face.

#### Feedback from briefings with suppliers and service providers about the KMS

Feedback from suppliers and service providers following CKAIDP briefings about the InfoVeg database has been uniformly positive.

#### Hits to the statistics section of the AUSVEG website

The statistics section of the AUSVEG website contains economic information and data relevant to the vegetable industry. Ensuring that this information is available for levy payers is a key aspect of the CKAIDP, and the average of 742 visits to this section every month (totalling over 26,700 visits over the life of the program) shows that growers continue to find this information valuable.

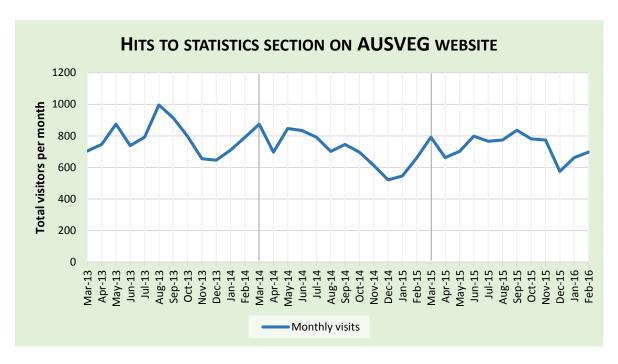


Figure 3: Monthly visits to the statistics section of the AUSVEG website, March 2013 – February 2016 (Note: data collected at the end of each month)

Media coverage related to the program, including statistics on newspaper, radio and TV media mentions

AUSVEG collated data on its media coverage on a biannual basis to align with the project's milestones:

Milestone	Time period	Media hits
102	Mar-13 to Aug-13	148
103	Sep-13 to Feb-14	482
104	Mar-14 to Aug-14	351
105	Sep-14 to Feb-15	161
106	Mar-15 to Aug-15	224
190	Sep-15 to Feb-16	666

These media mentions include newspaper, radio and TV media coverage on a range of topics related to the program or industry development R&D, including the 1800 Agronomist program, consumer data from Project Harvest and Nielsen research, economic commentary and discussion papers, and InfoVeg Radio podcasts.

The high level of media attention for levy-funded R&D which was generated by the work of the CKAIDP ensured that the results of levy investment reached a broad audience, both within industry and the general public. By ensuring R&D results were promoted to such a wide audience, AUSVEG advertised the positive results from levy investment and encouraged its on-farm application.

#### Feedback from growers on the information sheets

Over the life of the program, growers considered fact sheets to be one of the most useful ways of receiving R&D information. In response to the question "Which of the following do you find most useful?", the answer "fact sheets" was chosen by 61% of grower respondents in 2013-14, 69% of grower respondents in 2014-15 and 83% of respondents in 2015-16.

This feedback shows the increasing level of engagement by growers with AUSVEG's information sheets and the overall usefulness of these information sheets as a method of communicating the results of levy-funded R&D.

#### Results of the annual online survey

The 485 total responses to the CKAIDP's three annual online surveys were noted and used to guide the program's outputs. These results are discussed further in *Evaluation and Discussion*.

#### Logbook of calls to 1800 Agronomist and a final report on the project

The final report summarising this pilot project is included in this report as Appendix 8.

#### **Evaluation and Discussion**

### Success measured against Key Performance Indicators

The CKAIDP Steering Committee agreed upon a range of Key Performance Indicators ("KPIs") to establish benchmarks and gauge the effectiveness of the program in achieving its intended outcomes. AUSVEG's performance against these KPIs has been universally successful.

**KPI:** 10 per cent increase in unique traffic to the AUSVEG website in each year of the program, based on the number in 2012 (65,093 unique visits in 2012.)

	2013	2014	2015
Target visitors	71,602	78,763	86,639
Actual visitors	156,003	192,729	309,989
Target % increase on 2012 number	10%	21%	33%
Actual % increase on 2012 number	140%	196%	376%

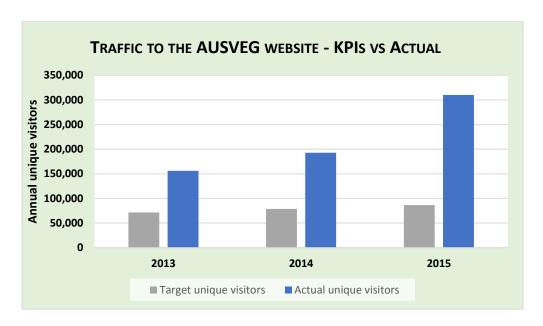


Figure 4: Total unique traffic to the AUSVEG website – KPIs vs actual performance, across calendar years

**KPI:** 10 per cent increase to the total number of registered users of the AUSVEG website (measured at the end of each year), based on the current number of users as at December 31 2012 (2,667 registered users).

	2013	2014	2015
Target number	2,934	3,227	3,550
Actual number	3,266	3,799	4,272
Target % increase on 2012 number	10%	21%	33%
Actual % increase on 2012 number	22%	42%	60%

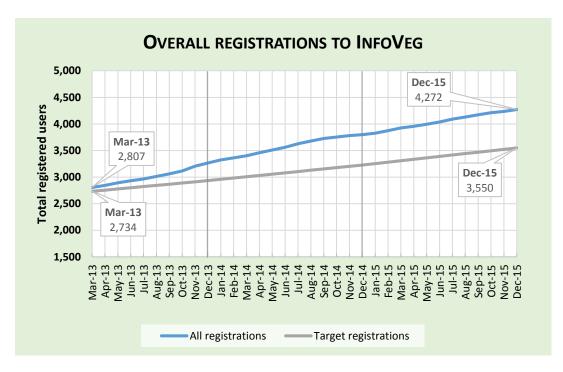


Figure 5: Registrations to InfoVeg – KPIs vs actual performance, across calendar years

**KPI:** Three briefings in each year of the program with varying industry service providers about the Knowledge Management System (nine in total for the life of the project).

First year	Second year	Third year
AgNova Technologies	Yara	Watermark
AgVita Analytical	Bayer	Boomaroo
Visy	Syngenta	Solargain

**KPI**: 10 media mentions per month related to the program, averaged on an annualised basis.

	First year	Second year	Third year*	Total*
Target mentions	120	120	120	360
Actual mentions	630	512	890	2032
Average monthly mentions	52.5	42.7	74.2	56.4

<sup>\*</sup> Data for third year complete to 2 March 2016.

**KPI:** Annual feedback on the Industry Economics (topics reviewed in the bi-monthly economist columns and the two discussion papers each year), Knowledge Management or Consumers and Markets Programs and specific improvements to be considered.

See below.

**KPI:** Awareness of the digital communications for R&D announcements through AUSVEG social media and the AUSVEG R&D e-newsletter. Recommendations on improvements to consider.

See below.

#### Overall evaluation and discussion of project

The CKAIDP was hugely successful in its goals of promoting the InfoVeg database to levy payers and communicating the results of levy-funded R&D to stakeholders. For all metrics which AUSVEG was asked to monitor and report against for the project, the CKAIDP either met or exceeded its goals, including:

- Over-delivery on target amount of registered users by over 700 additional members by the end of the project;
- Over-delivery on target amount of unique visitors to the AUSVEG website by 223,350 additional visitors for the final calendar year of the project; and
- Over-delivery on media hits target by an average of 46 additional hits per month.

The CKAIDP successfully delivered all outputs agreed upon at the outset of the project, as well as delivering additional outputs either agreed upon during the course of the project or produced through the initiative of AUSVEG.

With the overall goal of the program being to increase levy payer engagement with the R&D in which their levy is invested, it can be seen that across all outputs, the CKAIDP was successful in attracting grower attention, informing growers about new and existing R&D results, and leading them to engage with the InfoVeg database.

The program was highly successful in providing communications support for the Project Harvest reports produced by Colmar Brunton, generating 397 syndicated media hits from releases based on Project Harvest findings and reaching more than 2.3 million people. Digital communications support was also highly effective, with e-mailouts in the year 2015 alone attracting over 5,500 clickthroughs to Project Harvest reports (at an average of 324 clicks per e-mail). (For more details on AUSVEG's communications support for this program, see Appendix 7, which contains a report prepared for the Project Harvest steering committee in January 2016 showing the level of media discussing the project generated by AUSVEG communications work to that point.)

The InfoVeg Radio podcast initiative has also proved popular with growers, with the 5 episodes of the podcast attracting over 770 listens since they were introduced. This has produced R&D communications which are less academic than final reports, while retaining their technical accuracy, delivered in a new format which fits into growers' time spent away from a computer.

Through the annual surveys conducted by the CKAIDP, AUSVEG was able to evaluate the relevance and usefulness of the program's outputs to growers. The CKAIDP Steering Committee also undertook a Mid-Term Review to ensure the program was continuing to achieve its goals and to implement further monitoring and reporting requirements to maintain full transparency and accountability in the project.

To assist in evaluating the project, AUSVEG would like to highlight key results from the latest survey, conducted in January/February 2016:

- 77% of respondents indicate that they use the AUSVEG website, with a further 14% indicating that
  the reason they don't use the website is because they don't have the time or have poor/no internet
  access. This shows the high level of engagement with the website among industry members, with
  less than 10% of respondents choosing not to use the AUSVEG website.
- 54% of respondents rate the website at least 7/10 for user-friendliness, with 94% of respondents rating it at least 5/10 for user-friendliness. Considering the overall lower level of technology use (and therefore proficiency) in the vegetable industry, this is an excellent achievement.
- 58% of respondents say they have previously used InfoVeg, up from 42% in 2013-14, showing the

- effectiveness of AUSVEG's promotion of the database and its increasing value to the industry.
- When asked about their preferred form of communication to receive R&D information, 71% of respondents indicated e-newsletters, up from 66% in 2013-14. This shows the ongoing effectiveness and popularity of the quarterly R&D e-newsletter.
- When asked about what economic output from AUSVEG they find useful, the most popular answers
  are the Veggie Stats series of documents (72%), articles in Vegetables Australia (62%), and
  vegetable trade data (54%).
- 70% of respondents indicate that they are aware of the Project Harvest consumer research reports, showing AUSVEG's overall success in promoting the research to industry members. The most useful information in these reports was identified as the price information and information on purchase and consumption frequency.

Overall, through regular updates and refinements to the InfoVeg database and regular communication using digital and traditional media, the CKAIDP was successful in ensuring that payers of the National Vegetable Levy received a regular stream of information about the outcomes of levy-funded R&D and were able to access outputs from these projects through a convenient and accessible system.

#### **Recommendations**

**Recommendation 1:** The economics program should be continued and further promoted to levy payers and the broader vegetable industry, to maximise the potential benefits from this valuable resource.

**Recommendation 2:** Consideration be given to redeveloping the AUSVEG website to address technical inadequacies with the current platform and improve promotion of R&D outcomes to levy payers.

**Recommendation 3:** The InfoVeg Radio podcast initiative should be continued to further explore and utilise this new method of communicating R&D outputs to growers.

**Recommendation 4:** Future programs should continue the CKAIDP's focus on communication of outputs related to R&D pillars under the Strategic Investment Plan (while this remains applicable).

**Recommendation 5:** AUSVEG and HIA should continue seeking and incorporating feedback from levy payers to ensure that industry development activities are relevant and effective in achieving the goal of engaging levy payers with the results of levy-funded R&D.

## **Scientific Refereed Publications**

None to report.

## **Intellectual Property/Commercialisation**

AUSVEG has created and registered the trademark "InfoVeg" to refer to the Knowledge Management System developed and maintained on the AUSVEG website.

## References

*Vegetable Industry Strategic Investment Plan 2012-17,* Consulting & Implementation Services on behalf of AUSVEG Limited (March 2012)

### **Acknowledgements**

AUSVEG wishes to acknowledge and thank the following individuals and organisations for their contribution, service or assistance in what has been the highly successful implementation of the Coordinated Knowledge and Industry Development Program:

- Horticulture Innovation Australia Limited (HIA);
- Members of the former Vegetable Industry Advisory Committee (IAC);
- Members of the CKAIDP steering committee;
- Colmar Brunton and their work conducting the Project Harvest research;
- Nielsen Australia and their work delivering Nielsen Homescan consumer data; and
- Industry members and stakeholders who have contributed to outputs from the CKAIDP, including vegetable R&D researchers, consultants and others belonging to institutions, universities and any other relevant bodies.

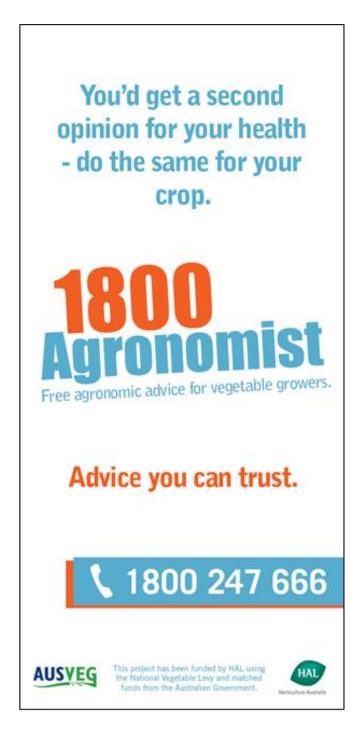
# **Appendices**

1. Info-sheets	30
2. Selection of media releases distributed by CKAIDP	54
3. Quarterly R&D e-newsletters	63
4. Selection of articles by the AUSVEG Economist in Vegetables Australia	164
5. Discussion papers	172
6. Veggie Stats series	253
7. Media generated on Project Harvest reports, July 2013 – January 2016	275
8. 1800 Agronomist Pilot - Final Report – June 2014	280

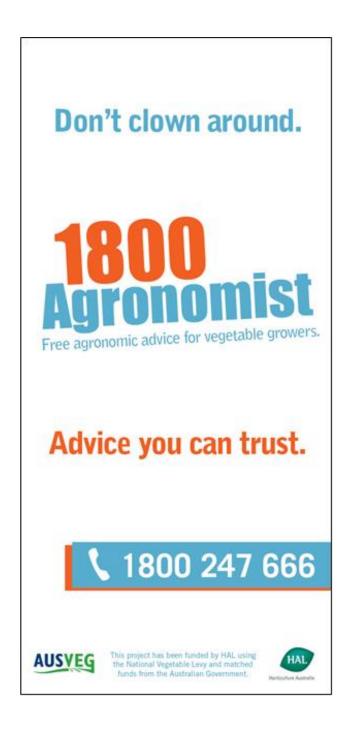
#### 1. Info-sheets

#### 1.1 1800 Agronomist









#### 1.2 Captain Agronomy, Edition 1



The InfoVeg Web App can be accessed via your computer, smartphone or tablet.

#### To access InfoVeg follow these THREE easy steps:

- 1. Visit the InfoVeg R&D database at www.infoveg.ausveg.com.au
- 2. Log in OR register as a user
- 3. Now you're ready to start searching! Enter a keyword or phrase.



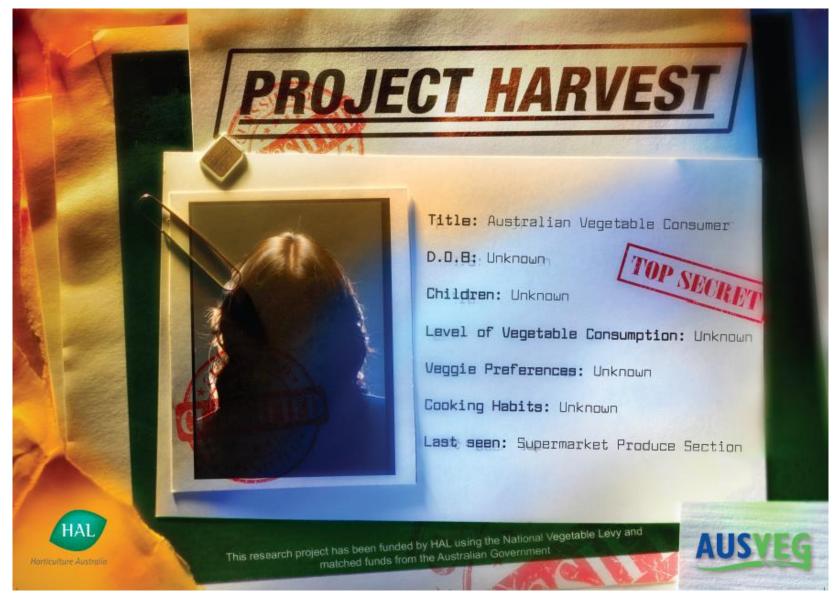
This project was funded by HAL using the National Vegetable Levy and matched funds from the Australian Government.







#### 1.3 Project Harvest/Interactive Data Tool



# YOUR MISSION: IDENTIFY TARGET CONSUMER



**Brief:** In operation since June 2013, **Project Harvest** is a monthly consumer and market research study that provides information on consumer preferences in relation to fresh vegetables.

Hundreds of consumers are surveyed and a range of vegetables are studied each month.

# 1. ACCESS PROJECT HARVEST REPORTS

Visit: www.ausveg.com.au/projectharvest

Track vegetable consumer purchasing trends.
The monthly Project Harvest reports contain detailed information compiled from surveys of hundreds of consumers relating to a range of fresh vegetables.

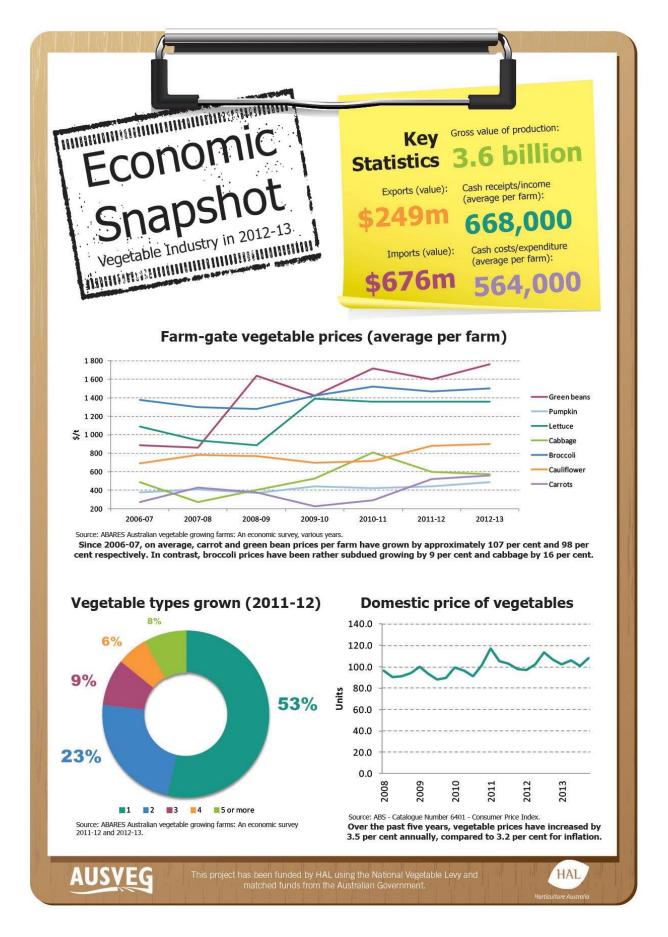
## 2. UTILISE THE IDT

Email: info@ausveg.com.au for login details

Track your target consumer using the online "Interactive Data Tool" (IDT). The IDT compiles all of the data collected from Project Harvest in graphs and tables.

All Vegetable Levy payers have clearance to access the IDT.

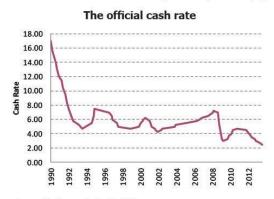
Growers can compare and contrast data between different vegetables and filter by demographic.

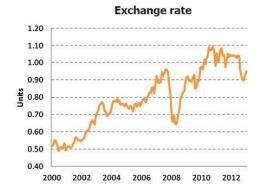




Over the past two years, the vegetable industry has endured many challenges, including exchange rate and vegetable price movements, an increasing number of vegetable imports, and rising input costs.

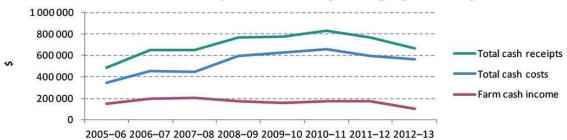
These challenges, to some extent, have been offset by relatively low interest rates, and favourable seasonal conditions in 2011-12. Looking forward, a weakening Australian dollar is expected to enable Australian vegetable exports to be more cost competitive, although growers input costs (e.g. fuel and machinery) are likely to rise.





Source: The Reserve Bank of Australia

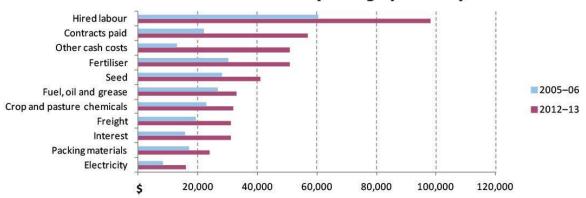
### Farm financial performance (average per farm)



Source: ABARES Australian vegetable growing farms: An economic survey, various years

In the past seven years, vegetable growers average cash income has varied. In 2012,13, average farm cash income is projected to fall by 40 per cent to \$103,000, due to less favourable growing conditions.

### Production costs - cash (average per farm)



Source: ABARES Australian vegetable growing farms: An economic survey 2011-12 and 2012-13

Over the past eight years, contracts paid have increased significantly (158 per cent), similarly with hired labour (62 per cent), fertiliser (69 per cent) and electricity (97 per cent).

For more information growers can contact the AUSVEG Economist on (03) 9882 0277 or info@ausveg.com.au.

#### 1.5 Captain Agronomy, Edition 2



InfoVeg can be accessed via your computer, smartphone or tablet, by following these THREE easy steps:

- 1. Visit the InfoVeg R&D database at www.ausveg.com.au/infoveg
- 2. Log in OR register as a user
- 3. Now you're ready to start searching! Enter a keyword or phrase.



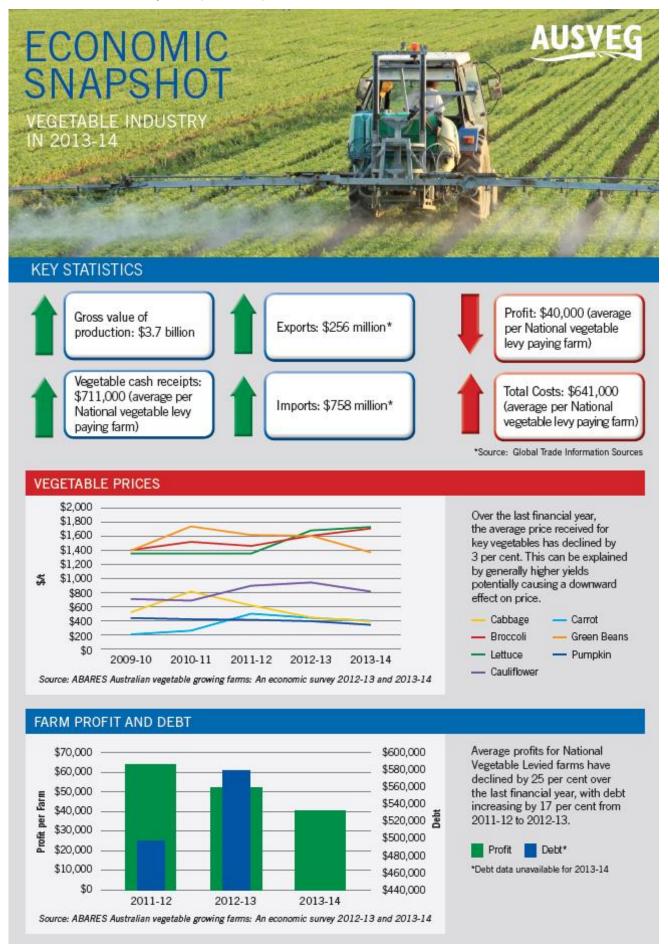
This project was funded by HAL using the National Vegetable Levy and matched funds from the Australian Government.





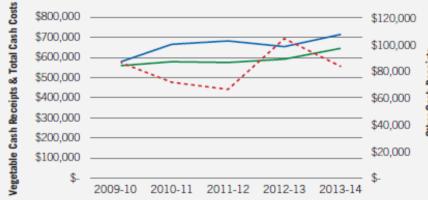


#### 1.6 Annual economic snapshot (2013/14)



#### **SUMMARY**

#### CASH RECEIPTS AND TOTAL CASH COSTS

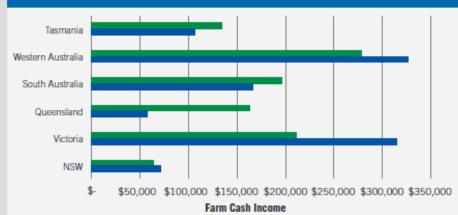


Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

There has been a steady increase in vegetable cash receipts and total cash costs for National Vegetable Levied farms in 2013-14. However, farms can have other cash receipts such as wool and cattle. Other cash receipts have decreased from the previous financial year, possibly explaining the decrease in profits.

- Vegetable Cash Receipts
- Total Cash Costs
- - Other Cash Receipts

#### STATE BY STATE FARM CASH INCOME



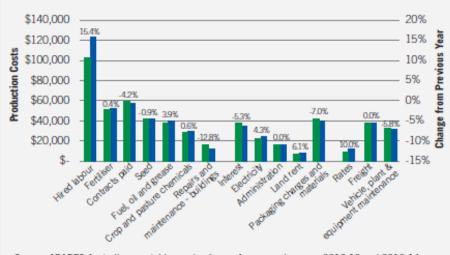
Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

Victorian National Vegetable Levy paying growers experienced the highest increase in income due to the ability of growers to vary their enterprise mix and produce more in response to higher prices. Queensland National Vegetable Levy paying growers experienced the largest decrease in income, due to lower prices for the main vegetables grown in Queensland.

2012-13

2013-14

#### PRODUCTION COSTS



Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

Hired labour is the largest production cost on average for National Vegetable Levy paying growers and has increased by 15.4 per cent from the previous financial year.

2012-13

2013-14



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



# Energy Saving Tips for Australian Vegetable Growers

The following energy saving tips have been developed as part of a HIA project to help Australian vegetable growers cut down on the amount of energy they use on-farm.

For more information visit infoVeg at: www.ausveg.com.au/infoveg and search for project VG13054.



# IMPROVE IRRIGATION PUMP COUPLINGS:

Improve efficiency by redesigning the pump to include a direct gearbox coupling.

Cost Savings Approximate Break-Even

\$2,000 \$1,124 p.a. 1 Year 10 Months

#### **ELECTRIC FORKLIFTS:**

Replace all diesel and LPG forklifts with electric forklifts. Electric forklifts can be charged at off-peak times and produce no emissions.

Cost Savings Approximate Break-Even

\$20,000 \$2,937 p.a. 6 Years 10 Months





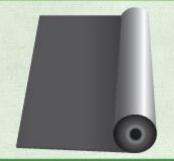
#### **EQUIPMENT SHUTOFF SWITCHES:**

Install a central shutoff switch connecting all packing-shed equipment. Switching equipment off during break times will lead to energy savings.

Cost Savings Approximate Break-Even

\$400 \$312 p.a. 1 Year 4 Months

**Note:** Before relying on this information or altering any business practices users should carefully evaluate the relevance of this information for their purpose and should obtain appropriate professional advice relevant to their particular circumstances.



#### COOL ROOM FLOOR INSULATION:

Cooling loss can be reduced by installing floor insulation such as 10mm compact rubber, which can reduce slab conductance and decrease energy usage significantly.

Cost Savings Approximate Break-Even \$3,900 \$19,500 p.a. 3 Months

#### REPLACE OLD LIGHTS:

Metal Halide Bays can be replaced with Inductive Fluorescent lights enabling the use of sensor controls. This ensures that lights are only used when needed. The same can be achieved with LED tubes as a replacement for Fluorescent T8's.

Cost Savings Approximate Break-Even

\$600 \$629 p.a. 1 Year





# THERMAL INSULATION OF COLD WATER BUFFER VESSELS:

All exposed surfaces and metal stands associated with cooling vessels should be insulated to reduce energy usage.

Spray insulation is a cheap option and is adequate for most surfaces.

Cost Savings Approximate Break-Even \$2,400 \$2,092 p.a. 1 Year 2 Months

# ELECTRIC IRRIGATION PUMP INSTALLATION:

Replace all diesel irrigation pumps with electric pumps where possible (only if access to electricity is viable). Electric pumps are more efficient and require much less maintenance over time.

Cost Savings Approximate Break-Even

\$26,400 \$10,146 p.a. 2 Years 7 Months



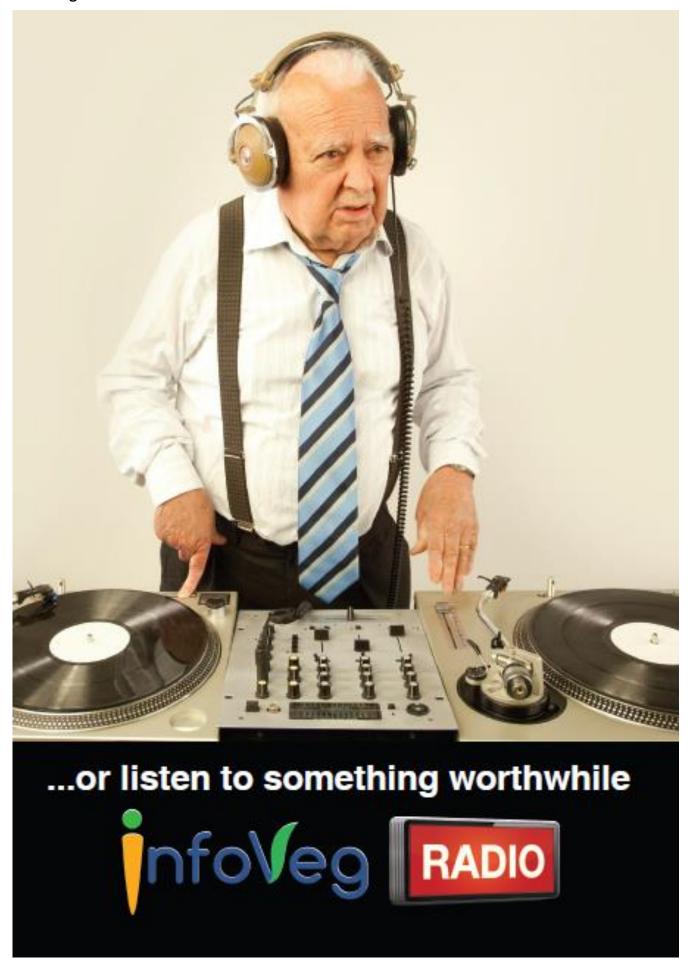
FOR MORE INFORMATION ON THIS PROJECT, PLEASE CONTACT DR JOHN CUMMING, PROJECT LEADER, INFOTECH RESEARCH VIA: JOHN@INFOTECHRESEARCH.ORG PHONE: (03) 9867 7446





This project has been funded by HIA using the National Vegetable Levy and matched funds from the Australian Government.

### 1.8 InfoVeg Radio





InfoVeg Radio is an R&D-focused podcast developed by AUSVEG specifically for Australian vegetable producers.

Each edition includes interviews with researchers conducting projects using the National Vegetable Levy and matched funds from the Australian government.

There are several ways to listen to InfoVeg Radio while at home or in the field.

# Stream

Each edition of Infoveg Radio is available to stream online via the AUSVEG website. ausveg.com.au/ infoveg-radio

# Subscribe

To subscribe via an Apple device simply open the 'Podcast' app and search for Infoveg Radio. Search InfoVeg Radio in Apple iTunes

# Download

You can download (save) each edition as an MP3 audio file directly from the AUSVEG website.

Visit ausveg.com. au/infoveg-radio and 'Download'

# Listen

Growers with vehicles equipped with a USB input in the cab stereo - like many of the tractors in the John Deere range can also listen to the programs while out in the field. Download episodes onto a USB and plug into your vehicle's stereo.

If you would like any further information on how to listen to InfoVeg Radio please contact AUSVEG on (03) 9882 0277.



This project has been funded by Horticulture Innovation Australia Limited using the National Vegelable lovy and funds from the Australian Government. Horticulture Innovation Australia

### 1.9 Project Harvest consumer segmentation report



# **Project Harvest: Consumer Segments**



Likes new ideas, new tastes, new recipes, new ingredients. Taste, colour and texture are motivators.

Looks for new ideas all the time, and is aware of new introductions and celebrity endorsed offers.

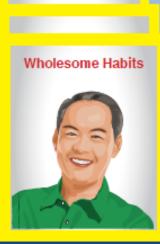
Seeks new flavours, ideas and experiences.



Only buys what they know they like.

May try new things, if they are similar to something they know they like the taste of.

Can be influenced by new packaging, and searches for flavours that complement their regular buys.



Eats vegetables as a habit, and is not looking for anything new.

Knows that eating vegetables is healthy, but sticks to what they know how to cook and what others they cook for will eat.

Price and value sensitive, and keen not to waste food.



Selects vegetables based on nutritional benefit. Motivated by a specific need, such as weight management, or for general health reasons.

Willing to spend the time and money in-store to buy the most nutritious ingredients and understands the importance of freshness.

To find out how to better meet the needs of these consumers visit



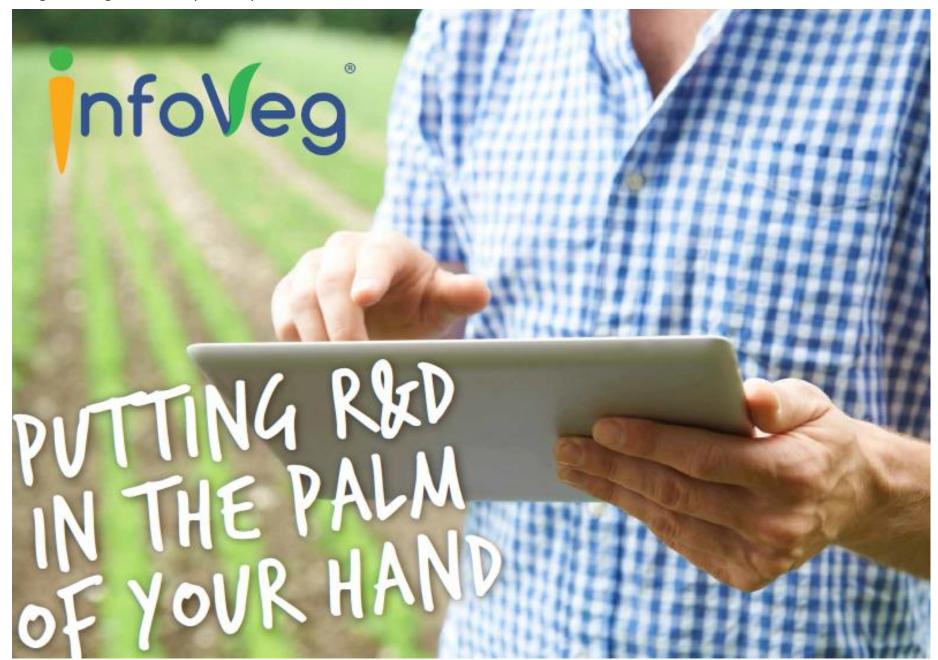
www.ausveg.com.au/infoveg

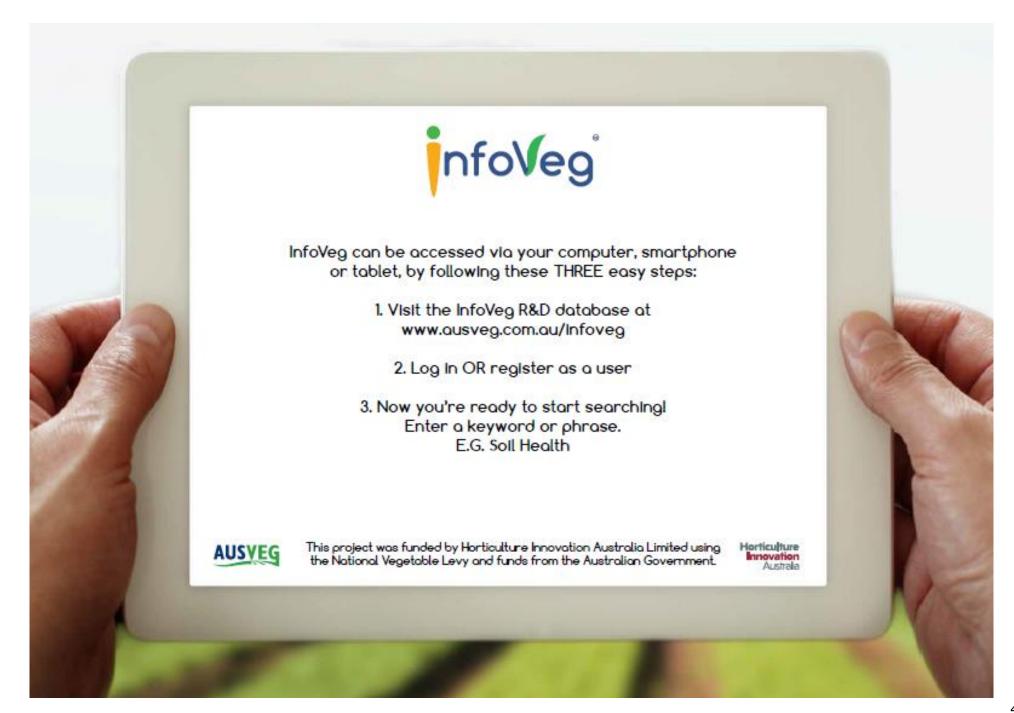


This project has been funded by Horticulture Innovation Australia Limited using the National Vegetable levy and funds from the Australian Government.

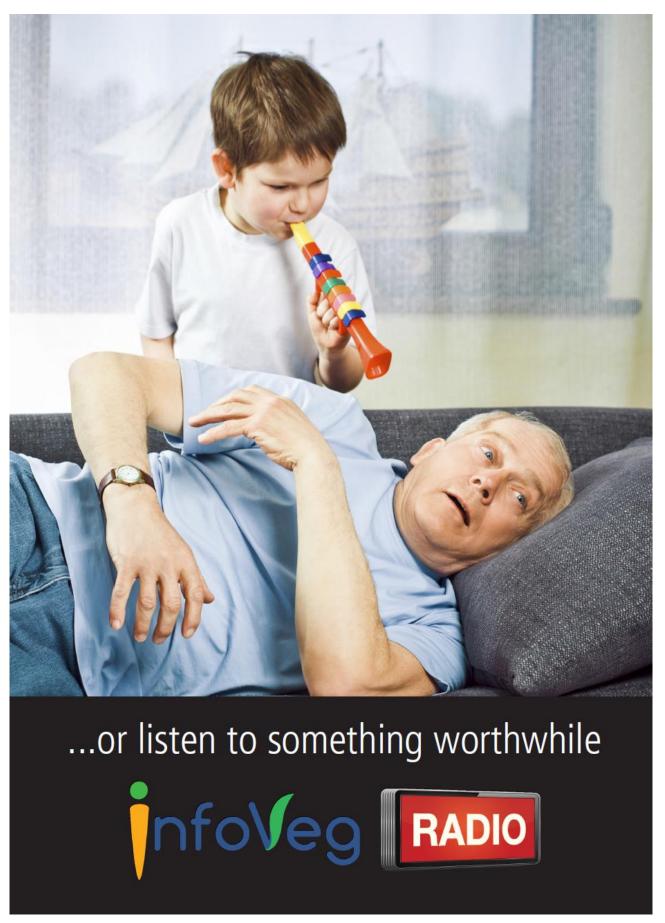


### 1.10 InfoVeg – Putting R&D in the palm of your hand





### 1.11 InfoVeg Radio





InfoVeg Radio is an R&D-focused podcast developed by AUSVEG specifically for Australian vegetable producers.

Each edition includes interviews with researchers conducting projects using the National Vegetable Levy and matched funds from the Australian government.

There are several ways to listen to InfoVeg Radio while at home or in the field.

# **STREAM**

Each edition of Infoveg Radio is available to stream online via the AUSVEG website.

ausveg.com.au/ infoveg-radio

# SUBSCRIBE

To subscribe via an Apple device simply open the 'Podcast' app and search for Infoveg Radio.

Search InfoVeg Radio in Apple iTunes

# **DOWNLOAD**

You can download (save) each edition as an MP3 audio file directly from the AUSVEG website.

Visit ausveg.com. au/infoveg-radio and 'Download'

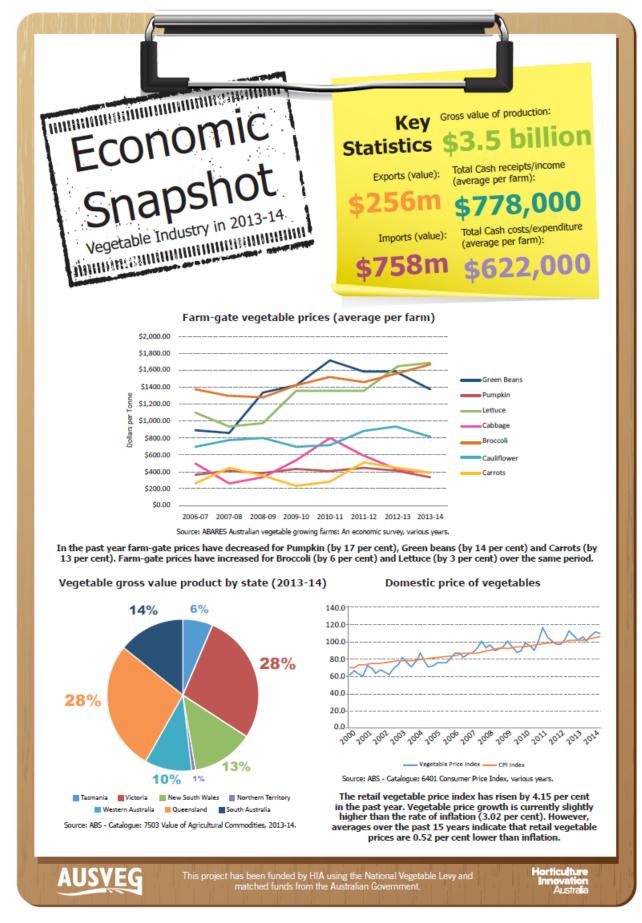
# LISTEN

Growers with vehicles equipped with a USB input in the cab stereo - like many of the tractors in the John Deere range - can also listen to the programs while out in the field.

Download episodes onto a USB and plug into your vehicle's stereo.

If you would like any further information on how to listen to InfoVeg Radio please contact AUSVEG on (03) 9882 0277.

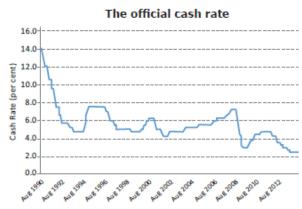






Australian vegetable growers faced an economic squeeze in 2013-14 as vegetable prices declined and production costs continued to rise. This problem was enhanced by a trade deficit in vegetable production as imports into Australia exceeded exports.

Growers can still find opportunity through flexibility in the current economic climate. Exchange rates are falling as the Reserve Bank of Australia becomes wary of the effect of a high dollar on the domestic economy. Furthermore, interest rates are the lowest that they have been in 20 years, providing opportunity to growers for the funding of additional farm expansion or mechanisation, allowing some growers to achieve benefits from economies of scale and enhanced farm productivity.

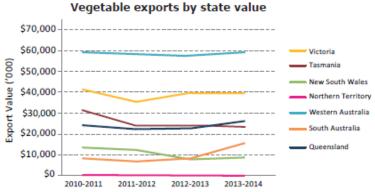




Exchange rate - trade weighted index

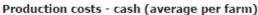
Source: The Reserve Bank of Australia

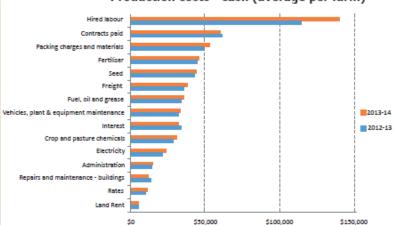




Vegetable exports have increased by 7.48 per cent nationally in 2013-14. The value of South Australian and Queensland vegetables exports have increased by 84.06 and 15.26 per cent respectively.

Source: ABS Export Statistics.





over the period 2012-13 to 2013-14. Hired Labour remains the highest cost averaging \$140,000 per farm. Labour costs have increased by 22.48 per cent in comparison to 2012-13 estimates.

Production costs have continued to increase

Source: ABARES Australian vegetable growing farms: An economic survey 2013-14 and 2005-06.

### 2.1 13 May 2013 – 1800 Agronomist launch

# AUSVEG launches innovative 1800 Agronomist hotline for vegetable growers

AUSVEG has today launched a 1800 Agronomist hotline for vegetable growers, an industry-driven initiative which will be introduced on a national basis to provide technical information and address gaps in knowledge across the industry.

AUSVEG spokesperson Andrew White said the hotline would provide vegetable growers with unparalleled access to technical agronomy information and would benefit many vegetable growers across Australia by providing them with technical insights relevant to their circumstances.

"This is a unique and innovative initiative for the Australian vegetable industry that will be particularly useful for those growers that cannot afford to employ a full-time technical agronomist on staff or are unable to easily access technical information relevant to their circumstances due to the remoteness of their farm," Mr White said.

"Technical advice will be provided through the service by a leading Australian agronomy service provider. The hotline will provide a useful resource for growers to obtain technical advice in a range of areas, including pest control and identification of pest problems, weed control, nutrition, post-harvest, seed / genetic selection, protected cropping and other on-farm technical issues," Mr White said.

"Growers will be provided with up-to-date information relevant to their circumstances and may also be guided to the industry's Knowledge Management R&D database located on the AUSVEG website for additional information where it's appropriate," he said

The pilot project is being funded by Horticulture Australia using the National Vegetable Levy with matched funds from the Australia Government.

AUSVEG is the National Peak Industry Body representing Australia's vegetable growers.

Mr White said that the service would become a valuable industry resource.

"The industry felt that a 1800 hotline was the easiest and most cost-effective way to address potential lack of access to technical information on a national basis. The service provides an avenue to access technical information that will assist those growers who would otherwise be unable to access such information," Mr White said.

**ENDS** 

**MEDIA CONTACT:** Andrew White, Manager of Industry Development & Communications, Phone: (03) 9822 0388, Mobile: 0409 989 575, Email: andrew.white@ausveg.com.au Media Release

#### 2.2 15 July 2013 – Project Harvest launch

### New research tracks consumers' perception of vegetables

The first of a series of regular monthly reports tracking consumer behaviour and perception in relation to vegetables has just been released.

"Measuring purchasing habits, consumer knowledge of vegetable varieties, new product launches and how Australians prepare their vegetables, Project Harvest will track consumer trends across a number of key vegetables on a monthly basis over a three-year period in order to identify opportunities for growers to better meet consumers' needs," said AUSVEG Manager of Industry Development and Communications, Mr Andrew White.

"There is an increasing need in the Australian vegetable industry to monitor and gauge consumer perception and behaviour in relation to vegetables," said Mr White.

"Understanding consumer purchasing behaviour will be critical to identifying ways in which vegetable growers and retailers can best meet the needs of Australian consumers," Mr White said.

AUSVEG is Australia's leading horticulture body representing 9,000 vegetable and potato growers.

"To continue to maximise the opportunities for Australian vegetable growers it is imperative that we are able to evaluate consumer trends. For instance, if Australians are moving away from traditional meat-and-three-veg to Asian inspired cooking we may discover a raft of opportunities to supply new varieties of vegetables to the market."

"This research will also monitor new product releases from around the globe, whether this is an entirely new product or innovative packaging of vegetables, the outcome will be positive for both growers and consumers."

"This is exciting and innovative research for an industry that has never before conducted such a comprehensive and far reaching evaluation of Australian vegetable consumption," said Mr White.

The research will utilise an online panel of 500 consumers with respondents representing all states and territories, as well as metro and rural areas, in order to identify opportunities for vegetable growers to better meet consumer needs.

The research project has been funded by HAL using the National Vegetable Levy and matched funds from the Australian Government.

#### **ENDS**

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#### 2.3 30 May 2014 – Economic commentary

### Australian vegetable industry grows to \$3.8 billion

The gross value of Australia's vegetable industry production has jumped \$500 million in just 12 months according to new data released today from the Australian Bureau of Statistics (ABS).

AUSVEG has welcomed the data which shows that in 2012-13, Australia's vegetable industry generated around \$3.8 billion for the Australian economy and played a critically important role in contributing to both regional and state economies.

"This increase in growth is significant, especially considering that the gross value of Australia's vegetable industry from the previous year was approximately \$3.3 billion. That's around a half-a-billion dollar increase in one year," said AUSVEG Economist, Mr Shaun Muscat.

AUSVEG is the leading voice in Australian horticulture, representing 9,000 vegetable and potato growers.

"This data clearly shows that the vegetable industry has never been more valuable to the national economy," said Mr Muscat.

"However, whilst it is imperative that the Australian vegetable industry continues to grow, we must ensure that this translates to growers receiving better returns and improving their profitability," said Mr Muscat.

Potatoes continued to be Australia's largest contributor to the economy providing \$690 million of value in 2012-13. Other crops doing the heavy lifting were tomatoes (\$439 million), mushrooms (\$285 million), melons (\$234 million), onions (\$200 million) and carrots (\$194 million).

"The volume of vegetables produced also increased compared to the previous year, according to the ABS data. Vegetables that increased in production included lettuce (43 per cent), melons (36 per cent) and tomatoes (23 per cent)," said Mr Muscat.

However, certain commodities also experienced falls in production, such as carrots (15 per cent), onions (13 per cent) and capsicums (8 per cent).

"Continued growth is essential, particularly since, despite the best efforts of industry, rising production costs such as electricity, fuel, fertiliser and labour, mean many growers are being squeezed," said Mr Muscat.

"The vegetable industry must remain resilient and continuously explore opportunities to improve returns, by reducing operating costs and improving productivity levels," said Mr Muscat.

#### **ENDS**

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# AUSVEG launches 'InfoVeg Radio' to drive uptake of cutting-edge R&D initiatives

AUSVEG has today launched 'InfoVeg Radio', a R&D-focused podcast specifically for Australian vegetable producers.

"InfoVeg Radio will provide industry R&D in an audio format so that vegetable growers can more easily digest the latest research findings," said AUSVEG Manager of Industry Development and Communications, Mr Andrew White.

"We recognise that growers are time poor and want an overview of the latest R&D so that they can pick and choose the research findings that are relevant to their businesses," said Mr White.

"InfoVeg Radio will release regular audio programs focusing on cutting-edge research and development being undertaken within the industry."

AUSVEG is the leading horticulture body representing Australia's 9,000 vegetable and potato growers.

"Whether it is access to the latest findings regarding innovative soil health measures to manage plant diseases, the feasibility of biogas generation as an electricity source, or innovative mechanised equipment that could drive labour efficiencies, InfoVeg Radio will be available to download, providing a regular and reliable update on the most recent discoveries," said Mr White.

Mr White said that InfoVeg Radio podcasts would be around 10 minutes long and would include interviews with leading researchers in order to provide a snapshot of the latest R&D occurring across the sector.

"The vegetable industry invests around \$15 million each year, including matched Commonwealth funds, to try and find the answers to the big questions that are affecting growers, from critical technical issues like pests and diseases, to game changing programs that investigate trade opportunities to open up new markets," Mr White said.

"The first edition of the InfoVeg Radio features an update on a recent levy funded program from DAFF Queensland that is looking at managing soil health, as well as an interview with a researcher from Victoria who has investigated the future potential for electricity generation using biogas," said Mr White.

Each edition of InfoVeg Radio will include the very latest research discoveries and will be available for vegetable levy payers to stream online from the AUSVEG website (www.ausveg.com.au/infovegradio), or to subscribe to via a portable audio device, such as a smartphone.

Growers with tractors equipped with a USB input in the cab stereo, such as those in the John Deere range, can also listen to the programs while out in the field.

This communication has been funded by HAL using the National Vegetable Levy with matched funds from the Australian Government.

#### **ENDS**

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### Energy efficiency a key concern for vegetable growers

As Australian vegetable growers continue to struggle under the weight of rising production costs, an energy audit report on the industry has taken a closer look at power consumption and efficiency.

"Energy costs have practically doubled over the last decade, prompting the industry to take a closer look at the way facilities use energy, and to then use the report to identify inefficiencies and reduce costs," said AUSVEG spokesperson Tamara Ungar.

The benchmarking data in the report was gathered from a series of 22 audits conducted on vegetable growing farms, by Infotech Research. The study focused on medium and large growing facilities with processing plants.

Facilities producing a wide range of vegetable commodities have been included in this audit, with significant variation in energy consumption more closely related to crops processed than the size of operations.

"A unifying factor regardless of commodities being produced was that growers are very conscious of the rising cost of energy and the impact that this has on the bottom line of their business. The study suggested that the best returns on investment are achieved through prevention of energy losses followed by energy efficiency improvements," said Ms Ungar.

AUSVEG is the leading horticultural body representing 9,000 Australian vegetable and potato growers.

According to the report, many growers audited were investing in new technologies and equipment to increase efficiency and decrease waste.

"Innovative technologies, such as PV panel systems for solar energy production and LED lighting, are some of the ways that growers are aiming to combat rising energy costs, and to improve efficiency," said Ms Ungar.

"It is clear that many growers have embraced, or are looking to adopt, measures to improve energy practices at their operations, with the report stating that a reduction in processed waste is a major opportunity for some growers to pursue."

Key areas for potential reductions in energy demands for the vegetable industry include:

- Diesel plant efficiency
- Refrigeration efficiency
- Cool room energy loss reduction
- Irrigation pump efficiency
- Irrigation system design

An information sheet outlining key energy saving opportunities from the report is being distributed to growers with the latest addition of *Vegetables Australia* magazine.

This project is funded by HIA using the National Vegetable Levy and funds from the Australian Government.

#### **ENDS**

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### Independent singles need more vegetables

Australians aged over 35 without any dependent children are consistently buying fewer vegetables than any other age bracket, according to the latest Nielsen consumer research data into vegetable purchasing habits.

Despite representing the second largest contingent of the adult population surveyed (21 per cent), those classified as "Independent Singles" regularly represent a far smaller share of purchases both in terms of volume and frequency.

"It is concerning to see this large component of the adult population purchasing fewer vegetables compared to the rest of the population, and it is something that the industry would like to see changed," said AUSVEG spokesperson Shaun Lindhe.

"Vegetables of all varieties are a vital part of a healthy, well-balanced diet. The nutrition provided by high-quality Australian vegetables could be giving these consumers the energy and drive they need in their day-to-day lives."

AUSVEG is the leading horticultural body representing Australia's 9,000 vegetable and potato growers.

The Nielsen data, which surveyed consumers of 13 separate vegetable commodities including carrots, fresh salads, capsicum and pumpkin, shows that market share for Independent Singles consistently fails to match their representation in Australia's population.

For nearly all commodities measured, Independent Singles account for only 12-15 per cent of purchase by volume, despite making up more than one fifth of the surveyed group. Even for fresh salad, where they account for 18 per cent of purchase by volume, the demographic is under-represented in proportion to the overall population.

"Whether this trend is the result of a lack of awareness of the health benefits that accompany a vegetable-rich diet, or external factors such as a lack of meal preparation time, it is important that all Australians make an effort to include more vegetables in their diets and make that investment in their long-term health," said Mr Lindhe.

The data also shows that young families with children under 17 are consistently buying more vegetables than their childless counterparts.

"The nutrition provided by vegetables gives children an excellent foundation for physical and mental development, and it's encouraging to see that young families are incorporating vegetables into their children's diets," said Mr Lindhe.

"Vegetables are an integral part of a healthy lifestyle, and it is important that all Australians, regardless of age, consume the recommended amount of vegetables in their diet."

The Nielsen research is funded by HIA using the National Vegetable Levy and funds from the Australian Government.

#### **ENDS**

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#### **2.7 14 May 2015** – Project Harvest

### The "weekly shop" is dead

The traditional "weekly shop" is a thing of the past, with a new study showing Australian consumers are going through the checkout on average more than 135 times a year – almost three times a week.

The latest consumer research from Project Harvest, which tracks consumer attitudes towards vegetable purchases, shows that 80 per cent of Australians buy vegetables more than once a week, and nearly two thirds of all Australians go grocery shopping more than twice a week.

"With this research showing that only a third of Australians shop once a week, it's time we move on from the idea that Australians rely on one big shop for their weekly groceries," said AUSVEG Assistant Manager – Industry Development, Mr Kurt Hermann.

"While consumers may have a regular 'primary' shopping trip, many shoppers are taking advantage of the fact that major retailers are open late on weekdays, providing them with a convenient option to 'grab and go'."

AUSVEG is the leading horticultural body representing more than 9,000 Australian vegetable and potato growers.

The research shows that the major retailers are the leading grocery shopping destination for consumers, followed by local grocers and independent retailers, with consumers valuing the convenience the major retailers provide.

However, consumers prefer to shop at their local grocer when given the choice, with respondents suggesting that visits to local grocers or market-style retailers have greater sentimental value.

"The data shows that many consumers have two separate types of shopping trips: convenient trips to top up their cupboards, and 'treats' or 'outings' to specialist food retailers," said Mr Hermann.

"For example, nearly 20 per cent of respondents say they buy vegetables at their preferred location because of the people and staff, and another 17 per cent say they visit because of the atmosphere and experience of shopping there."

"Vegetables provide excellent value for money, and it's great to see that Australians are contributing to their long-term health and wellbeing by buying vegetables multiple times a week."

Project Harvest is funded by HIA using the National Vegetable Levy and funds from the Australian Government.

#### **ENDS**

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### Consumers eating more sweet corn

Sweet corn production has increased by around five per cent since 2010-11, despite the number of growers decreasing in the same time period, according to the latest 'Veggie Stats' figures.

The figures reveal that, despite sweet corn production increasing from 70,808 tonnes in 2010-11 to 74,483 tonnes in 2013-14, the gross value of the sweet corn industry has marginally decreased over the same time period. ABS data has also illustrated that the number of sweet corn growers has decreased by 38 per cent since 2010-11.

"Sweet corn production has increased over the last few years despite the decrease in the number of growers in the sweet corn industry," said AUSVEG Economist Steve Razdan.

"This indicates that the sweet corn industry is following a similar trend to other vegetable commodities and transitioning to a situation where a smaller number of larger growers produce a larger proportion of sweet corn."

"This situation may still potentially benefit remaining sweet corn growers as overall profits are being shared between fewer growers, despite the overall value of the industry decreasing marginally."

AUSVEG is the leading horticultural body representing more than 9,000 Australian vegetable and potato growers.

There is also good news for growers looking to develop markets, with frozen sweet corn exports valued at over \$2.5 million, having grown more than five-fold since 2009-10.

"Sweet corn exports, particularly frozen exports to Japan, have given sweet corn growers an additional market for their produce. The rapid rise of exports to this region shows a strong sign that growers can increase their production even more into the future, thereby increasing the value of the industry," said Mr Razdan.

"Since 2012-13 alone, the export value of frozen sweet corn has increased by 84 per cent, with Japan accounting for 94 per cent of the total value of exports."

"We are finding that some Asian markets are increasing their demand for Australian vegetables, such as sweet corn, with larger growers able to meet this demand."

"Recent Free Trade Agreements are also an important step to potentially increase vegetable exports, and we encourage all growers capitalise on the increasing demand for clean, green and safe Australian vegetables."

"The knowledge gained through Veggie Stats, including export opportunities for Australian vegetable growers, has further cemented the importance of industry research and development projects that might enable growers to improve their bottom line."

AUSVEG has developed a series of Veggie Stats documents to profile different commodities. Veggie Stats studies are currently being featured in each issue of the industry magazine, *Vegetables Australia*, with sweet corn featuring in the latest edition.

Veggie Stats uses data compiled from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and the Global Trade Atlas. The research has been funded by Horticulture Innovation Australia using the National Vegetable Levy and funds from the Australian Government.

#### **ENDS**

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### Veg farms could be fully automated by 2025

Australia could see fully automated vegetable farms by 2025, according to top robotics researchers, with the ability to automate the entire production process for some crop commodities emerging through targeted research and development in the industry.

The latest edition of the InfoVeg Radio R&D podcast, developed specifically for Australian vegetable producers, features the developer of the Ladybird automated vegetable farm robot, Professor Salah Sukkarieh from the Australian Centre for Field Robotics, University of Sydney, who provides his insights into the vegetable farm of the future.

"With the work being done on robotics and mechanisation across a wide range of on-farm applications, from seeding to spraying to harvesting, the leading minds in the industry believe there will be fully automated solutions for certain crops by 2025," said AUSVEG Deputy CEO Mr Andrew White.

AUSVEG is the leading horticultural body representing more than 9,000 Australian vegetable and potato growers, and publishes the InfoVeg Radio podcast to communicate R&D results to growers.

"There's potential to have a fleet of robots and automated vehicles working in conjunction with each other – so, for example, cutting-edge growers could use drones for low-resolution, rapid information gathering across a wide area and combine that information with results from stationary sensors on the ground, as well as data gathered by ground robots," said Mr White.

"As more and more automated information-gathering options come into play, growers will also need new systems or technology to bring the information together in a useable format and automate, to some degree, the whole decision-making process as well as the tasks themselves."

The podcast also interviewed Mr John McPhee, Farming Systems Researcher at the Tasmanian Institute of Agriculture, and Ms Sue Heisswolf, Senior Horticulturist at the Department of Agriculture and Fisheries, Queensland.

"Australia has been an innovator in the robotics space for industries like mining, and with targeted research and development applying our field robotics expertise to the agriculture industry, we're now world-leaders in farm mechanisation," said Mr White.

"Levy-funded research and development, as well as projects funded from other sources, are identifying priority crops for mechanisation, the benefits it can have for the industry, and areas where there is the most potential for innovation in this area."

"The interviews in this edition of InfoVeg Radio provide great insights into how all these factors are going to play into the future of vegetable growing, and we recommend that all growers listen in."

The podcast is available to stream online or download via the AUSVEG website (<a href="www.ausveg.com.au/infovegradio">www.ausveg.com.au/infovegradio</a>) or via iTunes. Growers with tractors equipped with a USB input in the cab stereo, such as those in the John Deere range, can listen to the program while out in the field.

This communication has been funded by Horticulture Innovation Australia using the National Vegetable Levy and funds from the Australian Government.

#### **ENDS**

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### 3. Quarterly R&D e-newsletters

#### 3.1 June 2013



## Welcome

It is with great pleasure that AUSVEG introduces you to our new quarterly R&D Industry Development e-Newsletter! In these editions we will be taking SNAPSHOTS of recent R&D for our readers. We will also be gathering fact sheets with the aim of providing useful information for growers while keeping our finger on the pulse of other relevant research and scientific news around Australia. In the newsletter we also summarise economic developments relevant to vegetable growers from the past quarter. We look forward to hearing your feedback on this first edition!

## In this edition

**Industry Development News** 

**Research Snapshots** 

'Dollars and Sense' - Economic Update

**Latest R&D Reports** 

**R&D News** 

**Useful Tools and Fact Sheets** 

**Fast Facts** 

## **Industry Development News**



#### "A first for vegetables and a first for horticulture"

For vegetable growers around Australia, Monday 13 May 2013 marked a nation-wide first for the delivery of agronomic support to levy payers.

AUSVEG, in conjunction with Horticulture Australia (HAL), launched the 1800 Agronomist (1800 247 666) hotline last month at E.E. Muir & Sons Head Office in Laverton, Victoria.

The hotline is now live and free to access for all vegetable levy payers around Australia. Growers are encouraged to call 1800 247 666 to seek information about their on-farm issues.

The aim of the hotline is to provide up-to-date technical information relevant to the specific circumstances of vegetable growers. AUSVEG feels the service will be particularly useful for those who may be unable to access agronomic information because of their remoteness.



David Moore, General Manager of R&D Services at Horticulture Australia, addresses attendees at the launch

David Moore, General Manager of R&D Services, attended the event to formally launch the hotline.

Mr Moore stated that industry leaders had been searching for alternative mechanisms to communicate research and development over the past couple of years and that a changing landscape required new ways of thinking. Mr Moore explained that the hotline would be used to assist with growers' needs and current issues, further noting that "this is a first for vegetables and a first for horticulture..."

For AUSVEG, understanding the individual needs of the growers is a primary concern. As an industry, the 1800 number will assist in figuring out how best to address on-farm issues, which range from pest control to post harvest. Importantly, the hotline will assist in bridging the gap between growers needs and the published research.

The hotline will be integrated closely with the R&D Knowledge Management System accessible for free via the AUSVEG website (<a href="www.ausveg.com.au">www.ausveg.com.au</a>). AUSVEG is confident that the hotline will be a cost-effective and efficient program to address knowledge gaps among growers.

The official media release on the launch of the 1800 Agronomist hotline can be <u>found here</u>. The hotline has been funded through HAL using the National Vegetable Levy with matched funds from the Australian Government.

## Latest R&D Reports



Below are the latest R&D reports that can be found on the AUSVEG website (<a href="www.ausveg.com.au">www.ausveg.com.au</a>). By clicking on the research article you will be prompted to login to the Knowledge Management System before the content will become accessible. If you do not have an account you can register by <a href="clicking here">clicking here</a>.

- VG09037 Importance of high vegetable consumption in controlling weight
- VG09190 Carbon and Sustainability A demonstration on vegetable properties across
   Australia
- VG11038 Vegetable Industry Development Bridging Project
- <u>VG05053 Virus identification and development of long-term management strategies for</u> the rhubarb industry
- VG07127 Integrated Management of Foliar Diseases in Vegetable Crops
- VG08141 Vital Vegetables 2 New Zealand Component
- VG08141 Quantifying the effects of no till vegetable farming and organic mulch on greenhouse gas emissions and soil carbon
- <u>VG09095 Publication of Vegetables Australia bi-monthly grower magazine</u>
- VG10028 Cold disinfestation of capsicum and chilli fruit from Queensland

## Research Snapshots



Don't have time to flick through a 100-page research report? Below are a sample of summaries of recent research and how it may be relevant to you.

To access each full research report simply log into the <u>AUSVEG website</u> and search for the project code or title. It's free to register for the AUSVEG website - you can register by <u>clicking here</u>.

Getting the most out of Eretmocerus hayati, an effective natural enemy of silverleaf whitefly (Dr Paul De Barro, CSIRO Entomology, 2012)

The Silverleaf Whitefly (SLW) is one of the world's most notorious vegetable pests. Its

adaptive resistance to insecticides and its broad host range make it a tough opponent for growers in Australia. Globally, the SLW is ranked in the top ten most invasive arthropods. A recent report by Dr Paul De Barro (2012) has made monumental progress on the problem, with research uncovering a new protagonist, *Eretmocerus hayati* (*E.hayati*), as a proven competitor of the infamous Whitefly. *E. hayati* has been shown to reduce Silverleaf Whitefly prevalence by up to 100 fold.

Research and data were taken from three regions: the Lockyer Valley, Bundaberg, and Burdekin. Many growers have expressed interest in using *E. hayati* as the primary control of the Whitefly, and for good reason. Results of *E. hayati* have been impressive. Over just three years *parasitism* (proliferation of *E.*hayati) has increased dramatically, and since its release in 2004 by the CSIRO there has been an overall decrease in SLW abundance across all regions studied. Growers who improved their farm hygiene have also shown reductions in SLW. Other characteristics of *E. hayati* make it a viable solution to the SLW pest. The parasitoid (*E. hayati*) has faster breeding rates than the native *E. mundus* as well as a high spatial distribution capability with distances in kilometres. The CSIRO began releasing *E. Hayati* in November 2004 and the results in this study are intended to provide a new primary control option for growers to combat SLW. "Given that the post-release period is less than 3 years, the shift in levels of parasitism is remarkable." (De Barro et al. 2012)

What does this mean for growers? Bringing in *E. Hayati* into the fight against SLW can be most effective in conjunction with other actions including: (1) decreasing use of broad spectrum pesticides, (2) control of broad-leaf weeds, (3) increasing parasitoid refuge habitat, and (4) strategic planting to avoid peak SLW periods. The article provides further hands-on, practical information for managing the introduction of *E. Hayati* on top of three case studies which demonstrate regional variability of success. If the Silverleaf Whitefly has ever been on your hit-list and a threat to your crop, perhaps it's time to bring in the muscle: *E. Hayati*.

**HAL Project No. VG08051.** Click here to view the report.

Comparison of biodegradable mulch products to polyethylene in irrigated vegetable, tomato and melon crops (Sarah Limpus, The Department of Agriculture, Fisheries and Forestry, QLD 2012)

How can you keep costs down while maintaining a high level of environmental responsibility? Responsible waste management is one key area to address. Polyethylene mulch, otherwise known as 'plastic mulch', is a widespread weed suppressing tool used to increase crop yields around Australia. However, not only does plastic mulch become a toxic pollutant at the end of its life-cycle, it can also be associated with higher labour costs involved with clearing it from the land once it has broken into non-biodegradable pieces. Plastic mulch is becoming a significant environmental problem across the industry, with municipal management facilities *restricting* or *increasing* the costs involved with dealing with non-biodegradable polyethylene mulch. So what's the solution?

This study released late last year provides insightful information on biodegradable plastic mulch with encouraging results. New generation products such as the Mater-Bi® CF04/P demonstrate that technology is continually advancing resulting in stronger, more flexible plastics that are more easily biodegradable. Any gaps between standard polyethylene and biodegradable films is rapidly closing, and in some respects have already been closed.

Growers themselves reported that biodegradable films involved less labour to collect polyethylene fragments, meaning savings could be passed on immediately. These new films also appeared to reduce the frequency of stem and shoot burns because of lower heat absorption. Plastic sticking to fruit and vegetables has previously been an issue for growers, but when biodegradable films are used the plastic washes off with ease. The main issue that still remains with biodegradable films is that their longevity is still challenged by traditional

plastic mulch and hence their adoption differs with growers' needs.

The results in this study, however, conclude that biodegradable coverage and weed suppression for most crops is an adequate competitor for the older, less environmentally-friendly polyethylene 'plastic mulch' films. At the moment cost is the main barrier to uptake of this new technology, but as waste management strategies begin to proliferate and waste disposal becomes more expensive, biodegradable films are likely to be a key strategy in achieving environmental well-being and ethical farming practices while keeping costs to a minimum.

HAL Project No. MT09068. Click here to view the report.

# Design and demonstration of precision agriculture irrigation applied to different vegetable crops (Dr Susan Lambert, University of Tasmania, 2012)

Growers operate in a volatile industry. When opportunities to protect their businesses from jumps in water prices and rising energy costs arise they need to be grasped with two hands. This study by Dr Susan Lambert of the University of Tasmania demonstrates viability in retrofitting technologies for irrigated agriculture by looking at two systems: (1) a pressure control system for a travelling gun irrigator, and (2) a variable rate irrigation (VRI) system for a linear move irrigator (also known as a centre pivot irrigator). Climate change and environmental sustainability are also two critical issues that can also be positively addressed by improving irrigation efficiency, so there are benefits for both growers and the environment.



Approximately half of Australia's total water usage in 2009/2010 was taken up by irrigated agriculture so in terms of scale it doesn't get much bigger. Retrofitting infrastructure that is already widely used across the sector makes good sense. The study examines data related to capital costs, operating and energy costs, labour costs, water usage and crop yields and utilises, amongst others, soil moisture sensors and wireless sensor network systems to measure their results. Obviously, retrofitting irrigation infrastructure should be site specific to obtain maximum benefits and efficiencies. Realistically then, there are still broad key challenges which prevent the viable uptake of either the pressure control or VRI system. Under the test conditions the pressure control system proved to be economically viable, while the VRI system did not. This particular study, however, is only one amongst a wide array of literature that appears to support, consistently, that water-efficiency technologies can be effective and achievable. For example, a study by Barber et al. (2002) showed that horticultural growers in Darling Downs, Lockyer Valley and Granite Belt had *increased* profits by \$30 million by targeting and modifying irrigation infrastructure.

Research that targets irrigation technologies is one step forward for Australian growers,

especially if it provides them with opportunities to increase water efficiency, reduce energy costs and lessen their impact on the environment.

HAL Project No. VG08029. Click here to view the report.

# Benchmarking uptake of soil health practices (Dr Gordon Rogers, Applied Horticultural Research, 2012)

"Not another wordy publication please!" was a commonly expressed sentiment in the Soil Health Survey in the face-to-face feedback conducted in this study. The report was commissioned to review previously completed Soil Health Projects with a focus on engaging with vegetable growers' conceptions of soil management practices. How are growers taking care of their soils? Are they willing to try new soil management practices and if not what are the major barriers? For the industry, recommendations for future directions in soil research were also identified.

For vegetable growers, a lack of information and technical/economic uncertainty were found to be the primary barriers preventing an uptake of new soil management strategies. Three key messages came from the Survey: 1) that soil health research should continue 2) that research should have a strong *regional* focus, and 3) that there needs to be effective communication of research results back to growers. The most promising aspect of this study is that despite recognised barriers growers who *did* try new soil management strategies found a range of benefits including higher crop yields, reduced disease prevalence and contributions to on-farm sustainability goals. "This is a highly encouraging result that demonstrates that Australian vegetable growers place a high degree of importance on the correct management of soils in the conduct their vegetable farming operations" (Rogers 2012: 46).

Other facts that came out of the survey include that the majority of growers monitor their topsoil at least once a year and that they value the advice of consultants equally with their own observations above information provided by management software or the fertiliser suppliers. In terms of where growers would like additional training, more than one in three listed soil biology and microorganisms as the preferred area, followed by training in soilborne disease control and interpretation of soil results. In addition, growers have rated field days as the most effective way of conveying knowledge while online tools, such as YouTube clips, are also useful. Facilitating more online tools including videos and apps will help make those wordy-publications easier to access for growers in the future.

HAL Project No. VG11034. Click here to view the report.

## 'Dollars and Sense'



#### **Economic Update**

In April, the Federal Government announced a Farm Finance Package to provide concessional loans of up to \$650,000 to help farmers restructure their debts. The scheme will provide the six states and the Northern Territory with \$60 million each over two years.

The package is expected to provide some short-term relief to farmers, especially those farmers that find it difficult to obtain finance for the next year. The concessional loans scheme would decrease debts as they would be offered at a lower interest than commercial loans, with the actual interest rate to be determined subject to negotiations with the states. Reducing debt repayments in the short-term will provide some farmers with breathing space to continue to run their businesses and support their families. Click here for more information.

Meanwhile, in delivering the 2013-14 Federal Budget, Treasurer Wayne Swan, outlined a strategy to provide for education and disability reforms, while announcing a raft of spending cuts. For AUSVEG's analysis on the Federal Budget, please click here.

Also in this quarter, Consumer Price Index figures for vegetables have indicated that the price of vegetables fell by 4% in March, likely due to a decline in processing vegetable prices. <u>Click here</u> for the AUSVEG report or <u>here</u> for the AUSVEG media release.

# National R&D Database: A useful tool for growers

With smart phones and tablets like iPads increasingly being used by growers as an on-farm tool, AUSVEG's online R&D database and search engine - the Knowledge Management System (KMS) - is a key resource to have bookmarked and favourited.

The database, accessible by logging on to the AUSVEG website, is an invaluable online resource for growers that contains R&D reports and findings from the past decade. Other tools, such as fact sheets, calculators and guides, are also being incorporated into the searchable database.

After registering to become a member (<u>register for free by clicking here</u>), users will have access to a database of past and present research reports published by Horticulture Australia Limited (HAL).

The search engine allows users to narrow down their topic of interest with vegetable specific categories. For example, if you're looking for research about carrots, cucumbers, capsicum, or any other products that you grow, the search page allows you to do so in a user friendly format.

Perhaps you are more interested in *soil health* or the broader effects of *climate change* on your farm? The search function lets you search categorically as well!

We encourage all growers to check out the AUSVEG website and see what the latest research is saying about your vegetables, farming techniques and technologies.

Simply click here to get searching!

### **R&D News**



May saw the launch of a new national <u>Soil Quality website</u> to assist growers to compare their soil quality with others in their region.

Also in May, a joint initiative of Animal Health Australia (AHA) and Plant Health Australia (PHA) sees the <u>Farm Biosecurity website</u> come online. The website assists vegetable growers to increase their awareness to help protect their crops from biosecurity threats.

Meanwhile, in March Growcom made free the online database for agricultural and veterinary (Agvet) chemical products (previously managed by the Queensland Government) to provide up-to-date and comprehensive information for weed, disease and pest control. The InfoPest database can now be accessed for free by <u>clicking here</u>.

Also in March, new research was released showing that leafy greens promote a healthy

immune system that can protect the body from infection. The research was completed by researchers at the Walter and Eliza Hall Institute of Medical Research in Melbourne. <u>Click here</u> for more.

Finally, for those growers wanting to keep track of on-farm greenhouse gas emissions, the Vegetable Carbon Calculator may be a valuable tool. <u>Click here</u> to access the website for more information.

### Useful Tools and Fact Sheets



Fresh off the press, these fact sheets have arisen from a project conducted by Applied Horticultural Research (published by HAL, Project Number VG12046).

They are a part of several wider projects on climate change and waste products. The fact sheets provide information ranging from what to do with your leftover cauliflower to using insects instead of fish-based protein meals. Check out the links below to download these bite-sized fact sheets.

- Factsheet Bio-active Compounds
- <u>Factsheet- Biogas Production</u>
- <u>Factsheet Fibre from Vegetables</u>
- Factsheet Flavour Extraction
- <u>Factsheet Insects for Fish Feed</u>
- Factsheet Marketing For Health
- Factsheet Multipurpose Vegetables
- Factsheet Vegetables Wastes

### **Fast Facts**



Dr Salah Sukkariah, Head of Robotics Research at Sydney University, one of the guest speakers at the last AUSVEG National Convention explains how robots could be running our farms within the next decade. <u>Click here</u> for more.

A report by Robert Premier (2013) examines 'oxidized water' (the electrochemical disassociation of water and natural salts) as a viable alternative to standard chlorine cleaning methods. Oxidising water units provide the opportunity for a fully automated, low-cost and low-maintenance solution that does not need special approval in Australia.

Click here for more.

This project has been funded by HAL using levy funds from the Australian vegetable industry and matched funds from the Australian Government.



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



#### **About**

Welcome to AUSVEG's quarterly R&D Industry Development e-Newsletter. In this edition we provide you with 'SNAPSHOTS' of recent R&D to help keep your finger on the pulse of research and scientific news from around Australia. We have also included a summary of recent economic developments and how they may impact you.

We are always looking to lift the bar, please help us and future readers by completing a quick three-question survey by clicking the link below:



### Industry Development News



Consumer & Market Research

Horticulture Australia Limited (HAL) has commissioned Colmar Brunton Research to undertake a three-year tracking study called **Project Harvest**. The objectives of this study are to better understand consumer attitudes to fresh produce, consumer trends and triggers/barriers to purchase

# In this edition

Vegetable Consumer and Market Research

Managing Diamondback Moth

Benefits of Floating Crop Covers

Alternative Uses for Vegetables

'Dollars and Sense' -Vegetable Industry Shows Resilience

## Latest R&D Reports



You can access the latest R&D reports by logging on to the <u>AUSVEG</u> website.

over time.

Click the following links to access the <u>June</u> and <u>July</u> Reports.



#### Key findings of the first report:

- Consumer awareness of varieties of vegetables is low
- Vegetables that scored higher in the 'interest of new varieties' category displayed higher future purchasing intent.
- Education about vegetable versatility is needed, especially as people try more exotic cuisines.
- Consistent, high-quality freshness coupled with more reliable shelf-life (particularly for soft vegetables) may lower barriers to purchase.
- There is potential to grow demand for vegetables through the development of secondary products (e.g. juices, snack bars) on top of general meal consumption - see global trends.

#### New website to help make sense of climate



Government funding may assist vegetable growers to reduce electricity costs.

Climate variability can be daunting to think about, especially for growers. The complexity of environmental policy and regulation on top of widespread uncertainty about the future of Australia's climatic regions highlights the significance of this issue. How will these policies, regulations, taxes and carbon pricing mechanisms affect growers?

VG08062 Mechanisms and
management of
insecticide resistance in
Australian diamondback
moth

VG12049 Understanding and
managing impacts of
climate change in relation
to government policy,
regulation and energy
efficiency

VG12042 - Domestic and Export Market Access and Trade Viability Issues - A Strategy to Address

VG12046 - Identifying new products, uses and markets for Australian vegetables: A desktop study

VG12042 - Domestic and Export Market Access and Trade Viability Issues - A Strategy to Address

VG09023 Alternative fruit fly
control for market access
and to enhance IPM in
eggplant

VG09070 - Managing a greenhouse capsicum crop - an interactive DVD demonstration and resource package

VG09160 Development of a test to
detect & quantify
irradiation damage in fruit
flies

VG12079 - A subgroup to further

Earlier this year, Australian Horticultural Research (AHR) completed a report addressing these uncertainties. See the Research Snapshots below to read about this in more detail and to download the full report.

The project resulted in the creation of a new website that focuses on how climate variability in Australia will affect vegetable growers and the industry as a whole.

"We can't stress the importance of this website enough. It is an invaluable tool for growers dealing with the impacts of climate, especially when it comes to government grants, programs, subsidies and funds that are available to industry," said Andrew White, AUSVEG Manager of Industry Development and Communications.

Information on energy efficiency, weather forecasts, impacts by crop, irrigation, profitability and a raft of other tools are provided to equip growers with the knowledge that they need to respond to a changing climate. Growers are encouraged to check out the new website

atwww.vegetableclimate.com.au

### Research Snapshots



Don't have time to flick through a 100-page research report? Below is a sample of summaries of recent research and how it may be relevant to you.

To access each full research report simply log into the <u>AUSVEG website</u> and search for the project code or title. It's free and you can register by <u>clicking here</u>.

# Mechanism and management of insecticide resistance in Australian diamondback moth

(Greg Baker, South Australian Research & Development

Institute (SARDI) SA 2013)

"Brassica growers should expect to have increasing difficulty controlling DBM with a number of the newer insecticides" - Greg Baker

The Diamondback moth (**DBM**) is the bane of the Brassica vegetable industry with the pest being infamous for rapid resistance development from older insecticide classes in Australia. Growers are now turning to newer synthetic pesticides to deal with DBM, although it seems increasing resistance to these chemicals is now growing.

Currently, a two-window rotation strategy is available to Brassica growers to conserve the newer synthetic insecticides against resistance development.

advance the ideas and information presented at the Future Technologies
Seminar 2012

VG12088 - Vegetable
Industry Environment
Assessment - Scoping
Project

MT10044 - Screening Vegetable Varieties from Asian Seed Companies for Australian Markets

VG09188 - The production of baby-leaf lettuce under floating crop covers

VG09037 Importance of high
vegetable consumption in
controlling weight

### 2013 Emerging Technologies Seminar

Click the thumbnails below to view two popular presentations from the 2013 Emerging Technology Seminar.



Optimised Insect Control Dr Luke Alphey

Unfortunately, in some instances there is evidence that field control is declining with the Group 6 and 28 insecticides.

The full implication of tolerance processes is still being understood, but one thing is for certain: alternative pest control methods need to be explored in conjunction with a lower application of insecticides.

Alternatives may include mating disruption (through the use of sex-pheromones), lure and kill, and inundative release of biocontrol agents (predatory organisms). The study also identified cross-tolerance relationships between a number of DBM pesticides; a finding that is crucially important to developing an effective resistance management rotation strategy. In addition, the study mentions that more conservative chemical spraying and Integrated Pest Management practices (IPM) should be a focus for reducing resistance build-up.

This project highlights that DBM control is becoming increasingly difficult, particularly if newer insecticides are used without considering Integrated Resistance Management (IRM) and IPM strategies.

"DBM strains from all major production areas should be tested to assess the full extent of this problem, and new, non-insecticidal tactics for DBM control in Australian Brassica vegetables should be tested, refined and promoted to provide the industry with sustainable crop production," said Mr Baker.

For further information visit the SARDI <u>Insecticide</u> Resistance Management page.

**HAL Project No. VG08062.** <u>Click here</u> to view the full report.

The production of baby-leaf lettuce under floating crop covers
(Colin Britton of Britton Produce, & Robert Munton, QLD 2013)



Crop covers shown to reduce insect infestation by almost 90% and irrigation requirements by up to 50%



Plant Symbiotics Dr Rusty Rodriguez

For more videos visit the AUSVEG YouTube channel.

# There's an app for that!





AUSVEG has collated a comprehensive list of useful smartphone and tablet apps to assist you with your farm operations, improve the way you do business, network and track weather data.

To view the list <u>click</u> here.

## 1800 Agronomist wallpapers



Need to add colour to your screen?

The 1800 Agronomist hotline is a national service for all Vegetable Levy payers. Call the hotline for FREE:

1800 247 666

The aim of the this project was to uncover the practicality of floating crop covers, with a particular focus on the effect on reducing foreign body contamination (from insects, windblown debris and animals). A handful of unforeseen benefits were also discovered.

The crop covers were shown to reduce insect infestation by almost 90% in the best scenarios, with chemical applications reduced by at least 50% and windblown debris reduced to 0% for baby-leaf salads. The quality, strength and shelf-life of the baby-leaf crop in the trial was indistinguishable from the control.

"It was observed over multiple trials that a very significant reduction in pest numbers can be achieved by removing the nets immediately prior to harvest," the study stated. The project was hosted in Queensland's Granite Belt region, in which crop growing times were shown to be reduced by up to 20% in cooler periods. Higher rates of soil moisture retention were also found, leading to a reduction in irrigation between 30-50% depending on the time of year. The caveat with crop covers is that they may also inhibit normal rates of drying after a wet period.

## Protection from frost and hail damage were also winning attributes of the floating covers

The nets also created a microclimate - stable temperature/moisture conditions at the level of the plant itself - that allowed protected crops to grow more consistently with less variance in leaf size. They also open the door for frost-sensitive crops to be grown in colder regions. Protection from frost and hail damage were also winning attributes of the floating covers.

With pesticide regulation on the rise in Europe and now Australia, as well as shifting climatic zones and consumer complaints about high levels of foreign body contamination in baby-leaf salads, floating crop covers provide a viable investment for growers looking to simultaneously address these issues and provide a higher quality product to consumers.

**HAL Project No. VG09188**. Click here to view the report.

# Identifying new products, uses and markets for Australian vegetables: A desktop study

(Dr Gordon Rogers, Applied Horticultural Research, Pty Ltd NSW 2013)

# Scraps into savings: reducing vegetable waste through alternative uses

An estimated 227,000 tonnes of waste from major vegetable commodities is produced each year in Australia, costing growers approximately \$155 million annually. Significant cost savings on farm can be achieved if vegetable waste is

Download the wallpapershere.

# New Resources



# PRODUCTIVE CAPSICUM CROPS

If you haven't already heard of renowned capsicum grower Phuong Vo, you're about to.

A new website, 'Growing Health, Productive Capsicum Crops', compiling his expertise, techniques and tips for growing capsicums in conventional glasshouses was launched recently.

Mr. Vo also featured in the Jan/Feb 2013 edition of <u>Vegetables</u> <u>Australia</u> magazine.

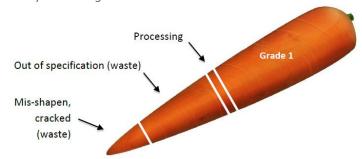
#### **Fast Facts**



Wild ducks have caused up to \$20,000 worth of damage in a night on a trial farm, with the 'attacks' coinciding with either a full moon or an extended dry period. A recent study (project VG09188, left) has shown how crop covers can be used for protecting babyleaf lettuce from damage.

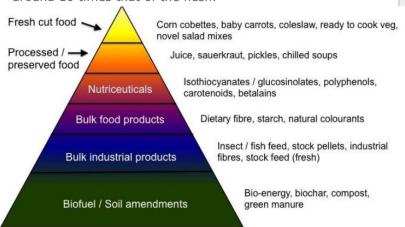
All capital cities, with the exception of Perth, experienced an increase in vegetable prices in the used creatively.

Vegetable waste can be utilised in a number of ways: 1) bio-active nutrients can be extracted for use in nutrient supplements, food colouring and flavouring, 2) dietary fibre can be extracted and used in fortified foods and supplements, 3) the waste can be used as food for insects such as mealworms or black soldier fly larvae which can then be turned into aquaculture feeds, and 4) biogas production through anaerobic fermentation can be used for onsite electricity generation as well as creating a product known as 'biochar' which can be used to enhance soil fertility. The diagram below shows how carrots are utilised.



#### Proportion of carrot uses and waste

For example, carrot pomace (the pulp leftover after carrots have been crushed for juicing) can be used for a range of subsidiary products including: additives for bread, additives for beverages, and an ingredient in chicken feed to enhance egg size and production. In addition, vegetables have been shown to contain high levels of phytonutrients, compounds associated with health benefits, but often these nutrients are concentrated in peels and stems; often the first part to be wasted. The concentration of phenolics in eggplant skin is around 10 times that of the flesh.



leirarchy of alternative uses for waste. Products at the top are the hill hest value, but utilise smaller quantities and higher qualities of remarked materials compared to those at the base.

"The best way to reduce waste would be to increase demand for fresh vegetables," the report stated.

Educating consumers about the health benefits of vegetables may also increase demand, reduce waste and lessen the impacts of obesity and cardiovascular disease.

June quarter. In 2012/13, Brisbane recorded the largest increase in prices, while prices of vegetables declined in Hobart.

One person's waste is another person's treasure: carrot pulp is being added to chicken feeds to boost egg size and production.

Project Harvest's first monthly report stated that over 1,200 new carrot products were released around the globe between April - June this year. 15% of launches were in the United Kingdom. 25 were launched in Australia.



GT Carrot Lotion
(Philippines) is said to
reduce signs of ageing,
promoting healthy,
white and smooth
even-toned, young
looking skin



Lotte Kidstree Carrot & Pumpkin Chocolates (South Korea). No Additives/Preservatives, Low/No/Reduced Sugar

Another reason why vegetable waste is so high is because stringent product quality tests mean that perfectly edible produce may be being thrown away. Changing customer's expectations through education may be part of the solution (see the Think, Eat and Save campaign), however, utilising food scrap resources for on-farm benefits can be economically viable in Australia. See the report for more details on how you can put your leftover vegetables to use.

#### Related factsheets:

- Bio-active Compounds
- Biogas Production
- Fibre from Vegetables
- Flavour Extraction
- Insects for Fish Feed
- Marketing For Health
- <u>Multipurpose Vegetables</u>
- Vegetables Wastes

HAL Project No. VG12046. Click here to view the report.

### 'Dollars and Sense'



# Vegetable industry projected to grow strongly in the next five years

According to reports from IBISWorld, a leading market research company, the vegetable industry is projected to grow strongly over the next five years. The projections are based on increases in production value due to improved production volumes, and greater health consciousness in consumers.

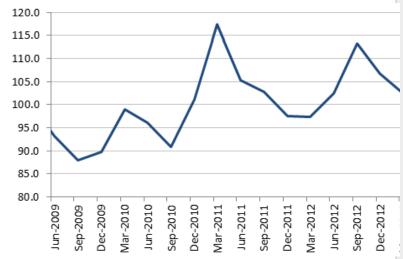
"The reports show that the vegetable industry has displayed remarkable resilience in the face of difficult conditions and this puts it in good shape to take advantage of future growth opportunities," an AUSVEG spokesperson said.

"The key thing for the vegetable industry will be that we can take advantage of growth opportunities as an overall industry. We need to ensure that we grow the industry in a way that is profitable for vegetable producers," the spokesperson said.

Recent economic developments affecting the vegetable industry include:

- The Reserve Bank cut the official interest rate by 0.25 per cent inAugust to a record low of 2.5 percent. This is good news for growers with high debt and those looking to lease, borrow or purchase new assets.
- The Australian dollar has declined from US\$1.05 in January to US\$0.90 at the start of August, its lowest in three years. This is likely to make Australian produced vegetable products more competitive, especially for exporters.
- Outdoor and indoor vegetable growing are projected to grow by 3.6 per cent and 4.0 per cent per annum respectively, according to IBIS World data.
- Vegetable prices rose by 3.3 per cent in the June quarter, according to the Consumer Price Index, after declining in the previous two quarters. The rebound in prices was driven by the short supply of vegetables due to the cooler weather. Vegetable prices have been trending upwards over the year, with prices rising faster than overall food prices.

#### **Vegetable Price Index**



Source: ABS 6401.0 Consumer Price Index, Australia

• The consumer price index for all goods and services rose by 0.4 per cent in the June quarter and by 2.4 per cent over the year.

This project has been funded by HAL using levy funds from the Australian vegetable industry and matched funds from the Australian Government.



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Below are summaries of recent research which may be relevant to you. To access the full reports simply log into the <u>InfoVeg database</u> and search for the project code or title. If you don't already have an account please visit the<u>registration page</u>.

# Industry Development



# In this edition

**InfoVeg Launched** 

**Project Harvest Update** 

Interactive Data Tool for Growers

Australia Vegetable Export Opportunities

**Understanding Climate** 

Cold Dis-Infestation of Q-Fly

In the Pipes: Ongoing R&D

Visionary R&D: Around the Globe

Dollars & Sense: Update and Outlook

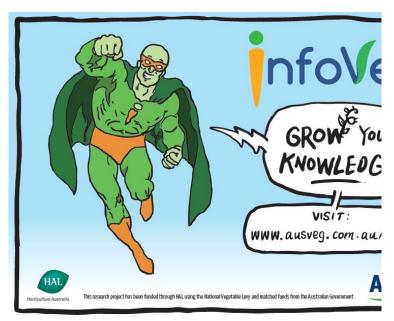
## News

#### InfoVeg R&D app is now live



The InfoVeg web-app, a mobile and tablet friendly R&D database is now live and ready for use. The web-based app can be accessed via Apple, Android and Windows devices, being specifically designed for quick, easy and comprehensive searches of industry-related R&D. The InfoVeg database holds over 10 years of accumulated research reports, fact sheets and other useful resources.

InfoVeg is a great starting point for growers who want to investigate topics of interest to them, and the app can be accessed directly from the field on your mobile device. InfoVeg is free to levy payers and the login details are the same used to access the AUSVEG website. If you do not already have an account you can register here .



Captain Agronomy - Your Harvest Hero

# Latest R&D Report



You can access the latest R&D reports by logging on to the AUSVEG website.

VG12101 - Reverse Trade Mission

VG12093 - Exporting to China - A Symposium for Vegetable Growers

VG12077 Investigating future
training and education
opportunities for both
new and existing
vegetable industry
member

VG12048 - Plant Health Desktop Study

VG12041 -Vegetable Climate Website

VG09098 - National
Vegetable Industry
Communication
Strategy: Management
and Implementation

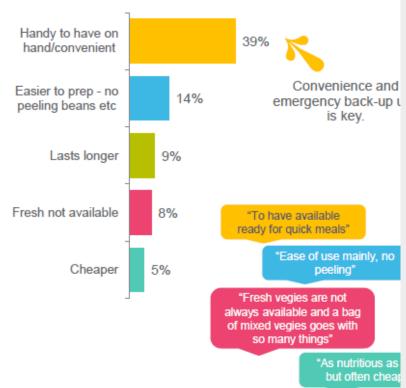
VG12050 - Emerging
Technologies in
Horticulture Seminar

VG12070 Understanding the
attributes that inhibit
purchase and
consumption of
vegetables - Cauliflower

#### www.ausveg.com/infoveg

#### **Project Harvest Update**

Monthly Question in September: Why do you purchase frozen vegetables?



>>> colmar brunt

#### **Key findings of the September report:**

- Consumers are settling into a routine when it comes to selection and consumption of vegetables.
- Asian vegetables were rated as having a high importance and future purchasing intent. There appears to be an increasing trend towards cooking Asian cuisine.
- The majority of new baby spinach products launched in Australia in September were in the baby food category. Trends show convenient, healthy baby food is a growing market.
- Educating customers about new cooking styles may help reduce barriers to future purchase and increase consumption.

#### and Green Beans

VG12102 - Summer Root Rot in Parsley: A Scoping Study

### Grower Resourc es



#### **Climate Dogs**

A tool to help communicate climate processes in Australia was put together in a combined effort by the Victorian DEPI, NSW DPI and the Bureau of Meteorology. The institutions developed a series of five videos and five 'climate dogs' to help simplify the main drivers of climate in Australia. Each of the dogs represents a climatic process.

Visit the climate dogs at the <u>Vic DEPI website</u> or the <u>NSW DPI website</u>.

# PaDIL: Pest & Disease Identification Library

The 'PaDIL' website is a database providing access to high-quality images and information tools to help with identification of pests and diseases. The photos can assist

 Fresh vegetables have the ability to compete with frozen vegetables by offering pre-prepared vegetables (such as pealed beans), with consumers saying they buy frozen for the convenience, freshness, longevity and availability.

For more go to: <a href="https://www.ausveq.com.au/projectharvest">www.ausveq.com.au/projectharvest</a>

#### Project Harvest - Interactive Data Tool

Market research agency Colmar Brunton has developed a web-based**Interactive Data Tool (IDT)** to give levy paying vegetable growers access to consumer perception and purchasing behaviour data generated by **Project Harvest**.

Vegetable growers can use the IDT to identify opportunities, manage their product to meet market trends, and expand product varieties to suit consumer preferences.

For example, growers can use the IDT to identify the following consumer attributes for a selected vegetable:

- Average purchase amount
- Motivation to purchase
- Interest regarding new varieties
- Value of provenance (i.e. grown in Australia)
- Likeliness to endorse consumption

Long-term trend analysis has the potential to inform production schedule and volume, potential varietal expansion and targeted marketing programs.

Levy paying vegetable growers wishing to access the IDT service are advised to contact AUSVEG for login details.

T (03) 9882 0277 E info@ausveg.com.au

The latest Project Harvest reports can be accessed here.

### Australian Vegetable Export Opportunities - Discussion Paper

(Horticulture Australia Ltd/AUSVEG)

growers with faster identification of unknown pests or diseases that they encounter. This is a combined initiative between DAFF, Plant Health Australia, Museum Victoria, CRC Plant Biosecurity, and the Government of Western Australia. Click here to visit the website.



Photo: Simon Hinkley and Ken Walker -Museum Victoria. A close up photo of a Queensland Fruitfly.

#### Vegetable Climate Website



An online resource developed for growers and funded by the National Vegetable Levy (project VG12049), the Vegetable Climate website compiles practical information, impacts of government policy, and provides outlooks on regional climatic variability. It is a comprehensive resource that should be bookmarked in your web browser. Click here to visit the website.

A step-by-step guide for Australian Exporters



The Department of Agriculture has created a guide for exporters of plants and plant products. This information is essential for growers looking to export their product; the guide also provides information on reducing the costs of exporting. Click here to download the guide.

AUSVEG recently released a discussion paper on Australian vegetable export opportunities, which outlines the current state of the domestic and export markets. Australia is currently focused on domestic markets and subsequently faces pressure from major retailers, and issues such as oversupply. In order to remain competitive, Australian growers are beginning to show an increased interest in selling to overseas buyers.

Vegetable exports have remained steady in recent years, largely due to the strong Australian dollar, but with a rising Asian population the Australian vegetable industry is well-positioned to broaden its exports.

The discussion paper concludes that in order to tackle the export market, vegetable growers and the industry need to collaborate and share their knowledge. Learning from growers who are already exporting and building trust with international buyers will help solidify the export market potential. Australian vegetable exporters can differentiate products from their international competitors based on quality, safety, and reliability.

Click <u>here</u> to download the discussion paper.

Click <u>here</u> to view a step-by-step guide to exporting plants and plant material developed by the Department of Agriculture.

# Research Snapshots



Understanding and managing impacts of climate change and variability on vegetable industry productivity and

## 1800 Agronomist: More Grower Calls



In the last month, the 1800 Agronomist hotline has seen an increasing number of calls from growers seeking information about their crop!

The 1800 Agronomist hotline is a national service for all Vegetable Levy payers. Call the hotline for FREE:

1800 247 666

Download the desktop wallpapers <u>here</u>.

## 2013 Emerging Technologies Seminar

Click the thumbnails below to view popular

#### profits

(Dr Gordon Rogers, Applied Horticultural Research Pty Ltd, VG12041)

What does climate variability mean for growers and the vegetable industry more broadly? The outlook is not all negative; in fact there are a number of positive things to take into account, as well as scope for adaptation.



The vegetable industry in Australia is in a relatively strong position to deal with changes in climate, partly because it has a greater capacity to adapt than most other rural industries. Some key adaptation methods listed in the report include:

- Selecting new varieties that will grow in the changed climate
- Adapting planting times
- Protected cropping
- Using irrigation to manage frost and temperature spikes
- Irrigation to increase water security
- More efficient post-harvest cooling and temperature management

Moreover, vegetables overall have relatively low carbon and water footprints compared to other industries in Australia. Approximately 85 tonnes of carbon dioxide emissions are released per \$1 million of revenue (at the farm gate), compared to the beef cattle sector which emits around 6,687 tonnes of carbon dioxide per \$1 million of revenue.

The environmental credentials of the industry could therefore provide a significant marketing advantage into the future, especially as the population becomes more aware of the energy

presentations from the 2013 Emerging Technology Seminar and the entire 2013 Greate Debate on Genetic Modification.



Advanced Harvesting Technology Mr Royce Bell



2013 Greate Debate Genetic Modification

For more videos visit the AUSVEG YouTube channel.

#### **Fast Facts**





Aquaponics combines aquaculture with hydroponics to simultaneously produce fish and vegetables within a single system which may impact vegetable production near urban centres (as mentioned in VG12041).



Grated carrot has been used to combat cancer, cardiovascular and neurodegenerative diseases in a compound developed by researchers from the FEMSA Center of Biotechnology.

#### taken to produce the food on their plate.

According to the report, growers should be aware of the likely changes that may impact their businesses such as: increasing intensity and frequency of extreme weather events, a frost window that is predicted to begin earlier and end later, as well as new challenges in dealing with pests and diseases especially as regional weather patterns change.

Dr Rogers and the key personnel involved with this study have also included a list of practical and informative resources for growers. A selection of the resources are listed on the side bar. To view a comprehensive list of resources download the final report.

HAL Project VG12041. Click here to view the report.



(Dr Jenny Ekman, NSW Department of Primary Industries VG10028)

The aim of this project was to develop a quarantine treatment against Q-fly for capsicums and chillies, with and without the addition of a Hot Water Shower (HWS).

Capsicums and chillies are major hosts for Queensland fruit fly (Q-fly). Fruit grown in endemic areas must be treated to ensure a Q-fly free status prior to sale in areas free of this pest. Recent research demonstrated that a HWS can reduce cold sensitivity, allowing capsicums and chillies to be stored at suitably low temperatures for several weeks.

Tests showed that first instar larvae could survive longer at 3 °C than any other life stage, regardless of whether they were treated with a HWS. The HWS slightly reduced the storage time required to kill the larvae, especially for older life stages. Around 50% of all larvae were killed using a HWS alone. No larvae survived when chillies and capsicums were stored for more than seven days at 3 °C.

The HWS consisted of a 60 second shower in  $55^{\circ}$ C water. The shower was constructed using a hot water bath, a pump and a perforated header tank with water delivery area 14cm x 24cm.



Project Harvest Wave 5 Report: One third of consumers believe they purchase and consume enough carrots!



It is estimated that a 'Hot Water Shower' treatment of capsicums would effectively reduce infestations of Q-Fly by at least 50%.

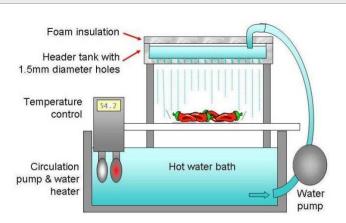
# There's an app for that!





AUSVEG has collated a comprehensive list of useful smartphone and tablet apps to assist you with your farm operations, improve the way you do business, network and track weather data.

To view the list <u>click</u> <u>here</u>.



Hot Water Shower system used to dis-infest capsicum and chilli fruit.

Following initial analyses, the treatment was tested by storing larger volumes of infested capsicums and cayenne chillies at 3 °C for 10 days. It was estimated that at least 171,511 first instar larvae were treated. No survivors were found from any of the trials. This demonstrated that 10 days at 3 °C provides an extremely high level of quarantine security against Q-fly.

Based on the project results, a cold storage period of 10 days is likely to provide a very high level of quarantine security against Q-Fly.

The exercise illustrated some practical difficulties with application of the method including the large volume of water required, sterilising associated with recirculating used water and OH&S issues. The HWS is most likely to be useful where products are especially chilling sensitive or very long storage times are required.

HAL Project VG10028. <u>Click here</u> to view the final report.

# In the Pipes: Ongoing R&D



Investigating the costs associated with the production, sale and distribution of vegetables

(Adrian Kennelly, RMCG VG12086)



Reducing the cost of production (COP) associated with vegetable production is a primary goal of many RD&E programs. In an effort to develop a greater understanding of COP issues within the Australian vegetable industry, this project will investigate the costs associated with the production, sale and distribution of vegetables. The results of this project aim to guide an improved strategic approach to managing these issues at both national and regional scales.

The initial task of reviewing and further analysing the available data and previous cost of production studies demonstrated that total cost had increased over time, farm financial performance has the most significant affect on COP, COP is directly linked to scale, and that there is no link between commodity grown or location and vegetable grower profitability.

#### **Next Steps:**

The next stage of the project will involve consultation at a State and regional level. This approach aim to assist the industry develop an improved strategic approach to managing cost of production, because it will focus on identifying practical strategies that have been successfully implemented by growers and identify what needs to be done at an industry level to assist other growers overcome the barriers to implementing similar strategies.

# Visionary R&D: Around the Globe



#### Can veggies fix N? Now, they can.

Nitrogen fixation, the process by which nitrogen is converted to ammonia, is vital for plants to survive and grow. Most plants obtain nitrogen from the soil, meaning a huge proportion of crops currently being grown across the world

rely on synthetic nitrogen fertilisers. However, a small number of plants have the ability to fix nitrogen from the atmosphere - with a little help from nitrogen fixing bacteria.



Professor Edward Cocking Image Credit: University of Nottingham

Professor Edward Cocking, Director of The University of Nottingham's Centre for Crop Nitrogen Fixation, has developed a unique method to put nitrogen-fixing bacteria into the cells of plant roots. The implications for the vegetable industry are potentially enormous, with less reliance on nitrogen fertilisers, reduced nitrogen pollution of the environment from the use of nitrogen based fertilisers, and reduced fertiliser costs for the grower. For more information, please see Azotic

#### **Increasing Efficiency by Decreasing Drift**

Technologies website.

Scientists from CSIRO's Water for a Healthy Country Flagship have trialled a new technique for applying herbicides to raised beds of furrow irrigated sugar cane by using a specially adapted shielded sprayer. Early trials of the shielded sprayer indicate significant decreases in herbicide drift, with reductions of up to 90% recorded.



Shielded sprayer covering furrows. Inset - close up of shielded sprayer.

Image Courtesy: CSIRO

"The conventional application of herbicides in furrow-irrigated sugarcane production is to broadcast spray across the whole field using boom sprayers, which applies herbicides to both beds and furrows." CSIRO Research Leader, Dr Rai Kookana said.

"These trial results are extremely encouraging, and clearly demonstrate that the use of precision herbicide application technologies by the industry, including using shielded sprayers for furrow-irrigated sugarcane cultivation, can be highly effective in reducing herbicide run-off," said Dr Kookana.

#### Thanet Earth - the farm of the future

Thanet Earth comprises the largest and most technologically advanced glasshouse complex in Britain. Consisting of four vast glasshouses, the Thanet Earth facility produces approximately 225 million tomatoes, 16 million capsicums and 13 million cucumbers each year - equating to roughly 12, 11 and eight per cent respectively of Britain's entire annual production of those salad ingredients.



Inside one of Thanet Earth's massive glasshouses

Each of Thanet Earth's greenhouse roofs is constructed from special glass with low iron content to maximise translucency and the floor is covered in white plastic to reflect and amplify light. The glasshouses are powered by a series of gas-fired generators for electricity, whereby waste heat is pumped back into the glasshouses for temperature control.

Water content, humidity and irrigation within the Thanet Earth facility is computer controlled. The facilities' ambient temperature is controlled to within a tenth of a degree. A weather detection system located on the greenhouse roof constantly monitors temperature, sunlight intensity, wind speed and direction, and adjusts a system of vents and blinds accordingly.

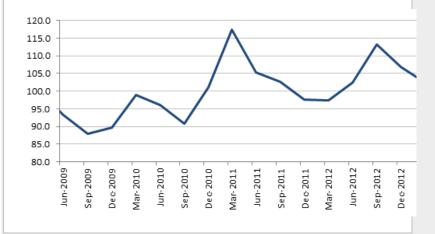
To read more visit the **Thanet Earth** website.

# 'Dollars & Sense'



#### **Economic Update and Outlook**

#### Vegetable Price Index



Source: ABS 6401.0 Consumer Price Index, Australia

The consumer price index for all goods and services rose by 1.2 per cent in the September quarter and by 2.2 per cent over the year.

As reported by Deloitte, a financial advisory and audit firm, the Australian agribusiness industry has been identified as one of the five super-growth sectors. In total, these sectors are expected to be worth an extra \$250 billion to the national economy over the next 20 years. The agribusiness industry is expected to grow approximately 10 per cent faster than global GDP, and fastest of all those sectors covered.

The increasing global population, Asia's growing middle class, and Australia's close proximity to Asia are the underlying reasons behind the expected growth in the agribusiness industry. Recent economic developments affecting the vegetable industry include:

- The Reserve Bank of Australia (RBA) decided to leave the cash rate unchanged at 2.5 per cent at its latest November meeting. The level of the current cash rate is at an unprecedented low and is positive news for growers with debt and those looking to borrow. The RBA also left open the possibility of reducing the cash rate further, as the exchange rate is uncomfortably high, and that a lower exchange rate may be required to achieve more balanced growth in the economy, given that investments in mining are slowing.
- Although the Australian dollar has increased over the past few months to US\$0.96 at the end of October, it remains considerably lower than US\$1.05 in January 2013. According to Deloitte, the Australian dollar is expected to settle around US\$0.80, in the longer term.
- Vegetable prices fell by 4.5 per cent in the September quarter after increasing in the previous quarter. The fall in prices was mainly driven by a warm winter leading to an oversupply of winter crops; in particular, tomatoes and capsicums. Vegetable prices have been trending downwards over the year, with vegetable prices now 10.7 per cent cheaper than what they were a year ago.

Free and convenient specialist advice

1800 Agronomist

© @1800agronomist 1800

This project has been funded by HAL using levy funds from the Australian vegetable industry and matched funds from the Australian Government.



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# **About**

Welcome to AUSVEG's quarterly R&D Industry Development e-Newsletter. In this edition we provide you with 'SNAPSHOTS' of recent R&D to help keep your finger on the pulse of research and scientific news. We have also included a summary of recent economic developments and how they may impact you.

To access the full reports simply log on to <u>InfoVeg</u> and search by project code or title. If you don't have an account please visit the <u>registration page</u>.

# Industry Development News



Project Harvest Update - December

**QUESTION**: When purchasing new vegetables and/or cooking new recipes, what is your main influence(s)?

# In this edition

**Project Harvest Update** 

Input Costs for Australian Growers

Vegetable Soil Health Systems

**Movento Label additions** 

USA Carrot Grower Study Tour

In the Pipes: Ongoing R&D

Visionary R&D: Around the Globe

The Front Line: Biosecurity R&D

Dollars & Sense: Update and Outlook



**ANSWER**: The top three influences for Australian consumers are cookbooks, recommendations from family and friends, and online recipes and cooking websites.

Key findings of the January 2014 report:

- 52% of consumers purchase zucchini as they perceive it as quick and easy to prepare.
- Overall, cabbage was perceived to be good value for money and there was a significant increase in purchases of half cabbages.
- Health was a key trigger for celery purchases. It was recommended that the health benefits of celery as a snacking vegetable be emphasised in promotion.
- A total of 463 cabbage products were launched globally between October-December 2013. 18% of all products launches were in South Korea, indicating a potential opportunity for cabbage exporters.
- To help manage consumers' expectations of celery freshness and longevity, shoppers should be educated on the best storage methods, particularly during warm months.
- Consumption frequency of cucumber was significantly higher in January compared with August results. This may be due to the warmer weather, as cucumber is perceived to be a summer vegetable.

For all the Project Harvest reports visit: www.ausveg.com.au/projectharvest

Input Costs for Australian Vegetable Growers - Discussion

# Latest R&D Report



You can access the latest R&D reports by logging on toInfoVeq.

VG12707 - USA Carrot Grower Study Tour 2013

VG12100 - Asia Fruit Logistica 2013

VG10094 - Consumer attitudes and usage in the green leaf category

VG12038 - Vegetable
R & D program
implementation and
design team support
(HAL)

VG11039 - Movento label additions - Lettuce (western flower thrips), rhubarb, bulb vegetable crop group and herbs

VG08012 - Nuffield Farming Scholarship

VG09038 - Vegetable soil health systems for overcoming limitations causing soil borne diseases

VG12036 Implementation Officer
and Design Team
Coordination for the
Vegetable R&D Program
(AUSVEG)

# Paper (Horticulture Australia Ltd/AUSVEG)



AUSVEG recently released a discussion paper entitled 'Costs of production for Australian vegetable growers'. The paper looks at vegetable growers' operating costs at a national level, focusing on the drivers of costs and what growers are doing to alleviate them. The paper draws from survey data released by the Australian Bureau of Agriculture and Resource Economics (ABARES), Government and other independent reports.

The discussion paper states that average total cash costs have remained stable between 2007-08 to 2010-11, and that cash costs decrease as the scale of area sown increases. Findings show that cash costs per tonne of production by area in 2010-11 are significantly higher for operations of less than 5 hectares.

The paper also examines the major input costs for Australian vegetable growers such as labour, energy (electricity and fuel), and fertiliser. It concludes that additional levels of support are needed to ensure costs of production are managed sustainably, particularly as growers are limited in how they can influence the price of production inputs. Improving productivity, market competitiveness and returns from new technologies are highlighted as priority areas for growers.

Click here to download the discussion paper.

# Research Snapshots



Vegetable Soil Health Systems for

VG12072 - Desktop preparation of pesticide minor-use permit applications in vegetable crops 2012

## Grower Resourc es



# Biological Farming Workshops

Biological farming workshops for vegetable arowers will be held 17-19 March and 7-9 August 2014. Hosted by biological farmer, and author of 'The Biological Farmer'and'Advancing Biological Farming', Gary Zimmer, the workshops will include presentations from pasture ecologist, Dr Julie Earl, analytical chemist, Graham Lancaster, and biological farming advocates Dave Forrest and Alan Coates. For more information click here.

# Trade in Vegetables: Economic Data



Trade data on the AUSVEG website suggests that Australian vegetable products can be very competitive on the international market, due to a reputation for quality and safety. See also the discussion paper

# Overcoming Limitations Causing Soil Borne Diseases

(Dr Tony Pattison, DAFF QLD - VG09038)

This project identifies the benefits and constraints of moving from a traditional intensive vegetable production system to a less intensive conservation tillage system. Long term field trials conducted in Queensland and New South Wales identified how management practices could take advantage of soil biology and diversity, while still producing economically viable vegetable crops.

Field trials in North Queensland investigated minimum tillage organic mulch systems compared to a conventional "plasticulture" approach. Researchers initially encountered soil constraints attributed to soil compaction and water and nutrient management. These constraints were overcome in the second year of the trial, when equivalent yields of zucchini and capsicum were obtained, and an increase in soil organic carbon (C) led to an increase in capsicum fruit quality.



Long term field trials conducted in New South Wales investigated the use of recycled organics as compost. The addition of 125 t/ha of compost every five years resulted in an increase in soil organic C, cation exchange capacity, available nutrients and structural stability compared with conventional practices. The application of compost initially increased soil biological activity, which diminished in subsequent vegetable crops.

Increased organic C in soils improved capsicum plant growing conditions, resulting in increased yields of high quality fruit and reduced production of unmarketable fruit. The results suggest organic compost may be a useful preparatory soil conditioner for intensive vegetable production in the Sydney

onvegetable exports.

# Vegetable Climate Website



An online resource developed for growers and funded by the National Vegetable Levy (project VG12049), the Vegetable Climate website compiles practical information, such as government policy, and provides outlooks on regional climatic variability. To visit the website click here.

#### **InfoVeg**



InfoVeg is a great starting point for growers who want to investigate topics of interest. The app can be accessed directly from the field on your mobile device. InfoVeg is free to levy payers, who can login using the same details needed to access the AUSVEG website. If you do not already have an account you can register here.

### 2013 Emerging Technologies Seminar

Click the thumbnails below to view presentations from the

#### basin.

Research undertaken in this project has increased the knowledge of soil ecological interactions and the requirements to develop minimum tillage vegetable production systems. Additionally, the project provides valuable recommendations to support growers who trial minimum tillage systems in vegetables.

Click here to access the full report.

### Movento Label Additions - Lettuce (Western Flower Thrips), Rhubarb, Bulb Vegetable Crop Group and Herbs

(Robert Vitelli, Bayer CropScience Australia Pty Ltd - VG11039)

This project generated efficacy, crop safety and residue data to support the future registration of Movento® as a foliar spray for the control of sucking pests in several vegetable crops. The main aim of this project was to avoid the need for minor use permits with support from industry funding, achieve registrations and label extensions.

Products such as Dimethoate (an organophosphate) have limited activity on aphids and thrips. However, products which belong to the organophosphate and synthetic pyrethroid group of chemistries are known to be disruptive to beneficial species. A lack of new and softer chemistry, especially those with an Integrated Pest Management (IPM) fit, has impacted vegetable production and resulted in a reliance on minor use permit applications.

2013 Exporting to China Symposium.



Exporting to China Symposium - Mark Gwizdalla



Exporting to China Symposium - Richard Macchiesi

For more videos visit the AUSVEG YouTube channel.

### 1800 Agronomist:



The 1800 Agronomist hotline is a national service for all Vegetable Levy payers. Call the hotline for FREE:



1800 247 666

Download the desktop wallpapers <u>here</u>.

Fast Facts





Movento trial site - Heatherton, Victoria

Movento® 240 SC Insecticide (active ingredient spirotetramat) is an insecticide for the control of sucking pests in a range of vegetable and fruiting tree crops. Movento® is effective on many pest populations that may have developed resistance to existing insecticide groups. Data generated by this project will be used within the APVMA submission for registration of Movento® 240 SC Insecticide. The submission to the APVMA will seek a label extension of Movento, so that it can be applied as foliar spray for the control of:

- Western flower thrips in lettuce
- Aphids and thrips in rhubarb
- Onion thrips in bulb vegetables
- Aphids, thrips and Silverleaf Whitefly in herbs.

Click here to access the full report.

#### USA Carrot Grower Study Tour 2013 (Richard Mulcahy, AUSVEG Ltd - VG12707)

The 2013 USA Carrot Grower Study Tour gave 10 vegetable levy payers a unique opportunity to learn about some of America's latest carrot farming methods, technology, equipment and knowledge. Growers were exposed to production and supply chain systems at a number of operations, including Bolthouse and Grimmway farms - the two largest carrot processors and growers in the USA.

"Being able to interact with other leaders in the worldwide carrot industry enables you to feel like you are not fighting alone and view things from an alternative perspective." Representatives from Bolthouse Farms, located in San



Vegetables don't have to be eaten to be consumed. Nearly a third of all cucumber related products launched globally between October and December last year were skincare related.



In trials as part of VG09038, crops grown with compost treatments showed a 21% increase in yield, a 36% saving in urea and a 100% saving in P and K fertiliser.



Bolthouse farms, situated in the San Joaquin valley (USA), plant an average of 800-1000 acres of carrots per week for processing.



The November Project Harvest report showed that 73% of consumers couldn't name any varieties of sweet cornlesser known varieties include baby, white and yellow corn.

# There's an app for that!





AUSVEG has collated a comprehensive list of useful smartphone and tablet apps to assist you with your farm operations, improve the way you do business, network and track weather data.

Joaquin Valley, took the group of Australian growers through a carrot field where they plant an average of 800-1000 acres of carrots per week for processing. The operation uses modified planters to accommodate such a large scale of work, allowing bedding and planting to be done in a single pass.

To view the list <u>click</u> <u>here</u>.



Australian carrot growers inspect seed sowing equipment on *Grimmway Farm* 

A visit to Grimmway Farms' carrot fields proved to be another invaluable experience for the Australian growers. The business processes 40,000 acres, employs around 3,500 people and distributes roughly 4,500 tons of carrots each year.

The tour also visited University of Wisconsin's West Madison Agricultural Experiment Station. Carrot researchers discussed an ongoing carrot study on natural nematode resistance, looking to develop early warning signs of nematodes for specific carrot types.

The delegation also attended the 36th International Carrot Conference in Wisconsin. The conference was attended by a mix of carrot growers, packers shippers, seed producers, breeders, pathologists, marketers, university and government researchers and extension specialists from around the world.

Click <u>here</u> to access the full report.

# In the Pipes: Ongoing R&D



# Controlling Multiple Heading and Transplant Shock in Lettuce

Dr Gordon Rogers, Applied Horticultural Research - VG12017

In lettuce, blindness results in altered plant morphology, the

loss of apical dominance and can result in multiple heading. The aim of this trial is to determine if blindness affects the root and shoot biomass of lettuce seedlings.

Meetings have been conducted with managers at two leading nurseries and trials and data collection has begun. A survey has been sent to stakeholders in the lettuce industry asking for their feedback regarding lettuce blindness. The results of this survey will be incorporated into future trial design.

#### **Next steps:**

Researchers will conduct meetings with a further two nurseries in 2014 and continue to analyse data from the two trials currently underway. A further nursery has indicated an interest in becoming involved in the program. Transplant shock trials are to commence in 2014.

Increasing Productivity and Extending Seasonality in Soil Grown Vegetables using Capsicum as a Candidate David Carey, DAFF QLD - VG12103

This project is being conducted in order to increase crop productivity and extend the productive life of soil grown vegetables. The outputs and outcomes of the research investigating a perennialised capsicum crop will:

- Increase industry knowledge of rootstocks with grafting potential.
- Investigate the potential to extend and enhance crop productive life under protected cropping.
- Investigate alternate methods to increase crop productivity.
- Compare and contrast current and alternate production methods which employ covered or open soil based production systems.
- Review current economic returns to the industry.

A literature review documenting relevant capsicum and chilli R&D carried out in Australia and around the world has been completed. This includes a review of plant material, production techniques and technological advances as a first step in determining immediate project direction. This literature review also includes topics which address issues associated with the outputs and outcomes.

#### Next steps:

Future project work will be focused on "step change advances", including advances in the areas of:

- 1. Appropriate rootstock material identification, selection and assessment with current scion material.
- 2. Investigation of crop rationing to extend seasonality and reduce production costs.

# Visionary R&D: Around the Globe



#### Mitsubishi's Agri-Dream

Pressure from increased climatic uncertainty has led to a variety of innovative agricultural solutions. Developed by Mitsubishi Plastics Group in conjunction with MKV Dream Co. Ltd, Napperland is an innovative hydroponic system combining capillary hydroponics and nutrient film techniques, enabling planned production without relying on the natural environment.



Mitsubishi's Napperland Facility - located in Ibaraki Prefecture, Japan

Early trials of the Mitsubishi technology indicate significant reductions in water, fertiliser and labour input. The system is able to achieve 15 harvests of baby leaf lettuce per year (one harvest every six weeks), effectively doubling the production of conventional field growing. The system's capillary action provides a rich supply of oxygen to the rhizosphere, increasing vegetable health.

Seeds are germinated on site using UV light in a specially-built facility jointly developed with Chiba University. Called Naeterasu, the system consists of an artificial (fluorescent) light seedling production system that automatically controls temperature, light, culture solution and carbon dioxide gas. This level of control enables planned production of high quality seedlings without being affected by seasonality.

An added advantage of the Mitsubishi Agri-Dream system is its modularity, meaning that additional production can be added if required.

Click here for more information.

#### Molecular Mechanism Yields SUMO Salad

Plants adjust their growth rate in response to environmental stress in order to save energy. Led by the Durham Centre for Crop Improvement Technology, researchers have discovered a natural mechanism in plants which stimulates plant growth regardless of stress conditions, potentially resulting in

enhanced crop yields during times of environmental stress.

Plant growth is regulated by proteins that repress growth, and hormones which break down these growth repressing proteins. Growth repression during times of high environmental stress leads to reduced yields. The Durham team discovered that plants regulate their growth independently of hormones by producing a modifier protein called *SUMO*.

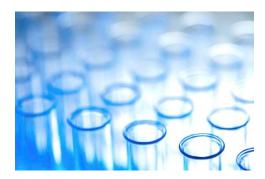
According to research team leader Dr Sadanandom, the researchers found "... a molecular mechanism in plants which stabilises the levels of specific proteins that restrict growth in changing environmental conditions." Dr Sadanandom believes that modifying this interaction may lead to higher yields even during episodes of plant stress.

The interaction can be modified in a number of ways, including conventional plant breeding methods and novel biotechnology techniques.

Click here for more information.

#### Fungus Amongus

The market potential for 'green' crop protection products is predicted to triple from USD 1.2 billion in 2010, to roughly USD 4 billion by 2020. Bayer CropScience is exploring 'green' options for pathogen management, focussing on naturally derived crop protectants. Commonly referred to as biologics, these products employ specialised bacteria or fungal microorganisms to protect plants from pathogenic incursions.



Bayer CropScience's Prophyta Biologischer Pflanzenschutz GmbH has developed Contans®, an innovative biological fungicide consisting of highly active spores of the soil fungus *Coniothyrium minitans*. The spores have a antagonistic action against plant pathogens *Sclerotinia sclerotiorum* and *Sclerotinia minor* survival systems (sclerotia), while avoiding adverse impacts on soil ecosystems and toxic or allergic effects on mammals, fish or insects in general.

Click here for more information.

# The Front Line: Biosecurity R&D



#### Bees get Bugged for Science

In a world first, CSIRO researchers are outfitting one thousand honey bees with tiny sensors to gain an understanding of their behaviour, the drivers behind bee Colony Collapse Disorder (CCD) and the impact of commonly used farm chemicals on honey bee fitness.



The sensors, measuring 2.5mm x 2.5mm, are currently being attached to the backs of bees in Hobart, Tasmania, prior to their release into the wild.

Image courtesy: CSIRO

The sensors function like a vehicle's e-tag, recording when the insect passes a particular checkpoint. This information is then sent to a central location where researchers build a comprehensive three dimensional model to visualise the insects' movement through the landscape.

The next stage of the project is to reduce the size of the sensors to only 1mm so they can be attached to smaller insects such as mosquitoes and fruit flies. An improved understanding of pest insect behaviour will increase management knowledge and maintain domestic and international market access.

Click here for more information.

# Smartphones Sweeten Swarm Surveillance

Conventionally, bait boxes installed at Australian ports for the purpose of attracting and intercepting bees have been inspected manually by apiary officers. University of Southern Queensland researchers have developed an autonomous image-analysis based remote sensing system to automatically detect swarms of bees entering bait boxes.

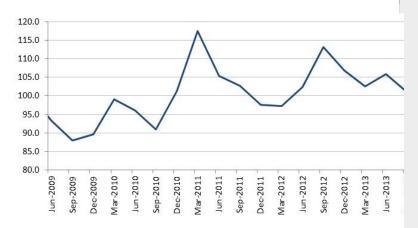
The bait box remote camera surveillance mechanism repurposes a low-cost and readily available smartphone. Prototype systems have reliably and accurately indicated the presence of swarms entering bait boxes. Prototype systems have been installed in Brisbane and Cairns ports, and have been operating reliably and without human intervention throughout 2012/13.

Click here for more information.

# 'Dollars & Sense'



### Vegetable Price Index



Source: ABS 6401.0 Consumer Price Index, Australia

Vegetable prices increased by 7.1 per cent in the December quarter following falls in the previous quarter of 4.5 per cent. Fluctuating weather conditions in some parts of Australia may have affected production levels for some crops in the lead up to Christmas, and therefore may have contributed to this price increase. However, over the year, vegetables continued to represent fantastic value, with vegetable prices increasing by 1.4 per cent compared to 2.7 per cent for inflation.

The consumer price index for all goods and services rose by 0.8 per cent in the December quarter and by 2.7 per cent over the year.

The Reserve Bank of Australia (RBA) decided to leave the cash rate unchanged at 2.5 per cent at its November, December and February meetings. The current cash rate of 2.5 per cent is an unprecedented low, and is positive news for growers with debt or who are looking to borrow.

Despite stronger than expected annual inflation of 2.7 per cent, inflation remains within the 'upper half' of RBA's inflation range of two to three per cent. However, the inflation rate, continued global economic uncertainty and Australia's rising unemployment levels are likely to remain key concerns for future cash rate decisions.

The Australian dollar has experienced a significant decline over the past year, currently trading at approximately US\$0.89, compared to US\$1.08 in February 2012.

Free and convenient specialist advice



This project has been funded by HAL using levy funds from the Australian vegetable industry and matched funds from the Australian Government.

set out in this publication.



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

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### Industry Development News





### In this edition

**InfoVeg Radio** 

**Smart phone Microscope** 

**Research Snapshots** 

**Robotic Farming** 

Market analysis and strategy

The Front Line: Biosecurity R&D

**Dollars and Sense** 

**R&D News** 

Latest R&D Report



AUSVEG is proud to announce the first edition of InfoVeg Radio, an R&D audio series which growers can listen to while on-the-go. InfoVeg Radio can be streamed online or downloaded to your portable audio device (including your smartphone), as an MP3 audio file. Growers who have USB capability in their vehicle can save the file to a USB stick and listen through the stereo.

Episode 1 features biogas feasibility, the International Horticultural Congress, soil health and advice on managing pests & diseases.

Click here to listen or to download Episode 1.

#### Smart phone microscope

Scientists at the Australian National University (ANU) College of Engineering and Computer Science have invented a simple and cheap way of making a high-powered lens that can transform a smart phone into a high-resolution microscope.

"We put a droplet of polymer onto a microscope cover slip and then invert it. Then we let gravity do the work, to pull it into the perfect curvature," said ANU researcher, Dr Steve Lee.

"By successively adding small amounts of fluid to the droplet, we discovered that we can reach a magnifying power of up to 160 times with an imaging resolution of four micrometres."

Dr Tri Phan, Senior Research Officer at the Garvan Institute of Medical Research, said the tiny microscope has a wide range of potential uses, particularly if coupled with the right smartphone apps.

"They (farmers) can photograph fungus or insects on their crops, upload the pictures to the internet where a specialist can identify if they are a problem or not," said Dr Phan.

For more information click here.

### Research Snapshots



Project Harvest Update - March, April

The latest Project Harvest reports are now available for viewing. The reports include the third wave of data for the

#### S

You can access the latest R&D reports by logging on to InfoVeg.



VG08106 - Developing a Sustainable Soil Management Model to Increase Farm Gate Returns in Tasmania



VG09009 - Evaluating sweet potato varieties to meet market needs



VG11028 - Generation of residue, efficacy and crop safety data for pesticide minor-use permit applications -CPR



VG01093 - First stage agronomic research for sub tropical chicory production



VG100417 - Economic survey of Australian vegetable growers, 2010-11, 2011-12 and 2012-13



VG10094 - Consumer attitudes and usage in the green leaf category

### Grower Resources



Vegetable Pest ID application

focus vegetables and are now starting to show some interesting market trends. <u>Click here</u> for more information.

### Presenting Vegetables to Consumers

As part of Project Harvest a study was conducted that focused on presentation and packaging of vegetables in Australia, specifically analysing what consumers want to know about their vegetables.

From the study emerged **seven distinct consumer categories**, each with their own attitudes and preferences for particular vegetable products. The key insight from this finding is that vegetable growers should first understand their target consumer category and tailor their product accordingly.

This report gives growers clear points as to what to do and what to avoid when designing the packaging and presentation of products when targeting a specific consumer. To access the full report click here.

#### Vegetables in Restaurants

Dining at a restaurant, café or local eatery is a common activity for many Australians. As part of project harvest a study uncovered how vegetables are eaten and perceived by consumers when eating out.

The report found consumers valued the quality of their vegetables just as much as the quality of their meat, and that the *freshness* of vegetables was the most important attribute to them. Consumers also wanted a greater variety of vegetables in restaurants and to have them take a more prominent place on their plate, not as an extra side dish.

One way that growers might take advantage of this knowledge is by establishing a business relationship with a local restaurant or eatery to promote their fresh produce. To access the full report <u>click here</u>.

# In the Pipes: Ongoing R&D

### for phones and tablets

A new mobile phone application has been released that allows growers to quickly and effectively diagnose exactly what is affecting their crops. The app allows users to search via type of plant and then viadisorders, pests or diseases.

It can be searched from an IOS or Android device on the relevant App Stores by searching for the name:



#### **InfoVeg**



InfoVeg is a resource for growers who want to investigate topics of interest. The app can be accessed directly from the field on your mobile device, by going towww.ausveg.com.au/infoveq.

InfoVeg is free to levy payers, who can login using the same details needed to access the AUSVEG website. If you do not already have an account you can register here.

#### Robotic Farming

The Australian Centre for Field Robotics (ACFR) at the University of Sydney has put together a website which will help keep the horticulture industry up-to-date with the most recent developments in automated farming technologies, such as autonomous robots and robotic arms for harvesting.

Headed by Project Lead, Dr Salah Sukkarieh, the ACFR has been working in this space over the last 10 years. The vegetable industry has invested in a project to create its own on-farm automated robot.

The mobile ground robot or "Vegie Bot" with supporting intelligent software will have the capability of conducting autonomous farm sensing and manipulation tasks for various vegetable crop varieties. These tasks will include mapping, classification, detection, weeding and ultimately harvesting.

<u>Click here</u> for more information and to view videos on the creation of "VegieBot".

### InfoVeg enriched with fact sheets and guides.

InfoVeg has recently been enriched with dozens more fact sheets and guides, many of which were developed from past industry projects from all over Australia.

A fact sheet outlining some basic principles growers can follow to avoid pesticide resistance has been uploaded, along with a tool to complete a gross margin analysis for your particular vegetable growing enterprise and numerous other fact sheets and tools.

The InfoVeg database continues to be the most extensive and comprehensive database for vegetable R&D in the country, cataloguing both old and new information for growers. To access the database go to <a href="https://www.ausveg.com.au/infoveg">www.ausveg.com.au/infoveg</a> and check out the new tools.

### Finalised Projects



Market analysis and strategy: baby leaves and long beans Umesh Madhavan, Euromonitor International Ltd, VG13046

This study by Euromonitor was designed to figure out consumer vegetable preferences in Malaysia and the United Arab Emirates (UAE) by conducting extensive consumer surveys and interviews with local stakeholders. The study also looked at the optimal route-to-market and distribution

### Trade in Vegetables: Economic Data



Trade data on the AUSVEG website suggests that Australian vegetable products can be very competitive on the international market, due to a reputation for quality and safety. See also the recent AUSVEG discussion paper onvegetable exports.

#### Vegetable Climate Website



An online resource developed for growers and funded by the National Vegetable Levy (project VG12049), the Vegetable Climate website compiles practical information, such as government policy, and provides outlooks on regional climatic variability. To visit the website click here.

### There's an app for that!





strategy.

In addition, a supply chain participant database for both Malaysia and the UAE was compiled to help growers understand the export market nuances and forge stronger trade relationships.

The study revealed a number of insights. For example, an overwhelming number of consumers surveyed preferred a darker green baby-leaf, associating it mainly with higher nutritional value in terms of antioxidants and vitamins.

For a copy of the final report, contact AUSVEG via info@ausveg.com.au.

AUSVEG has collated a comprehensive list of useful smartphone and tablet apps to assist you with your farm operations, improve the way you do business, network and track weather data.

To view the list <u>click</u> <u>here</u>.

# The Front Line: Biosecurity R&D

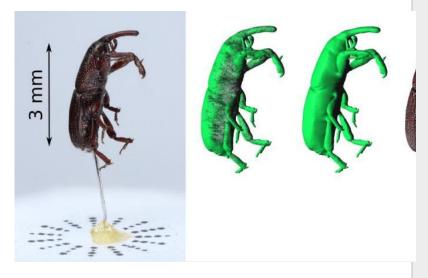


#### Polyscopic insect catalogue

In order to identify and classify specimens, bug scientists rely on data collected over many years and shared through written descriptions, diagrams, and photographs. CSIRO scientists are currently developing an insect imaging system to speed up this process.

The prototype scanner captures colour images from different angles and

focal depths using a high-resolution digital camera and a flat turntable.



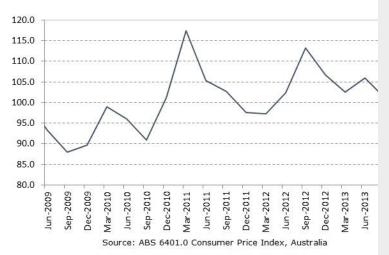
The resulting 3D models are compact (around 10 megabytes each), have excellent optical resolution, and can be embedded into documents and web pages, as well as viewed on mobile devices.

For more information, click here.

### 'Dollars & Sense'



#### Vegetable Price Index



AUSVEG took to the media recently to notify the public that new data released by the Australian Bureau of Statistics (ABS) was not all positive news for vegetable growers.

The data showed that the gross value of Australia's vegetable industry production increased by \$500 million in 12 months to \$3.8 billion in 2012-13. In addition, yields for most vegetables improved in 2012-13 with tomatoes experiencing the largest yield improvements (45 per cent), followed by lettuce (30 per cent), capsicums (12 per cent), onions (6 per cent). Potatoes and carrots had improved at similar rates (1 per cent) in 2012-13 when compared to the previous year.

AUSVEG made it clear that increases to both the value of the vegetable industry and yields does not necessarily translate into greater returns or profitability for vegetable growers. For example, higher yields could simply mean growers are using their land more intensively, which also increases production costs, particularly for inputs such as fertiliser and energy, therefore impacting on profitability. In addition, vegetable growers' production costs continue to increase with electricity costs almost doubling since 2005-06.

Separately, the Reserve Bank of Australia (RBA) left the cash rate unchanged at 2.5 per cent at its June meeting. While the RBA's stance to maintain the current interest rate is unlikely to change in the short term, the annual inflation figure is beginning to creep towards the upper band of its 2 to 3 per cent target. The Australian dollar continues to fluctuate based on various political and economic announcements and is currently trading at approximately US\$0.94, compared to US\$1.08 in February 2012.

This project has been funded by HAL using levy funds from the Australian vegetable industry and matched funds from the Australian Government.



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### **About**

Welcome to AUSVEG's quarterly R&D Industry Development e-Newsletter. In this edition we provide you with 'SNAPSHOTS' of recent R&D to help keep your finger on the pulse of research and scientific news. We have also included a summary of recent economic developments and how they may impact you.

To access full R&D reports simply log on to <u>InfoVeg</u> and search by project code or title. If you don't have an account please visit the <u>registration page</u>.

### Industry Development News



### 29th International Horticultural Congress

A contingent of Australian vegetable growers and industry members, recently attended the 2014 International Horticultural Congress (IHC) in Brisbane.

The event was held at the Brisbane Exhibition and Convention

### In this edition

International Horticultural Congress

**Research Snapshots** 

**Veggie Stats: Carrots** 

Minor Use Permit Update

In the Pipes: Ongoing R&D

Soil Wealth, ICP

**Final Reports** 

The Front Line: Biosecurity R&D

**Dollars and Sense** 

Centre from 18-22 August and attracted over 3,000 delegates from more than 100 countries. It is only the second time the Congress has been held in the southern hemisphere in its 150-year existence.



Throughout the week, the group attended a range of symposia, workshops and other events that aligned with the Congress theme: 'Sustaining Lives, Livelihoods and Landscapes'. The delegates listened to presentations from some of the world's leading experts in horticultural research and discussed topics that could be used for future R&D projects in Australia.

Vegetable production was a prominent topic at this year's congress with a number of symposia featuring researchers specialising in this field. Symposia attended by the group included, 'Innovative Plant Protection in Horticulture', 'Indigenous Vegetables' and 'Plant Breeding in Horticulture.' These symposia and a number of other presentations, provided the industry delegation with a large array of Research and Development ideas from around the world.

### Research Snapshots



### Project Harvest Update - May, June, July

The latest Project Harvest reports are now available. The reports include the third wave of data for the target vegetables and are now starting to show some interesting trends. <u>Click here</u> for more information.

### Latest R&D Report



You can access the latest R&D reports by logging on to InfoVeq, or clicking the reports below.



VG13045 -Identification of potential alternatives to Metham Sodium



VG12094 - Optimum Vegetable Portion Size to Meet Consumer Needs



VG11706 - Vegetable Growers Study Tour -Germany, Netherlands



VG07198 - Pre-emptive breeding to combine superior eating quality in tropical super sweet corn with resistance to major diseases



VG12084 - Enhancing Market Attitudes Towards IPM and Sustainable Vegetable Production Practices



VG13063 - Guest worker scheme desktop study



VG09124 - Increasing energy efficiency and assessing an alternate energy option for Australian Protected

#### Veggie Stats: Carrots

AUSVEG has developed a series of six 'Veggie Stats' documents, which have been developed to provide insights of the financial, production and exporting performance of key Australian vegetable commodities.

The data itself provides a broad analysis of the performance of vegetable crops and should be interpreted carefully. The data provides a general overview of the industry's performance.

To view the most recent Veggie stats sheet Click here.

#### Minor Use Permit Update

A recently approved Minor Use permit for Snow Pea and Sugar Snap Pea targets several Mite species including Two-spotted mite (*Tetrayshus urticae*), Red Tomato Spider Mite (*Tetranychus evansi*), European Red Mite (*Panonychus ulmi*) and Bryobia Mite (*Brubia rubrioculus*).

The permit allows for the spraying of ACRAMITE MITICIDE (Containing: 480 g/L BIFENAZATE) once per season. With a withholding period of only 7 days (not approved for grazing at all), this should help to gain control against these pests. Only use as directed and allowed, permit number <a href="PER14044">PER14044</a> for more information.

For information regarding Minor Use permits, email <a href="mailto:info@ausveg.com.au">info@ausveg.com.au</a> or call Scott Kwasny on (03) 9882 0277.

# In the Pipes: Ongoing R&D



Soil Wealth and Integrated Crop Protection educational extension projects.



#### Cropping



VG13050 - Production of fish food for aquaculture from vegetable waste feasibility study



VG12092 - Evaluating the success of VG12045/069/070 -Barriers & Drivers of Vegetable Consumption & Purchase



VG13047 - Malaysia and UAE market analysis and strategy: carrots and sweet corn



VG09041 -Environmental effects of vegetable production on sensitive waterways



VG13046 - Malaysia and UAE market analysis and strategy: baby leaf and beans



VG09052 - Integration of crop and soil insect management in sweet potatoes



VG10082 - Continuing on-farm improvements through good practice demonstration



VG00062 - Commercial pilot demonstration of Tasmanian greenhouse capsicum opportunities

Two collaborative projects have recently been developed to communicate the vast amount of research that has been conducted into Soil Wealth and Integrated Crop Protection in Vegetable production.

These projects build upon an extensive amount of ICP information from previous projects and investment. This project aims to ensure that information is accessible, practical and relevant to individual commercial farming operations, rather than generating more information.

The new Soil Wealth project, being run jointly by AHR and RMCG, aims to develop capacity among growers, agronomists and advisers, to support soil management and achieve long-term benefits for growers. The project will assist growers to effectively use existing soil management information.

The project team will work closely with growers, commercial agronomists, independent advisers and on-farm agronomists. As a result, there are several opportunities available to growers interested in being involved with these projects.

For more information on the Soil Wealth project, contact Dr Gordon Rogers on (02) 9527 0826 and gordon@ahr.com.au, or Dr Doris Blaesing on (03) 6437 2264 anddorisb@rmcq.com.au.

To recieve notification of upcoming grower events for both projects <u>Click Here</u>.

### Finalised Projects



Optimum vegetable portion size to meet consumer needs Georgina Woodley, BDRC Jones Donald Pty Ltd, VG12094

The vegetable industry continues to look for ways to increase vegetable consumption. It has been shown that consumers do not buy some vegetables for fear of wasting them. Horticulture Australia commissioned this research to explore the potential for optimising portion sizes to drive increased purchase and consumption. The research focused on six vegetables including carrots, pumpkin, cabbage, cauliflower, celery and broccoli.

The project has made four recommendations, all of which may lead to increased purchase and consumption of vegetables:

- Retailers will benefit from offering more fairly basic portion options.
- Removing 'excess parts' of the vegetable will enhance perceived value.
- Smaller versions of vegetables should be considered.
- Industry should provide greater inspiration about how to store and prepare vegetables.

For a copy of the final report <u>Click Here</u>.

#### Grower Resourc es







InfoVeg is a resource for growers who want to investigate topics of interest. The app can be accessed on your mobile device, by going towww.ausveg.com.au/ infoveg.

InfoVeg is free to levy payers, who can login using the same details used to access the AUSVEG website. If you do not already have an account you can register here.

### Project Harvest IDT

Track your target consumer using the online "Interactive Data Tool" (IDT). The IDT compiles all of the data collected from Project Harvest in graphs and tables.

Growers can compare and contrast data between different vegetables and also filter by demographic.

Email <u>info@ausveg.com</u> <u>.au</u>for more information and for login details.

### There's an app for that!

# The Front Line: Biosecurity R&D



### Handy DNA diagnosis tool fits in your hand

Rapid in-field diagnosis of viral diseases and bacterial pathogens is now possible thanks to a revolutionary device developed by researchers at the University of Otago, New Zealand. Dubbed Freedom4, the device harnesses advances in quantitative Polymerase Chain Reaction (qPCR) technology to identify target DNA sequences in real-time.



"This mobility could provide a great boon for farmers... there is currently no other system in the world that compares in terms of the analytical power we have achieved at this level of mobility and ease of use," said Dr Jo-Ann Stanton, who led the programme to develop the Freedom4 device.

Freedom4 works by repeatedly splitting and copying DNA so that it can be easily read.

Click Here for more information.

### 'Dollars & Sense'



China's imports across all commodities fell by 2.4 per cent in the year to August2014. This fall in imports may seem insignificant, however, it has direct implications for vegetable growers and illustrates that China's growth is beginning to subside.

#### What does this mean for Australian vegetable growers?

The fall in China's imports, coupled with growing signs in both the US and UK translated to a lower Australian dollar which has fallen to US87.72¢ as of October 102014. A lower





AUSVEG has collated a comprehensive list of useful smartphone and tablet apps to assist you with your farm operations, improve the way you do business, network and track weather data.

To view the list <u>click</u> here.

Australian dollar results in Australian vegetable exports becoming more price competitive.

Furthermore, after China has averaged around 10 per cent annual growth for three decades, the economy has begun showing signs of slowing growth, falling to 7.5 per cent in the past two years. Consequently, Australia's exports of minerals to China is beginning to slow, as demand for coal plateaus. Whilst this lowers the Australian dollar, it also reduces the level of employment in the mining sector.

This has a direct effect on Australian national unemployment, which has increased recently, creating a larger labour pool for vegetable growers to choose from, particularly skilled labour. This trend is expected to continue, with the Reserve Bank of Australia (RBA) expecting it to be some time before Australian unemployment declines consistently.

Whilst China's imports have been declining, China's household consumption has been climbing as a proportion of Gross Domestic Product (GDP), rising from 34.9 per cent in 2010 to 36.2 per cent last year. This increase in consumption tends to suggest that China's appetite for imports (other than minerals) such as vegetables, is likely to continue increasing.

However, Australian vegetable growers currently have very limited access to the Chinese market. Negotiations are currently underway on a Free Trade Agreement which is expected to be concluded by the end of 2014, however, greater market access is needed to deliver opportunities for Australian vegetable growers, particularly in the long-run, with China's consumption and demand for premium produce expected to grow.

In summary, China is expected to continue developing considerably, albeit at a slower rate than previously experienced. China's transitional shift resulting in falling imports and weaker GDP may actually prove beneficial to Australian vegetable growers, from improved export opportunities and a larger pool of labour.

Separately, the RBA left the cash rate unchanged at 2.5 per cent at its October meeting. The RBA's stance of maintaining the current interest rate is unlikely to change in the short term, with the RBA indicating that stability in interest rates is likely to continue.

This project has been funded by HAL using levy funds from the Australian vegetable industry and matched funds from the Australian Government.



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### InfoVeg R&D Update



#### **In This Edition**

Welcome to AUSVEG's quarterly Research and Industry Development e-Newsletter!

In this edition we look at the latest industry R&D, including a biosecurity-themed InfoVeg Radio, a Veggie Stats profile of broccoli, Project Harvest consumer data on a range of vegetables, and a new paper examining exports written by the AUSVEG Economist.

We also help keep your finger on the pulse of research and scientific news by providing you with snapshots of recent levy-funded R&D projects, including work on transplant shock in lettuce and research into on-farm power generation.

Finally, in the biosecurity section *The Front Line*, we highlight upcoming research into photosynthesis, and in the *Dollars & Sense* economic update, we discuss recent changes in fuel prices and what they mean for growers.

#### Latest InfoVeg Reports:

#### VG13085

Benchmarking Australian Vegetable Industry Points of Difference

#### VG13029

Adaptive pest
management for
horticulture under
climate change – pilot
pest scoping

#### VG13066

<u>Double knock low</u> <u>dose fenthion</u> <u>treatment of zucchinis</u>



The third edition of InfoVeg Radio is now live!

This edition features Dr Denis Persley, who discusses managing virus diseases in vegetable crop systems. We also interview Professor Phil Taylor on fruit fly management, Dr Tim O'Hare on zeaxanthin in sweet corn (in a project funded by voluntary contributions from the Queensland Department of Agriculture with matched funds from the Australian Government), and AUSVEG Biosecurity Officer Dr Jessica Lye discusses on-farm biosecurity.

InfoVeg Radio can be streamed online or downloaded to your portable audio device (including your smartphone) as an MP3 audio file. Growers who have USB capability in their vehicle can save the file to a USB stick and listen through the stereo.

To listen, simply <u>click here</u>.

as a quarantine treatment against cucumber fly

#### VG13051

On farm power generation - options for vegetable growers

#### VG12043

Conveying health benefits of Australian vegetables

#### VG13707

Vegetable Industry's
Participation at the
International
Horticultural
Congress, Brisbane,
August 2014

#### VG13035

2014 Reverse Trade Mission

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R & D REPORTS

#### Veggie Stats: Broccoli

Veggie Stats has been developed to enable deeper insights of the financial, production and exporting performance of key Australian vegetable commodities.

This report on broccoli suggests that returns for broccoli growers have varied considerably from year to year, with rising costs over the past five years placing increasing pressure on growers.

To download a copy of the broccoli report, please <u>click here</u>.



AUSVEG



<u>Twitte</u>

#### Project Harvest updates: August, September, October

The latest Project Harvest reports are now available for download on the AUSVEG website. Recent reports track Asian vegetables, beetroot, capsicum, carrot, cauliflower, celery, cucumber, eggplant, green bean, pumpkin, sweetpotato and zucchini.

To view all Project Harvest reports, please <u>click here</u>.

## **Economic discussion paper - Exporting to the Middle East and Asia**

The latest AUSVEG economic discussion paper, discussing exporting Australia's vegetables to the Middle East and Asia, has recently been released.

The paper provides an overview of Australia's domestic market. It also provides easy-to-read market snapshots of the Middle East, China, South Korea and Japan, examining their domestic markets and vegetable trade opportunities for Australian growers.

To read the discussion paper, please click here.

#### VG12017 - Controlling multiple heading and transplant shock in lettuce

Transplant shock refers to the pause in growth which occurs when seedlings are transplanted into the field. The result of significant transplant shock can be poor plant stands and a lower percentage cut of good quality lettuce.

The timing of transplantation is critical to controlling transplant shock. Young seedlings are more delicate than further advanced seedlings and more sensitive to transplant shock. Young, healthier seedlings also have a greater yield potential as they are able to develop stronger root systems.

Recent results from this project have shown that transplant shock in lettuce seedlings can be reduced by drenching roots in a potassium nitrate solution at transplantation. This was observed to reduce transplant shock and result in 12-19% higher yields at harvest.

More exciting developments are set to come out of this project, so stay tuned. More information is available from the InfoVeg website.

### VG13051 - On farm power generation

Australian vegetable growers are major consumers of electricity, with on-farm irrigation, heating and cooling processes, processing and packing plants creating significant power demands. Electricity retail prices increased on average by more than 60% over the five years to 2012-13. However, falling installation costs of some renewables, and the growth of incentive schemes, have created opportunities for growers to reduce energy costs and meet sustainability goals by adopting on farm power generation.

This project's research into on-farm power generation has produced details of the options and explored the feasibility of adopting such systems. Growers can use this to help them make informed decisions about the costs and benefits of the various technologies, their challenges, and the suitability of these systems to individual ventures.

Technologies studied in this project include solar photovoltaics, wind power, natural gas generation, LPG power, woody biomass power generation, and micro-hydro power generation.

The project has produced a factsheet on power generation by vegetable farmers, as well as factsheets on solar photovoltaics, wind power, and gas fuelled power generation. The final report and all factsheets are available from <a href="mailto:the InfoVegwebsite">the InfoVegwebsite</a> under project VG13051.

#### The Front Line: Biosecurity R&D

Food security, a concern of increasing importance, will soon be bolstered by research to be carried out at the Australian-based Centre of Excellence for Translational Photosynthesis.

The Centre will be a focal point for joint research ventures between the University of Queensland, Australian National University, the University of Sydney, the University of Western Sydney, CSIRO and the International Rice Research Institute in the Philippines.

Controlling photosynthetic processes at a molecular level, which will be the focus of the Centre, is the next exciting platform in agricultural sciences. Effective photosynthesis is key to producing high crop yields and plant tissue that is packed with micronutrients.

For more information, please visit their website.

#### **Dollars & Sense**

The rapid decline in global crude oil prices, which have more than halved over the last year, could give Australian vegetable growers some respite amidst tough business conditions. Increased oil production by Saudi Arabia and the United States coupled with China's slowing economic growth have caused oil prices to tumble, and they are projected to stay low.

This serves as good news for Australian vegetable growers, who are heavily reliant on petroleum for transport. Furthermore, many pesticides and fertilisers, essential inputs for growers, are dependent on petroleum in their production.

Fuel, oil and grease cost growers \$36,000 on average in 2013-14, increasing by approximately 28 per cent over the past two years. Since 2011-12, total cash costs have increased by almost 11 per cent (largely due to increasing labour costs), contributing to farm business profits decreasing by 38 per cent. Therefore, the decrease in oil prices

should greatly relieve Australian vegetable growers.

However, fuel discrepancies between regional and metropolitan areas are concerning, with the benefits of lower fuel prices not fully passed on to rural areas in some cases. The ACCC attributes some of the discrepancies to increased transport and storage costs, but has committed to continued monitoring of fuel markets.


This project has been funded by Horticulture Innovation Australia Limited using the National Vegetable Levy and funds from the Australian Government.

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### InfoVeg R&D Update



#### **In This Edition**

Welcome to this quarter's InfoVeg R&D Update!

In this edition we look at the latest levy-funded industry R&D, including:

- a special InfoVeg Radio edition on consumer and market research;
- Veggie Stats reports on pumpkin and cauliflower;
- the latest consumer research and Project Harvest data from Colmar Brunton;
- the latest Nielsen Homescan market and consumer data; and
- a discussion paper on state-by-state performance of the Australian vegetable industry written by the AUSVEG Economist.

We also profile project VG13054 Economic evaluation of farm energy audits and benchmarking of energy use on vegetable farms, which identifies key points of improvement for industry energy use.

Finally, in our biosecurity section *The Front Line,* we look at Bayer CropScience's partnership with the GRDC, and in the *Dollars & Sense* economic update, we analyse the key features of the 2015/16 Federal

#### Quick links

InfoVeg Radio
Veggie Stats
Project Harvest
Nielsen reports
Discussion paper
Farm energy use
The Front Line
Dollars & Sense

View More
R & D REPORTS







The fourth edition of InfoVeg Radio is now live!

This edition features Megan Ferguson from Colmar Brunton discussing the newly-released Project Harvest consumer segmentation report. We also interview Shane Scacco from Nielsen on their vegetable purchase tracking through Homescan data, talk to grower Belinda Adams on the value of consumer and market research to her business, and look at the buying habits of an Eager Explorer consumer.

InfoVeg Radio can be streamed online or downloaded to your portable audio device (including your smartphone) as an MP3 audio file. Growers who have USB capability in their vehicle can save the file to a USB stick and listen through the stereo.

To listen, simply <u>click here</u>.

### Veggie Stats: Pumpkin & Cauliflower

The Veggie Stats series has been developed to enable deeper insights of the financial, production and exporting performance of key Australian vegetable commodities.

Two new reports have been produced and released recently, profiling the performance of the pumpkin and cauliflower industries.

These reports include data on the commodities' average price per tonne over recent years, the average costs per tonne, and the average yield

against area planted.

To download a copy of the pumpkin report, please<u>click here</u>.

To download a copy of the cauliflower report, please<u>click here</u>.

### Consumer segmentation report and Project Harvest updates

The Project Harvest study tracks consumer attitudes to vegetable purchases over time to capture an indepth snapshot of the Australian fresh vegetable market.

The study has recently produced a consumer segmentation report, which found that the Australian fresh vegetable market consists of four segments based on the key drivers and motivators behind consumers' vegetable purchases. This report includes insights into how growers and the vegetable industry as a whole can target and capture a greater market share for their produce.

To read the segmentation report, **click here**.

The latest commodity-specific Project Harvest reports are also now available for download on the AUSVEG website. Recent reports track Asian vegetables, beetroot, capsicum, carrot, cauliflower, celery, cucumber, eggplant, green beans, pumpkin, sweetpotato and zucchini.

To view all Project Harvest reports, please <u>click</u> <u>here</u>.

#### Nielsen consumer reports

The latest Nielsen reports are available for download on the AUSVEG website. These reports use Nielsen Homescan data to analyse the vegetable-buying habits of Australian consumers, providing an indepth look at the purchasing trends and demographics of the Australian fresh vegetable market.

These reports include commodity-specific deep dives, reports, opportunity calculators and analysis of consumer behaviour.

The reports cover vegetable commodities including Asian vegetables, beans, broccoli, cabbage, capsicum, carrots, cauliflower, celery, cucumber, fresh salad, lettuce, pumpkin, sweet corn, sweetpotato and zucchini.

To view all Nielsen reports, please <u>click here</u>.

### **Economic discussion paper -** Financial performance by state

The latest AUSVEG economic discussion paper, which investigates the performance of Australian vegetable growing operations on a state-by-state basis, has been released by AUSVEG Economist Steve Razdan.

The paper compares the performance of vegetable growing operations in each state, using metrics including cash receipts, cash costs and their rate of return on capital, and finds that South Australia, Western Australia and Victoria are the best-performing states.

To read the discussion paper, please click here.

#### VG13054 - Vegetable farm energy audits and benchmarking of energy use

With energy costs representing nearly 10 per cent of overall costs for vegetable-growing businesses, energy management is an important element of operating a successful vegetable growing and processing business.

Growers can reduce energy waste and usage by managing their processes more effectively, and energy audits are an excellent tool for growers looking to understand the sources of their energy costs and identify opportunities for savings.

After completing 22 audits, Infotech Research

identified that energy audits are of greatest assistance to medium-sized growers with packing sheds.

The project's final report concludes that key areas of potential industry improvement include diesel plant efficiency, refrigeration efficiency, cool room energy loss reduction, irrigation pump efficiency, and irrigation system design.

To view the final report, please **click here**.

#### **The Front Line: Biosecurity R&D**

Bayer CropScience have teamed up with the Grains Research & Development Corporation (GRDC) in an effort to fight weeds and develop solutions to herbicide resistance.

Under the deal, \$45 million will be invested over five years, resulting in jobs for an extra 40 chemistry and biology researchers - including a number of Australian post-doctoral researchers - at the Bayer CropScience laboratories in Frankfurt, Germany.

This partnership will ensure that Australia is on the front line of global herbicide and pesticide research, and it is likely there will be positive flow on effects to the horticulture industry.

Weeds often fly under the radar from a biosecurity perspective, and tend to gain resistance quickly. This partnership is anticipated to prioritise research into Australian weeds, which should see direct benefits for Australian growers.

For more information, please <u>click here</u> to read Bayer CropScience's release.

#### **Dollars & Sense: Economic update**

The primary benefits for growers in this year's Federal Budget are newly-introduced drought relief measures, including continuing concessional loans and introducing the ability to immediately claim expenditure on fencing and water facilities, such as dams, tanks, pumps and windmills, as tax

deductions.

This is complemented by Budget measures which grant small businesses (those with an annual turnover of under \$2 million) the ability to immediately claim expenditure on any asset as a tax deduction.

Other key features of the Budget include the allocation of resources to promote business understanding of the recently concluded FTAs in North Asia.

For more detail on the impact of the Budget on vegetable growing operations, look out for AUSVEG Economist Steve Razdan's article in the July/August edition of *Vegetables Australia*, or **click here** to read his email update.

**Notice:** this information is provided as a resource only, and growers should seek independent advice from an expert before seeking to act on the basis of any of this information. AUSVEG is not liable for any loss or damage that may result from using this information incorrectly.

This project has been funded by Horticulture Innovation Australia Limited using the National Vegetable Levy and funds from the Australian Government.

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### InfoVeg R&D Update



#### **In This Edition**

Welcome to the latest InfoVeg R&D Update!

In this edition we look at the freshest updates from levy-funded industry R&D, including:

- a Veggie Stats report on sweet corn;
- the latest Project Harvest data from Colmar Brunton on celery, cucumber, eggplant and zucchini; and
- the latest Nielsen Homescan market and consumer data.

We also look at the latest final reports from levyfunded R&D projects:

- VG13080 Global scan for vegetable innovation;
- VG13107 Benchmarking international road transport regulations;
- VG13087 Review optimal cooking techniques for vegetables to maximise retention of nutrients; and

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**Global innovations** 

Road transport regulations

Optimal cooking techniques

Vegetable consumption in children

**The Front Line** 

• VG13090 A strategy to address consumption of vegetables in children.

Finally, in the biosecurity section *The Front Line*, we highlight the recent detection of vegetable leafminer in the Cape York Peninsula, and in the *Dollars & Sense* economics update, we discuss how farm size affects financial performance.

Please enjoy this edition of the update. You can use the quick links in the sidebar to jump to any section of the newsletter.

#### **Veggie Stats: Sweet Corn**

The Veggie Stats series has been developed to enable deeper insights of the financial, production and exporting performance of key Australian vegetable commodities. The latest edition in the series, profiling the performance of the sweet corn industry, has now been released in the newest edition of *Vegetables Australia*.

According to the latest data, while sweet corn production has increased by 5% since 2010-11, the gross value of sweet corn production has declined by 2.7% over the same period, and the number of sweet corn growers has dropped by over 35%.

The full Veggie Stats report, with a comprehensive analysis of Australia's sweet corn production, is available from the InfoVeg database. To download a copy of the report, please <u>click here</u>.

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#### **Project Harvest updates**

The Project Harvest study tracks consumer attitudes to vegetable purchases over time to capture an indepth snapshot of the Australian fresh vegetable market.

The latest commodity-specific Project Harvest reports are also now available for download on the AUSVEG website. These reports, containing consumer data from April 2015, track celery, cucumber, eggplant and zucchini.

#### **Dollars & Sense**

#### Latest InfoVeg reports

#### VG13080

Global scan for vegetable innovation - fresh and minimally processed

#### VG13107

Benchmarking international road transport regulations

#### VG13087

Review optimal cooking techniques for vegetables to maximise retention of nutrients

#### VG13090

A strategy to address consumption of vegetables in children

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The reports also feature key industry insights into the rise of snacking as a consumption occasion and the chance for the vegetable industry to capitalise on this trend.

To view the full report for April 2015 which contains all these commodities, please <u>click here</u>.

To view all Project Harvest reports for 2015, please **click here**.

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#### **Nielsen consumer reports**

The latest Nielsen reports are available for download on the AUSVEG website. These reports use Nielsen Homescan data to analyse the vegetable-buying habits of Australian consumers, providing an indepth look at the purchasing trends and demographics of the Australian fresh vegetable market.

These reports include commodity-specific deep dives, reports, opportunity calculators and analysis of consumer behaviour.

The latest reports cover vegetable commodities including Asian vegetables, beans, cabbage, capsicum, carrots, cauliflower, celery, cucumber, fresh salad, lettuce, pumpkin, sweet corn, sweetpotato and zucchini.

To read the latest reports, please click here.

To view all Nielsen reports for 2015, please <u>click</u> here.

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### VG13080 - Global scan for vegetable innovation

With the Australian vegetable industry aiming to increase its produce's appeal, as well as its competitiveness in Asian export markets, this levy-funded project was undertaken to identify new and commercially viable innovations which could be

implemented by Australian growers.

From April 2014 to January 2015, Euromonitor scanned the globe for product innovations, ranging from packaging and value-adding to entirely new products and other initiatives. After identifying 40 key innovations, the project conducted deeper investigations into a short-list of the 10 most viable concepts as shortlisted by HIA in consultation with growers.

These innovations included "living salads" that can be bought in-store and harvested at home, preprepared fresh vegetable snack packs, and compostable packaging and labels.

To read the final report on the InfoVeg database, including its full analysis of all 10 key innovations, please <u>click here</u>.

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# VG13107 - Benchmarking international road transport regulations

Australian road transport regulations, and any potential constraints that exist within them, are a major factor in the productivity - and therefore competitiveness - of the Australian vegetable industry.

This study, undertaken by HGH Consultants, was designed to identify areas in which the transport cost of vegetables in Australia could be lowered through the introduction of improved regulation, facilities, equipment or work practices.

The study consisted of three components: a benchmarking literature review of road transport regulations in New Zealand, Canada, the USA and other jurisdictions; detailed interviews and discussions with stakeholders in Australia and overseas; and case studies to quantify the gains from potential reforms.

While the review did not identify any "silver bullet" solution, it did identify opportunities to improve productivity in Australia's existing regulatory framework, including greater use of high-performance trucks, more flexible fatigue management regimes, and the development of a

"vegetables road network".

To read the full report on the InfoVeg database, please <u>click here</u>.

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#### VG13087 - Review optimal cooking techniques for vegetables to maximise retention of nutrients

This levy-funded project, led by Dr Hazel MacTavish-West, collated scientific information on the impact of cooking on the texture, flavour, colour and nutrition on all levied vegetables, with a view to increasing consumption of Australian-grown vegetables.

As a result of this research, recommended cooking methods were developed to get the best taste and nutrition benefits from each levied vegetable. Through consumer-testing of diagrams depicting the best cooking methods, the project has developed clear, simple ways of communicating this information to consumers.

These methods and instructions are now available on the Veggycation website. Recommended techniques can be viewed by visiting the <u>vegetables section of the Veggycation website</u> and selecting any vegetable in the drop-down menu.

To read the final report on the InfoVeg database, please **click here**.

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# VG13090 - A strategy to address consumption of vegetables in children

Encouraging good eating behaviours in children is essential, as it forms the basis for their behaviour for the rest of their lives. However, results from the latest Australian Health Survey suggest that children are a long way off meeting recommended vegetable intakes.

This project, undertaken by the CSIRO Preventative Health Flagship, aimed to develop a strategic investment plan for increasing vegetable intake among children, as a way for the vegetable industry to work with organisations pursuing public health goals.

The project identified key areas for industry investment, including:

- collaboration with other stakeholders;
- publishing and endorsing best-practice guidelines for community initiatives;
- researching new initiatives to encourage vegetable consumption; and
- influencing policy changes.

To read the project's full final report on the InfoVeg database, please **click here**.

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#### The Front Line: Biosecurity R&D

In May 2015, routine surveillance detected two vegetable leafminer (*Liriomyza sativae*) larvae in a backyard garden in the Cape York Peninsula community of Seisia.

Vegetable leafminer affects a broad range of vegetables and ornamentals. Damage is primarily caused by larvae feeding under the surface of leaves and petioles. Typically, this feeding causes mines, which appear as silvery lines on leaves. Higher levels of infestation can affect photosynthetic ability, leading to reduced plant growth and crop yield.

In response to this detection, the Consultative Committee on Emergency Plant Pests (CCEPP) has established a separate group that is working with industry to develop delimiting surveillance protocols, investigate control options, and raise public and industry awareness of the pest.

AUSVEG is investigating preparedness measures for the vegetable industry, including seeking the necessary minor use permits for control of this pest on vegetable crops from the APVMA.

Any unusual plant pest should be reported immediately to the relevant state/territory agriculture agency through the Exotic Plant Pest

Hotline (1800 084 881). Early reporting increases the chance of cost-effective control and eradication.

Additionally, AUSVEG has released an online biosecurity quiz as part of its efforts to increase awareness surrounding the importance of good biosecurity practices on-farm. The first 150 growers to complete the quiz and score over 80 per cent will receive a free 900mmx600mm corflute biosecurity gate sign. To take the quiz, please click here.

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#### **Dollars & Sense: Economic update**

The vegetable industry is in a period of consolidation, with the number of vegetable growing businesses declining over the last few years.

Increased labour costs and low prices are seen to be constraining the bottom line for vegetable growers, which makes business unviable for many of the smaller growers in the industry.

According to recent ABS figures, vegetable growers with an estimated value of agricultural operations (EVAO) of \$5,000 or more decreased by over 10 per cent from 2011-12 to 2013-14.

This may be due to larger vegetable growers taking up more of the market share as a result of economies of scale, which acts as a cushion to rising production costs.

This effect is demonstrated by the sweet corn industry, as seen in **the latest Veggie Stats**: the number of sweet corn growers has decreased by 38% since 2010-11, yet gross value has only marginally decreased, showing us that larger growers are attaining a larger slice of the pie.

Additionally, larger growers are better equipped to take advantage of export markets, putting them in a position to capitalise on opportunities in Asian markets as they develop into the future.

AUSVEG is developing a discussion paper on the financial performance of different sized farms, which will demonstrate the concept of economies of scale and compare financial indicators. This will be released in August.

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### InfoVeg R&D Update



#### **In This Edition**

Welcome to the latest InfoVeg R&D Update!

In this edition we look at the freshest updates from levy-funded industry R&D, including:

- the latest Project Harvest data from Colmar Brunton on eighteen different vegetable commodities;
- the latest Nielsen Homescan market and consumer data; and
- a Veggie Stats report on peas.

We also investigate results from the following levy-funded R&D projects:

- VG14031 New product development information for the vegetable industry;
- VG13110 Economic modelling of the vegetable industry;
- VG13109 Innovative ways to address waste management on vegetable farms; and

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Economic modelling

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Farm software evaluation

**The Front Line** 

• VG13106 Evaluation of commercially available farm management software programs for the vegetable industry.

Finally, in the biosecurity section *The Front Line*, we highlight recent findings about the link between Downy mildew and *E. coli*.

Please enjoy this edition of the update. You can use the quick links in the sidebar to jump to any section of the newsletter.

#### **Project Harvest updates**

The Project Harvest study tracks consumer attitudes to vegetable purchases over time to capture an indepth snapshot of the Australian fresh vegetable market.

The latest Project Harvest reports are now available for download on the AUSVEG website. They contain consumer data from May, June and July 2015 and track a broad range of commodities, including Asian vegetable varieties, baby broccoli, beans, capsicum, beetroot, and more.

The reports feature key industry insights into the financial success of "superfood" vegetable commodities, with a particular focus on the proliferation of products containing beetroot following consumer recognition of its health benefits.

The reports also look at how consumers feel about vegetable provenance, including an analysis of how they rank the quality of vegetables from a range of importing nations, and investigate how much more consumers are willing to spend for particular value-added products.

Please click below for the full reports from:

- May 2015 (first release): covering Asian vegetable varieties, beetroot, capsicums and sweetpoatoes.
- May 2015 (second release): covering baby broccoli, beans, carrots, cauliflower, parsley, pumpkin and silverbeet.
- <u>June 2015</u>: covering broccoli, chillies, corn, green peas, kale, leeks, and lettuce.
- July 2015: covering cabbage, celery, cucumber, eggplant, radish, spring onion and zucchini.

### Latest InfoVeg reports

#### VG13106

Evaluation of commercially available farm management software programs for the vegetable industry

#### VG13109

Innovative ways to address waste management on vegetable farms

#### VG13110

Economic modelling of the vegetable industry

#### VG14035

Health claims in food advertising

#### VG14040

Scoping study of a disorder that reduces shelf life and consumption of green beans

#### VG14700

ASDS8 - Conference support for vegetable specialists

#### VG14709

PIRSA Netherlands Trip

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# **Nielsen consumer reports**

The latest Nielsen reports are available for download on the AUSVEG website. These reports use Nielsen Homescan data to analyse the vegetable-buying habits of Australian consumers, providing an indepth look at the purchasing trends and demographics of the Australian fresh vegetable market.

These reports include commodity-specific reports, opportunity calculators and analysis of consumer behaviour.

The latest reports cover vegetable commodities including Asian vegetables, beans, broccoli, cabbage, capsicum, carrots, cauliflower, celery, cucumber, fresh salad, lettuce, pumpkin, sweet corn, sweetpotato and zucchini.

To read the latest releases of Nielsen reports, click below:

- For July reports, please click here.
- For August reports, please click here.
- For September reports, please click here.

To view all Nielsen reports for 2015, please <u>click</u> here.

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# **Veggie Stats: Peas**

The Veggie Stats series has been developed to enable deeper insights of the performance of key Australian vegetable commodities. The latest edition profiles the pea industry and has been released in the newest edition of *Vegetables Australia*. This edition includes domestic market and trade data from the 2014-15 financial year.

Since 2010-11, the GVP of fresh pea production has

increased by 5 per cent, while the GVP of processed pea production has increased by 22 per cent. However, exports for both commodities are down over the same period.

The full Veggie Stats report, with a comprehensive analysis of Australia's pea production (both fresh and processed), is available from the InfoVeg database. To download a copy of the report, please **click here**.

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# VG14031 - New product development information for the vegetable industry

The development of value-added products is a key strategy for any vegetable-growing operation looking to increase their productivity and appeal to modern consumers looking for convenience and new tastes.

However, the transition from growing vegetables to new product development (NPD) can be difficult to navigate for growers and the financial risk can often outweigh the potential reward.

This levy-funded project has developed a best practice "how-to" guide for Australian vegetable growers to take the risk out of new product development, including tips on how to scope out potential products and protect intellectual property.

The project has also developed a Resources Guide which lists suppliers of goods and services required during NPD, including packaging suppliers and contract manufacturers.

The guides were launched at a workshop on Monday 31 August, and will be made available to the industry in the coming weeks. For more information, please contact AUSVEG at <a href="mailto:info@ausveg.com.au">info@ausveg.com.au</a>.

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# VG13110 - Economic modelling of the vegetable industry

A constantly-evolving economic landscape means that Australian vegetable growing operations must be aware of, and be prepared for, potential developments that could have impacts on their financial performance.

This economic modelling, undertaken by Econtech Pty Ltd, simulates seven scenarios affecting levied vegetable growing, including increased export market access, lower vegetable import prices, and the introduction of GST on unserved vegetables.

The modelling uses Independent Economics' Independent Extended CGE model, which incorporates a highly detailed treatment of business taxation and 288 industries overall - including 15 vegetable-growing industries, instead of the two broad industries used by modelling which employs standard ABS tables.

To read the full final report on the InfoVeg database, please **click here**.

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# VG13109 - Innovative ways to address waste management on vegetable farms

Vegetable production can create large amounts of unwanted materials and waste products. While dealing with this waste is often not a priority for individual growers, inappropriate waste management can cause serious issues at the industry level.

While supply chains exist for plastics processing in some areas, the options are not always cost-effective; additionally, there are technological barriers to processing some key plastics, particularly plastic mulch.

This levy-funded project, undertaken by RMCG, aimed to identify alternatives to plastic use and recycling which could contribute to continuous improvement in farm management practices, efficiency and sustainability.

The report highlights recycling technology as a key area for potential R&D investment, and suggests that the horticulture industry work with plastic processors during the development of degradable plastics to

ensure the production of fit-for-purpose plastics.

An article on this project also appears in the latest edition of *Vegetables Australia*. To read the full final report on the InfoVeg database, please **click here**.

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# VG13106 - Evaluation of commercially available farm management software programs for the vegetable industry

Australian vegetable growers are adopting new farm management practices to maintain their productivity in changing seasonal and market conditions. As new technologies emerge, growers need to be able to identfy the best options for their operations, as well as have the capacity to adopt them effectively.

In this project, TQA Australia compiled a list of farm management software programs for growers to use in identifying the most appropriate tool for their operations. The software in the list, called the Farm Management Software Program Matrix, covers a range of functions - from crop management to farm mapping and social media.

Recommendations from the project include increased government investment in technologies which enable or increase the effectiveness of farm management software, such as high-speed broadband, and further industry training and extension programs regarding the use of farm management software.

The latest edition of *Vegenotes*, distributed with *Vegetables Australia*, also offers an in-depth profile of this project, including an interview with project leader Belinda Hazell.

The full list of software developed by the project is available as an appendix in the project's final report, and can be found <a href="https://example.com/here">here</a>. To read the project's full final report on the InfoVeg database, please <a href="click">click</a> <a href="here">here</a>.

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# The Front Line: Biosecurity R&D

Scientists from a United States Department of Agriculture agency have found that the presence of Downy mildew increases the chance of *E. coli*bacteria infecting the plant.

The Agricultural Research Service's Maria Brandl and Ivan Simko have collaborated to identify that under warm temperature and on wet leaves, *E. coli*multiplies far greater in downy mildew lesions than on healthy lettuce leaf tissue. On dry lettuce leaves, *E. coli* still persists in greater numbers on leaves where downy mildew disease is present.

The researchers have also found that *E. coli* did not grow as well on downy mildew lesions on a lettuce line bred by Simko and a colleague to be less susceptible to the disease, compared to its growth on Triple Threat, a commercial variety which is highly susceptible to downy mildew.

The exact factors behind these findings are yet to be fully explored. For more information, please see<u>their</u> press release here.

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# InfoVeg R&D Update



# **In This Edition**

Welcome to the latest InfoVeg R&D Update!

In this edition we look at the freshest updates from levy-funded industry R&D, including:

- the latest Project Harvest consumer research from Colmar Brunton;
- a Veggie Stats report on beans; and
- the final report on Nielsen consumer research for the vegetable industry.

We also investigate results from the following levy-funded R&D projects:

- VG13081 Prioritisation of vegetable crop commodities and activities for mechanisation;
- VG13079 Weed management for the vegetable industry; and
- VG12087 Updating and republishing valuable vegetable industry resources.

We also look at CropLife's new web tool to help farmers access resistance management strategies.

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**Veggie Stats** 

Nielsen research

**Veg Pest ID** 

Weed management

Priority crops for mechanisation

Resistance management

**The Front Line** 

**Dollars & Sense** 

In the biosecurity section *The Front Line*, we look at a new project targeting Mediterranean fruit fly, and in the *Dollars and Sense* Economics column, the AUSVEG Economist discusses the importance of maximising labour productivity in the Australian vegetable industry.

Please enjoy this edition of the update. You can use the quick links in the sidebar to jump to any section of the newsletter.

# **Project Harvest update**

The Project Harvest study tracks consumer attitudes to vegetable purchases over time to capture an in-depth snapshot of the Australian fresh vegetable market.

The latest Project Harvest reports are now available for download on the AUSVEG website, containing data from September and October 2015 and tracking consumer sentiment regarding purchases of Asian vegetables, baby broccoli, beans, beetroot, Brussels sprouts, capsicum, carrots, cauliflower, parsley, parsnips, pumpkin, silverbeet, spinach, and sweetpotatoes.

The reports also contain ad hoc research investigating consumer sentiment regarding preprepared and pre-packed vegetables and their perceptions of vegetable quality and freshness from various retailers, as well as industry insights into the rise of "Millennials" (born between the early 1980s and the early 2000s) as vegetable consumers.

To read the Project Harvest for September 2015, please <u>click here</u>. To read the Project Harvest for October 2015, please <u>click here</u>.

To view all Project Harvest reports for 2015, please <u>click here</u>.

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# **Veggie Stats: Beans**

The Veggie Stats series has been developed to enable deeper insights of the performance of key

# Latest InfoVeg reports

#### VG12022

Managing biting fly in vegetable crop residues

### VG12074

Generation of residue and crop safety data for pesticide minor-use applications in vegetable crops

#### VG12087

Updating and republishing valuable vegetable industry resources

### VG13048

Market analysis and strategy: broccoli to Japan

#### VG13053

Develop vegetable industry occupational health and safety resources

### VG13079

Weed management for the vegetable industry scoping study

#### VG13081

Prioritisation of vegetable crop commodities and activities for mechanisation

### VG13088

Baseline demographic research for the vegetable industry

#### VG13116

2015 Global Innovations in Horticulture Seminar

#### VG14034

Review of regulatory export barriers for

Australian vegetable commodities. The latest edition profiles the bean industry and has been released in the newest edition of *Vegetables Australia*. This edition includes domestic market and trade data from the 2014-15 financial year.

Since 2010-11, exports of fresh beans have risen in value by over 50 per cent, leading to a record export value of over \$5.4 million in 2014-15. However, the gross value of bean production has decreased by 12.3 per cent over the same period.

The full Veggie Stats report, with a comprehensive analysis of Australia's bean production (both fresh and frozen), is available from the InfoVeg database. To download a copy of the report, please <u>click here</u>.

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# VG13088 - Baseline demographic research for the vegetable industry

From August 2014 to September 2015, Nielsen Australia produced a series of consumer research reports which aimed to provide the vegetable industry with baseline demographic research.

These reports, <u>made available on the AUSVEG</u> <u>website</u>, covered 15 vegetable commodities: fresh salad; lettuce; carrots; broccoli and baby broccoli; capsicum; cucumbers; pumpkin; sweetpotato; zucchini; cauliflower; beans; sweet corn; celery; cabbage; and Asian vegetable varieties.

For each commodity, Nielsen prepared a suite of reports:

- Regular Analyses analysing monthly trends (eight per commodity).
- **Reports** summarising the performance of the commodity (four per commodity).
- Opportunity Calculators estimating potential retail revenue that could be generated by improving key indicators (one per commodity).
- Deep Dives analysing the previous two years of a commodity's performance to

Australian vegetable growers

VG14061
Vegetable industry education and training gap analysis

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benchmark the industry against its objectives (one per commodity).

These reports provide the vegetable industry with a detailed view of the market and a complete view of shopper behaviour, including an understanding of the relationships between the performance of different vegetable commodities. The data compiled can also be used as a benchmark to measure future success.

The final report for the project looks at the overall methodology behind the project and its outputs, and is now available on the InfoVeg database. To read the report, please <u>click here</u>.

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# VG12087 - Updating and republishing valuable vegetable industry resources

Over many years, a wide range of resources, tools and guidance materials for growers have been developed by the Australian vegetable industry, as well as by Government departments, private companies and HAL/HIA. However, many of these resources are no longer useable - they may be out of print, contain outdated information, or have been published in a format which is now inaccessible to growers.

In this project, Applied Horticultural Research worked to collate, review, and republish outputs from previous vegetable industry projects to ensure the valuable information they contain is not lost to the industry.

A key result from this project has been the creation of the Veg Pest ID app - a completely new method of providing information to the vegetable industry. With 250 entries and over 880 photos covering 84 diseases, 67 disorders and 99 insect pests and beneficials, this app is a valuable searchable database for any vegetable grower.

The project has also developed five guides to pests, diseases and disorders of sweetpotato, sweet corn, babyleaf vegetables, brassica vegetables, and carrots, celery and parsley.

For a copy of AHR's plant pest guides, please visit

**their website**. For a full list of smartphone and tablet apps that can help you with your farming operations, including the Veg Pest ID app, please visit AUSVEG's guide to smartphone and tablet apps by **clicking here**.

To read the project's full final report on the InfoVeg database, please <u>click here</u>.

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# VG13079 - Weed management for the vegetable industry

Vegetable production has high potential for weed growth due to a number of major features of the production process, including frequent cultivation, irrigation and the addition of large quantities of nutritional inputs.

In consultation with the Australian industry, the University of New England undertook this project to identify the most significant weed species in Australian vegetable production and the methods currently used to control them, find gaps in current knowledge of weed control, discover potential lessons from other industries, and identify the most important RD&E issues in the area of weed management.

Key priorities identified by the project include R&D into herbicide resistance and new herbicide options, the promotion of efficient herbicide use, development of minor use herbicide permits and working on region-specific extension programs.

For information on AUSVEG's Minor Use Awareness Program, which looks to ensure Australia's minor use system adequately reflects the crop protection needs of vegetable growers, please **click here**.

To read the full final report for the project on the InfoVeg database, please <u>click here</u>.

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# vegetable crop commodities and activities for mechanisation

Compared to many exporting countries, Australia is a high-cost producer of vegetables. In particular, labour is a major production cost for Australian growers compared to their international counterparts, making up 30 per cent of total farm costs on average. The adoption of mechanisation and automation technology presents an opportunity to alleviate some of this cost pressure.

However, due to the variety and diversity of commodities produced by the Australian vegetable industry (including significant variability in factors like growing environments, size of actual crop units and overall suitability for mechanisation), it is important to prioritise particular crops to ensure a satisfactory return on investment in the technology needed to mechanise or automate the production of that commodity.

In prioritising crop commodities, the Tasmanian Institute of Agriculture (TIA) considered several factors, including overall production value, production tonnage and area of production, and number of enterprises growing that commodity. They also analysed the potential for industry expansion, the opportunities for cross-industry collaboration, a crop's general suitability for mechanisation across various activities (such as transplanting and harvesting), and possible whole-of-industry benefits.

The TIA concluded that for both harvesting and transplanting, lettuce and broccoli are priority crops. They also found that there are some key generic fields of R&D where investment could provide benefit across many industry sectors - namely, controlled traffic farming, robotics, machine vision and sensors.

To read the full final report on the InfoVeg database, including the complete analysis of potential financial benefits from mechanising key crops, please <u>click here</u>.

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**CropLife Resistance Management Strategies web tool** 

CropLife Australia have introduced an innovative new web tool to improve access to resistance management strategies for fungicides, herbicides and insecticides.

Farmers, environmental land managers and other agricultural chemical users are able to use the new web tool to search for and locate best-practice strategies on managing pests, weeds and crop diseases sustainably.

With hundreds of millions of dollars invested every year by the plant science industry to ensure economically viable and environmentally sustainable crop protection solutions, it is vital that chemistry is used according to registered purposes and in accordance with approved labels.

To access the Resistance Management Strategies web tool, please <u>click here</u>.

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## The Front Line: Biosecurity R&D

Western Australian reseachers are set to trial new technology to combat the destructive fruit pest, Mediterranean fruit fly (or "Medfly"), in a project funded by the Department of Agriculture and Food WA (DAFWA) and HIA.

The trial will involve a Medfly strain sourced from United Kingdom company Oxitec, with imported eggs that have been reared in an approved facility at the Department.

The trial bears similarities to the sterile insect technique, which uses radiation to render male flies sterile and releases them to disrupt the breeding cycle of fruit fly populations.

Instead of radiation, however, this technique uses genetically modified male Medflies. When they mate, these flies pass on a self-limiting gene to their female offspring so they do not reach maturity or lay eggs in fruit, which could dramatically reduce the next generation of Medly.

To read the DAFWA media release announcing the trial, **click here**.

# **Dollars & Sense: Economic update**

Interest rates are the lowest that they have been for 25 years. In comparison, hired labour costs have grown by over 27.2 per cent since 2011-12, representing a 19.61 per cent share of average total farm costs in 2013-14. Given these statistics, maximising productivity has never been more important - growers need to ensure that vital funds spent on labour are producing adequate returns for their business.

The productivity of labour can have a significant effect on grower margins, which have declined by over 33 per cent per farm nationally since 2011-12. By enhancing the amount of output produced per labour input in the production process, farmers are not only able to increase their yield per harvest, but can also improve their profit margins by reducing the impact of hired labour costs on their bottom line.

One method of increasing labour productivity is to increase farm investment into capital, such as by increasing the mechanisation of farm operations. Given the current low interest rates on loans, debt financing for the investment of capital goods in order to increase labour productivity is an important business strategy that can be used to combat rising labour costs.

This idea has several key factors that need to be taken into deep consideration before obtaining additional investment funds. These factors include interest costs, wage costs, current business confidence and equity ratios. In the January/February edition of *Vegetables Australia*, AUSVEG Economist Andrew Kruup will explore the issue of labour productivity in greater detail, highlighting and explaining important economic statistics and business considerations.

To read the latest edition of *Vegetables Australia*, or to read previous editions of *Vegetables Australia*, *Potatoes Australia* and *Vegenotes*, please <u>click here</u>.

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# InfoVeg R&D Update



# **In This Edition**

Welcome to the latest InfoVeg R&D Update!

In this edition we look at the freshest updates from levy-funded industry R&D, including:

- the latest Project Harvest consumer research from Colmar Brunton;
- a compilation report of ad hoc questions asked by Colmar Brunton during the monthly Project Harvest surveys;
- VG13051 Develop vegetable industry occupational health and safety resources;
   and
- a fact-sheet summarising the habits of the average Australian vegetable buyer.

Finally, in the biosecurity section *The Front Line*, we look at a new import conditions for seed potatoes in Victoria and South Australia, and in the *Dollars & Sense* Economics column, the AUSVEG Economist discusses risk management in the Australian vegetable industry. We also provide a link to the latest edition in the *Veggie Stats*series, profiling chillies.

Quick links

**Project Harvest** 

Ad hoc report

**OHS resources** 

Consumer snapshot

**The Front Line** 

**Dollars & Sense** 

View More
R & D REPORTS

Please enjoy this edition of the update. You can use the quick links in the sidebar to jump to any section of the newsletter.

# **Project Harvest update**

The Project Harvest study tracks consumer attitudes to vegetable purchases over time to capture an in-depth snapshot of the Australian fresh vegetable market.

The latest Project Harvest research is now available for download on the AUSVEG website, containing data from November 2015 and tracking consumer sentiment regarding purchases of broccoli, chillies, corn, green peas, kale, leeks and lettuce.

The reports also contain ad hoc research investigating consumer perceptions about wastage of their fresh vegetable purchases, showing that while there has been a slight increase in wastage of fresh vegetables, overall wastage still remains relatively minimal.

Industry insight in these reports also reveals that 58% of respondents to the Australian Health Survey think that unhealthy diets are an issue for children, reflecting the fact that children are consuming, on average, only 2.4 serves of vegetables per day. The report suggests that children are deterred by vegetables with bitter, sour, tart or aniseed flavours, and that offering them vegetables with blander or sweeter flavour profiles may help to increase their vegetable consumption.

To read the full Project Harvest report for November 2015, please <u>click here</u>.

To view all Project Harvest reports for 2015, please <u>click here</u>.

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# Project Harvest ad hoc compilation report

Every month, the levy-funded consumer research program Project Harvest delivers tracking data on consumer attitudes regarding their purchases of a



range of fresh vegetable commodities.

Colmar Brunton, the team behind the study, also ask fresh ad hoc questions every month about aspects of consumer attitudes beyond the scope of the tracking data: What drives consumers to buy new vegetables? How do they store, clean and prepare their produce? Where do they draw their cooking inspiration from?

This compilation report brought together the responses to over two years' worth of ad hoc research across a range of categories to paint a picture of what drives the modern Australian vegetable consumer.

The full report is available from the InfoVeg database. To read the report, please <u>click here</u>.

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# VG13053 - Develop vegetable industry occupational health and safety resources

In 2012 a research project titled "Review of skills and training in the vegetable industry" identified that occupational healthy and safety (OHS) was a skill weakness among vegetable growers. This led to the development and delivery of a project to develop OHS resources for the vegetable industry, conducted by RMCG.

The project aimed to move OHS information from a "system-based approach" to a "task-based" approach, allowing growers to select OHS resources by individual tasks relevant to their operations and move from there to self-assessment and developing risk management policies and procedures.

After consulting with vegetable growers and reviewing existing management systems and resources in the industry, RMCG has developed a suite of tools for growers to use to help them improve OHS practice on-farm and in the packing shed. This suite of tools includes a Safety Management System, 72 tasks with safe work assessments and procedures, and diagrammatic, pictorial and LOTE tools.

The resources developed by the project have been

made available to levy payers on USB sticks, which can be obtained by emailing AUSVEG atinfo@ausveg.com.au. The project's final report is also available on the InfoVeg database. To read the full report, please click here.

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# Project Harvest one-shot: the average vegetable buyer

In 2015 Colmar Brunton, who undertake consumer research for the vegetable industry, produced a consumer segmentation study which used the findings of their monthly Project Harvest research to identify four key categories of vegetable consumers in Australia.

AUSVEG and HIA recently asked Colmar Brunton to use this in-depth cross-section of the market to create an overview of the average vegetable buyer in Australia. This overview creates a profile using data ranging from demographic information on gender, age and income to more societal influences, like entertainment choices, and financial information like average spend on vegetables.

This overview is now being made available to industry to provide a snapshot of the average Australian vegetable buyer, their buying habits and what motivates their vegetable choices. The snapshot is available from the InfoVeg database. To view the snapshot, please click here.

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# The Front Line: Biosecurity R&D

Biosecurity South Australia and the Victorian Department of Economic Development, Jobs, Transport and Resources will be imposing Potato spindle tuber viroid (PSTVd) testing regulations for seed potatoes entering their states.

PSTVd is a highly contagious pathogen of solanaceous crops that can be transmitted

between plants by touch. The use of cutting or pruning tools, contaminated machinery or physical contact between plants can spread the viroid. Additionally, PSTVd can remain infectious in seeds for long periods of time and can even be passed from one generation to the next through infected tubers.

Typical symptoms of severe infections include colour changes in the foliage, stunted leaf growth, and spindle like elongations. Sprouting can also be delayed and progress at a slower rate than in unaffected potatoes. It is important to maintain good biosecurity practice on-farm to prevent plant pathogens from impacting crops.

To read the new conditions for entry for Victoria, <u>click here</u>. To read the new conditions for entry for South Australia, <u>click here</u>.

New South Wales will also be imposing conditions in the coming weeks. AUSVEG will continue to provide industry with updates. For further information regarding import conditions and area freedom please contact either:

- AUSVEG National Manager Scientific Affairs, Dr Jessica Lye (jessica.lye@ausveg.com.au)
- AUSVEG Assistant National Manager Scientific Affairs, Mr Nicholas Schmidt (nicholas.schmidt@ausveg.com.au)

These staff members can also be reached by phone on (03) 9882 0277.

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# Dollars & Sense: Economic update

Risk is defined as a situation involving exposure to danger under conditions of uncertainty. We can see that in horticulture, there are many decisions that are made by growers under conditions of uncertainty that could expose their businesses, and therefore their livelihoods, to financial danger. This is because risk plays a large role in determining the variation in yearly profits.

Why doesn't a farm with a consistent area harvested and a consistent crop yield therefore

consistently make the same profit every year? It may be due to the uncertainty of future prices for the crop produced, it could be due to variation in input prices (such as labour), or it could be because of a recent drought that is effecting the industry. All of these examples involve situations of uncertainty that can damage a growing operation's financial stability and that could ultimately threaten to reduce business longevity.

It is clearly important to account for risk within business strategies and planning. It is also important to be able to understand the different types of risk and how their potential effects can be minimised. Some of the techniques available to growers include crop diversification, insurance, contingency planning and expected value calculation.

In the next edition of *Vegetables Australia*, AUSVEG Economist Andrew Kruup will discuss the effects of risk and the tools available to growers in order to minimise the harm it can create to income variability. Keep an eye out for the March/April edition of *Vegetables Australia* to read this article.

The AUSVEG Economist also continues to publish new editions in the *Veggie Stats* series, providing snapshots of the financial performance of vegetable commodities. The latest edition, profiling chillies, is now available - to download it, please <u>click here</u>.

For more information on economic matters, please contact Andrew Kruup on (03) 9882 0277.

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### 4. Selection of articles by the AUSVEG Economist in Vegetables Australia

# 4.1 "Summing up: The Federal Budget outcomes for agriculture" (July/August 2013)



FORMER TREASURER WAYNE SWAN HANDED DOWN THE FEDERAL BUDGET ON 14 MAY 2013, WHERE HE CHARTED A RETURN TO A BUDGET SURPLUS THROUGH GREATER SPENDING RESTRAINT. IT WAS A MIXED RESULT FOR THE AGRICULTURE SECTOR AS TIGHTENING ON THE PUBLIC PURSE KICKED IN, WRITES AUSVEG ECONOMIST, BEN LOE.



In the 2013 Federal Budget, agriculture was spared major funding cuts. The big news for agriculture was a new Farm Household Allowance to support farmers in hardship and a Farm Finance package to alleviate debt pressures and provide financial assistance to farmers.

#### National Drought Program Reform

The Federal Government announced a \$99.4 million investment over four years for a new Farm Household Allowance, under the National Drought Program Reform. This investment will provide much needed assistance to farm families during periods of hardship and support farmers in preparing for future challenges, including drought. Eligible farmers and their partners will receive up to three years of fortnightly income support paid at the Newstart Allowance rate.

A national approach to farm business training and a coordinated approach to social support services were also announced as part of the reform.

#### Farm Finance

The Budget unveiled a Farm Finance package to help farmers restructure their debts. Concessional loans of up to \$650,000 will be available to eligible farm businesses, at an interest rate of 4.5%, adjusted according to prevailing economic conditions. \$420 million has been committed over two years towards the loans, with the states and the Northern Territory receiving \$60 million each.

Farm Finance is expected to provide some short-term relief to farmers, especially those in financial distress and finding it difficult to obtain finance for the next year. The package provides an extra 17 financial counsellors to work with agricultural businesses. A tax relief deposit scheme to help farmers manage fluctuations in their income will be overhauled, including raising the off-farm income threshold from \$65,000 to \$100,000.

#### Cost shifting

While some new assistance was announced, other areas have seen their funding cut. Funding for programs, such as the Biodiversity Fund to promote reforestation and revegetation and the Caring for Our Country program focused on sustainable agriculture and environment, have been reduced.

The money for these programs was reallocated into other government priorities, with \$141.5 million redirected from the Caring for our Country program to fund the Farm Household Allowance.

#### Investment in the environment

The Budget allocates \$25 million over five years towards a pilot National Produce Monitoring program that will monitor the use of chemicals on Australian crops. It will help identify risks associated with the use of agricultural chemicals not already being assessed. While this is good for local produce, it

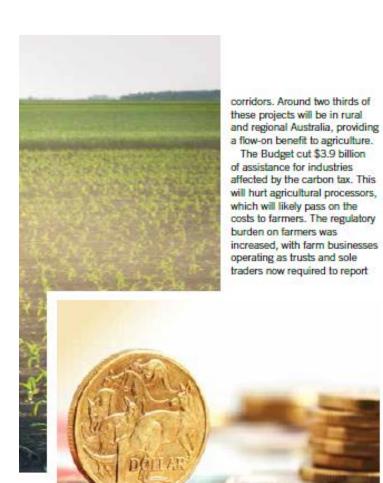
will not cover any produce that is imported.

Other initiatives announced include \$669 million to be distributed over five years to regional Natural Resource Management organisations to enhance and maintain Australia's biodiversity and environment and \$429 million for the Carbon Farming Futures program, which converts abatement and greenhouse gas reduction research for use on farms.

A further \$200 million will be invested over five years in the next phase of the Reef Rescue program under Caring for our Country to assist land managers across the reef catchment to adopt improved agricultural and urban management practices. There is also money allocated to assist communities affected by floods and continued investment in Australia's biosecurity system program.

#### Other outcomes

The Budget makes a substantial \$24 billion investment in road and rail, including freight



PAYG monthly.

Relocation grants will be offered to skilled workers and apprentices to encourage them to move to rural areas with farming and mining labour shortages. However, application fees for 457 visas will almost double to \$900, which may discourage rural businesses looking to hire overseas labour.

#### More to be done

Many initiatives announced in the Budget were already announced in the lead up to the Budget, such as the Farm Household Allowance and the Farm Finance Package.

The Budget does not provide any additional money for research. The Government's commitment to match research and development funding remains unchanged. However, without additional funding for research, Australia's agricultural sector may find it difficult to improve its productivity and compete on the world stage.

Pressing long-term economic

issues faced by the industry remain increased input costs and competition from producers in other countries.

# THE BOTTOM LINE

- Former treasurer Wayne Swan delivered the Federal Budget on 14 May 2013, charting a return to surplus through greater spending restraint.
- A new Farm Household Allowance to support farmers in hardship was announced.
- Also announced was a Farm Finance package, designed to alleviate debt pressures and provide financial assistance to termore



AUSVEG Economist Ben Loe (03) 9882 0277 Project Number: VG12071

This project has been funded using the National Vegetable Levy and matched funds from the Australian Government. Australian vegetable export opportunities in Asia

GROWTH IN AUSTRALIAN VEGETABLE EXPORTS HAS REMAINED RELATIVELY STAGNANT IN RECENT YEARS, WITH ONE NOTABLE EXCEPTION. OVER THE PAST DECADE, SALES TO ASIA HAVE INCREASED CONSIDERABLY, WITH EXPORTS TO CHINA ALONE GROWING BY 378 PER CENT IN JUST THE PAST SIX YEARS. WITH RELATIVELY FEW DOMESTIC VEGETABLE GROWERS CURRENTLY EXPORTING COMPARED TO OTHER HORTICULTURAL INDUSTRIES, AND A GROWING ASIAN MIDDLE CLASS SHOWING SOME WILLINGNESS TO SPEND ON QUALITY PRODUCE, AUSVEG ECONOMIST SHAUN MUSCAT REPORTS THE REGION WILL LIKELY PRESENT FUTURE EXPORT OPPORTUNITIES FOR AUSTRALIAN PRODUCERS.

Many Australian vegetable growers are facing significant cost pressures, partly due to the market dominance of major retailers and increasing cheaper imports. To overcome these pressures, a number of Australian growers have begun to recognise that the rising affluence of the Asian region is presenting unprecedented opportunities, scope for future growth, and the ability to

compete on the basis of quality, branding and reputation. In this article, we examine Australia's vegetable export trends to Asia and the opportunities and challenges that exporting vegetables to the region presents.

State of the export market Australian vegetable exports
currently make up a very
small proportion of Australian
agricultural exports. Only four
per cent of growers currently
sell vegetables overseas,

Australia
have rem
totalling a
in 2012-1
Zealand vegetables vegetables

significantly less than other

agricultural industries, leaving

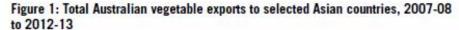
scope for immense expansion.

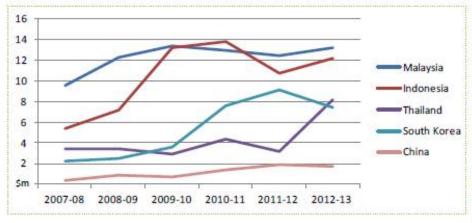
Over the past seven years,

Australia's vegetable exports have remained reasonably flat, totalling around \$249 million in 2012-13. In 2011-12, New Zealand was Australia's largest vegetable export market but has since been overtaken by Japan in 2012-13, with a total value of \$51 million.

Despite stagnant growth in overall Australian vegetable exports over the past decade, sales to Asia have increased considerably. As shown in Figure 1, there has been an increasing trend of Australian vegetables exported to Asian countries over the past six years and this trend is expected to continue. For example, exports to Thailand, Indonesia and South Korea have more than doubled to \$8 million, \$12 million and \$7 million respectively in the past six years.

Australian vegetable exports to China have also increased considerably, by 378 per cent, to around \$1.8 million over the past six years. China provides enormous future potential for Australian vegetable growers. The real value of world agrifood demand in 2050 is projected to be 77 per cent higher than in





Source: Global Trade Information Service, sourced from ABS International Trade data; 2012-13

2007, with 43 per cent of this future demand deriving from the Chinese market alone (Veriy Linehan et al).

Traditionally, Australia's total vegetable exports have predominately focused on fresh vegetables. A similar story arises with Australia's vegetable exports to Asia. In 2012-13, approximately 65 per cent of Australia's total vegetable exports to Asia were fresh vegetables. Australia's exports of fresh and processed vegetables to Asia have increased by 36 per cent and 101 per cent respectively in the six years to 2012-13. This demonstrates Asian consumers have a willingness to pay higher prices for quality produce and pre-packed products that offer greater convenience.

### Opportunities and challenges

An expanding Asian middle class with increasing incomes and populations will lead to additional demand for quality and safe vegetables over the next 40 years. There are predictions that higher-income consumers in Asia will spend up to five times more on high quality food products compared to lower income brackets. This demand for quality products presents Australian vegetable producers with the opportunity to pursue these export markets based on the renowned quality of our produce, as opposed to solely competing with other exporting countries on price. This has been demonstrated in Singapore, where Australian

carrots hold the largest market share, despite costing considerably more than carrots from China.

Although Australian growers are well positioned to target these Asian markets, there are many challenges, particularly given Australia's labour and marketing costs are among the highest in the world. Many of the major challenges to vegetable exports include, competition from other exporting countries, high transportation costs, a strong Australian dollar, building relationships, and trade barriers in foreign markets. However, the recent decline of the Australian dollar and the ongoing efforts to remove trade barriers will enable Australian vegetable exports to be more cost competitive and allow easier international market

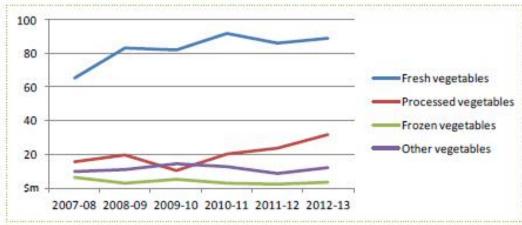
access.

Many vegetable growers are beginning to realise that the future viability of the industry lies in its ability to build exports. The key to this is building relationships and trust between domestic growers and overseas customers. The vegetable industry has an important role to play in working together with growers to deliver research and development work that supports the growth of export opportunities.

For more information on Australia's exporting opportunities, please refer to the AUSVEG website where you can find a discussion paper (under the Resources tab) titled 'Australian Vegetable Export Opportunities 2013'.

Reference: Veriy Linehan et al. ABARES, "Food Demand to 2050 – Opportunities for Australian Agriculture," 2012. Conference paper presented at 42nd ABARES Outlook conference 6-7 March 2012, Canberra: 1

Figure 2: Types of Australian vegetable exports to Asia



Source: Global Trade Information Service, sourced from ABS International Trade data, 2012-13

# BOTTOM LINE

- The rising affluence of the Asian region presents Australian vegetable growers unprecedented export opportunities, scope for future growth, and the ability to compete on the basis of quality, branding and reputation.
- Over the last six years, there has been an increase in vegetable exports to Asian countries and this is expected to continue.
- Although Australian growers are well positioned to target these Asian markets, there are a number challenges, however, many vegetable growers are beginning to realise that the tuture viability of the industry lies in its ability to build exports.



AUSVEG (03) 9882 0277 Project Number: VG12071

This project has been funded by HAL using the National Vegetable Levy and matched funds from the Australian Government.

# Fluid economics

AUSVEG ECONOMIST SHAUN MUSCAT EXAMINES IRRIGATION AND WATER USE.

fficient irrigation of vegetables is critical in ensuring vegetable growers maximise their yields and reduce their water costs. Improving water efficiency is essential to vegetable growers since the majority of vegetables

irrigated. The average area of irrigated vegetable crops accounted for 94 per cent of the total area sown for vegetables in 2011-12.

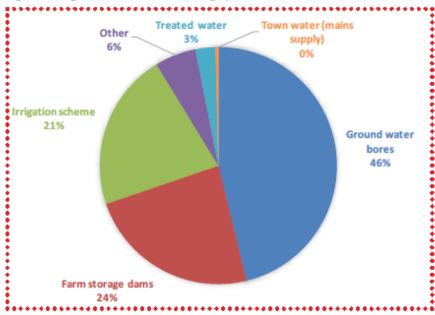
A key trigger and motivation for farmers to invest in water efficiency due to reduced water was the millennium drought. which occurred from 2002 to 2009

m R&DDrive Train

This article will analyse vegetable growers' irrigation practices both at a national and state level, in particular focusing on the water sources used to

irrigate crops, the total area

produced in Australia are availability and price increase Figure 1: Irrigated water sources (average per farm)



Source: ABARES, Australian vegetable growing farms, an economic survey, 2011-12 and 2012-13

of vegetables irrigated and the average water use per hectare of irrigated vegetables.

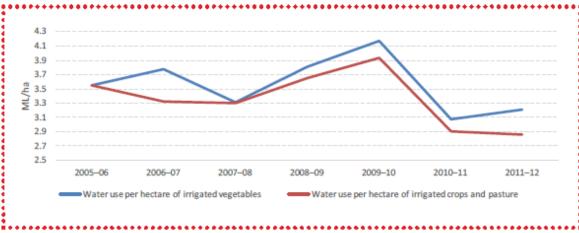
IRRIGATION SPECIAL

Irrigated vegetables play a significant role in contributing to the Australian economy. According to the Australian Bureau of Statistics, in 2011-12, the total gross value of irrigated agricultural production (GVIAP) for Australia rose by 5 per cent over the previous year to \$13.5 billion. The three commodities with the highest GVIAP in Australia were vegetables, valued at \$2.6 billion, fruit (excluding grapes) valued at \$2.4 billion and cotton valued at \$2.2 billion.

#### Water source

The types of water sources used by vegetable growers to irrigate crops largely depends on the location of the farm and the natural resources





Source: ABARES, Australian vegetable growing farms, an economic survey, 2011-12 and 2012-13



available. Nationally, the most common type of water source for vegetable growing farms is ground-water bores, accounting for approximately 46 per cent in 2011-12. Over the past seven years, the average use of ground water-bores to irrigate crops has remained rather stagnant.

As shown in Figure 1, farm storage dams are the second largest source of irrigation for vegetable growers, accounting for 24 per cent of the water sourced to irrigate crops in 2011-12. Conversely, this is marginally greater than the national average over the last seven years of 20 per cent.

Irrigation schemes are also an important source of irrigation for vegetable crops. However, their use in 2011-12 was 21 per cent, the lowest since records were first taken in 2005-06.

The types of irrigation water sources differ extensively among states. For example, Tasmanian vegetable growers largely use farm storage damns (87 per cent), whilst storage dams only account for 20 per cent in Queensland.

#### Water use

The average total water use per hectare of irrigated vegetable crops provides a reasonable indication of efficiency improvements in irrigation being used by vegetable growers. As shown in Figure 2, the long-term trend of the water use per hectare of irrigated vegetables has been declining. This implies vegetable growers are generally becoming more efficient in the

amounts of water being used to irrigate vegetable crops. For many growers, this reduction in water use would be expected to translate to a reduction in water costs and therefore an overall improvement in returns The reduced use of water per hectare of irrigated vegetables could be derived either through efficiency improvements to capital used to irrigate the crops, favourable seasonal conditions, improved natural resource management, or vegetable types that require less water to produce an equivalent or increased amount of vegetables.

Notwithstanding the declining trend in water use per hectare of irrigated vegetables, this trend has been at a slower rate in comparison with the water used in irrigated crops and pastures. In 2011-12, the average water use per hectare of irrigated vegetables was 3.2 (megalitres per hectare), whereas the average water use for crops and pastures was 2.9 (megalitres per hectare). This difference could be simply due to vegetables requiring greater water use for optimum yield in comparison to crops and pastures. More importantly, both the irrigation of vegetables, and crops and pasture follow almost identical paths. This suggests that the efficient use of water is occurring at a similar rate for both vegetables, and crops and pastures.

Analysing the water use of irrigated vegetables at a state level presents some interesting findings (see Figure 3). Whilst most states have reduced their water use, both Western Australia and Tasmania remain the exception.

Despite a reduction in the water use of irrigated vegetables at a national level, both Western Australia and Tasmania have increased their water use per hectare. Since 2005-06, Tasmania's water use increased albeit marginally. Tasmania has invested significantly in irrigation storage, increasing the availability of water.

Western Australia's water use per hectare of irrigated vegetables has also increased since 2007-08. This increase in water use could be due to a combination of factors, including growers shifting their enterprise mix towards crops which require additional water, a greater intensification of the land or the availability of water being more prevalent.

Overall these findings demonstrate that vegetable growers are actively exploring and implementing efficient water use techniques to minimise their dependence on water. Water use will continue to remain an integral aspect of vegetable production, growers reducing their use of water is essential in improving growers' returns, particularly if the predictability of rainfall is less certain in the years to come.

### THE BOTTOM LINE

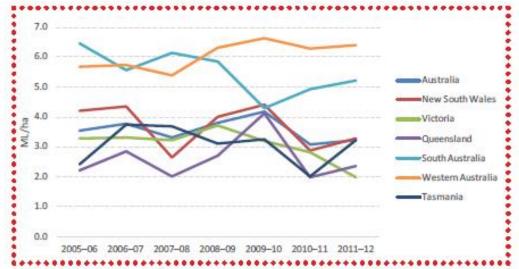
- According to the ABS, in 2011-12, the total gross value of irrigated agricultural production (GVIAP) for Australia rose by 5 per cent over the previous year to \$13.5 billion.
- Nationally, the most common type of water source for vegetable growing farms is groundwater bores, accounting for approximately 46 per cent in 2011-12.
- Types of irrigation water sources differ extensively among states.
- Data implies vegetable growers are generally becoming more efficient in term of the amounts of water being used to irrigate vegetable crops.
- Water use will continue to remain an integral aspect of vegetable production. Growers reducing their use of water is essential in improving returns.



AUSVEG: (03) 9882 0277 Project Number VG12078

This project has been funded by HAL using the National Vegetable Levy and matched funds from the Australian Government.

Figure 3: Average water use per hectare of irrigated vegetables by state



Source: ABARES, Australian vegetable growing farms, an economic survey, 2011-12 and 2012-13

### 4.4 "The link between labour productivity and investment" (January/February 2016)





# The link between labour productivity and investment

INCREASING LABOUR PRODUCTIVITY THROUGH INVESTMENT IS EXTREMELY IMPORTANT TO FARM PROFITABILITY. AUSVEG ECONOMIST ANDREW KRUUP EXPLAINS THE CONSIDERATIONS THAT GROWERS SHOULD TAKE INTO ACCOUNT WHEN IT COMES TO ON-FARM INVESTMENT.

arm investment refers to the amount of money spent each year on capital goods such as machinery, vehicles or farm infrastructure. The primary motive for the acquisition of capital through investment is generally to increase the productivity of hired labour. For example, an employee may be able to sow two hectares of land every hour by hand, however, when a seed drill is used, that employee may be able to sow 10 hectares of land every hour. That employee's productivity is seen to have increased fivefold through investment into the acquisition of capital.

Suppose a farm produces 100 tonnes of potatoes a season by hiring 30 labourers. If the productivity of labour increases, the farm may be able to produce 120 tonnes in the season, thereby increasing the amount of produce sold to the market while total labour costs remain the same. Alternatively, the increased productivity can be used to maintain production levels at 100 tonnes by using less labour (for example, 20 labourers). In this case, the farm is able to increase its profitability through a reduction in labour costs while still maintaining the previous level of production.

#### The high cost of labour

The amount of farm investment and labour productivity is a particularly relevant issue for Australian vegetable growers. Table 1 below presents the average farm cash costs for hired labour for the past three financial years ending 2013-14.

As can be seen, labour costs have been increasing over the period. With labour costs increasing to a 19.61 per cent proportion of total cash costs per farm and remaining the single largest cash expenditure in operation, increased planning and budgeting for capital investment, farm mechanisation and labour productivity can help to control this ever-increasing cost of business.

# Important economic indicators for investment

There are four key economic indicators that should be taken into account when deciding whether to invest more funds into labour productivity. These indicators are current interest rates, wage rates, debt to equity ratios and market sentiment.

Interest rates are sometimes referred to as being an economy's cost of capital. This is because capital purchases are often made on credit, and interest payments are paid on top of the asset price.

A large determinant of the size

of these interest payments is the cash rate set by the Reserve Bank of Australia (RBA). When the cost of capital is low, interest rates on debt are also low and growers have an incentive to borrow more funds to invest in capital. If the additional revenue obtained through increased capital investment and labour productivity is greater than the cost of borrowing for investment, then growers should continue to purchase additional capital on credit.

Figure 1 presents the cash rate set by the RBA. This graph shows that the cash rate is the lowest that it has been in 25 years, implying that credit rates are also at very low levels. Given how costly labour has become, more growers could be focusing their attention towards labour productivity and capital investment to save money on these costly operating expenses.

#### Other considerations

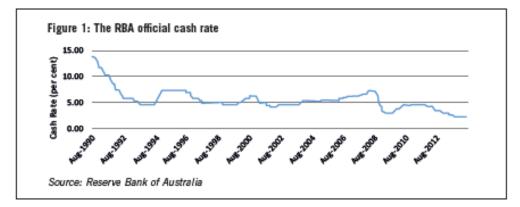
Wage rates are another important factor in determining the level of capital investment. If wage rates are sufficiently lower than the cost of purchasing additional capital, then it would make sense to continue to

Table 1. Average spent on hired Jahour (per farm)

	2011-12	2012-13	2013-14
Hired labour	\$95,930	\$105,700	\$122,000
Percentage of Total Cash Costs	16.86%	17.21%	19.61%

Source: ABARES Vegetable Growing Farm Survey, various years.

# **Economic Update**



employ more workers rather than invest in additional capital.

For example, the purchase of a new tractor may cost \$200,000 plus \$5,000 in interest payments. You estimate that the employees cost, on average, \$50,000 per year. Clearly if a tractor is worth the equivalent of five employees in terms of production, then you should invest in the tractor. However, if wages were only \$40,000 on average, then it would be economically efficient to hire five employees over the purchase of the tractor.

Market sentiment is essential in determining the amount of

capital investment and labour productivity. Capital is generally more fixed in comparison to labour. Once a business loan has been established with a financial institution, you have an obligation to ensure that payments are made on the outstanding debt for the term of the loan. If the market falls and less vegetable produce is being sold, you still have to find a way to pay for the interest payments which are fixed. Labour is often considered more flexible because it is much easier and less costly to vary according to market conditions.

Equity ratios also play an

important role in determining your ability to obtain funding for capital investment. Financial institutions generally lend to growers based on the equity they have in their business and their ability to service the debt. Most businesses are required to have an equity ratio of greater than 70 per cent, meaning that 70 per cent of the assets of the business have been purchased by the owner. This rule may be relaxed for larger farms that hold substantial off-farm assets or income. Smaller farms may also face an even greater difficulty in obtaining credit due to a perceived enhanced risk premium.

#### The bottom line

This article has explained the key business concepts of labour productivity and capital investment and has shown how these two concepts are related. Furthermore, it has explored and described the economic relationships between current interest rates, wage rates, debt to equity ratios and grower's market sentiment in relation to investment decision making.

Through a greater understanding of these indicators, vegetable growers should be able to conduct more informed decision making to ultimately help improve their profit margins.



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### 5. Discussion papers

### 5.1 Australian Vegetable Export Opportunities

### Introduction

Trade is becoming an increasingly important issue for the Australian vegetable industry as global trade in food products increases. The vegetable industry has undertaken research analysing the effect of imports on the industry, however, there has been little work conducted on exports.

This discussion paper will explore Australian vegetable exports, in particular vegetable export opportunities for Australia in the future. The research examines the current state of the vegetable export market by analysing individual vegetable commodities and growth markets. The paper also draws upon the findings of Australian Government reports and information obtained via AUSVEG trade missions in compiling its findings.

### The Domestic Market

The Australian vegetable industry has enjoyed slow but steady growth in recent years, with the gross value of vegetable production increasing from \$2.8 billion in 2005-06 to \$3.3 billion in 2011-12<sup>1</sup>.

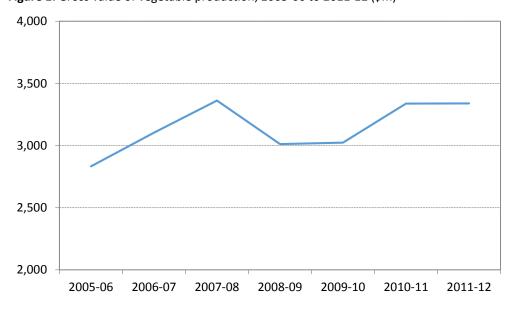


Figure 1: Gross value of vegetable production, 2005-06 to 2011-12 (\$m)

Source: ABS, Catalogue 7503.0 Value of Agricultural Commodities Produced, 2011-12

The majority of Australian vegetable production is sold in domestic markets. Australian grown vegetables account for 85 per cent of vegetable products sold in Australia, with the remaining 15 per cent imported<sup>2</sup>.

Vegetable produce is primarily distributed to local fresh produce wholesalers, retail chains and vegetable processors. These distribution channels account for around 92 per cent of production<sup>3</sup>, while exports make up

<sup>&</sup>lt;sup>1</sup> ABS Catalogue 7503.0, Value of Agricultural Commodities Produced, 2011-12

<sup>&</sup>lt;sup>2</sup> AUSVEG, Australian Vegetable industry Strategic Investment Plan 2012 – 2017, 2012

<sup>&</sup>lt;sup>3</sup> IBISWorld, Industry Report AO113, 'Vegetable Growing in Australia', February 2011, p.18

around 7 per cent of production and 1 per cent is sold direct to consumers<sup>4</sup>.

The high levels of produce sold locally have led to the majority of resources being allocated to cater for the domestic market. Much of the research and development work undertaken by the industry has been focused on increasing production productivity and understanding domestic consumer habits and preferences.

The focus on the domestic market has benefited vegetable growers by informing them about domestic market conditions and preparing them to meet changing consumer needs.

However, the focus on the domestic market has contributed to an oversupply of vegetable produce, with an estimated 25 per cent of vegetable production going to waste each year<sup>5</sup>. This in turn reduces vegetable prices to levels that may not be commercially sustainable and leads to an increase in unsold product through wastage.

Growers operating in the domestic market also face pressure due to the market dominance of the major retailers. The major retailers' share of Australian food consumption has increased in recent years, allowing them to demand lower prices and higher quality standards<sup>6</sup>. The retailers are increasingly looking to foreign suppliers for vegetables in an effort to raise operating margins and supply fresh produce all year round. This puts pressure on farm returns as Australian growers struggle to compete with cheaper imports<sup>7</sup>.

The over-reliance on the domestic market leads to short-term problems with oversupply and lack of control of the supply chain. In the longer term, it inhibits the industry fulfilling its potential and limits future growth opportunities.

# **Looking Abroad**

While issues with oversupply and pricing pressure are causing concern for vegetable growers, it also creates opportunities, as evidenced by the numbers of growers turning their attention abroad<sup>8</sup>.

In the past, vegetable growers have been reluctant to expand beyond Australian shores. Most growers have a limited experience of international trade and believed that the development of export markets was too difficult or time-consuming<sup>9</sup>. These impediments reduce export growth as there are few growers with the knowledge and expertise to share with growers looking to export.

However, attitudes are shifting. In May 2013, the Australian Government released the National Food Plan outlining a vision to grow food-related exports and build stronger trade and investment relationships <sup>10</sup>. The Asian Food Markets Research Grants program was launched offering funding for research and development projects designed to take advantage of new agriculture and food export opportunities arising from growing demand in Asia.

The 2013 AUSVEG National Convention saw a large number of growers attend the Exporting to China Symposium. Many growers expressed an interest in exporting, but lacked the knowledge and capability to do so.

Research shows that export markets offer the greatest opportunity to Australia's vegetable industry.

<sup>&</sup>lt;sup>4</sup> ABS Catalogue 5465.0, International Trade, Australia, 2011-12

<sup>&</sup>lt;sup>5</sup> Rogers, G. Identifying new products, uses and markets for Australian vegetables: A desktop study, 2013

<sup>&</sup>lt;sup>6</sup> Inside Retailing, Duopoly dominates food spend, 2012

<sup>&</sup>lt;sup>7</sup> IBISWorld, Outdoor Vegetable Growing Industry in Australia, 2013

<sup>&</sup>lt;sup>8</sup> AUSVEG, Australian vegetable growers ready to rise to the global food challenge, 2013

<sup>&</sup>lt;sup>9</sup> ABARES, Australian vegetable growing farms: An economic survey 2010-11 and 2011-12, 2012

<sup>&</sup>lt;sup>10</sup> DAFF, National Food Plan, 2013

Modelling undertaken by the Centre for International Economics suggests that the gains from increases in exports offer the greatest potential returns on research and development investment<sup>11</sup>. The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) predict that world demand for fruit and vegetables will increase significantly over coming decades<sup>12</sup>.

The growing demand from international markets and freeing of trade barriers will present growers with opportunities that did not exist before. Strong economic growth in developing countries is likely to spur demand for vegetables. Developing countries are growing at more than 5 per cent per year, with East Asian countries growing at 7 per cent<sup>13</sup>. These high growth rates are projected to continue, leading to an increase in demand for quality food commodities.

Some vegetable growers are recognising these opportunities. ABARES found that the more profitable vegetable growers are more likely to export<sup>14</sup>. These growers recognise that expansion to overseas markets mitigates the risks of the domestic market and increases the scope for future growth.

Providing growers with an understanding of export markets is crucial to success in international markets. It is vital for growers to build an understanding of specific export markets, their opportunities, and the capacity to establish and grow in these markets over time.

## **State of the Export Market**

Vegetable exports make up a very small proportion of Australian agricultural exports. Only 4 per cent of growers currently sell vegetables for export<sup>15</sup>.

Vegetable exports (excluding dried vegetable exports) have remained flat in the last seven years, totalling \$252 million in 2011-12<sup>16</sup>. Dried vegetables contributed an additional \$248 million in 2011-12. However, dried vegetables are excluded from the report as they are not included in the Australian Bureau of Statistics measure of 'vegetables for human consumption'.

<sup>&</sup>lt;sup>11</sup> AUSVEG, Australian Vegetable industry Strategic Investment Plan 2012 – 2017, 2012

<sup>&</sup>lt;sup>12</sup> ABARES, Food demand to 2050: Opportunities for Australian agriculture, 2012

<sup>&</sup>lt;sup>13</sup> IMF World Economic Outlook, April 2013

<sup>&</sup>lt;sup>14</sup> James, I. 'The other side of the coin', Vegetables Australia, January/February 2011

<sup>&</sup>lt;sup>15</sup> ABARES, Australian vegetable growing farms survey, 2012

<sup>&</sup>lt;sup>16</sup> ABS Catalogue 5465.0, International Trade, Australia, 2011-12

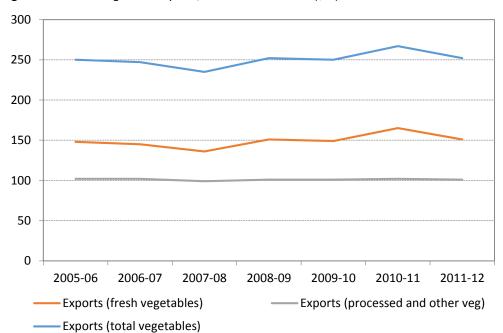


Figure 2: Value of vegetable exports, 2005-06 to 2011-12 (\$m)

Source: Global Trade Information Service, sourced from ABS International Trade data, 2011-12

Vegetable exports have held steady despite the strong appreciation of the Australian dollar from US75c in 2005-06 to US\$1.03 in 2011-12. Had the dollar not increased as strongly, it is likely that exports would have been higher.

The bulk of vegetable exports were fresh vegetables, which comprised \$151 million of total exports in 2011-12. Fresh carrots and turnips were the largest vegetable commodity exported, followed by fresh and frozen potatoes, and fresh onions and shallots.

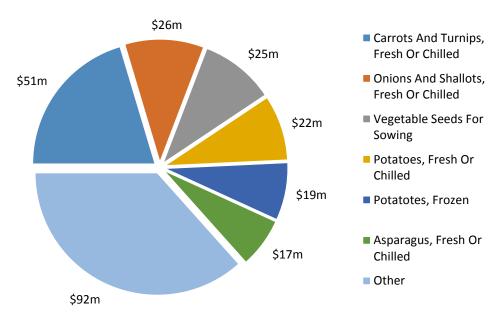


Figure 3: Vegetable exports by vegetable commodity, 2011-12 (\$m)

Source: Global Trade Information Service, sourced from ABS International Trade data, 2011-12

New Zealand was Australia's largest export market in 2011-12, with a total value of \$51 million. However, vegetable exports to New Zealand have been declining across a range of vegetable products, including frozen potatoes and fresh tomatoes<sup>17</sup>. It is expected that Japan will overtake New Zealand as Australia's largest export market in 2012-13. Exports to Japan have experienced solid growth in recent years, in part due to the recovery in the Japanese economy.

Besides New Zealand, most of Australia's export markets have seen moderate to high growth. Vegetable exports to Australia's northern neighbours have experienced sustained growth over recent years and this is likely to continue. In the last five years, exports to Indonesia have increased from \$6 million to \$11 million and exports to Papua New Guinea have grown from \$3 million to \$7 million. Both Indonesia and Papua New Guinea have experienced strong economic growth in recent years, which has in turn led to an increase in vegetable consumption.

Demand for vegetables in Asia has been increasing and has led to strong export growth in these markets. Exports to South Korea and China have more than doubled to \$9 million and \$2 million respectively in the last five years. China, in particular, has enormous future potential for Australian vegetable growers, considering that it presently makes up less than 1 per cent of total vegetable exports (see Box 1: The Emergence of China).

The rising affluence of Asian consumers is leading to demand of quality vegetables. These consumers have demonstrated a willingness to pay higher prices for quality produce and pre-packed products that offer greater convenience.

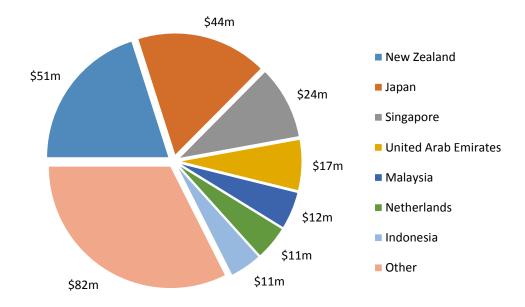


Figure 4: Vegetable exports by country of destination, 2011-12 (\$m)

Source: Global Trade Information Service, sourced from ABS International Trade data, 2011-12

Australia's vegetable trade balance has been deteriorating for more than a decade, as exports have not kept up pace with imports. The trade balance has dramatically reversed from a net surplus in 2002-03 to a deficit of \$452 million in 2011-12.

The decline in the trade balance is largely attributed to the increased imports of frozen and processed vegetables to Australia. Imports of frozen and processed vegetables have increased by 93 per cent and 42 per

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<sup>&</sup>lt;sup>17</sup> Global Trade Information Service, sourced from ABS International Trade data, 2011-12

cent respectively in the five years to 2011-12, driven by a doubling of imports of prepared potatoes and mixed vegetables<sup>18</sup>.

It is likely that imports of processed and frozen vegetables will continue to grow, due to the lower prices of imported product and a change in consumer preferences that favour frozen vegetables<sup>19</sup>.

Fresh vegetable imports have also increased in recent years, primarily in garlic and asparagus. As a result, the trade balance of fresh vegetables has experienced a small decline. Despite the decline, the trade balance of fresh vegetables remains in surplus.

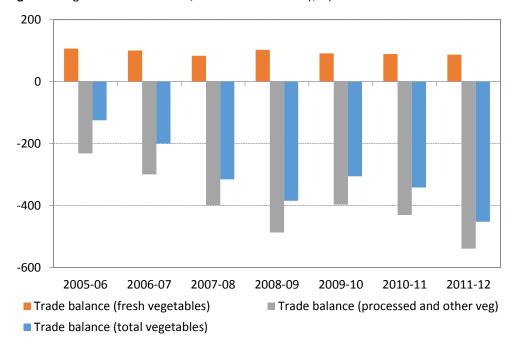


Figure 5: Vegetable trade balance, 2005-06 to 2011-12 (\$m)

Source: Global Trade Information Service, sourced from ABS International Trade data, 2011-12

Vegetable exports composed a mere 0.8 per cent of the \$30.6 billion value of Australian food exports in 2011-12. In comparison, grain and meat exports are more than 25 times larger than vegetable exports and are worth \$8.8 billion and \$7.2 billion of the Australian food export market respectively<sup>20</sup>.

Given the success of other Australian agricultural exports, there is no reason why vegetables should be left behind.

# Opportunities and challenges

Growing populations, rapid urbanisation and industrialisation in Asia is leading to a loss of agricultural land<sup>21</sup>. This has led to higher food prices and an increase in food shortages globally<sup>22</sup>.

Australia is likely to benefit from an increase in food demand due to its proximity to Asia. Rising incomes across the Asia Pacific region have led to an increase in consumption of vegetables and Australian exporters

<sup>&</sup>lt;sup>18</sup> Global Trade Information Service, sourced from ABS International Trade data, 2011-12

<sup>&</sup>lt;sup>19</sup> Global Industry Analyst, Frozen Fruits and Vegetables A Global Market Perspective, 2012

<sup>&</sup>lt;sup>20</sup> ABARES, Agricultural Commodities, 2012

<sup>&</sup>lt;sup>21</sup> Wee, R. Cold Chain Best Practices – Difficulties and Opportunities in Asia, 2013

<sup>&</sup>lt;sup>22</sup> FAO Food Price Index, 2013

are well positioned to target these growing consumer markets. It is predicted that higher income consumers in Asia will spend up to five times more on high quality food products compared to the lowest income brackets<sup>23</sup>. This is evidenced in Singapore, where Australian carrots hold the largest market share despite costing almost 90 per cent more than carrots from China<sup>24</sup>.

Australian vegetable growers have comparative technological advantages. The mechanisation of vegetable growing has reduced labour costs and improved productivity. Technological developments have improved fresh vegetable shelf life, enabling fresh vegetables to be shipped to a larger number of destinations. To become a key supplier of vegetables in export markets, Australian producers must continue to adopt new farm technologies to increase efficiency and reduce the industry's dependence on labour<sup>25</sup>.

Growers have the opportunity to take advantage of seasonal conditions to export vegetables to overseas markets during times when overseas production slows. This strategy has been successful for other vegetable exporting countries.

While opportunities for exports are opening up, there are challenges too.

One of the major challenges that growers will have to contend with is competition from other vegetable exporting countries. There is a high level of global self-sufficiency in vegetables and some Asian markets that have traditionally imported Australian vegetables are becoming net exporters of vegetables<sup>26</sup>. The opening up of trade barriers will further intensify competition. This will be particularly challenging for Australian growers, given high input costs and limited investment capital in the industry. Australia's labour and marketing costs are among the highest in the world.

Australia's isolation also means higher transport and logistics costs. Domestic trucking and freight costs are comparatively high in Australia. However, transportation of fresh vegetables is improving and Australia's proximity to Asia results in lower shipping costs and delivery times. Despite this, growers still face transportation issues in securing freight capacity and ensuring the proper handling of produce. For growers to succeed at exporting, it is essential that the supply chain infrastructure is efficient and cost-competitive.

Another challenge vegetable growers face is the high Australian dollar. The Australian dollar traded at historical highs during 2011 and 2012, reducing the competitiveness of Australian vegetables on the global market. However, the decline in the Australian dollar in the last six months to US90c in August 2013 is expected to benefit vegetable exporters.

Other impediments to export include a lack of understanding regarding crop scheduling, a lack of knowledge and relationships in export markets, trade barriers in foreign markets, an absence of local agents, and lack of competitive scale.

### Box 1: The Emergence of China

Australia's trade with China has surged in recent years, spurred on by China's strong economic growth. Vegetable trade is no exception. Vegetable exports to China have risen strongly from \$690,000 in 2006-07 to

<sup>&</sup>lt;sup>23</sup> Bryant, G. Opportunity Enormous for Australian Agriculture Exports to Asia, 2013

<sup>&</sup>lt;sup>24</sup> Bensley, T. Exporting Vegetables to China: Examining Opportunities and Barriers, 2013

<sup>&</sup>lt;sup>25</sup> Australian Government, Australian farms and farming communities, 2011

<sup>&</sup>lt;sup>26</sup> AgEconPlus, Domestic and Export Market Access and Trade Viability Issues, 2013

\$1.9 million in 2011-12<sup>27</sup>.

While vegetable exports to China have been growing, they represent less than 1 per cent of Australia's total vegetable exports and only a fraction of Australia's \$1.9 billion agrifood exports to China<sup>28</sup>. Reasons for this may be that growers see the Chinese market as too hard, too time consuming, tariff and nontariff barriers, and lack of market information<sup>29</sup>.

China is becoming a major player in the international trade of vegetables as both an importer and exporter. Vegetable production in China is significantly higher than in Australia, with China producing 561 million tonnes of vegetables in 2011<sup>30</sup> compared with 3 million tonnes in Australia<sup>31</sup>.

However, there exists scope for Australian growers to pursue export opportunities with China. The urbanisation of China is reducing farming land. Its exports to Australia are primarily more labour-intensive crops, such as garlic and mushrooms<sup>32</sup>. Furthermore, China's increasing population and wealth are driving demand for high quality food products.

Increasing household income and vegetable prices in China should encourage vegetable growers looking to export to the Chinese market. While vegetable consumption in China has remained steady over the last decade, China's vegetable imports have tripled over the past 10 years to around \$100 million<sup>33</sup> and research has shown that China's consumption of vegetables increases with higher incomes and urbanisation<sup>34</sup>.

Food safety concerns in China have led many higher income Chinese households to purchase quality produce from overseas suppliers. Chinese customers have shown a propensity for paying a premium price for quality vegetables. Estimates show that 83 per cent of Chinese middle-class consumers are willing to pay more for safe food products<sup>35</sup>.

Growth in Australian vegetable exports to China is expected to be helped by the completion the Australia-China Free Trade Agreement and the establishment of stronger business relationships with Chinese importers.

## **Tackling the Export Market**

### A team effort

Collaboration is the key to tackling the export market. Vegetable growers interested in exporting are encouraged to work other growers across various agricultural commodities in order to share ideas and knowledge.

Building and enhancing relationships between growers will be integral to increasing vegetable exports. For growers new to exporting, it will be invaluable to access the knowledge of other growers who have been through the process before. There are many issues that a grower new to exporting will have to deal with. These include selecting which vegetables to supply, regulatory and logistical hurdles, identifying trading partners, building relationships with importers, and packaging and delivery. Collaboration is key to overcoming

 $<sup>^{27}</sup>$  Global Trade Information Service, derived from ABS International Trade data, 2012

<sup>&</sup>lt;sup>28</sup> DFAT, Feeding The Future, 2012

<sup>&</sup>lt;sup>29</sup> Bensley, T. Exporting Vegetables to China: Examining Opportunities and Barriers, 2013

<sup>&</sup>lt;sup>30</sup> ChinaAg, Market Intelligence on China's Agriculture & Food Industry, 2011

<sup>&</sup>lt;sup>31</sup> ABS Catalogue 7121.0, Agricultural Commodities, Australia

<sup>&</sup>lt;sup>32</sup> ABS Catalogue 5465.0, International Trade, Australia, 2011-12

<sup>&</sup>lt;sup>33</sup> Get Farming, Chinese vegetable imports have tripled, 2011

<sup>&</sup>lt;sup>34</sup>DAFF, Food Consumption Trends in China, April 2012

<sup>&</sup>lt;sup>35</sup> A.T. Kearney, Food Safety in China: What it means for global companies, 2007

these hurdles and delivering benefits that may not be achieved individually.

Similarly, it is beneficial for growers to partner with overseas importers. These relationships are immensely valuable for growers as it helps them understand the customer's needs and work out how to meet them. Importers can also help build relationships with other customers and retailers.

AUSVEG conducted a Reverse Trade Mission in June 2013 hosting 20 importers, retailers and chefs interested in purchasing local produce. All the importers mentioned that they enjoyed meeting and networking with vegetable exporters to discuss opportunities for doing business together. Developing a good understanding of cultural backgrounds and objectives is crucial to building these business relationships.

Growers are encouraged to utilise the resources and programs available through the vegetable industry and government. Austrade provides growers with a range of services including market research, business introductions and funding.

#### **Building trust**

It is a common misconception that it is quick and easy to establish an export operation. However, growers looking to export have to take on additional operational requirements in conjunction with current business operations.

Current Australian vegetable exporters say that consistency, reliability, and trust are imperative to tackling the export market. Trust takes time to build and it is vital that growers do their research and get to know their customers, their market, and their needs. It requires an ongoing interest in working with the customer, understanding of their culture, and open communication regarding any issues that may arise<sup>36</sup>.

Meeting the demands of overseas customers is an important component of developing export supply chains. Growers should look to offer products that cater towards the needs of the market and deliver on quality and time expectations.

Another element of building trust is through the branding of Australian vegetables. An objective of the Government's National Food Plan is to promote Australia as a globally recognised food brand that is synonymous with quality, innovation, safety and sustainability<sup>37</sup>. According to the OECD, Australia ranked equal first with Denmark and the UK for food safety performance in 2010<sup>38</sup>.

Future success in vegetable exporting will depend heavily on the ability to deliver produce of consistent quality<sup>39</sup>. Given Australia's reputation for food safety and quality, it makes sense for Australian growers to compete on quality as opposed to price.

The AUSVEG Reverse Trade Mission demonstrated that there is potential for premium quality and niche Australian foods, as well as staples such as carrots and broccoli. ABARES notes that for many growers, exports remain low because they aim to compete on selling prices, which are not high enough to justify the degree of difficulty, time and cost associated with expanding markets abroad<sup>40</sup>.

Many consumers in Asia regard the origin of their food as an indicator of quality. Australian producers can enhance the reputation and appeal of their product by promoting the sustainable attributes of their products and Australia's superior food production regulations. This can be done via branding, packaging and information

<sup>&</sup>lt;sup>36</sup> Lee, T. Doing Business in China, 2013

<sup>&</sup>lt;sup>37</sup> DAFF, National Food Plan, 2013

<sup>&</sup>lt;sup>38</sup> DFAT, Feeding The Future, 2012

<sup>&</sup>lt;sup>39</sup> IBISWorld, Outdoor Vegetable Growing in Australia, 2013

<sup>&</sup>lt;sup>40</sup> ABARES, Australian vegetable growing farms survey, 2012

presented on grower websites.

To assist growers, the government is working to reduce trade barriers and negotiate access to global markets and by working with businesses to sell their produce overseas. Expanding access to export markets is essential for supporting Australian growers and manufacturers as reducing tariffs and other trade barriers will improve the competitiveness of Australian exports.

#### Research and development work

It is recommended that research be undertaken to develop better approaches to export markets. These include looking at other countries that are successfully exporting vegetables, strategies to build connections with overseas customers, and training programs to assist growers in becoming export ready.

Countries that successfully export vegetables can provide plenty of insight for Australian vegetable growers. The Netherlands is the largest exporter of vegetables worldwide. A reason for their success has been their ability to effectively utilise growers associations and marketing organisations to enable more efficient picking, handling, and marketing of vegetables<sup>41</sup>.

A common theme among leading vegetables exporters is the ability to provide high quality products to countries in their off-season. This is common for places like Spain and Mexico which supply tomatoes nearly year-round to countries that do not have a suitable climate to grow tomatoes themselves<sup>42</sup>.

Australian growers can also look to successful domestic vegetable exporting industries. The carrot industry makes up 20 per cent of Australia's vegetable exports by successfully differentiating itself from overseas competitors on the basis of quality, safety, and reliability.

Other Australian agricultural industries provide lessons too. The Australian lamb industry was in a similar position to the Australian vegetable industry 20 years ago, but now exports \$1 billion of product per year<sup>43</sup>.

It would be valuable for the vegetable industry to conduct research into Australian agricultural industries that have had success with exporting and investigate whether there are lessons can be applied to the vegetable industry.

#### Conclusion

The growing global demand for vegetable products, rising global population, and increased incomes of Asian countries have simultaneously combined and present Australian vegetable growers with unprecedented opportunities.

Traditionally, the vegetable industry has relied upon the domestic market for its sales. However, in the last decade, the domestic market has been eroded by competition from cheap foreign vegetable imports. In particular, processed and frozen vegetable imports have surged, leading to a widening of the vegetable trade deficit.

As trade barriers continue to decline, international trade will play an increasing role in vegetable sales.

<sup>&</sup>lt;sup>41</sup> Trade Nosis, Global Foreign NCE Trade Edible vegetables and certain roots and tubers, 2012

<sup>&</sup>lt;sup>42</sup> AUSVEG, Australian Vegetable industry Strategic Investment Plan 2012 – 2017, 2012

<sup>&</sup>lt;sup>43</sup> ABC, Lamb's lessons for vegetable exporters, 2013

Countries that are not export competitive will ultimately become targets for exporting countries.

Growth in vegetable exports has been stagnant in recent years, hurt by a strong Australian dollar and high input costs. Despite these challenges, vegetable exports to Asian markets have increased substantially, led by a shift in consumer preferences towards quality and safe food products. This trend is likely to continue with the increasing affluence of Asian countries and the recent decline of the Australian dollar enabling Australian produce to be more cost competitive.

Many growers are beginning to realise that the future viability of the industry lies in its ability to build exports. The key to this is building relationships and trust between domestic growers and overseas customers. The vegetable industry and government have an important role to play in working together with growers to deliver research and development work that supports the development of export opportunities.

## 5.2 Costs of production for Australian vegetable growers

# Introduction

Australian vegetable growers operate in a highly competitive domestic and international market, which results in continuous pressure to reduce operating costs. Understanding the nature of vegetable production costs is important due to the impact these costs have on the profitability and sustainability of Australian vegetable growers.

The objective of this discussion paper is to highlight the Australian vegetable industry's costs of production. The paper will explore the trends in growers' costs of production at a national level, the drivers of these costs, and also highlight initiatives being implemented by growers to help alleviate these costs. This research builds on survey data produced by the Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES) who survey Australian vegetable growers on behalf of Horticulture Australia Limited (HAL). In addition, this paper draws upon many other Government and independent reports.

# **Total Cash Costs\* (average per farm)**

Reducing and managing total cash costs is essential to maximising the returns of Australian vegetable growers, who have had to contend with rising average total cash costs for much of the past eight years, particularly during 2005-06 to 2010-11.

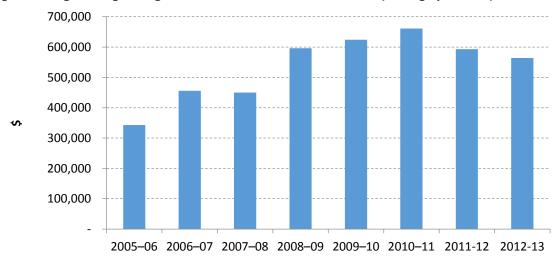


Figure 1: Vegetable growing farms total cash costs in real terms (average per farm)

**Source:** ABARES Australian vegetable growing farms: An economic survey, various years \*Total cash costs: Payments made by the farm business for materials and services and for permanent and casual hired labour (includes administration costs, seed, electricity, fertiliser etc).

Despite lower average total cash costs in 2011-12 and 2012-13, growers' returns are estimated to have fallen due to decreased production<sup>44</sup>. There is a strong correlation between the average total cash costs for growers and the amount of vegetables produced.

<sup>&</sup>lt;sup>44</sup> ABARES Australian vegetable growing farms: An economic survey, 2011-12 and 2012-13, (2013-14).

For example, if Australian vegetable growers produce less vegetables, fewer production inputs, such as labour and fuel, are required, costs generally fall accordingly overall.

The average vegetable production per farm experienced slow but steady growth from 2005-06 to 2010-11, however average production per farm has fallen in the past two years. In 2005-06, Australia's average total volume of vegetables produced per farm was 882 tonnes, but is estimated to have fallen to 847 tonnes in 2012-13<sup>45</sup>. Despite average vegetable production per farm decreasing by four per cent since 2005-06, average total cash costs have increased by approximately 65 per cent during the same period.

To understand the relationship between total cash costs and production in more depth, the costs have been analysed by tonne of production. As shown in Figure 2, average total cash costs per tonne of vegetables produced continues to increase over time and peaks in 2010-11 due to lower than average yields. These findings suggest that although production volumes undoubtedly affect growers' total cash costs, increases in production input prices are also having an impact on total cash costs.

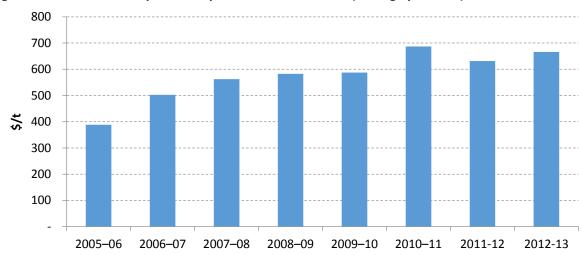


Figure 2: Total cash costs per tonne produced in real terms (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, various years

The data also suggests that the impact of cash costs on vegetable growers varies depending on the size and scale of the business in question. As shown in Figure 3, growers that produced vegetables on less than five hectares had significantly higher average cash costs than those that grew vegetables on five or more hectares, when measured by per tonne of vegetables produced in 2010-11. Moreover, average cash costs continue to decline as the size of area sown increases. This is largely due to the cost advantages that are achievable with increased vegetable production. For example, the cost to produce a vegetable unit tends to decrease as total vegetable production increases as the costs are shared over a

<sup>&</sup>lt;sup>45</sup> ABARES Australian vegetable growing farms: An economic survey, 2011-12 and 2012-13, (2013-14).

larger sum of vegetables. Increased scale may also reduce costs per vegetable unit due to efficiency gains.

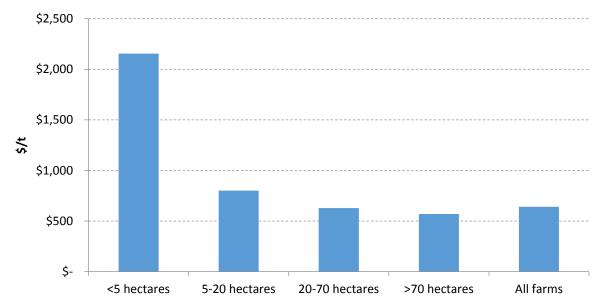


Figure 3: Total cash costs per tonne of production by area sown in 2010-11

**Source:** ABARES Australian vegetable growing farms: An economic survey, various years

In summary, reducing production costs and improving productivity is critical to improving returns for Australian vegetable growers. Although increasing scale of production may help to alleviate production costs, this may not be an option for many vegetable growers. Therefore, it becomes increasingly important to understand the costs involved in vegetable production and what techniques are being implemented by growers to reduce these cost pressures.

# **Vegetable Production Cash Costs**

According to ABARES data, hired labour continued to be the highest cash cost for vegetable growing farms, accounting for approximately 17 per cent of total average cash costs in 2011-12. This was followed by contracts paid (10 per cent), fertiliser (9 per cent) and seed (7 per cent). Other cash costs used during the production of vegetables, such as fuel and electricity accounted for 6 per cent and 2 per cent respectively.

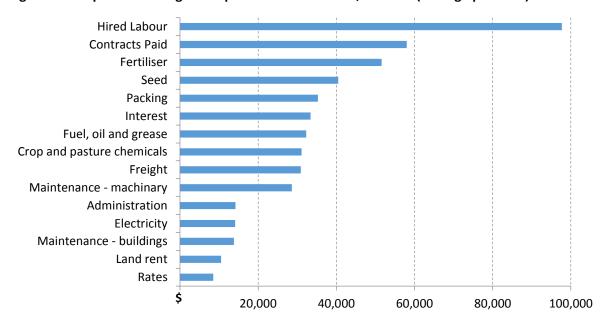


Figure 4: Composition of vegetable production cash costs, 2011-12 (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2011-12 and 2012-13

# **Hired Labour Costs**

Typically, vegetable growing in Australia is more labour-intensive than other agricultural industries. The delicate nature of the produce commonly requires the use of labour to hand pick the vegetables. This puts the vegetable industry at a disadvantage to other agricultural industries as it limits vegetable growers' ability to introduce mechanised technologies as a substitute for labour.

Growers dependency on labour to grow vegetables, coupled with Australia's high labour costs, reduces their capacity to minimise labour costs. Australia's labour costs are amongst the highest in the world<sup>46</sup>. As shown in Figure 5, Australia ranks third highest internationally for its hourly direct pay rate for time worked in manufacturing, being surpassed only by Switzerland and Denmark. Australia's hourly direct pay rate for time worked in manufacturing is approximately 60 per cent higher than New Zealand's.

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<sup>&</sup>lt;sup>46</sup> International Labour Organization, Global Wage Report 2012/13, wages and equitable growth, (2012-13).

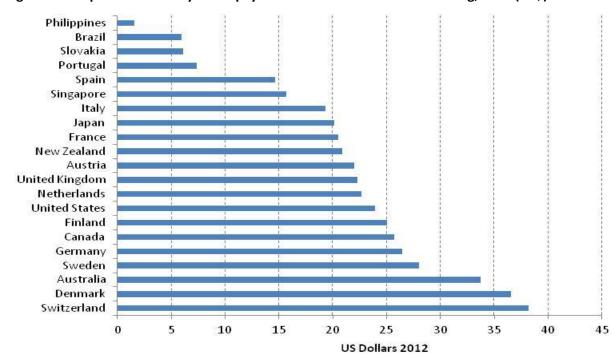


Figure 5: Comparison of hourly direct pay\* for time worked in manufacturing, 2012 (US\$)

Source: United States Department of Labor, Bureau of Labor Statistics (BLS), 2012.

Over the decade to 2011, Australian labour costs have grown rapidly, more than twice as quickly as a number of OECD countries, as shown in Figure 6. During this period, Australia's average unit labour costs grew by 3.3 per cent a year, in contrast to 2.4 per cent in the United Kingdom, 1.8 per cent in the United States, 0.2 per cent in Germany, and the entire OECD averaged 1.3 per cent. As labour costs rise faster in Australia than most other OECD countries, this weakens Australia's competitiveness, particularly for vegetable growers given the labour intensity involved in producing vegetables.

Figure 6: International Unit Labour Costs\*, 2001-2011

	Average, annual percentage change	Percentage change (2001- 2011)
Australia	3.3%	36.3%
United Kingdom	2.4%	26.2%
Italy	2.4%	26.7%
France	1.9%	21.0%
United States	1.8%	19.9%
Korea	1.5%	16.0%
OECD average	1.3%	14.5%
Germany	0.2%	2.7%
Japan	-1.6%	-17.3%

Source: OECD Statistics, Unit Labour Costs – Annual Indicators

<sup>\*</sup>Hourly Direct Pay: Pay for time worked is primarily base wages and salaries, overtime pay, regular bonuses and premiums (paid each pay period), and cost of living adjustments.

\*Unit labour costs: measure the average cost of labour per unit of output.

#### **Opportunities and Challenges**

Australian vegetable producers directly employed around 15,000 people in August 2012<sup>47</sup>. However, labour shortages and the ability to retain workers has been an ongoing issue for the vegetable industry. The availability of human capital is of significant concern, as these shortages provide growers with limited opportunities to reduce their labour costs. Labour issues, primarily in rural and regional Australia, have occurred as a result of lower birth rates, an ageing demographic profile, increased personal wealth, provision of social welfare, sustained economic growth, and low unemployment<sup>48</sup>. These reasons have lessened the number of persons willing to work in the vegetable industry, coupled with competition and more generous rewards on offer from other industries, such as mining.

#### **Overseas Workers and Skilled Migration**

Australian vegetable growers typically use local labour, although, during peak periods overseas workers and skilled migrants provide an adequate secondary labour source. The Temporary Work (Skilled) visa (subclass 457) allows skilled workers to come to Australia and work for an approved sponsored business for up to four years. In 2012-13, around 1,400 applications were granted throughout the Agriculture, Forestry and Fishing industry, representing approximately a 40 per cent increase from the previous year<sup>49</sup>. The Regional Skilled Migration Scheme is a similar type of program but provides a permanent residence visa for skilled workers who want to work in regional Australia. There are currently categorisation issues that may prevent some vegetable businesses from utilising these schemes to obtain skilled workers.

Vegetable growers' labour requirements vary throughout the year, given many vegetable products are seasonal in nature. While migration programs are undoubtedly beneficial for growers, they can also become problematic for both migrants and growers. Depending on the nature of the business, during quiet periods, some growers may not be able to afford to pay for migrants' wages, and there may be limited alternative job and training opportunities for migrants to pursue given the remoteness of many vegetable farms.

As such, many growers still depend on the thousands of backpackers looking for work, to fill un-skilled labour shortages during peak periods. Initiatives that encourage backpackers to visit Australia and travel to vegetable growing areas are essential to minimising growers' labour costs and providing greater access and flexibility with regards to labour.

<sup>&</sup>lt;sup>47</sup> ABS, Labour Force, Australia, Detailed, Quarterly, cat.no. 6291.0.55.003 Australian Bureau of Statistics, Canberra

<sup>&</sup>lt;sup>48</sup> Maclellan, N. & Mares, P, Labour mobility in the pacific: Creating seasonal work programs in Australia (2005).

<sup>&</sup>lt;sup>49</sup> Department of Immigration and Border Protection, *Subclass 457 State/Territory summary report 2012-13 to 30 June 2013, (2012-13).* 

Growers also have the opportunity to provide incentives for backpackers to work on their farm by offering discounted or free rental accommodation, free dinners and other amenities. This strategy is likely to provide additional appeal and encourage backpackers to travel and work on vegetable farms.

#### **Skills Shortage**

Over the past decade, vegetable growers have found it increasingly difficult to access both skilled and unskilled workers. Impediments to meeting the industry's skills shortage include low levels of industry participation in education and training, low numbers of under-graduates and graduates in tertiary agriculture courses, poor awareness of agricultural career pathways amongst students and the limited capacity of the current education and training system to deliver innovative training solutions<sup>50</sup>.

The vegetable industry's ability to attract young people to study and pursue a career in vegetable farming is critically important to the longevity of the industry. Without an injection of new and younger workers into the farming workforce, there will be an inevitable loss of productivity. The industry must realise that attracting new entrants and retaining quality staff is pivotal to future growth and productivity<sup>51</sup>.

One of the most significant impediments to attracting people to study and work in the agriculture industry is its poor image in the media and a reluctance to relocate to rural areas. The agriculture industry has low prestige due to the common belief that agricultural employment is necessarily manual labour with limited (if any) skill requirements, that may not provide secure ongoing work or opportunities to develop and advance careers. Agriculture is also not considered to have strong economic prospects or provide a stable income given its vulnerability to climatic events<sup>52</sup>.

Although enrolments in agricultural courses are no longer declining, there are currently no courses offered that exclusively focus on horticulture at any university, and many of the agricultural courses have a reduced or limited focus on horticulture. To assist in increasing the number of enrolments in agriculture and improve its image, the vegetable industry could increase its focus on high school students (particularly those nearing completion); provide students paid employment for work placements in conjunction with degrees; and target agriculture related scholarships to students nearing completion of their course53.

<sup>&</sup>lt;sup>50</sup> DAFF Workforce, training and skills issues in Agriculture 2009, (2009).

<sup>&</sup>lt;sup>51</sup> DAFF Workforce, training and skills issues in Agriculture 2009, (2009).

<sup>&</sup>lt;sup>52</sup> DAFF Workforce, training and skills issues in Agriculture 2009, (2009).

<sup>&</sup>lt;sup>53</sup> AUSVEG, Investigating future training and education opportunities for both new and existing vegetable industry members, project number: VG12077, (2013).

Implementing these initial initiatives would be expected to provide tangible benefits for the vegetable industry and establish a strong foundation the industry could improve on.

#### **Labour Intensity**

Whilst vegetable growers will always require sources of labour to produce vegetables, growers may have the ability to reduce their labour requirements by reviewing and identifying alternative methods in relation to their production processes. In theory, where inputs to production are flexible and interchangeable, the industry would move away from the relatively expensive labour into relatively cheaper capital<sup>54</sup>.

However, as mentioned earlier, growing vegetables generally requires labour to hand pick vegetables. Where feasible, growers should seek to substitute labour intensive processes with capital and mechanised improvements. Although this would require a financial outlay, in the long-term, this could improve growers' financial position. If the cost of purchasing capital equipment is too expensive, arrangements where growers could pool together funds and share the machinery, as required, could be pursued as an alternative.

# **Energy Costs**

Rising energy costs (electricity, fuel, oil and grease) place additional cost pressures on the vegetable growing industry, therefore reducing growers' returns. On average, energy costs accounted for approximately 8 per cent of total cash costs per farm in 2011-12<sup>55</sup>. While energy costs account for a moderate proportion of growers' overall costs, energy prices have increased significantly in recent years.

Agriculture accounts for nearly 4 per cent of industry energy usage in Australia, with energy being consumed in three major forms on most farms: general electricity (lighting, appliances); fuel (machinery, vehicles and freight costs); and heating/cooling and refrigeration<sup>56</sup>.

As with many other costs, vegetable growers have very limited ability to influence the price of energy (supply side), as these prices are influenced by other factors, including exchange rates, world market trends and consumer preferences.

## **Electricity Costs**

Over the past four years the cost of electricity for households has risen on average by around 59 per cent nationally<sup>57</sup>. Electricity prices vary considerably amongst states, due to different electricity generation methods (e.g. coal, solar, wind etc...) and grid investment strategies (transmission and

<sup>&</sup>lt;sup>54</sup> Cuadrado, F. & Long, N, Capital labour substitution, structural change, and growth, (2013).

<sup>55</sup> ABARES Australian vegetable growing farms: An economic survey, 2011-12 and 2012-13, (2013-14).

<sup>&</sup>lt;sup>56</sup> Clean Energy Finance Corporation: Energy Efficiency Agriculture, date accessed:15/12/2013, http://www.cleanenergyfinancecorp.com.au/energy-efficiency/agriculture.aspx.

<sup>&</sup>lt;sup>57</sup> ABS (Sept 09 – Sept 2013) Consumer Price Index for electricity (cat. no. 6401.0)

distribution of electricity). Regardless, most Australian states' wholesale electricity prices have experienced significant price increases since 2011-12. In 2012-13, average wholesale electricity prices in South Australia, Queensland and Victoria more than doubled from the previous year. Electricity prices for New South Wales and Tasmania also increased by 86 per cent and 48 per cent respectively<sup>58</sup>.

The increase in electricity prices is largely being driven by improvements in Australia's infrastructure networks (power poles and wires) and transition to electricity generation from renewable energy sources, like solar or wind. The cost of these upgrades is then transferred to consumers, including growers, which pushes up electricity costs.

The proposed removal of the carbon tax is expected to provide vegetable growers some much needed relief through lower electricity prices. It is estimated that the removal of the carbon tax will reduce the average household electricity bill by \$200 and gas bill by \$70 in 2014-15<sup>59</sup>.

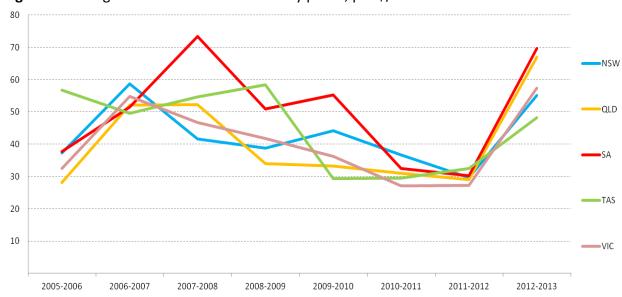


Figure 7: Average annual wholesale electricity prices, per \$/MWh

Source: Australian Energy Market Operator: Electricity data average price tables

Despite vegetable growers' inability to influence electricity prices, the retail electricity market is competitive. Accordingly, growers are shopping around for an energy market contract that provides the most cost-effective prices, and terms and conditions most suitable to their needs. Vegetable growers can also achieve energy cost savings by minimising the level of energy required to operate their farm (demand side). There are various ways to save energy, from adjustments to maintenance procedures, process

<sup>&</sup>lt;sup>58</sup> Australian Energy Market Operator: *Electricity data average price tables,* date accessed 25/11/2013, <a href="http://www.aemo.com.au/Electricity/Data/Price-and-Demand/Average-Price-Tables">http://www.aemo.com.au/Electricity/Data/Price-and-Demand/Average-Price-Tables</a>.

<sup>&</sup>lt;sup>59</sup> The Commonwealth Treasury cited in the Department of Industry, *the facts on electricity prices*, page 2 (2013).

improvements and increasing plant and equipment efficiency. Various energy saving options deliver immediate benefits and savings, whilst others involve an upfront cost that can be recovered within months or years<sup>60</sup>.

#### Fuel

Fuel is also an important production input for vegetable growers, as it enables growers to use machinery to more efficiently produce vegetables and can therefore improve productivity levels. To this end, increasing fuel prices adds a further cost pressure on growers.

In the past eight years, vegetable growers have had to contend with volatile national fuel prices. Prices for both petrol and diesel tracked similarly, with diesel generally being more expensive. During 2009-10 to 2011-12, average wholesale fuel prices have increased by approximately \$0.20 cents, but have remained steady since. To meet Australia's fuel demand, around 15-20 per cent of petrol is imported (mainly from Singapore)<sup>61</sup>. A weakening Australian dollar is expected to push up fuel prices.

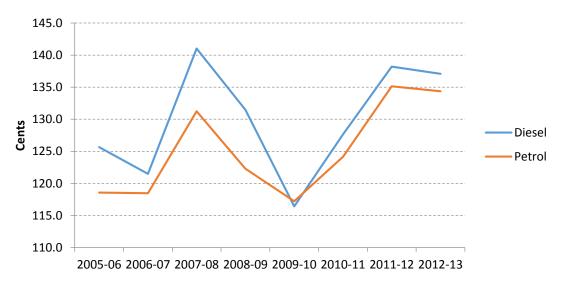


Figure 8: National average terminal gate fuel price (yearly)

Source: Australian Institute of Petroleum: Terminal Gate Prices (wholesale)

Many growers are beginning to realise the cost, efficiency and environmental benefits of improving their on-farm fuel efficiency. These benefits are being realised through various means, including replacing older equipment with more fuel efficient equipment and changing growing practices. According to research, the greatest gains in fuel efficiency can

<sup>&</sup>lt;sup>60</sup>Australian Industry Group, *Energy Saving Fact Sheet – Saving energy in the fruit and vegetable processing industry,* n.d.

<sup>&</sup>lt;sup>61</sup> Australian Institute of Petroleum – Facts About Petrol Prices and the Australian fuel market, date accessed 27/11/2013,

http://www.aip.com.au/pricing/facts/Facts\_about\_Petrol\_Prices\_and\_the\_Australian\_Fuel\_Market.htm.

be achieved through changing farm practices. This consists of: ensuring the field is designed with as little shape, contours and obstacles which can cause increased manoeuvring or reduced yield via nutrient loss; using a predetermined optimum tractor course which could improve fuel efficiency by up to 20 per cent; using one set of permanent tracks for all the machinery operations on the field (controlled traffic farming); machine maintenance which can reduce fuel consumption by 5-15 per cent; and using machinery at their optimum travel speed, since speed has a large effect on fuel consumption<sup>62</sup>.

## **Fertiliser Costs**

Fertiliser is an essential production input that contributes to growers achieving the highest possible yield for their produce. Australia uses between five and six million tonnes of fertilisers each year, with half being manufactured in Australia but also consisting of imported minerals<sup>63</sup>. In 2011-12, fertilisers represented 10 per cent of total cash costs for farms, according to farm survey data collected by ABARES.

Compared to the global fertiliser market, Australia is a small player. The International Fertilizer Association estimates that on a total nutrient (NPK) basis, Australian fertiliser consumption is just over 1 per cent of global consumption. As such, this limits Australia's ability to influence the global fertiliser price, resulting in Australian growers being vulnerable to global fertiliser price movements. Global fertiliser prices are highly dependent on prices for agricultural commodities. If prices for agricultural commodities increase, demand for fertiliser also rises as agricultural producers respond by increasing production<sup>64</sup>. The final price of fertiliser for Australian vegetable growers also depends on sea freight costs and exchange rate movements.

World fertiliser prices have been extremely volatile over the past decade, with fertiliser prices rising by over 750 per cent, in some instances. The most significant price increase occurred between 2007 and 2008 (world food price crisis), where the price of DAP, triple superphosphate, and potassium chloride reached above \$1,300 Australia dollars per metric tonne. This spike was spurred by the increase in global food prices which led to increased purchases of fertiliser as growers sought to capitalise on this opportunity. However, fertiliser prices also fell during the global financial crisis (GFC) as it had become too expensive for most growers to continue purchasing fertiliser at such a high cost. Fertiliser prices also tend to fluctuate based on key inputs such as natural gas, potash and crude oil.

<sup>&</sup>lt;sup>62</sup>Biggs, L & Giles, D, *Current and future agricultural practices and technologies which affect fuel efficiency,* Intelligent Energy, Europe, (c. 2012).

<sup>&</sup>lt;sup>63</sup> Fertilizer Australia – *Domestic Fertiliser Market*, date accessed 28/11/2013, http://www.fertiliser.org.au/default.asp?V DOC ID=1176

<sup>&</sup>lt;sup>64</sup> Fertilizer Australia – *Global Fertiliser Price*, date accessed 28/11/2013, http://www.fertilizer.org.au/default.asp?V DOC ID=1173

1600 1400 (Australian Dollar per Metric Ton) 1200 Triple Superphosphate 1000 DAP 800 Potassium Chloride 600 **Rock Phosphate** Urea 400 200 0 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

Figure 9: World Fertiliser Prices

Source: Indexmundi

In the last two years, world fertiliser prices have been generally declining, providing Australian vegetable growers some much needed relief. Whilst world fertiliser prices have reduced, prices remain above the pre-GFC period.

Many growers understand that managing and improving soil health is a crucial element to the success of their business. Attempting to minimise or stop the use of fertiliser and soil amendment for crop and pasture production can be counterproductive<sup>65</sup>. This could result in lower yields for growers and increased soil erosion, reducing returns for growers. Soil health is being improved through: tillage at minimum levels to reduce soil disturbance; growing green manures as cover crops; crop rotation; applying amendments from plant or animal origin, composts, crop residues that increase soil carbon and structure; manures; and minimising the movements of machinery and equipment across soil surfaces<sup>66</sup>.

## **Conclusion**

Australian vegetable growers have been incredibly resilient over time, continuing to produce high quality, safe and nutritious vegetables whilst experiencing increasing production costs. To assist growers, additional levels of support are needed to ensure costs of production are managed and controlled at more sustainable levels. This is essential for the industry given the majority of growers are price takers and cannot influence or control the prices of production inputs (i.e. fertiliser and fuel).

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<sup>&</sup>lt;sup>65</sup> New South Wales Department of Primary Industries, *AGFACTS: Managing soil amendments and fertilisers for a cleaner environment,* (2004).

<sup>&</sup>lt;sup>66</sup> The Department of Environment and Resource Management and the Department of Employment, Economic Development and Innovation, *Soil health for vegetable production in Australia*, (2010).

To help alleviate growers' rising labour costs the Australian vegetable industry needs: a flexible and adaptive workforce that meets growers needs; to target teenagers (at high school or university) to provide an injection of new and younger workers; to promote the industry as a highly-skilled viable and long-term career opportunity; and provide more flexible career development opportunities. For example, what other career opportunities could pursuing a career in the vegetable growing sector lead to; engaging in positive mainstream and targeted media to promote the success and employment opportunities that agriculture/horticulture can offer and dispel the notion that agriculture only involves manual labour, and lower salaries compared with other industries<sup>67</sup>.

Rising energy expenses, particularly electricity, have imposed additional costs on growers. Many growers have reduced their energy costs by implementing energy saving options, such as altering their production process and increasing their energy efficiency. In some cases, vegetable growers have exhausted most of these opportunities. While growers have a direct incentive to reduce their energy costs as it translates into higher returns (all else equal), the correct policy settings must encourage this transition. Generating renewable energy on farms, cogeneration plants and purchasing efficient and larger machinery generally require a significant capital outlay. Therefore, incentives to encourage the uptake of these type of investments, where cost-effective to do so, should be made more readily available. There is also a need for simplistic and streamlined arrangements, where multiple parties could pool funds together and purchase an energy efficient piece of machinery (i.e. cogeneration system). Such arrangements need to be explored further.

Fertiliser prices have fluctuated extensively over the past decade, partly due to the GFC and price movements in key production inputs such as natural gas and crude oil. Similar to many production inputs for growers, fertiliser prices are influenced by external factors, including exchange rates, the availability and prices of potash, world market trends and consumer preferences. To somewhat mitigate the volatility in fertiliser prices, growers will need to continue to effectively improve soil health through implementing various techniques, such as crop rotation, using slow release fertilisers, composts and growing green manures as cover for crops.

Vegetable growers need to continue managing the level of inputs required to achieve an optimum yield, given they have limited ability to influence the price of inputs. However, the key to reducing growers' costs is to improve and accelerate productivity growth, which would also increase the vegetable industry's competitiveness. Moving forward, it would be valuable for the vegetable industry to identify how productivity growth, which is essential for the sustainability of the industry, can be increased and which new technologies offer the largest gains.

<sup>&</sup>lt;sup>67</sup> AUSVEG, Investigating future training and education opportunities for both new and existing vegetable industry members, project number: VG12077, (2013).

## 5.3 Exporting Australia's vegetables to the Middle East & Asia

#### Introduction

Australia's vegetable growers face a challenging business environment in the domestic market, with rising production costs and lower prices resulting in decreasing farm profitability. The Middle East and Asia could act as key export markets for Australian vegetable growers as these countries are experiencing high population growth as well as increased wealth. The proximity of Australia to the Middle East and Asia also increases the viability of vegetable exports, which are currently low relative to domestic vegetable sales.

This discussion paper will provide an overview of Australia's domestic market, as well as provide market snapshots on the Middle East, China, South Korea and Japan, examining their domestic markets and vegetable trade with Australia.

#### Australia's Domestic Market

The Australian vegetable growing industry contributed around \$3.7 billion to the gross value of agricultural production in 2013-14, which was a 12 per cent increase from 2011-12.<sup>68</sup> Despite this, vegetable growers have been faced with increasing production costs, particularly labour, which is the largest production cost on average for Australian growers.

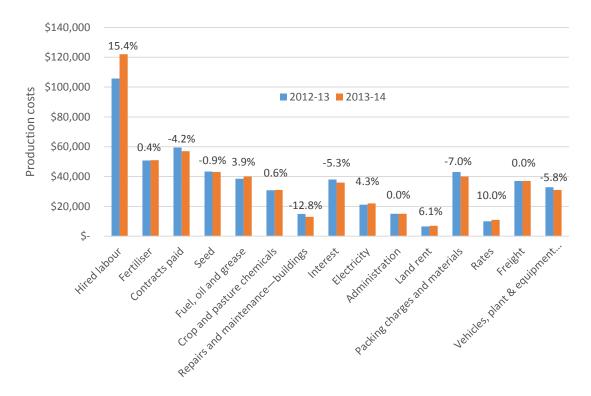


Figure 1: Average Production Costs

Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

This increase in labour costs has contributed to an overall increase in production costs, which have a larger impact on smaller growers who do not benefit from economies of scale. It is important for smaller growers to

<sup>&</sup>lt;sup>68</sup> ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

focus on input productivity and efficient use of their capital, as vegetable growers tend to be price takers and therefore have a limited influence on revenue through vegetable sales. Even though seasonal conditions were above average in 2013-14, higher yields have a downward effect on vegetable prices which can reduce margins.

The higher yields have traditionally caused an oversupply of vegetables in the domestic market, leading to large amounts of waste per year. Average profits for National Vegetable Levied farms have declined by 25 per cent over the last financial year, with debt increasing by 17 per cent from 2011-12 to 2012-13.

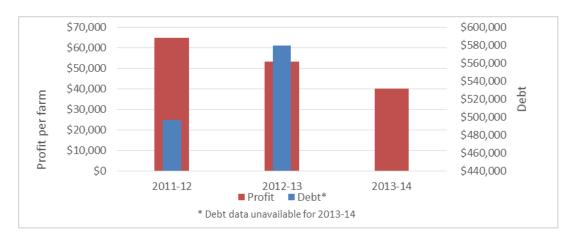


Figure 2: Farm Profit and Debt

Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

This oversupply of domestic production could open up opportunities for produce to be directed overseas to new export markets, with Australia's vegetables traditionally of a higher quality which is conducive to the growing middle class, especially in Asia. For this to occur, growers could start strengthening overseas ties and relationships to induce exports, with support from the government e.g. DFAT and Austrade. However, this may take some time as the protocols for exporting are quite different relative to producing for a domestic market.

#### **Australia's Export Market**

Australian vegetables are mostly grown for the domestic market, with only 7 per cent of the value of gross vegetable production exported in 2013-14<sup>69</sup>. The value of total exports has remained relatively stable over the past few years, amounting to almost \$256 million in 2013-14.<sup>70</sup>

<sup>&</sup>lt;sup>69</sup> GTIS total export data as a proportion of the gross value of vegetable production. \$256m / \$3.7b. Please note that this figure could be overstated due to storage, transport, insurance and other costs which can increase export prices.

<sup>&</sup>lt;sup>70</sup> Dried vegetables are excluded as they are not counted in the Australian Bureau of Statistics category of 'Vegetables for Human Consumption.'

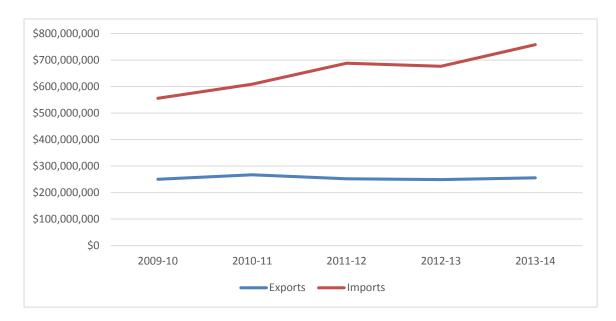


Figure 3: Value of exports and imports in AUD

**Source**: Global Trade Information Services

Despite exports slightly increasing from the previous financial year by 3 per cent, imports also increased by 12 per cent which has widened the trade deficit. This increase in imports relative to exports over time can put pressure on domestic vegetable growers, who face competition from overseas growers which can drive down prices.

Japan was Australia's largest export market in 2013-14 with a total value of \$46.5 million, which was 9 per cent lower than the previous financial year. However, exports to Japan have steadily increased on average since 2009-10, surpassing New Zealand as Australia's number one export destination for vegetables in 2012-13. In fact, vegetable exports to New Zealand have declined annually for four years, more than halving in total value since 2009-10.

Despite being one of Australia's largest trading partners, total export value to China totalled around \$2.5 million in 2013-14 which comprised of only 1 per cent of total world vegetable exports.

\$90,000,000 \$80,000,000 \$60,000,000 \$40,000,000 \$20,000,000 \$10,000,000 \$-\$-\*\*Integrated Fints and Sints and Sint

Figure 4: Export destination of vegetable exports in 2013-14

Source: Global Trade Information Services

Carrots and turnips were the largest commodity group that contributed to Australia's export value in 2013-14, continuing to be Australia's largest vegetable export in terms of value. As a proportion of total exports, Carrots and Turnips amount to approximately 20 per cent of total vegetable exports every year.

Figure 5 shows the breakdown of export value for particular commodities; it should be noted that all vegetable exports are either fresh or chilled, unless otherwise stated.

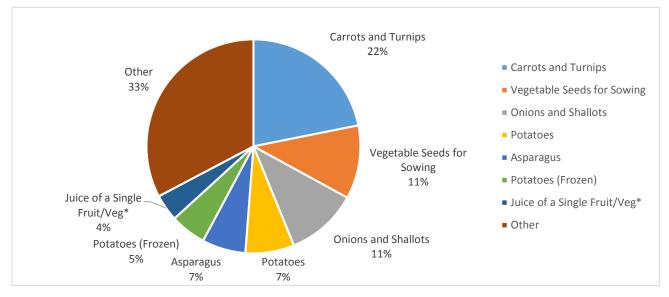


Figure 5: Per cent composition of \$256 million AUD value of vegetable exports in 2013-14

**Source:** Global Trade Information Services

Carrots and Turnips accounted for 22 per cent (\$56 million) of total vegetable exports in 2013-14. In comparison to the vegetables that fall under the National Vegetable Levy, carrots alone accounted for a much

<sup>\*</sup>Juice of Any Single Fruit or Vegetable (Excl. Orange, Grapefruit & Other Citrus Fruits; Pineapple; Tomato; Apple; Cranberry; Grape and Grape Must), Unfermented and With No Added Spirit, With or Without Sugar or Other Added Sweetening Matter

higher proportion, making up 75 per cent of total leviable export value in 2012.<sup>71</sup>

Australia's vegetable exports remain low due to a number of reasons. Historically around 80 per cent of vegetable growers believed development of export markets was too difficult or time-consuming. Inadequate prices for exported vegetables and shipping costs were also commonly stated impediments.<sup>72</sup>

However, Australian vegetable growers possess significant strengths in their businesses and products that can be of advantage in the export market. Strengths include high food safety standards, a perception of having premium products and counter seasonality to the northern hemisphere. <sup>73</sup> More information to increase the knowledge base for growers could be of great benefit and make Australia's vegetable export industry much larger.

AUSVEG believes there are significant opportunities to build profitability through exports and is actively working with growers to improve export readiness, promote export opportunities (including through business matching activities with growers) and communicate information about the exporting process. Examples of this include an export readiness checklist on the AUSVEG website and setting up various conferences and symposia pertaining to vegetable export opportunities.

# **Market Snapshots**

## The Middle East

The Middle East has a population of approximately 400 million people, with the region best known for producing and exporting oil. The GDP per capita varies dramatically from country to country, varying from approximately \$1,000 to \$100,000 USD per capita. The Middle East had a 16 per cent share of Australia's vegetable exports to the world in 2013-14, increasing slightly from the previous financial year. This section will have a focus on the United Arab Emirates (UAE), Saudi Arabia and Qatar as these countries accounted for 85 per cent of Australia's vegetable exports to the Middle East in 2013-14.<sup>74</sup>

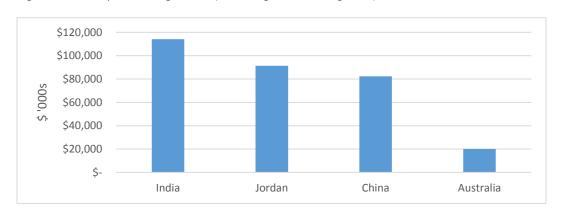


Figure 6: UAE imports of vegetables (excluding dried and legumes) in 2013

<sup>&</sup>lt;sup>71</sup> AgEconPlus 2014: Malaysia & UAE Analysis and Strategy – Carrots & Sweet Corn

<sup>&</sup>lt;sup>72</sup> ABARES Australian farm survey results: 2011-12 to 2013-14

<sup>&</sup>lt;sup>73</sup> AgEconPlus 2014: Malaysia & UAE Analysis and Strategy – Carrots & Sweet Corn

<sup>&</sup>lt;sup>74</sup> Global Trade Information Services

Source: International Trade Centre - Trade Map

India, Jordan and China were the biggest import sources for the UAE in 2013. Onions and garlic were the main vegetables being imported, with tomatoes also a key import.

Figure 7: Australian Carrot and Turnip exports - percentage out of all vegetables; and value

	2011-12	Value (USD)	2012-13	Value (USD)	2013-14	Value (USD)
UAE	77%	\$12,994,829	77%	\$14,347,370	74%	\$17,331,329
Qatar	86%	\$3,345,913	87%	\$3,811,785	82%	\$3,793,894
Saudi Arabia	96%	\$7,188,768	96%	\$5,505,000	95%	\$6,684,993

**Source:** Global Trade Information Services

As shown above, carrots and turnips dominated Australia's exports to Middle Eastern countries, with carrots comprising the majority. <sup>75</sup> It is clear that carrots are Australia's top export prospect and could be a focus of future growth in this market, in addition to other vegetables which are exported at vastly smaller amounts but have potential to increase.

Western Australia is Australia's main carrot exporting state, accounting for over 90 per cent of carrot exports due to its closer proximity to the Middle East (and Asia). As mentioned earlier, domestic production has an advantage and therefore trades successfully on quality and food safety, as opposed to price. <sup>76</sup> This means that consumers overseas are seeking better quality products (note the stronger colour of Australian carrots on the right in Figure 8). However, China remains the main competitive threat for Australian carrot exports to the Middle East with their lower cost carrots.

Figure 8: Chinese, US and Australian carrots (left to right) in a UAE retail store



Source: AgEconPlus 2014: Malaysia & UAE Analysis and Strategy – Carrots & Sweet Corn

Despite this, Saudi Arabia and Qatar imported almost four times as many carrots from Australia than they did from China in 2013 by value. This trend has remained stable since 2008. The UAE was the exception, importing more carrots from China than from Australia as shown below.

<sup>&</sup>lt;sup>75</sup> AgEconPlus 2014: Malaysia & UAE Analysis and Strategy – Carrots & Sweet Corn

<sup>&</sup>lt;sup>76</sup> Department of Agriculture and Food, Government of Western Australia ; Carrot exports from Western Australia https://www.agric.wa.gov.au/carrots/carrot-exports-western-australia

\$3 50,000 45,000 40,000 \$2 35,000 Price per kilo \$2 30,000 25,000 20,000 15,000 10,000 \$1 5,000 0 China Australia USA Quantity Value -

Figure 9: UAE imports of carrots by value, quantity and price

Source: International Trade Centre - Trade Map

The UAE is Australia's main export destination for carrots, as shown by Figure 7. Nearly all fresh vegetables consumed in the UAE are imported, with 100 per cent of fresh vegetables imported in the hotter months of June to September. In addition to carrots, the UAE imported vegetables from the US and other low cost suppliers such as India, South Africa and Iran.<sup>77</sup>

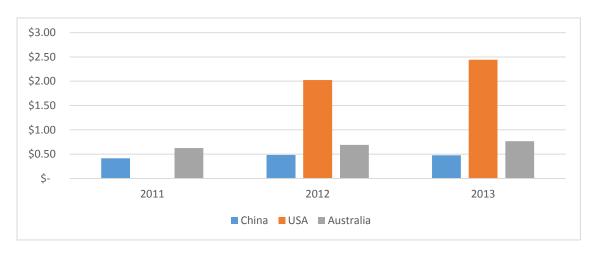


Figure 9: Saudi Arabian prices of imported carrots per kilo

Source: International Trade Centre - Trade Map. Figures derived using import values and weights.

Figure 9 above shows how much more expensive USA sourced carrots are than Australian and Chinese in Saudi Arabia. The average Australian price of around \$0.70 per kilo is similar in the UAE as well. It is interesting to note that according to one of Dubai's largest fresh produce importers, Australian carrots are commonly used by the juicing industry, whereas Chinese carrots are usually only sold fresh in retail markets. The carrot market is undersupplied in the UAE which gives Australia an opportunity to invest and expand its export markets. Australian carrots remain competitive due to their quality, taste, reliable supply all year and colour,

<sup>&</sup>lt;sup>77</sup> WOP Dubai 2013 – International Perishables Expo Middle East

<sup>&</sup>lt;sup>78</sup> African Agribusiness Academy – Fresh Produce Market in Dubai http://www.aa-academy.org/sites/default/files/resource/dubai\_bulletin.pdf

however, price remains much higher than lower quality Chinese carrots. Price levels of carrots can decrease as the Australian dollar weakens, however, increasing output to push prices lower could be an avenue to securing greater market share as well as demand from the Middle East. A big threat for Australian carrot exporters is the increasing quality of cheaper Chinese carrots. Therefore Australian growers must ensure their carrots are of the highest quality, which can be achieved by investing in product development.

Bilateral relations between Australia and the UAE are growing rapidly, arising from extensive people to people contacts due to a large population of expatriate Australians living and working in the UAE.<sup>79</sup> Growth in the food sector in the UAE is forecast to grow at 20 per cent per annum through to 2018,<sup>80</sup> with an expanding hospitality sector and increasing emphasis on healthy eating.

## Japan

Japan has the third largest economy in the world and is Australia's second largest trading partner, with a population of approximately 130 million. Japan is the leading export destination for Australian vegetables in Asia, accounting for almost 40 per cent of its export value to Asia in 2013-14.81



Figure 10: Australian vegetable exports to Asian countries over time (AUD)

**Source:** Global Trade Information Services

Since 2009-10, Australian vegetable exports to Japan have increased by 43 per cent. Vegetable production is the third biggest sector in Japanese agriculture, which has traditionally been protected and highly subsidised with the Japanese Government favouring small scale cultivation, leading to Japan having one of the world's highest crop yields per unit area. <sup>82</sup> Japanese vegetable consumption exhibits a seasonal pattern, with peak consumption occurring from March to June, and September to December. Most Japanese vegetable imports comprise vegetables to fill off-season supply such as asparagus, which cannot be grown in those times. Some

<sup>&</sup>lt;sup>79</sup> DFAT – UAE Country Brief

<sup>&</sup>lt;sup>80</sup> AgEconPlus 2014: Malaysia & UAE Analysis and Strategy – Carrots & Sweet Corn

<sup>81</sup> Global Trade Information Services

<sup>82</sup> New Welfare States in East Asia: Global Challenges and Restructuring – Gyu-Jin Hwang p64

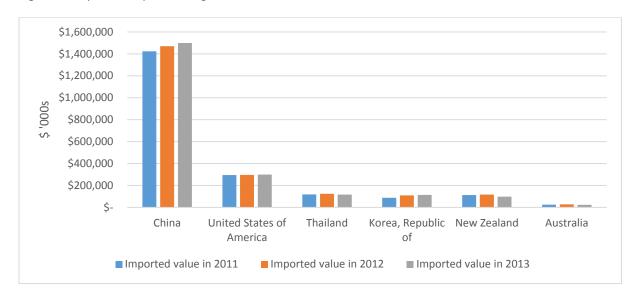


Figure 11: Japanese imports of vegetables

Source: International Trade Centre - Trade Map

Asparagus, juice of single/mixed fruits and onions accounted for the majority of Australia's exports to Japan. Carrots and sweet corn accounted for approximately 7 per cent of exports to Japan in 2013-14. China remains Japan's biggest import source, with USA and other southern hemisphere countries becoming major suppliers of vegetables to Japan. Despite China being a low cost supplier, there have been instances of Chinese vegetables being restricted or banned due to food safety issues, giving Australia an advantage due to higher food standards and low chemical usage.<sup>84</sup>

Japan's dependency on imported vegetables has increased over time due to lower production volumes and smaller sizes of land area. In addition, the 2011 tsunami induced food safety concerns which gave Japanese consumers a negative perception on domestic produce; therefore Japanese consumers are seeking higher quality imported vegetables.<sup>85</sup>

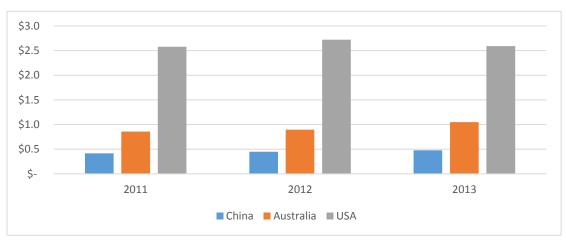


Figure 12: Japanese prices of imported carrots per kilo

<sup>83</sup> Protected Agriculture: A Global Review, Volumes 23-253 - Merle H. Jensen, Alan J. Malte p148

<sup>&</sup>lt;sup>84</sup> Austrade – Japan Profile, Fruit and Vegetables to Japan

<sup>85</sup> Ibid

Source: International Trade Centre - Trade Map. Figures derived using import values and weights.

Despite Australia's strong trade with Japan, agricultural tariffs have increased by up to 219 per cent over time as a result of Japan's heavily protected agriculture market. <sup>86</sup>. The Japan-Australia Economic Partnership Agreement (JAEPA) was implemented on 15 January 2015 and has reduced tariffs on the vast majority of Australia's vegetable and juice exports. Carrots, broccoli, cauliflower and cabbages are just some of the vegetables that have had tariffs immediately eliminated. Other vegetables like broad beans will have their tariffs gradually reduced over time. <sup>87</sup> This will increase the competitive advantage for Australian vegetable exporters to Japan and pave the way for increased exports for key export vegetables. In addition, Japan signed on to the Trans-Pacific Partnership (TPP) in 2013 which aims to enhance competitiveness and forge closer linkages between Australia and Japan. <sup>88</sup>

#### South Korea

South Korea has a population of almost 51 million and is Australia's third largest export partner. Despite the export value to South Korea having increased since 2009-10, exports in 2013-14 were almost half the value of exports in 2011-12.

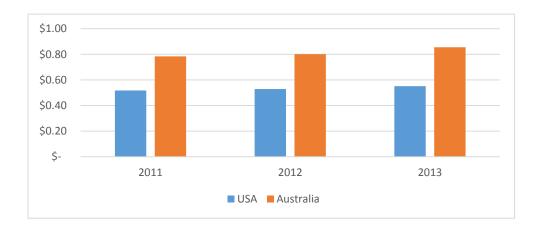


Figure 13: South Korean prices of imported potatoes per kilo

**Source:** International Trade Centre - Trade Map

Nearly 90 per cent of Australia's vegetable exports to South Korea are potatoes, with asparagus comprising approximately 5 per cent. The main sources of South Korean fresh vegetable imports are China and the United States, with increased demand for processed vegetables due to changing lifestyles. <sup>89</sup> Yams are also in high demand, comprising a large part of imports from Vietnam and Thailand.

<sup>86</sup> DFAT – Japan-Australia Economic Partnership Agreement

<sup>87</sup> Ibid

<sup>88</sup> DFAT – Trans-Pacific Partnership Agreement

<sup>89</sup> United States Department of Agriculture – Economic Research Service - Fruits, Nuts & Vegetables

\$600,000 \$500,000 \$400,000 \$ '000s \$300,000 \$200,000 \$100,000 Ś-China Viet Nam Thailand United States of Australia America ■ Imported value in 2011 ■ Imported value in 2012 ■ Imported value in 2013

Figure 14: South Korean imports of vegetables

Source: International Trade Centre - Trade Map

A key development in Australia's agriculture trade with South Korea has been the formation of the Korea-Australia Free Trade Agreement (KAFTA) which came into effect from December 2014. The KAFTA will be significant for Australia's vegetable exporters as it will eliminate tariffs and therefore ensure Australia is on a level playing field with other regions such as the US, EU and Asian countries which already have existing free trade agreements with South Korea. Examples include the 30 per cent tariff on carrots and most fruit juices which will be progressively eliminated by 2018 and the 45 per cent tariff on tomatoes which will be progressively eliminated by 2020. The Korea United States Free Trade Agreement (KORUS FTA) came in to effect in 2010 and diminished South Korea's high tariffs for the US, making them instantly more competitive.

#### China

China has a population of over 1.3 billion people and is Australia's largest trading partner. As of 2011, China became the largest consumer market for food and beverage, with food consumption changing drastically as increasing living standards lead to more people seeking foods with a higher nutritional value, better quality and freshness.<sup>93</sup> However, as mentioned earlier, Australia's exports of vegetables to China comprised of less than 1 per cent of total vegetable exports in 2013-14.

The increasing middle class and rapid population growth have resulted in increasing urbanisation, altering food consumption patterns. In addition, the tastes of younger consumers in China are said to again alter consumption patterns, with the likely effect of younger generations having more exposure to foreign food and therefore a greater mix of vegetables.<sup>94</sup>

<sup>90</sup> DFAT – Korea-Australia Free Trade Agreement

<sup>&</sup>lt;sup>91</sup> Ibid

<sup>&</sup>lt;sup>92</sup> The Prospective Free Trade Agreement with Korea: Background, Analysis, and Perspectives for California Agriculture - Hyunok Lee and Daniel A. Sumner 2009

<sup>93</sup> AusTrade – Food and Beverage in China

<sup>&</sup>lt;sup>94</sup> University of Sydney – Exporting to China, A symposium for Vegetable Growers. Professor Hans Hendrischke

China produces almost half of the world's fresh vegetables which may explain how Australian exports to China are so low. It is interesting to note that for processed vegetables, China is the third biggest export destination for Australia but for fresh vegetables it is 17<sup>th</sup> (based on 2013-14 figures). The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) predicts that China will account for 43 per cent of global growth in agricultural demand by 2050.

By value, China receives significant vegetable imports from Thailand, Canada and Vietnam, with a high demand for yams and dried vegetables. Australia's contribution of vegetable exports to China comprises only 0.14 per cent of the total it receives. Australia's exports to China have remained steady since the 2011-12 financial year.

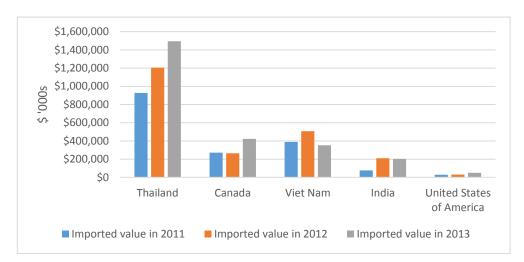


Figure 15: Chinese imports of vegetables

Source: International Trade Centre - Trade Map

Some impediments to Australian growers exporting to China are market access and information. Chinese export markets are deemed to be extremely time consuming and complex, especially for smaller to medium sized growers who have limited resources. There is said to be little information or protocols on how to export particular vegetables to China and market access for Australian produce is poor. China remains a net exporter of vegetables.

A big discrepancy between China and Australia is that Australian vegetable exporters face tariffs of between 10 to 25 per cent, whereas vegetable imports from China enter Australia duty free. However, the new China-Australia Free Trade Agreement (ChAFTA) which will come in to effect in 2015 is set to address China's high tariffs on horticulture products, with all tariffs set to be eliminated. The key outcome for vegetable growers in Australia is the elimination of the 10 to 13 per cent tariff on all fresh vegetables within four years.

#### Conclusion

Australian growers have the opportunity to take advantage of overseas vegetable markets, which would curb issues of oversupply which lead to lower prices domestically. The increased wealth and population growth in the Middle East and much of Asia has resulted in increased demand for a diverse range of high quality

<sup>95</sup> Exporting Vegetables to China: Examining Opportunities and Barriers – Tegan Bensley

<sup>96</sup> DFAT – China-Australia Free Trade Agreement

vegetables which Australia can supply.

More information is being provided to growers by AUSVEG to assist them with exporting. Considering only 4 per cent of Australian growers produce vegetables for export, and only 1 per cent of this value is exported to China, there are many opportunities to tap in to overseas markets where Australian growers potentially have an advantage selling premium and safe vegetables.

Carrots are a relatively large export to the Middle East but are in competition with cheaper Chinese produce. Research and development on consumer trends in the Middle East needs to be further analysed and conveyed to growers. For example, juice consumption (e.g. carrot juice) increases dramatically during the time of Ramadan which Australian growers could take advantage with their premium carrots.

The biggest developments for vegetable exports have been the recent free trade agreements with Japan, South Korea and China, which should hopefully result in a sustained increase in momentum for exports due to lower tariffs and therefore a more level playing field with other competitors. More information and better market access should be developed, especially to China where there is a lack of expertise and protocols for vegetables. Greater investment in these areas could be costly in the short term but over time produce an increase of vegetable exports, making the short term investment worthwhile.

## 5.4 Analysing vegetable growers' financial performance by state

#### Introduction

The financial performance of Australian vegetable growers can be affected by a range of supply and demand determinants, such as seasonality, costs of production, consumer behaviour and production processes. These determinants tend to vary considerably for different states due to Australia's large geographic area and diverse range of vegetables, and this can subsequently translate to mixed financial performance from state to state.

To better understand these dynamics, this paper will analyse the financial performance of growers in Australia's main vegetable-growing states that pay the National Vegetable Levy (NVL), and whose estimated value of agricultural operations are greater than \$40,000 as identified by the Australian Bureau of Agricultural & Resource Economics & Sciences, then compare these results with the national average. This approach will help identify the states which are performing best, and demonstrate some of the nuances in states' performances. It should be noted that the financial performances of all growers including those who do not fall under the NVL, could have quite different performances relative to an analysis solely of NVL growers.

The national averages mentioned in this paper should be used as a guide, and not a true indication of the nation's performance. For example, the national average for farm business profit in 2013-14 was a small profit of \$40,000, which does not mean that every farm in Australia a profit. On a state by state level, financial performance can vary drastically.

# Australian vegetable growers' financial performance

Particularly in recent years, Australian vegetable growers have experienced a difficult operating environment, largely due to rising production costs. Since 2007-08, Australian vegetable growers' vegetable cash receipts have increased by 48 per cent; however, this has been disproportionately offset by an increase in vegetable growers' total cash costs of 71 per cent. This increase in cash costs has contributed to a decrease in average farm business profit for vegetable growers by 53 per cent since 2007-08.

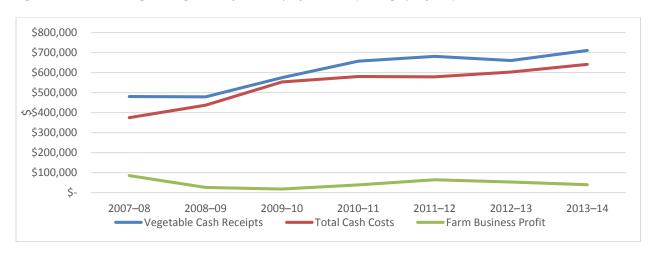


Figure 1: Australian vegetable growers' financial performance (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

In addition to profit, another key indicator of farms' financial performance is the rate of return to capital

(excluding appreciation, such as land value increases), which expresses profit as a percentage of investment on capital. This conveys how well a farm can generate cash flow relative to capital invested in the farm, regardless of farm size. For example, an increase in farm size typically requires increased expenditure on capital items relating to planting and harvesting vegetable crops, such as land, machinery, chemicals and equipment, which can enable the farm to generate more profit relative to smaller farms. This means that while a smaller farm may earn less profit than a large farm, it could have a better rate of return on capital, which means the small farm is utilising its capital more productively.

The rate of return on capital for Australian vegetable growers has fluctuated over the years, declining from 2007-08 to 2009-10, rising in 2011-12 and then declining again in the past two years. It can be seen by Figure 2 that the rate of return on capital is correlated to business profit. Over time, growers are now making less of a return on all capital used by the business, particularly when compared to returns achieved during 2007-08.

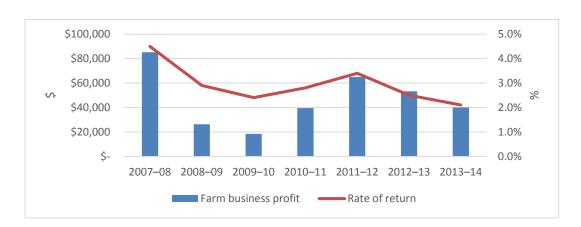


Figure 2: Australian vegetable growers' rate of return on capital (average per farm) and profit

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

# New South Wales vegetable growers' financial performance

NSW continued its trend of having a poor financial performance relative to the national average. There are approximately 616 NVL vegetable growers in NSW, with this number remaining steady over the last two years and representing the highest number of growers out of all the states.

As shown in Figure 3 below, NSW vegetable growers have averaged making losses over the past six years. NSW vegetable growers' profits, on average, peaked in 2007-08 at \$29,230, then declined from then on to register losses each year after. Despite vegetable cash receipts being much greater than cash costs in 2011-12, losses were still made on average in contrast with 2007-08, where a similar discrepancy occurred but profits were made. This could be attributed to 'other' cash receipts in 2007-08 being more than double 'other' cash receipts in 2011-12.

Despite some improvement in the last two financial years, on average, vegetable growing has not proven to be profitable in New South Wales. A possible explanation for this is that vegetable producing enterprises in NSW are smaller in scale than the national average, limiting the cost advantages derived from economies of scale in larger operations. This is illustrated by their cash receipts being 69% less than the national average in 2013-14.

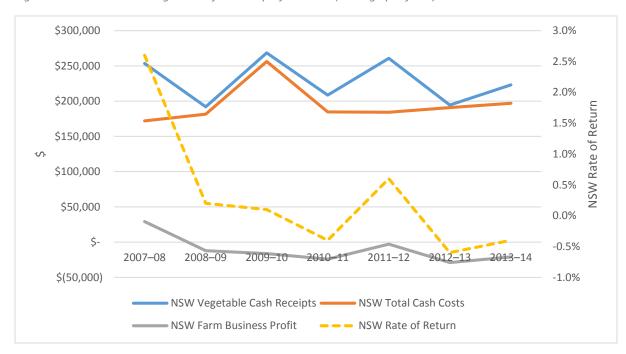


Figure 3: New South Wales growers' financial performance (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

New South Wales vegetable growers' rate of return is consistently less when benchmarked against the Australian average.

Although NSW vegetable growers were able to achieve considerably lower cash costs for each type of cost (such as fertiliser, labour and electricity) when compared to the national average, they were unable to deliver better returns. As mentioned previously, this could be attributed to the smaller scale of operations.

While the data suggests that on average NSW vegetable growers are unprofitable, this does not apply to all enterprises, and there are undoubtedly vegetable growing farms located in parts of NSW which perform better than the NSW average.

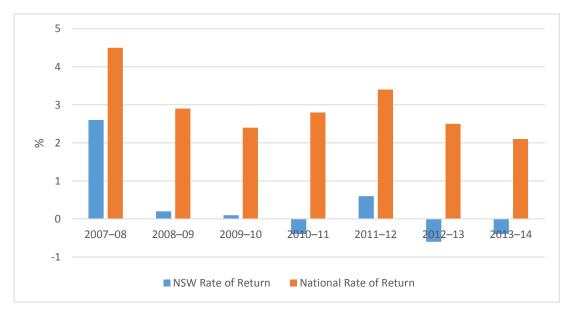


Figure 4: Australian and NSW vegetable growers' rate of return (average per farm)

# Victorian vegetable growers' financial performance

On average, Victorian vegetable growers had one of the best financial performance out of all of the states. The profit received in 2013-14 of \$263,000 was the second largest, and was far greater than the national average profit of \$40,000. There were 217 NVL growers in Victoria.

Since registering a loss of \$7,850 on average in 2011-12, Victorian vegetable growers' profits have increased over the past two years. This is due to average cash receipts increasing at a faster rate relative to average cash costs, as shown in Figure 5.

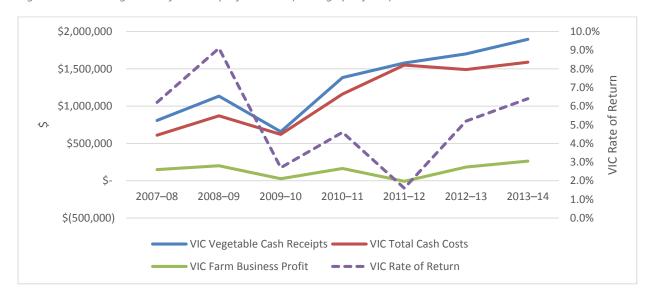


Figure 5: Victorian growers' financial performance (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

Victoria's cash costs are greater than Australia's national average for every single category; in total, this equated to an average difference between Australia and Victoria of \$948,000 per farm. Victoria is the only state to experience higher costs for every cash cost component due to their increased scale of operation, a stark contrast to the situation experienced in New South Wales.

Figure 6: Cash	costs o	f vegetable	growers	(2013-14)	

	AUS	VIC	Difference
Total Cash Costs	\$641,000	\$1,589,000	\$948,000
Contracts Paid	\$60,000	\$267,000	\$207,000
Hired Labour	\$140,000	\$305,000	\$165,000
Vehicles, Plant & Equipment Maintenance	\$33,000	\$74,000	\$41,000
Packing Charges & Materials	\$53,000	\$120,000	\$67,000

Seed	\$44,000	\$90,000	\$46,000
Freight	\$38,000	\$93,000	\$55,000

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

Despite Victorian growers' production costs being considerably higher than the national average, their rate of return (excluding capital appreciation) has been outperforming the national average for most years (except in 2011-12, where Victorian growers expended the most on contracted work out of any other year).

10.0% 9.0% 8.0% 7.0% 6.0% 5.0% 4.0% 3.0% 2.0% 1.0% 0.0% 2007-08 2008-09 2009-10 2010-11 2011-12 2012-13 2013-14 ■ VIC Rate of Return ■ National Rate of Return

Figure 7: Australian and Victorian vegetable growers' rate of return (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

# Queensland vegetable growers' financial performance

Historically, Queensland has been a major contributor to Australia's vegetable production, with this trend expected to continue into the future. In 2013-14, there were approximately 534 NVL paying enterprises. In 2013-14, farm cash income in Queensland is estimated to have decreased the most out of any state due to lower vegetable prices and an increase in the average area of harvesting and planting crops, which increased cash costs.

Over time, Queensland vegetable growers' financial performance has varied considerably, with average losses of \$80,000 being made in 2013-14, the first average loss since 2008-09. As shown on Figure 8, profits were at the highest point in 2007-08 with cash receipts being much higher than cash costs. In 2013-14, it can be seen that cash costs increased above cash receipts for the first time, leading to a large decline in farm business profit.

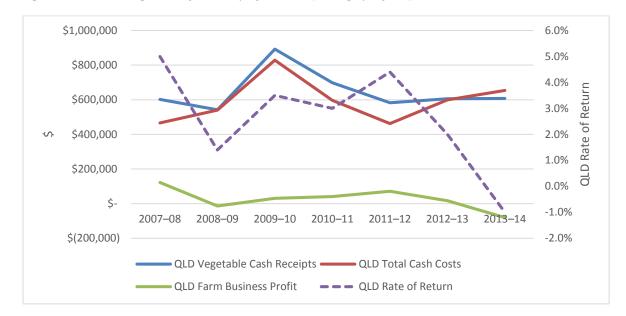


Figure 8: Queensland growers' financial performance (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

The increase in cash costs which surpassed cash receipts for the first time could be attributed to labour costs increasing drastically relative to previous years, due to planting and harvesting larger vegetable crops. Queensland had the highest increase in area sown for vegetables at 8 per cent.

In 2011-12 average hired labour costs amounted to \$123,490 and then \$142,500 in 2012-13. However, labour costs then jumped 40% in 2013-14 to \$199,000, with all other cash costs remaining steady from the previous year. Hired labour comprised 30 per cent of total cash costs in 2013-14, the highest proportion it had been over the last six years.

Queensland growers experienced the largest percentage increase in the quantity of vegetables produced in 2013-14 relative to the other states with a 20 per cent increase on the previous year, despite the average quantity produced of the main vegetables produced in Queensland declining, particularly green beans and potatoes. In addition, Queensland growers had lower average prices for their vegetables, which also contributed to a sharp decline in their rate of return on capital as shown in Figure 9. Green beans have proven to be an important vegetable for Queensland, with prices much higher in 2012-13.

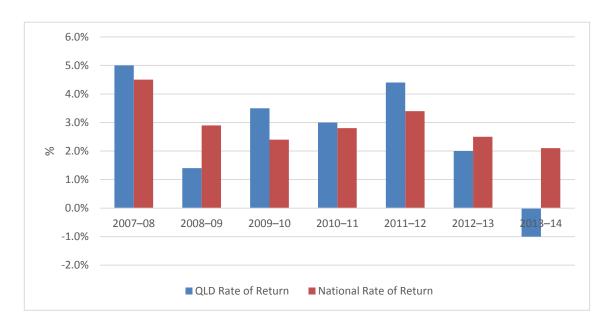


Figure 9: Australian and Queensland vegetable growers' rate of return (average per farm)

## South Australian vegetable growers' financial performance

South Australia has 177 NVL paying growers, which is the second lowest amount in Australia. However, South Australian vegetable growers have on average sustained modest business profits since 2008-09 as shown in Figure 10 below.

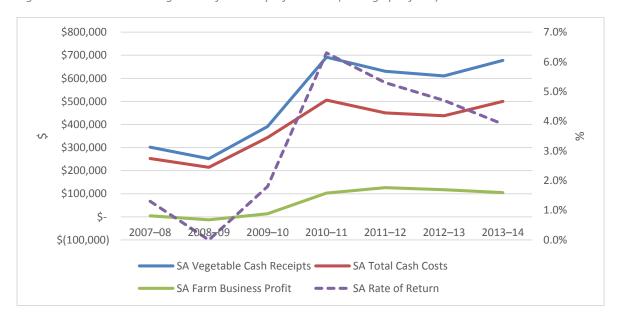


Figure 10: South Australian growers' financial performance (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

As shown by Figure 10, South Australian growers' profits peaked in 2011-12, coinciding with the largest discrepancy between vegetable cash receipts and cash costs. Since then, vegetable cash receipts have increased but cash costs have increased at a similar rate, leading to stable profit of \$100,000 to \$125,000 every year since 2010-11. However, profits have slightly decreased since the previous financial year despite vegetable cash receipts increasing by approximately 11 per cent, due to cash costs increasing by 14 per cent.

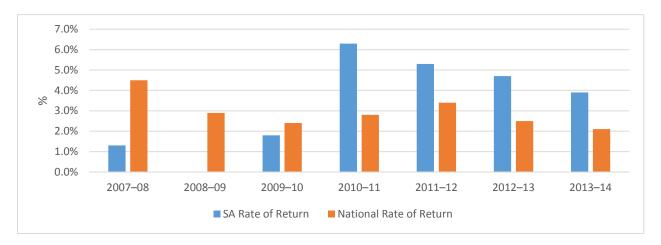


Figure 11: Australian and South Australian vegetable growers' rate of return (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

South Australian growers on average have been experiencing a decreasing rate of return on capital since 2010-11, despite profit staying relatively stable. From 2010-11 to 2011-12, profits actually increased for South Australian growers, despite the rate of return on capital decreasing. This is due to investment in total farm capital increasing by almost 50 per cent in 2011-12 from the previous year. Figure 11 also depicts the national rate of return on capital decreasing since 2010-11 in line with South Australia.

Compared to national averages, South Australia has similar vegetable cash receipts, but has also traditionally had much lower cash costs, which is a significant contributor to South Australian growers attaining higher profits than the national average.

On another positive note, South Australian growers experienced a consistently lower interest to receipts ratio

than Australia's average, meaning they have greater capacity to service their debts. Alth	nough South Australian
vegetable growers appear to be in a reasonable position compared to other states, this	is unlikely to be the
case for all vegetable types grown in South Australia, and should be considered a gener	al overview.

Interest to Receipts Ratio	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
AUS	5.9%	5.1%	6.3%	5.9%	4.8%	5.1%	4.5%
SA	4.8%	4.0%	4.4%	4.1%	3.6%	3.5%	3.4%

Figure 12: South Australia and Australia's interest to receipts ratio

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

### Western Australian vegetable growers' financial performance

There were approximately 212 NVL paying enterprises in Western Australia in 2013-14 – around one third of the number of vegetable growers in New South Wales. Western Australian vegetable farms are generally larger in size than the national average.

Western Australian vegetable growers' business profits have traditionally been very high relative to the national average, steadily increasing from 2009-10 each year to an average profit of \$269,000 in 2013-14. Since 2007-08, Western Australian vegetable growers' profits have almost doubled, from \$139,500 per farm to \$269,000. From 2009-10 to 2010-11, Western Australian growers on average received relatively low profits of around \$30,000 to \$33,000. This fall in profits could be attributed to the drought period suffered in Western Australia from 2009 to 2011. A key reason why profits increased after 2010-11 is due to vegetable cash costs flattening out relative to cash receipts. Since 2010-11, vegetable cash receipts have increased by approximately 20 per cent, whereas cash costs have decreased by 3 per cent. In contrast with the other states, hired labour costs decreased by 10 per cent since 2010-11.

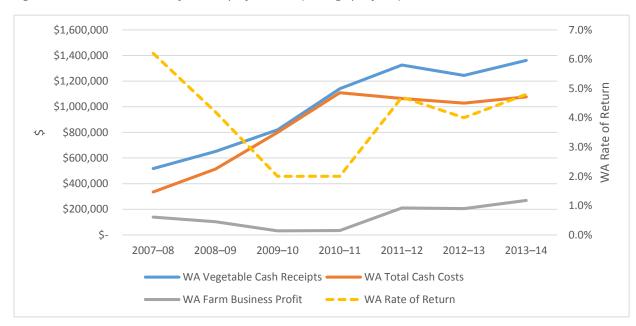


Figure 13: Western Australia's financial performance (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

The rate of return on capital for Western Australian growers has been consistently higher than the national average, except from 2009 to 2011 during the drought which lowered profits.

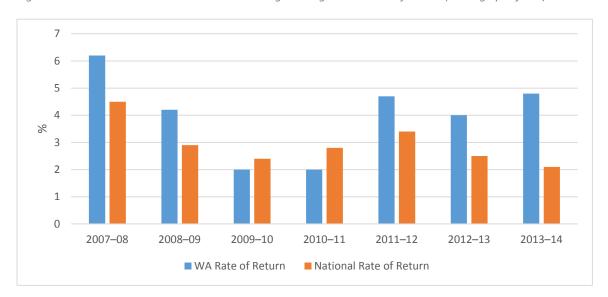


Figure 14: Australian and Western Australian vegetable growers' rate of return (average per farm)

# Tasmanian vegetable growers' financial performance

There were approximately 94 NVL paying vegetable farms in Tasmania, the smallest number out of all the states.

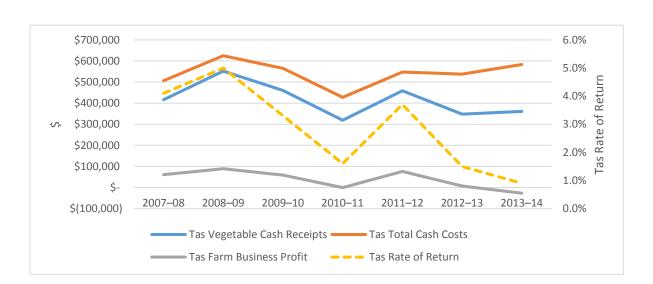


Figure 15: Tasmania's financial performance (average per farm)

In Figure 15, it can be seen that cash costs increased on average and cash receipts decreased from 2011-12 onwards, leading to a decrease in profit. This can partially be explained by damaged crops in late 2013 due to excessive rain. Despite this, Tasmania's average losses of \$27,000 were still lower than the national average of \$40,000 in losses.

Often, vegetable growers derive incomes from other sources (i.e. cattle, sheep or growing non-vegetable crops). This is particularly prevalent in Tasmania. As shown in Figure 16, Tasmanian growers' percentage of cash receipts from vegetables is considerably less than any other state at 54 per cent, with the next nearest being New South Wales at 85 per cent.



Figure 16: Percentage of cash receipts from vegetables (average per farm)

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

In terms of rate of return on capital for Tasmanian growers, Figure 17 below depicts volatility relative to the national rate of return on capital over time. In 2011-12, Tasmanian vegetable growers' rate of return was 3.7 per cent, higher than the national average of 3.4 per cent. However, in the year prior, Tasmania's rate of return on capital of 1.6 per cent was much less than the national average.



Figure 17: Tasmania and Australia's rate of return (average per farm excluding capital appreciation)

The most pressing concern for Tasmanian vegetable growers is the less than favourable interest to receipts ratio. For all years discussed in this paper, Tasmanian growers' interest to receipts ratio has been generally well above the national average. This means that the percentage of receipts required to pay interest is a concern for some growers in Tasmania. This could be largely due to the two variables in question: either interest payable increasing (due to increased debt and/or an increase in the interest rate itself) or Tasmanian growers' receipts falling.

Figure 18: Tasmania and Australia's interest to receipts ratio

Interest to Receipts Ratio	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
AUS	5.9%	5.1%	6.3%	5.9%	4.8%	5.1%	4.5%
TAS	8.7%	6.3%	9.3%	12.6%	10.5%	13.7%	13.9%

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

#### Conclusion

Analysing the data in its entirety clearly identifies the best and worst performing vegetable growing states. As shown in Figure 19, business profits for most states have fluctuated extensively, however, on average, the best performing states (in terms of business profits) have been South Australia, Western Australia and Victoria. Of all states, Western Australia's profits have been the most impressive, with the three-year average around \$228,000, followed by Victoria's average of \$146,000 and South Australia's average of \$116,000. In contrast, New South Wales is the only state to consistently make losses over the last three years, averaging a loss of \$17,563 from the last three years.

The strong performance of a state in terms of profitability also appears to translate to relatively strong rates of return. When compared to the Australian average, South Australia, Victoria and Western Australia all

experienced the best rates of return in 2012-13 and 2013-14. The national average of business profit has a slightly downward trend over time, but is extremely volatile as shown in Figure 19.

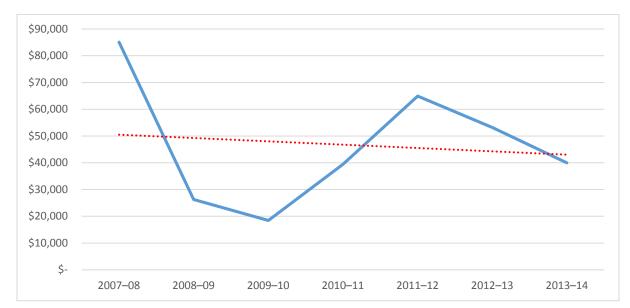


Figure 19: Australian vegetable growers' business profits and linear average

Source: ABARES Australian vegetable growing farms: An economic survey, 2012-13 and 2013-14

Australian vegetable growers continue to battle rising production costs, which are outpacing prices growers receive for produce and consequently affecting vegetable growers' margins. Australian vegetable growers need to explore options to reduce production costs. This could be achieved through substituting labour for capital (mechanisation); alternatively, vegetable growers could pursue markets where they receive the most value for produce, including exports.

Historically, most Australian vegetable growers have supplied the domestic market, leading to an oversupply of produce which translates to growers receiving lower prices. Exports may provide some growers a promising opportunity to improve their returns, with vegetable exports particularly to Asia and the Middle East expected to grow in the future.

Australian vegetable growers must also ensure that they do not overcapitalise on their borrowings. Whilst borrowing funds enables growers to expand or improve on their business, this should be done in a way that enables growers to still meet their repayments, especially in the long-term.

Overall, vegetable growers are unlikely to receive any respite from financial pressure, particularly in the short-term, as production costs are expected to rise and prices received are unlikely to rise enough to offset these cost pressures. Australian vegetable growers must continue being resilient and explore opportunities to minimise production costs whilst simultaneously continuing to be innovative and identifying markets outside of Australia.

### 5.5 Analysing Australian vegetable growers' financial performance by farm size

#### Introduction

Australia's vegetable growing industry generated approximately \$3.5 billion in gross value of production in 2013-14, with 5,300 agricultural businesses<sup>97</sup> that produced vegetables for human consumption. The industry is represented by a large proportion of smaller-sized growers and fewer larger-sized growers. This has inevitably caused the number of vegetable growing businesses to vary each year, with some smaller growers dropping out of the industry and re-entering when business conditions are more favourable.

This discussion paper will analyse the financial performance of vegetable growing farms by farm size (in hectares), for the period 2011-12 through to 2013-14. It will break down key financial indicators such as profits, cash costs and cash receipts and compare these indicators in order to present a detailed analysis on farm profitability.

This research is valuable to farm owners as it presents some of the strengths and challenges faced by Australian farms of various sizes. Furthermore, the analysis amalgamates financial data across years and can be used as a benchmark for growers to compare their own business statistics to the industry averages.

### Comparison of all farm size categories

The four categories of farm size to be analysed within this report are farms: less than 5 hectares, between 5 and 20 hectares, between 20 and 70 hectares and greater than 70 hectares. These categories are consistent with those used in Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) Vegetable Growing Farms Survey reports.

It is clear that vegetable growers with a larger farm size (and thus larger scale of production) are seen to be more profitable in the industry than smaller-sized farms, as shown by Figure 1 below.

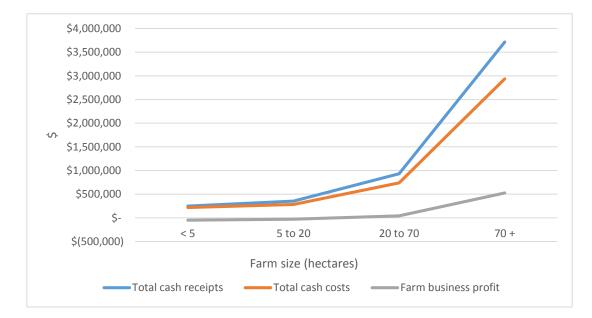


Figure 1: Key financial indicators for different sized farms, on average in 2013-14

<sup>&</sup>lt;sup>97</sup> ABS. A minimum cut-off value of \$5,000 was used to determine whether an agricultural business operation was in-scope.

As farm size increases, both cash costs and cash receipts continue to increase; however, cash receipts increase at a faster rate, which leads to a net increase in farm business profits. Farms less than 5 hectares in size actually registered average losses of \$49,000, with farms 5 to 20 hectares, 20 to 70 hectares and greater than 70 hectares, earning profits of \$30,000, \$42,000 and \$525,000 respectively. Figure 1 supports the idea that smaller farms face greater challenges in terms of profitability than larger farms.

The reason why farms that are greater than 70 hectares earn much more profit on average than smaller sized farms may be due to the category definition. Vegetable farms are known to be as large as 10,000 hectares, which can naturally skew average estimates in this category. The relationship between cash costs and farm size is explored in detail within this discussion paper in order to better understand the variation in profit levels between the four categories of farm size.

**Figure 2**: Key financial indicators for different sized farms (hectares) on average and costs to receipts ratio in 2013-14

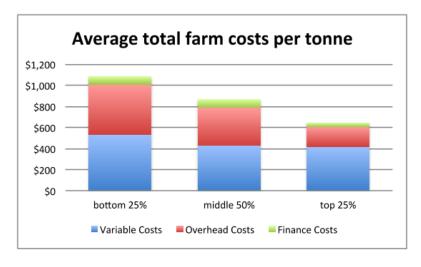
	Less than 5	5 to 20	20 to 70	Greater than 70
Total Cash Costs	\$ 216,000	\$ 283,000	\$ 738,000	\$ 2,935,000
Total Cash Receipts	\$ 249,000	\$ 351,000	\$ 930,000	\$ 3,713,000
Costs to Receipts Ratio	86.75%	80.63%	79.35%	79.05%
Profit	- \$49,000	- \$30,000	\$42,000	\$525,000

Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

The costs to receipts ratio shows cash costs as a proportion of cash receipts, which accounts for large discrepancies in absolute numbers for varying farm sizes. Farms that are less than 5 hectares in size have a cost to receipts ratio of 86.75%, which is much higher than that of the other farm size categories. There is a minimal decrease in the cost to receipts ratio for the higher categories, which fluctuate around 80%.

Figure 2 demonstrates that the cost to receipts ratio decreases as farm size increases. This is due to costs per tonne of production decreasing as farm financial performance increases (leading to a relative increase in farm output), as shown by Figure 3 below.

Figure 3: Average total costs per tonne relative to farm financial performance in 2010-11



Source: RMCG: Investigating the Costs Associated with the Production, Sale and Distribution of Vegetables (VG12086)

The bottom 25%, middle 50% and top 25% categories are based on ABARES profiles of vegetable growing farms which consider area grown, production and financial indicators. Thus, the bottom 25% category incorporates the smallest farm sizes with the lowest output as well as the lowest financial performance.

A key piece of information conveyed in Figure 3 is that variable costs for the middle 50% and top 25% of vegetable farms are roughly the same per tonne, however the bottom 25% have a considerably higher variable cost per tonne. This evidence aligns with the costs to receipts ratio in Figure 2, which shows that the ratio for farms less than 5 hectares is around 86.75%, with the remainder of the categories approximately around 80%.

Figure 3 not only illustrates that total costs decrease as farm financial performance (or farm size) increases, but it also shows a level of production where variable costs per tonne (e.g growing, harvesting and packaging costs) actually decreases. This finding is important for smaller vegetable growers who are considering expanding their scale of operations. It provides evidence to suggest that both fixed costs (e.g. rates and interest payments) and variable costs (per unit costs) can both decrease as farm size increases, up to a particular level of production. Grower's should factor in these decreasing costs when considering farm expansion as it can be an important cost saving in the planning phases of development and expansion.

**Figure 4**: Key financial indicators for all vegetable growing farms on average and costs to receipts ratio across time

	2010-11	2011-12	2012-13	2013-14
Total cash costs	\$ 623,170	\$ 568,860	\$ 614,100	\$ 622,000
Total cash receipts	\$ 786,090	\$ 733,730	\$ 775,900	\$ 778,000
Costs to Receipts				
Ratio	79.27%	77.53%	79.15%	79.95%
Profit	\$50,510	\$58,790	\$48,200	\$39,000

The costs to receipts ratio when measured across all vegetable growers is approximately equal to 80% throughout the past four years, as shown in figure 4 (above). Interestingly, the year in which the ratio was at its lowest, 2011-12, coincided with the highest profit over the same time period. Figures 2 and 4 further show that an average-sized farm will tend to earn over three times the total cash receipts as a farm that is less than 5 hectares in size.

The next four sections of this discussion paper go into greater detail on each of the categories of farm size. These industry statistics provide an important benchmark for farm owners to compare and contrast their own cost structures against the industry averages.

# Category of farms less than 5 hectares in size

In 2013-14, ABARES estimated that there were 1,133 vegetable growing businesses with an estimated value of agricultural operations (EVAO) greater than \$40,000. In 2007-08 there were 1,498 vegetable growing businesses, and 776 in 2010-11, showing a relative decline in the number of small growers over time.

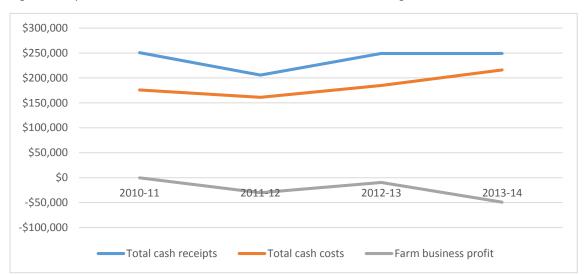
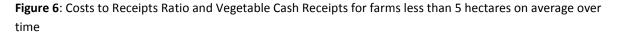


Figure 5: Key financial indicators for farms less than 5 hectares on average over time

**Source**: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

Figure 5 shows that business profit for farms less than 5 hectares have remained negative since 2010-11. This does not necessarily translate to the growers making losses every year, as it includes imputed labour (i.e. payments to the owner, partners and family members). Total cash costs have slowly increased since 2011-12, closing the gap on total cash receipts and therefore causing profit to decrease.



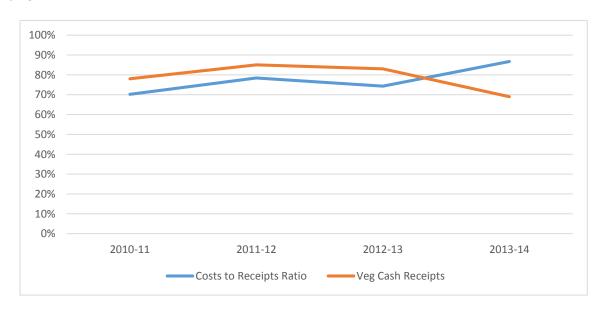


Figure 6 shows the costs to receipts ratio and vegetable cash receipts (expressed as a percentage of total cash receipts) following a similar trend up until 2012-13; however, the proportion of vegetable cash receipts drops sharply in 2013-14 with the cost to receipts ratio also increasing sharply

The costs to receipts ratio for farms less than 5 hectares has increased over the same time period, moving from approximately 70% in 2010-11 to an estimated 87% in 2013-14. The reason for the increase in the cost to receipts ratio can be explained in Figure 5, which shows total cash costs increasing from 2012-13 to 2013-14, while total cash receipts remain stabilised over the same period.

It could be concluded that vegetable cash receipts are a better source of profits than other farm cash receipts, as the percentage decrease in vegetable cash receipts coincided with total cash costs to increase. The data shows that growers less than 5 hectares in size should focus primarily on vegetables as a source of cash receipts in order to support their competitiveness within the market.

Figure 7: Average costs of production for farms less than 5 hectares over time

Cash costs	2011–12	% Share	2012–13	% Share	2013-14	% Share
Hired labour	\$26,300	16.32%	\$39,000	21.09%	\$45,000	20.83%
Fertiliser	\$12,140	7.53%	\$10,800	5.84%	\$16,000	7.41%
Contracts paid	\$3,590	2.23%	\$5,900	3.19%	\$8,000	3.70%
Seed	\$14,770	9.16%	\$13,500	7.30%	\$15,000	6.94%
Fuel, oil and grease	\$8,870	5.50%	\$11,300	6.11%	\$13,000	6.02%
Crop and pasture chemicals	\$5,370	3.33%	\$4,400	2.38%	\$6,000	2.78%
Repairs and maintenance - buildings	\$3,750	2.33%	\$5,000	2.70%	\$5,000	2.31%
Interest	\$11,540	7.16%	\$12,400	6.71%	\$18,000	8.33%
Electricity	\$5,810	3.60%	\$11,300	6.11%	\$13,000	6.02%
Administration	\$5,370	3.33%	\$6,000	3.24%	\$8,000	3.70%
Land rent	\$1,170	0.73%	\$900	0.49%	\$1,000	0.46%
Packing charges and materials	\$13,690	8.49%	\$13,800	7.46%	\$12,000	5.56%
Rates	\$3,520	2.18%	\$5,500	2.97%	\$7,000	3.24%
Freight	\$3,210	1.99%	\$4,100	2.22%	\$5,000	2.31%
Vehicles, plant & equipment maintenance	\$6,340	3.93%	\$6,500	3.52%	\$8,000	3.70%
Other cash costs	\$35,740	22.17%	\$34,500	18.66%	\$36,000	16.67%
Total cash costs	\$161,180	100%	\$184,900	100%	\$216,000	100%

**Source**: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

It can be seen in Figure 7 that hired labour is the largest cost of production for vegetable farms less 5 hectares in size, accounting for an almost 21% share of total cash costs in 2013-14 - an increase of approximately 71% in absolute terms since 2011-12.

A significant feature of the data presented above is that interest payments increased in absolute terms over the time period covered – and particularly so in 2013-14, where they comprised over 8% of total cash costs. This shows that interest payments are becoming increasingly burdensome to small growers, which can stifle investment in business.

The data presented in this section demonstrate a few of the significant financial challenges and strengths faced

by smaller farms in the industry. Smaller farms have a cost side incentive to expand due to the reduction in both fixed and variable costs, however they face difficulties in the funding of expansions because they tend to have less cash on hand and face a perceived additional risk premium associated with the lending of funds by financial institutions.

### Category of farms 5 to 20 hectares in size

In 2013-14, ABARES estimated there to be 777 vegetable growing businesses with an estimated value of agricultural operations (EVAO) greater than \$40,000. This is the lowest number of 5 to 20 hectare vegetable growing businesses in the last 10 years.

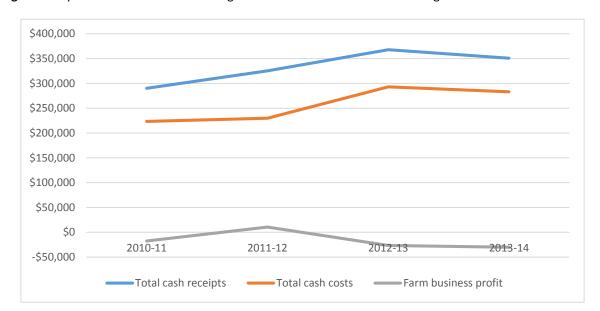


Figure 8: Key financial indicators on average for farms 5 to 20 hectares on average over time

Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

Figure 8 above shows that total cash receipts and total cash costs have remained mostly in parallel since 2010-11, even more so than for farm sizes less than 5 hectares. It can be seen that business profit was negative every year except 2011-12, which coincides with the largest gap between cash receipts and cash costs.

90% 80% 70% 60% 50% 40% 30% 20% 10% 0% 2010-11 2011-12 2012-13 2013-14 Costs to Receipts Ratio Veg Cash Receipts

Figure 9: Costs to Receipts Ratio and Vegetable Cash Receipts for farms 5 to 20 hectares on average over time

The costs to receipts ratio for farms 5 to 20 hectares in size was lowest in 2011-12 at 71%. Vegetable cash receipts were also the highest at the same time at 85%. In 2013-14, the costs to receipts ratio was at its highest at 81% which coincided with vegetable cash receipts being at their lowest (69%). This reaffirms the significance of vegetable cash receipts as a revenue source for vegetable farms. Interestingly, vegetable cash receipts also dropped significantly for farms less than 5 hectares in 2013-14, as can be seen by Figure 6.

Figure 10: Costs of production on average for farms 5 to 20 hectares over time

Cash costs	2011–12	% Share	2012–13	% Share	2013-14	% Share
Hired labour	\$34,120	14.84%	\$42,300	14.43%	\$47,000	16.61%
Fertiliser	\$23,600	10.26%	\$27,600	9.41%	\$24,000	8.48%
Contracts paid	\$19,110	8.31%	\$20,100	6.86%	\$25,000	8.83%
Seed	\$11,680	5.08%	\$16,100	5.49%	\$19,000	6.71%
Fuel, oil and grease	\$15,730	6.84%	\$21,600	7.37%	\$22,000	7.77%
Crop and pasture chemicals	\$11,910	5.18%	\$13,700	4.67%	\$13,000	4.59%
Repairs and maintenance - buildings	\$5,400	2.35%	\$9,300	3.17%	\$7,000	2.47%
Interest	\$14,500	6.31%	\$19,300	6.58%	\$13,000	4.59%
Electricity	\$5,240	2.28%	\$9,000	3.07%	\$9,000	3.18%
Administration	\$8,580	3.73%	\$11,700	3.99%	\$10,000	3.53%
Land rent	\$1,640	0.71%	\$4,200	1.43%	\$4,000	1.41%
Packing charges and materials	\$12,440	5.41%	\$16,600	5.66%	\$15,000	5.30%
Rates	\$3,850	1.67%	\$6,100	2.08%	\$7,000	2.47%
Freight	\$12,300	5.35%	\$15,400	5.25%	\$17,000	6.01%
Vehicles, plant & equipment						
maintenance	\$13,450	5.85%	\$16,800	5.73%	\$14,000	4.95%
Other costs	\$36,360	15.81%	\$43,400	14.80%	\$37,000	13.07%
Total cash costs	\$229,910	100.00%	\$293,200	100.00%	\$283,000	100.00%

Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

Hired labour remains the largest cost over the time period, although at a lower share relative to total costs in

comparison with farms less than 5 hectares. It also can be seen that the percentage of expenditure spent on fertiliser has decreased every year.

Interest payments decreased substantially from 2012-13 to 2013-14, which is somewhat contrary to the increasing average debt faced by the vegetable industry. However, in comparison to farms less than 5 hectares, interest payments take up a much lower share of total cash costs (4.59% in 2013-14, compared to 8.33% over the same period for farms less than 5 hectares). Labour costs have a much lower share of total costs when compared to farms less than 5 hectares, as well as electricity costs.

The lower share of interest payments for farms in this category compared to farms less than 5 hectares can be attributed to a lower dependence on the need to borrow money, as well as lower interest rates provided by banks as these businesses present a lower risk for debt default.

It is important for vegetable growing businesses to be able to generate enough capital not only to maintain business operations, but also to ensure investments can be made to improve business operations, such as through upgrading machinery and tools. A dependence on using borrowed funds can stifle investment, as mentioned previously, but can also increase the debt burden which is becoming a larger issue for the industry. This could create a 'downward spiral' of debt as more and more revenue is being used to pay off existing debt, which can then accumulate and grow over time.

### Category of farms 20 to 70 hectares in size

In 2013-14, ABARES estimated there to be 475 vegetable growing businesses with an estimated value of agricultural operations (EVAO) greater than \$40,000. This is the lowest number of 20 to 70 hectare vegetable growing businesses in the last 10 years; the same long term trend to vegetable growing businesses from 5 to 20 hectares.

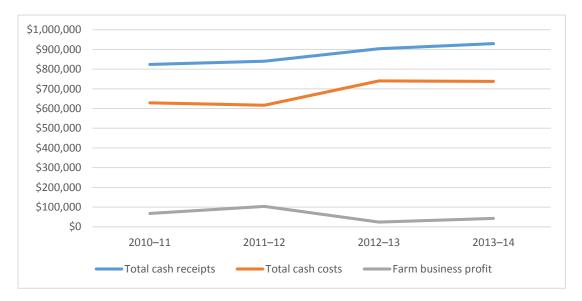


Figure 11: Key financial indicators farms 20 to 70 hectares on average over time

Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

Figure 11 shows total cash receipts to be more stable over time than total cash costs. Farm business profits were highest in 2011-12, which coincided with total cash costs being the lowest. From 2012-13 to 2013-14, cash costs actually decreased marginally whilst cash receipts increased, which explains why farm business profits has increased slightly.

84%
82%
80%
78%
76%
74%
72%
70%
68%

2010–11 2011–12 2012–13 2013–14
— Costs to Receipts Ratio Veg Cash Receipts

Figure 12: Costs to Receipts Ratio and Vegetable Cash Receipts for farms 20 to 70 hectares over time

Source: ABARES Australian vegetable growing farms: An economic survey 2012-13 and 2013-14

It can be seen by Figure 12 that the costs to receipts ratio and vegetable cash receipts exhibit an inverse relationship. The costs to receipts ratio was lowest in 2011-12, which coincided with vegetable cash receipts being at their highest.

Figure 13: Costs of production on average for farms 20 to 70 hectares over time

Cash costs	2011–12	% Share	2012–13	% Share	2013–14	% Share
Hired labour	\$109,010	17.67%	\$128,200	17.31%	\$143,000	19.38%
Fertiliser	\$65,140	10.56%	\$69,900	9.44%	\$70,000	9.49%
Contracts paid	\$56,520	9.16%	\$79,400	10.72%	\$74,000	10.03%
Seed	\$44,830	7.27%	\$56,300	7.60%	\$48,000	6.50%
Fuel, oil and grease	\$38,140	6.18%	\$49,400	6.67%	\$51,000	6.91%
Crop and pasture chemicals	\$41,770	6.77%	\$40,200	5.43%	\$44,000	5.96%
Repairs and maintenance - buildings	\$15,360	2.49%	\$19,300	2.61%	\$17,000	2.30%
Interest	\$37,260	6.04%	\$50,400	6.80%	\$43,000	5.83%
Electricity	\$15,670	2.54%	\$20,400	2.75%	\$20,000	2.71%
Administration	\$16,630	2.70%	\$17,700	2.39%	\$18,000	2.44%
Land rent	\$14,390	2.33%	\$7,000	0.95%	\$7,000	0.95%
Packing charges and materials	\$30,690	4.97%	\$31,100	4.20%	\$34,000	4.61%
Rates	\$12,740	2.07%	\$10,400	1.40%	\$11,000	1.49%
Freight	\$22,670	3.67%	\$42,500	5.74%	\$40,000	5.42%
Vehicles, plant & equipment maintenance	\$32,310	5.24%	\$38,500	5.20%	\$34,000	4.61%
Other costs	\$63,810	10.34%	\$80,000	10.80%	\$84,000	11.38%
Total cash costs	\$616,940	100.00%	\$740,700	100.00%	\$738,000	100.00%

Similar to vegetable farms 5 to 20 hectares in size, farms 20 to 70 hectares experienced a slight decrease in their total costs from 2012-13 to 2013-14. Despite this, hired labour increased considerably over the same period of time. Expenditure on seed, interest payments and electricity have also decreased, among other costs. This data highlights the burden of labour costs on vegetable growers, which has increased every year for vegetable farms 20 to 70 hectares in size.

An opportunity for vegetable growers to lower costs and to make investments in their business has come out of the 2015 Federal Budget, which not only provides drought assistance to growers, but include infrastructure support and deductions on asset expenditure. The Government will allow all primary producers to be able to immediately deduct expenditure on fencing and water facilities, such as dams, tanks, pumps and windmills. Growers will also now be able to depreciate fodder storage assets, such as silos and tanks used to store animal feed, over three years. Additionally, any farm that runs a small business (i.e. one with an annual turnover of under \$2 million) will be able to immediately deduct asset expenditure (in addition to fencing, water facilities and fodder storage), provided the asset costs less than \$20,000 and aids in business operations.

These measures should inject some much need confidence to the vegetable industry, which is made up of a large number of small farms who do not benefit from economies of scale. Growers who are unsure of investing in a new piece of equipment, for example, should now have the incentive to go ahead with the investment, as they will now be able to claim the expense back on their tax return.

These budget measures can not only spur on investment, but also reduce the debt burden on small businesses, as it could shift asset expenditure from being funded by borrowed money. These measures, coupled with low interest rates in Australia create an opportunity for vegetable growers to be able to further develop their businesses model.

### Category of farms greater than 70 hectares in size

In 2013-14, ABARES estimated there to be 292 vegetable growing businesses with an estimated value of agricultural operations (EVAO) greater than \$40,000 for farm sizes greater than 70 hectares.

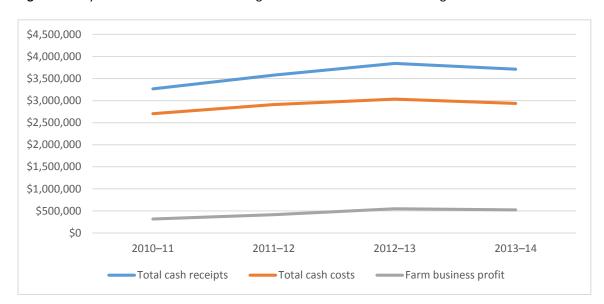


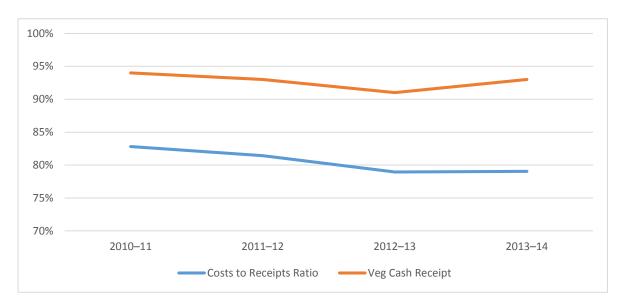
Figure 14: Key financial indicators for farms greater than 70 hectares on average over time

It can be seen in Figure 14 that key financial indicators for farms greater than 70 hectares have remained relatively stable over time, more so than for smaller farm sizes shown in previous sections. This can be attributed to larger farms having less volatility over time in their financial indicators. The reason for this is because larger farms tend to produce multiple commodities, diversifying risk in the case of an extreme event such as weather damage, a pest outbreak or a sudden drop in demand. Additionally, it tends to be the larger farms that export vegetables, which can provide an additional source of revenue.

As farm size increases, the absolute values of the gap between total cash receipts and total cash costs increases, being approximately \$500,000 in 2013-14 in Figure 14. This is due to lower costs per tonne of production, which arise from larger farms being able to purchase in bulk, as well as specialise.

Larger vegetable farms also tend to have the ability to split up the complex stages of the production process through specialising in particular stages of the process. This increases overall efficiency by having specialised workers in each stage of the production process (for example, having separate workers dedicated to picking, cleaning and packaging).

**Figure 15**: Costs to Receipts Ratio and Vegetable Cash Receipts for farms greater than 70 hectares on average over time



The costs to receipts ratio for farms greater than 70 hectares was lowest in 2012-13, which coincided with vegetable cash receipts being the lowest over the same time period. Both lines almost run in parallel until 2013-14, where vegetable cash receipts increase and the costs to receipts ratio decrease.

Figure 16: Costs of production on average for greater than 70 hectares over time

Cash costs	2011–12	% Share	2012–13	% Share	2013–14	% Share
Hired labour	\$498,070	17.10%	\$516,400	17.03%	\$587,000	20.00%
Fertiliser	\$239,430	8.22%	\$242,000	7.98%	\$226,000	7.70%
Contracts paid	\$338,220	11.61%	\$351,800	11.60%	\$307,000	10.46%
Seed	\$205,210	7.05%	\$218,500	7.20%	\$205,000	6.98%
Fuel, oil and grease	\$148,280	5.09%	\$175,800	5.80%	\$172,000	5.86%
Crop and pasture chemicals	\$154,260	5.30%	\$168,900	5.57%	\$155,000	5.28%
Repairs and maintenance - buildings	\$69,540	2.39%	\$63,000	2.08%	\$54,000	1.84%
Interest	\$154,880	5.32%	\$171,300	5.65%	\$161,000	5.49%
Electricity	\$65,540	2.25%	\$97,900	3.23%	\$97,000	3.30%
Administration	\$54,980	1.89%	\$55,600	1.83%	\$55,000	1.87%
Land rent	\$61,690	2.12%	\$36,200	1.19%	\$36,000	1.23%
Packing charges and materials	\$187,470	6.44%	\$261,900	8.64%	\$246,000	8.38%
Rates	\$30,150	1.04%	\$38,800	1.28%	\$39,000	1.33%
Freight	\$191,370	6.57%	\$221,800	7.31%	\$209,000	7.12%
Vehicles, plant & equipment maintenance	\$140,370	4.82%	\$174,800	5.76%	\$159,000	5.42%
Other costs	\$372,650	12.80%	\$238,100	7.85%	\$227,000	7.73%
Total cash costs	\$2,912,110	100.00%	\$3,032,800	100.00%	\$2,935,000	100.00%

The percentage shares in Figure 16 for particular cost categories for farms greater than 70 hectares is strikingly similar to farms between 20 to 70 hectares. Farms greater than 70 hectares also saw a decrease in their total costs from 2012-13 to 2013-14.

Again, labour was the biggest cost over the time period, accounting for 20% of total costs in 2013-14. Labour also increased by the largest amount over the time period.

Looking at the costs of production for different sized farms, the contracts paid category clearly increases as farm size increases. This category represents labour traditionally used for specific tasks, such as picking, labour needed during particular months and consulting. Combining hired labour with contracts paid for farms greater than 70 hectares, these labour costs account for over 30% of total cash costs in 2013-14.

A key development in the vegetable industry is mechanisation, which is the long-term transition from labour to technology. This trend could help to combat the burden of increasing labour costs for farms of all sizes. However, larger vegetable farms in particular have the opportunity to sustain their long-term viability through uptake of modern technologies, which can reduce labour costs and increase productivity further.

More investment into the research and development of new technologies can only lead to better outcomes, which will eventually reduce the costs of these technologies. In turn, this will increase their long-term viability for on-farm application.

#### Conclusion

The analysis presented in this discussion paper on the financial performance of vegetable farms by farm size shows that the larger a farm, the more profitable that farm is likely to be. This is due to cash receipts increasing by a higher proportion than cash costs as farm size increases, which is exemplified by the costs to receipts ratio.

However, the relative expenditure on particular cash costs as a share of total cash costs stays relatively the same for all farm sizes. For example, labour costs tend to constitute approximately a 17-20% share of total cash costs for all farm sizes.

Smaller sized farms incur greater cash costs per tonne of output, which they are able to dilute by increasing their scale of operations. Recent economic developments, such as low interest rates and the 2015 Federal Budget's favourable measures for small businesses, should encourage investment for smaller growers.

However, there are risks associated with expanding farming operations which need to be considered. It is important to assess the return on investments from any substantial increase in scale of operations. Any farm looking to remain financially viable, or increase their productivity and profitability, will require a long term investment strategy to ensure they can effectively reduce costs and increase revenue sources.

There are clear benefits for vegetable growers who have larger farms, as they are better equipped to dilute their cash costs with the extra revenue received. Export markets can produce other sources of revenue, which mitigates risks through diversification. It also tends to be the larger growers that export.

However, there is still scope to improve. Larger sized growers should invest in research and development to decrease labour costs, such as by increasing the efficacy of the technology available to them, and increasing their uptake of that technology.

Australian vegetable growers have been facing a challenging business environment for many years now, with increasing production costs and low retail prices adversely impacting on grower margins. However, by embracing emerging technologies, exploring new avenues for revenue raising and having a forward outlook on business viability, vegetable growers should be able to improve upon their business outcomes.

AUSVEG Ltd makes this formation available on the understanding that users exercise their own skill and care with respect to its use. Before relying on or altering any business practices users should carefully evaluate the accuracy, completeness and relevance of the information for their purpose and should obtain appropriate professional advice relevant to their particular circumstances.

#### 5.6 Total factor productivity in the Australian vegetable industry

#### Introduction

Productivity is vitally important to the long term growth and sustainability of any industry. It refers to a farms ability to increase the yield of produce (output) while maintaining the same level of expenses (input). By this definition, productivity can be viewed as an increase in a farm's production efficiency in terms of its ability to utilise resources into producing a valued good.

Productivity is important to growers because it defines how efficient their businesses are at utilising resources. High productivity means that their business is making the most out of the resources available and costs are being kept to a minimum. Low productivity demonstrates that resources are not being used efficiently and that costs may be a lot higher than what they should otherwise be. In this sense, productivity can have a large effect on a grower's yearly profit margins.

This study is particularly timely in today's economic climate. Data provided by the Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES) in their report titled "Australian Vegetable Growing Farm Survey" suggests that total cash costs including seed, fertiliser and labour costs have increased by over 127 per cent since 2005-06. Over the same period, revenue generated from vegetable produce has also risen by 97 per cent. As growth in cash costs exceeds the growth in revenue it is clear that farms are spending larger proportions of money on input costs than what they are getting back in returns. This issue highlights the importance of understanding the industry's productivity in terms of the returns earned from each dollar spent on production resources.

Productivity studies are not uncommon to other agricultural industries in Australia. ABARES produces productivity reports on several different agricultural industries including wheat, cattle and dairy. These studies tend to involve a basic calculation of productivity of the various inputs and output produced from these industries. These studies are quite thorough in their results and accompanying analysis, however the simplicity of the estimation process can lend itself to inaccurate or misleading results.

This study fills a research gap by being the first of its kind to present productivity estimates for the vegetable industry. Thus bringing the industries key economic indicators to the same standard as those already made available by ABARES. Furthermore, this study seeks to improve upon other studies by estimating productivity using a statistically unique and technical approach that produces both theoretical and empirical conclusions for studies of this type.

This discussion paper has three primary objectives. Firstly, it seeks to discuss and explain key economic concepts relating to productivity. By explaining these concepts, it is the hope of the author that readers will be able to think more in economic terms and be able to conduct a deeper analysis when faced with business decisions. Secondly, this study seeks to fill a research gap by conducting a statistical study that estimates the "marginal productivity" of various inputs from eight separate vegetable industries. These estimates are important because they allow growers to compare their industries productivity estimates against other industries to determine if there are productivity gains to be made. And thirdly, this study hopes to further ignite discussion and future research projects into the productivity of the vegetable industry in order to promote it as a key agenda for long-term industry growth.

### Methodology

There are two measures of productivity that are used frequently by economists. Total Factor Productivity (TFP) refers to an increases in output upon change in the level of *all* inputs whereas Partial Factor Productivity (PFP) refers to an increase in output pertaining to an increase in only a single specific input factor. The most well-known PFP measure is yield per hectare which measures the amount of output per unit of land (input) used within the production process.

One of the methods used to measure PFP is by estimating the "marginal productivity" of that input. The marginal productivity refers how much additional output (i.e. tonnes of produce) is produced by increasing an input (e.g. land) by one additional unit. Marginal productivities are important because they essentially determine the value of the next unit of an input. The amount of additional produce generated from each input naturally plays a crucial role in the decision making process of whether to employ more labour or purchase additional capital goods.

For example, when you are deciding whether to employ another staff member at your farm how do go about this task? A logical approach would be to approximate their worth to your business and determine if that worth is greater than the cost (wages) of employing them. One way of estimating an employee's worth is by determining their impact on your production process or output capabilities i.e. the employee's marginal productivity. The higher the potential employee's marginal productivity, the more value that candidate would add to your business and the greater the chances of that potential employee earning a position.

What happens when you face a decision of whether to hire additional labour or purchase additional machinery (i.e. to purchase one input over another?). The first step is to estimate the marginal productivity of both of these inputs separately. Say for example you estimate that an employee's marginal product is 800kg per week and that the marginal product of additional machinery is 500kg per week. Does this mean that you should employee the additional labour over the machinery? Another element that needs to be factored into this analysis is each inputs price. If the machinery costs \$200 per week and the employee costs \$600 per week then clearly you would prefer to purchase the machinery, as the additional output per dollar spent (500/200= 2.5kg per dollar spent) is higher than the additional output per dollar of labour (800/600=1.33kg per dollar spent).

Economic efficiency is all about the decision making process that was just described. A business or industry is economically efficient if it is able to correctly evaluate and make decisions that benefit it in the greatest possible way such as in the previous example. However, economic efficiency requires accurate estimates of both the marginal productivity and the associated costs of each of the inputs in order for the decision maker to make correct choices. One of the key challenges for economists is to be able to help explain the various methods used in decision evaluation including marginal productivity analysis so that we can help growers to enhance their economic efficiency.

This discussion paper seeks to achieve this goal by providing an industry wide analysis of partial factor productivity (marginal productivity). It does this by using high level statistical regression methods to estimate an economic model of the industry. The next section of this paper will describe some of the results of this economic model in terms of the marginal productivity estimates and its implications for the industry.

#### **Results**

The economic model developed in *appendix B* is estimated using a statistical technique called Ordinary Least Squares (OLS) for each of the eight Australian vegetable industries. Based on the estimation results there are five key findings that have been discovered in the process of undertaking this discussion paper. These results are summarised as follows:

- 1. The marginal productivities of labour and plant and equipment have a nonlinear, quadratic relationship with output. This means that the product produced from the addition of another unit of labour or plant and equipment is not constant. For example, an additional staff member will not always increase production by a constant 10 tonnes. In other words there is a maximum point after which additional labour has a detrimental effect on output.
- 2. **Labour appears to have a negative effect on production**. The results of this study have found that labour has, initially, a negative effect on production. However, this negative effect becomes positive after a particular level has been achieved. Several reasons have been given to explain this effect including a theoretical explanation (*Appendix D*) and the requirement for capital stock in order for labour to increase productivity.
- 3. Plant and Equipment has an instantaneous, positive effect on production. The results indicate that investment into plant and equipment appears to have a direct, positive impact on production (until a maximum point) implying that within certain bounds, the more investment that is made into plant and equipment the greater the output produced.
- 4. **Farm Specialisation has a strong effect on the marginal productivity of labour.** This result indicates that those farms that produce only one crop tend to benefit from enhanced labour productivity. This is likely to be due to the fact that labour is able to focus on one particular task as opposed to having to learn multiple, varying tasks on those farms that produce more than one crop.
- 5. The top 25 per cent of farms have higher marginal productivities because they have more money, on average, invested into capital goods such as plant and equipment. A key determinant of productivity includes the amount of investment made into capital goods such as plant and equipment.

The remainder of this section will discuss the specifics of the above listed industry results based on partial factor productivity. Due to the scale of the results discovered, the partial factor productivity has been narrowed down to a discussion on the marginal productivity of labour and Plant and Equipment. The purpose of this discussion is to present the results of the industry estimates for each input, as well as to describe some of the reasons why we may be seeing the results listed above.

### Partial Factor Productivity - Labour

Figure 1 presents a graphical representation of the estimated marginal productivity of Labour for the potato, carrot and lettuce industries. An interesting feature of these productivity estimates is that there is a non-linear (ie. quadratic) relationship between the number of weeks worked by hired staff and the quantity produced.

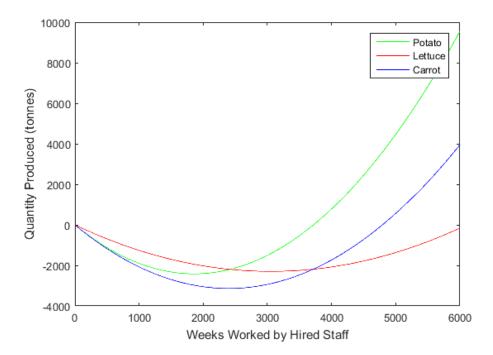


Figure 1 - Marginal Productivity of Labour

Due to the quadratic nature of the relationship shown in figure 1, the marginal productivity of labour is initially *negative* for potato, lettuce and carrot but after a "minimum point" is reached, the marginal productivity becomes positive and it can be seen that labour begins to have a positive effect on production.

For example, the minimum point for the potato industry occurs when the number weeks worked by hired staff exceeds 1860 weeks. This evidence suggests that those potato farms that hire more than 1860 weeks of hired staff are much more likely to be able to get more produce out of those additional staff (i.e. have a positive marginal productivity) than those farms that hire less than 1860 weeks' worth of labour within the potato industry.

Another interesting characteristic from figure 1 is the point at which labour appears to have a *positive* effect on production, (i.e. the average amount of labour required to create positive returns on production). Within the potato industry, it can be seen that this point is reached when the number of work hours is 3719 weeks. These results suggest that those potato farms that employee more than 3719 weeks' worth of labour start to see larger, more positive effects of each member of the labour force onto production.

Table 1 below presents the "minimum point", "positive production point" and the estimated measurement of the product of labour for growers performing bottom 25 per cent, middle 50 per cent and top 25 per cent in each industry incorporated into this study where it is both applicable and statistically significant:

Table 1 – Marginal Productivity Statistics by Industry

Industry	Minimum Point	Positive Production Point	Bottom 25 per cent	Middle 50 per cent	Top 25 per cent
Potato	1859.58	3719.17	-2.67	-211.43	-2122.8

Pumpkin	0.00	0.00	0.00	0.83	175.38
Lettuce	3055.05	6110.08	-1.55	-123.52	-1462.18
Carrot	2396.64	4793.30	-2.70	-214.25	-2372.5
Greenpea	1451.27	2902.54	-1.71	-134.35	-1172.54

The results in table 1 are interesting in that, with the exception of pumpkin, all of the positive production points exceed over 2900 weeks of labour. For example, within the potato industry you need an average of 3719 weeks of labour before any positive production returns are realised.

This observation is further realised when looking at the Bottom, Middle and Top percentages of labour. As you can see, the labour usage in the top 25 per cent of farms have a larger negative impact on production than the middle and the bottom categories. Similarly, the middle 50 percent appears to have a larger negative effect, on average, than the bottom 25 per cent of farms. In short, the results indicate that the more labour that is employed within farms, the larger the negative impact that the labour has on production outcomes.

It is a strange result for this dataset to show negative returns from labour within all industries. Appendix C provides a theoretical explanation of why these results have occurred. However, another explanation of these results may be due to the fact that labour requires equipment in order to be productive. Employees by themselves may have coordination issues or struggle to be productive without the required capital equipment (i.e. machinery) to help them produce a given crop. Although these results are curious, they can still be used to describe labour productivity within a given industry. Highlighting, with particular importance the nonlinear, quadratic relationship that exists between labour and production.

### Partial Factor Productivity – Plant and Equipment

Similar to the previous section, figure 2 below plots the estimated relationship between the amount of plant and equipment purchased and the quantity of output produced within the potato, carrot and lettuce industries.

Once again, the relationship between Plant and equipment and the quantity produced appears to take a nonlinear (quadratic) relationship. All three industries in figure 2 show positive marginal productivities (positive returns) from the use of additional plant and equipment throughout all industries. However, these productivities vary significantly between industries.

The potato industry has by far the highest marginal productivity from plant and equipment of all the industries. This suggests that plant and equipment is extremely valuable to the potato industry in terms of both production and productivity. In contrast, the pumpkin industry shows a positive marginal productivity up to a "maximum point" of \$42,253 that has been spent on plant and equipment. After this point, the data suggests that the quantity produced begins to fall, due to the marginal productivity of capital becoming negative.

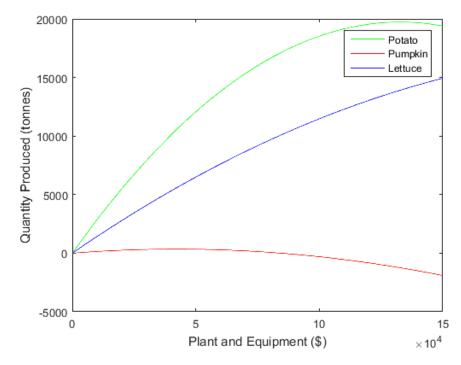


Figure 2 - Marginal Productivity of Plant and Equipment

Another important characteristic from Figure 2 is that plant and equipment instantaneously produces additional output. This differs from the marginal productivity of labour which requires a large amount of labour before positive returns are realised.

Table 2 below presents the "maximum" or "minimum" turning points for the marginal productivity of plant and equipment estimates for each of the industries represented in the dataset. The table again provides productivity estimates for the farms that are part of the bottom 25 per cent, middle 50 per cent and top 25 per cent of the dataset.

Table 2 – Marginal Productivity Statistics for Plant and Equipment by Industry

Industry	Maximum Point	Positive	Bottom 25 per	Middle 50	Top 25 per

		Production Point	cent	per cent	cent
Potato	132729.91	0	326.36	1057.38	8557.56
Pumpkin	42252.58	0	33.941	56.58	329.18
Lettuce	239325.08	0	306.64	518.96	4436.95
Cabbage	148320.0	0	140.73	237.71	1949.59
Greenbean	-31780.40	0	-90.90	-157.27	-1962.06

The first observation from the results in table 2 is that, with the exception of the green bean industry, investment in plant and equipment appears to have an instantaneous, positive effect on the amount of product harvested. In other words, the marginal productivity of plant and equipment is always positive. These result indicates that the more money spent on plant and equipment, the larger the results in terms of production quantities.

It is important to note that that these positive returns from plant and equipment have limitations. The maximum point shows the estimated point where the returns from plant and equipment tend to become negative, on average. For example, within the potato industry, there are positive returns from spending on plant and equipment up until \$132,729.91. After this point is reached, the data indicates that any additional spending beyond this limit may begin to have a negative impact on production.

In the case of the potato industry, the largest observation within the dataset spent \$150,102.2 on plant and equipment. This observation is not very far outside the present day maximum point for the industry (\$132,729.91) and so it can be concluded that most farms within the data are operating efficiently with regards to maximising their returns from plant and equipment.

The results from this analysis of the marginal productivity of plant and equipment is emphasised by looking at the average results from the bottom 25 per cent, middle 50 per cent and top 25 per cent. With the exception of the Green bean industry, it can be seen that the top 25 per cent of farms have much larger returns from plant and equipment than both the middle 50 per cent and the bottom 25 per cent. An explanation for this result is that the top 25 per cent of farms are likely to use more plant and equipment than the other two categories. Both the marginal productivity of plant and equipment is generally always positive, therefore, those farms that use more plant and equipment should logically produce larger quantities of product.

### The Role of Specialisation in Productivity

As the data used in this study was taken from a series of surveys conducted by ABARES (*See Appendix A*) an additional variable named "Intensity" was included which represents the proportion of the total land which was used in the production of the given crop in question. The variable "Intensity" can be viewed as a representation of the degree of specialisation a farm has in the production of its vegetable crop. For example, a potato farm with an intensity value of 75 per cent means that three quarters of its available land is used in the growing of potatoes. A farm with an intensity value of 75 per cent is therefore obviously much more specialised in production than another farm that only has an intensity value of 5 per cent.

Through the inclusion of the intensity variable within the economic modelling, it was possible to be able to study the effects of farm specialisation on the marginal productivity of labour. Figure 3 presents the results of this analysis.

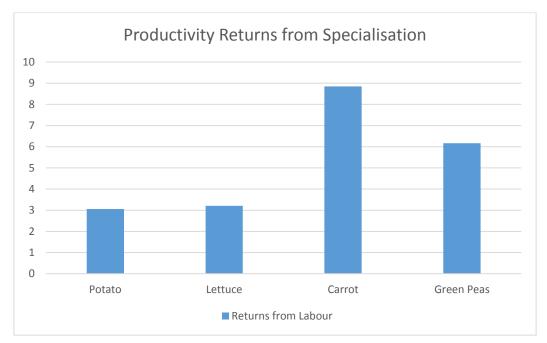


Figure 3 – Productivity Returns from Specialisation

Figure 3 shows that there are significant labour productivity returns from specialisation within the Potato, Lettuce, Carrot and Green pea industry. Within the carrot industry, each additional percentage increase in intensity leads to an average 8.85 tonne increase in the productivity of labour. Similarly, for each additional percentage increase in intensity leads to a 6.17 tonne increase in the productivity of labour within the Green Pea industry.

This result is particularly significant in helping to understand one of the drivers of productivity growth within the vegetable industry. Figure 3 shows that there are clear labour productivity gains from enhanced farm specialisation. On the one hand, growers may produce different crops in order to diversify production and have less exposure to risky events such as price or weather fluctuations. On the other hand, these results show that a significant cost associated to crop diversification is the labour productivity losses that can occur. This result can encourage growers to ensure that they account for these significant productivity losses within their decision making process when considering crop diversification.

### **Average Farm Results**

To highlight the importance of marginal productivities and to highlight their differences between industries, I have defined a typical farm for the bottom 25 per cent, middle 50 per cent and top 25 per cent in terms of the amount of inputs used (on average, across all industries) in their respective production processes. These averages are reported in table 3 below.

Table 3 - Average Farm Results by Percentile

Input	Bottom 25 per cent	Middle 50 per cent	Top 25 per cent
Buildings (QKBB)	247.41	865.05	8583.88
Plant and Equipment (QKPL)	2123.72	3605.40	32847.21
Land (QKL)	37.13	116.85	2051.82
Labour (QLH)	1.03	83.31	1213.99
Intensity	0.04	0.10	0.69

For example, the average number of weeks worked by labour in the bottom 25 per cent of farms within the dataset was 247 weeks. Similarly, the average number of weeks worked by labour within the top 25 per cent of farms was 1,214 weeks.

The figures from table 3 were then input into the models presented and an amount of produce grown was then forecasted by the model for each industry. By studying the variance of the output between industries, the importance of each industries marginal productivity becomes more apparent due to the same mix of inputs being used in each industry model.

Figure 4 – Estimated Production Based on Fixed Farm Inputs

Figure 4 shows that, when the same amount of inputs are used within different industries the models estimated production varies dramatically. This variation is apparent for all three categories of farms however it appears to be the largest for the top 75 per cent of farms. For example, when the average inputs of the top 25 per cent of

farms are used within the potato industry, that mix of inputs produces an estimated 12,816 tonnes of potatoes. However, when that same input mix is used within the lettuce industry, the model predicts a production of only 1,846 tonnes.

One obvious explanation for the large variance presented in figure 4 is that the nature of the different crops produced require differing levels of inputs. For example, perhaps the carrot industry is more labour intensive and less plant and equipment intensive than the other industries.

Another explanation for the variance in production between industries seen in figure 4 is the differing marginal productivities. For example, we have already discussed the marginal productivity of labour and plant and equipment in previous sections of this discussion paper and shown how it differs (significantly) between vegetable industries. From these results, it was shown how the potato and pumpkin industry has a significantly larger marginal productivity of plant and equipment in comparison to the other industries.

Similarly, one of the drivers for the carrot industry would be the high level of specialisation seen in the industry. As has already been mentioned, specialisation plays a significant role in increasing the marginal productivity of labour. Those increases are particularly large within the carrot industry (an average of 8.85 tonnes per percent increase in intensity) and are likely to be the key reason as to why the carrot industry is the second highest industry illustrated in figure 4.

A final observation made from figure 4 is the large variance in the production estimates between the top 25 per cent and the middle 50 per cent and bottom 25 per cent. Those farms that are within the top 25 per cent produce significantly larger production than the other two groups. This characteristic occurs throughout all the industries shown in figure 4.

The question needs to be asked, why does the top 25 per cent of farms produce much more than the two other categories? The short answer to this question is because the top 25 per cent of farms have a higher specialisation (intensity) and higher marginal productivity than the two other groups. Table 4 below presents the average amount of labour and plant and equipment spent in these three groups:

Table 4 – Average Farm Results by Percentile

Variable	Bottom 25 per cent	Middle 50 per cent	Top 25 per cent
Plant and Equipment (QKPL)	2123.72	3605.40	32847.21
Labour (QLH)	1.03	83.31	1213.99

The average amount of money spent on plant and equipment in the top 25 per cent of farms is \$32,847.21 this is in comparison to the middle 50 per cent of farms that average only \$3,605.40. Table 4 shows that there is a lot more money (811 per cent more), on average, being spent on plant and equipment within the top 25 per cent of farms than the middle 50 per cent. This is perhaps one explanation for the increased marginal productivity in this category. More money is spent on plant and equipment which can have a flow on effect in terms of increasing the marginal productivity of labour. These results provide evidence to show that increased investment in plant and equipment has extremely positive results for on farm productivity levels.

#### Conclusion

This discussion paper set out three objectives that it needed to achieve. These objectives were to define and explain economic concepts surrounding productivity, to be the first publication of productivity results for the vegetable industry and to ignite further discussion as well as research and development into the productivity of the vegetable industry so that it can become part of a key agenda in a plan for long-term economic growth within the industry.

This paper began by defining productivity and explaining the importance of understanding the concept including its strong relationship with farm profitability. Economic productivity is all about ensuring that input resources (such as labour or plant and equipment) are utilised efficiently within a production process. If productivity within the industry is kept high, then growers are getting the most out of their input resources and costs can be kept to a minimum.

Continuing to explain core economic concepts, this discussion paper presented the ideas of total factor productivity and partial factor productivity. By understanding and being able to differentiate between these two concepts, the implications of the results of the quantitative analysis component of this paper would have been a lot clearer. The second half of the methodology section then provided several examples to help show the importance of an understanding of the economic concept of marginal productivity and how this indicator can effect business decision making.

The results section of this discussion paper presented industry estimates of the marginal productivity of both labour and plant and equipment. These estimates were discussed in detail and there were five key results that were concluded from this study. These results were:

- 1. The marginal productivities of labour and plant and equipment have a nonlinear, quadratic relationship with output.
- 2. Labour appears to have a negative effect on production.
- 3. Plant and Equipment has an instantaneous, positive effect on production.
- 4. Farm Specialisation has a strong effect on the marginal productivity of labour.
- 5. The top 25 per cent of farms have higher marginal productivities because they have more money, on average, invested into capital goods such as plant and equipment.

All of these results can have strong, practical implications for growers. Some of these results were unexpected while others were likely to help to provide supportive evidence for ideas that may have been already well known.

Productivity is vitally important to the long term growth and survival of every industry. In order to understand the drivers of productivity growth within the vegetable industry, a continuous focus needs to be placed on the measures we can employee to seek to enhance industry productivity. This discussion paper does not profess to know all of the answers surrounding productivity, however it seeks to get the ball rolling on a series of research focussed on the topic. The key to understanding any concept is to maintain a continuous flow of up-to-date information to the topic and it is my hope that this paper inspires motivation and continued commitment towards this goal.

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### **Appendix A: Data**

#### **Aggregate Data analysis**

The data used in this paper is provided by the Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES). ABARES has a collection of survey data from its yearly Vegetable Farm Survey as well as data collected from several other agricultural surveys that it conducts. It was discovered that a lot of the farms surveyed in these other agricultural surveys also grew vegetables as a secondary occupation.

In order to increase the number of observations within the dataset for this study this discovery was exploited and data was obtained not only from the ABARES Vegetable Farm survey but also from the ABARES survey of irrigation farms in the Murray-Darling Basin, ABARES Australian Agricultural Grazing Industries Survey and the ABARES Australian Dairy Industry Survey. Table 5 presents the number of observations used for each of the eight vegetables within the model:

Table 5 - Sample Size Statistics

Sample size, 2010–11 to 2013–14		
Farm type	Sample size (no.)	
Potato	561	
Pumpkin	199	
Lettuce	184	
Carrot	168	
Broccoli	164	
Cabbage	163	
Green Bean	133	
Green Pea	117	
Total	1689	

These eight vegetable commodities represent over 35 per cent of the Australian vegetable industry. It is important to note that the sample size for potatoes is substantially larger that all the other vegetable commodities. There was no specific reason for this phenomenon however it is important to note that Potatoes represent over 17 per cent of the vegetable industry and so the additional observations used within the model for potatoes can thus be considered as justified. The data used in this analysis is sourced from most states in Australia and can be considered largely representative of the Australia Vegetable Industry.

#### **Variable Description**

Each of the models that are estimated within this study use a series of 10 variables. Each of these variables can roughly be categorised into one of four groups — land, labour, capital, production. Land, labour and production are self-explanatory in that they represent the quantity of land and labour used to produce a particular level of

crop output (production). Variables grouped within the capital category represent resources or machinery that used with the farming process. Examples of capital include seed, fuel, machinery, electricity and chemicals. There is also a set of binary variables representing the time period for each observation (yr012-yr2014). The purpose of this group of variables is to be able to isolate the yearly changes in the estimation results. Table 6 presents a summary description of each of the 10 variables used within this study.

Table 6 - Variable Description

Variable Name	Description	Category	Variable Type
Quantity	The quantity of the vegetable produced in tonnes	Production	Dependent, Continuous
QKBB	Imputed quantity buildings and fixed improvements	Capital	Independent, Continuous
QKPL	Imputed quantity of plant and equipment	Capital	Independent, Continuous
QKL	average operated land area	Land	Independent, Continuous
QLH	weeks worked by hired staff	Labour	Independent, Continuous
YR2011	A binary variable equal to 1 if the year is 2011, 0 otherwise.	-	Independent, Dichotomous
YR2012	A binary variable equal to 1 if the year is 2012, 0 otherwise.	-	Independent, Dichotomous
YR2013	A binary variable equal to 1 if the year is 2013, 0 otherwise.	-	Independent, Dichotomous
YR2014	A binary variable equal to 1 if the year is 2014, 0 otherwise.	-	Independent, Dichotomous
Intensity	Area planted to the vegetable of interest as a proportion of the total area cropped	Land	Independent, Continuous

### Appendix B: Theoretical Framework – The Production Function Model

The development of a theoretical framework for an economic model involves a simplification of the real word so that mathematical methods can be applied to understand economic decision making. In the case of the estimation of the productivity of the vegetable industry, we will conceptualise a typical vegetable farm as an entity than takes in resources such as seed, fertilizer, labour or capital etc. (inputs) and combines those inputs to produce/grow a vegetable commodity (output). Figure 1 below illustrates this conceptualisation:

Figure 5 - Input/output Model



As figure 5 shows, a typical farm process takes in inputs and combines them, over time, to produce a given output e.g Crop. Mathematically, figure 5 can be re-written as follows:

$$O = f(I)$$

Where O represents output as a function, f of inputs, I. Inputs (I) can be further categorised in capital inputs (C), land (L), labour (K) such that the equation above then becomes:

$$O = f(C, L, K) - (Equation 2)$$

Where output, O is given as a function of the combination of capital inputs, materials and labour. The key to this economic study is to try to understand the underlying function (process) that farms use to combine these three input categories to produce their given output. In order to do this, we will make some assumptions about this functional form of equation 2 and turn this function into a model that can be easily estimated using statistical techniques.

#### **Estimating Partial Factor Productivity - The Econometric Model**

Say, for example, we conceptualise a production function consisting of one output (carrots) and three inputs (capital, labour and productivity). A simplified version of this production function model (in mathematical terms) might look like the following:

By using a statistical method called Ordinary Least Squares (OLS), values for b0, b1 and b2 can be determined as we can obtain statistical observations for both labour and capital. For example, purposes, if OLS determines that b0=3.5, b1=6.7 and b2=2.4 then our model would now become:

Assuming that the coefficients (b1 and b2) of labour and capital are statistically significant these values represent marginal factor productivities. In the above example the coefficient of labour is 6.7, this means that for each additional unit of labour added the number of carrots produced increases, on average, by 6.7 tonnes. Similarly, the coefficient of capital is 2.4, this means that for each additional unit of capital added to the production process, the number of carrots produced increases by 2.4 tonnes, on average.

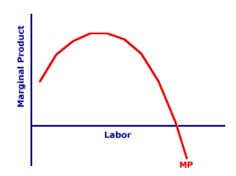
Parametric estimates of marginal factor productivity are admittedly complex to estimate; however, the results of the modelling procedure can be seen as much more accurate than their non-parametric counterparts. This is because the parametric estimates control for other inputs in the production process as well, whereas non-parametric methods do not.

The error term, u in the above models contain values for the unexplained variation between output and the selected inputs in the production process. As previously mentioned, because productivity is unobservable we are unable to estimate its effects directly. However, the error term, u, will capture the effects of total factor productivity within the model (assuming that the model is well specified and represents a good fit of the data). In this sense, studies that are focused on estimating total factor productivity are therefore necessarily focussed on the values held within the error term of the model.

#### **Appendix C: Theoretical Explanation for Negative Marginal Productivities**

Another interesting observation that can be taken from the results is the estimation of negative marginal products on some of the input variables, differing by industry. For example, the coefficient of labour (QLHDM) for carrots is -0.8066. Interpreting this statistic means that for each additional week of labour <u>reduces</u> the amount of carrots produced, on average, by 806.6kg. The question arises, "Does it makes sense to have negative marginal productivities?" or "Why would additional labour actually reduce production levels?"

The simple answer is yes it does make sense to have negative marginal productivities. According to economic theory the marginal productivity of a given input typical takes an inverted "U" shape as demonstrated in figure 6. As shown in figure 6, when the amount of labour exceeds a certain threshold, the marginal product becomes negative.



**Figure 6: Theoretical Marginal Productivity Curve** 

The reason for the inverted "U" shaped marginal productivity curve, and the decreasing and potentially negative marginal productivity results is due to what economists' call "The Law of Diminishing Returns". If you keep adding additional labour one unit at a time, but keep the amount of capital (equipment, seed etc.) fixed eventually, as you add more and more labourers they will not have any equipment to work with! As that additional labourer has less and less capital to work with, their productivity falls more and more and you see the decreasing marginal productivity effect as depicted in figure 6.

Some of the estimation results presented in in this section yield negative marginal productivities. It is my belief that the reason for this is because these industries are within the right hand side of the marginal productivity graph in figure 6, explaining why these results are negative. Future studies of the marginal productivity of inputs would ideally have larger sample sizes and be able to accommodation for non-linear relationships between the marginal productivities.

#### 6. Veggie Stats series

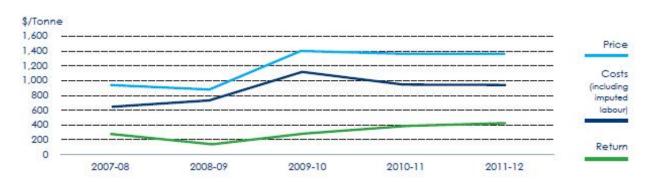
#### 6.1 Lettuce (July/August 2014)



### Lettuce Production – Key facts and figures

- Lettuce growers' average returns have been increasing since 2008-09.
- Since 2007-08, average domestic lettuce prices and costs have both grown at a similar rate of around 45%.
- Lettuce production has varied over the recorded years, with no clear trend.
- Australia's fresh lettuce exports were greater than \$3 million in value in 2012-13.
- More than 40% of Australia's total fresh lettuce exports were sent to Singapore in 2012-13.

### Australian Lettuce Growers' Financial Performance (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 72 Returns: The difference between price and costs (including imputed labour).

#### Current Financial Performance

Australian lettuce growers' returns on average totalled \$418 per tonne in 2011-12, up 6% on the previous year.

In 2011-12, the average price received per tonne of lettuce was \$1,369, whereas the average cost to produce a tonne of lettuce was \$951.

#### Long Term Trends

Lettuce growers' returns, on average, have continually increased annually since 2008-09.





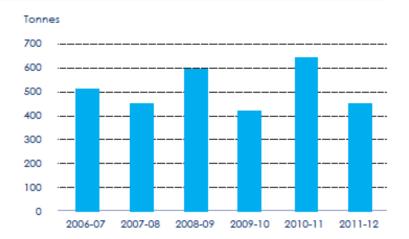
### Australian Lettuce Growers' Production (average per farm)

#### Australian Lettuce Production

Australian lettuce production per farm averaged 452 tonnes in 2011-12, down 31% on the previous year.

Average lettuce production has varied over the years, with no clear trend.

Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 72



#### Area Planted v Yield (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 72

#### Australian Lettuce Production

The average area planted in 2011-12 fell by 42% from the previous year.

In 2011-12, lettuce growers' average yields increased by 15% from the previous year.



#### Destination of Australian Lettuce Exports and Export Prices Received

#### Exports

The majority of Australia's lettuce exports were sent to Singapore in 2012-13.

Australia's lettuce exports received the highest export price per kg from Hong Kong and Singapore, whilst the lowest export price was Brunei Darussalam at \$1.97 per kg.

Source: UN Commtrade. Commodity 070519 and 070511

Please note that with any data related information errors may exist, recipients and individuals should use this information cautiously.

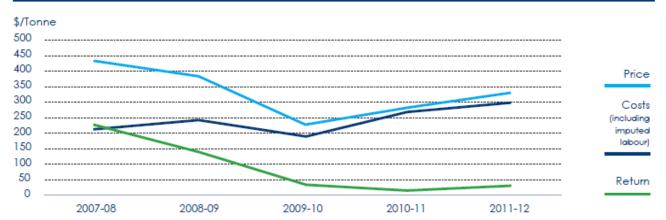


## VEGGIE STATS: CARROT

## Carrot Production – Key facts and figures

- Carrot growers' returns, on average, have been falling since 2007-08, despite marginally increasing in 2011-12.
- Since 2007-08, average domestic carrot prices have fallen by 24%, whilst average costs have increased by 42%.
- Carrot production has fallen on average by 80% since reaching its record high levels in 2008-09.
- Fresh carrot and turnip exports are Australia's largest vegetable exported commodity, representing over 20% of all vegetable exports in 2012-13.
- The value of Australian carrot and turnip exports has remained stable over the last four years, totalling \$51 million in 2012-13.

## Australian Carrot Growers' Financial Performance (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 71 Returns: The difference between price and costs (including imputed labour).

#### Current Financial Performance

Australian carrot growers' returns on average totalled \$35 per tonne in 2011-12, up 133% on the previous year.

In 2011-12, the average price received per tonne of carrots was \$331, whereas the average cost to produce a tonne of carrots was \$296.

#### Long Term Trends

Carrot growers' returns, on average, have been falling since 2009-10, despite marginally increasing in 2011-12.



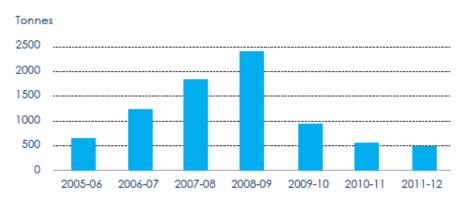


## Australian Carrot Growers' Production (average per farm)

#### Australian Carrot Production

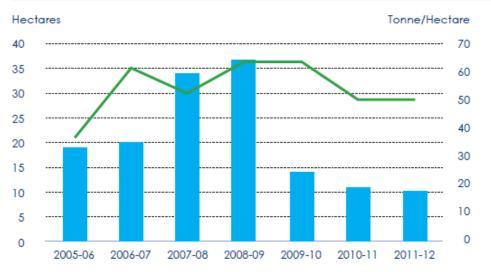
Australian carrot production per farm averaged 481 tonnes in 2011-12, down 11% on the previous year.

Average carrot production has fallen by 80% since reaching its record high levels in 2008-09.



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 71

#### Area Planted v Yield (average per farm)



#### Australian Carrot Production

The average area planted in 2011-12 is well below its peak in 2008-09.

In 2011-12, carrot growers' average yields were 50 tonnes per hectare, lower than the five year average of 56 tonnes per hectare.



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 71

#### Destination of Australian Carrot and Turnip Exports and Export Prices Received

#### **Exports**

The majority of Australia's carrot and turnip exports were sent to the Middle East and Asia in 2012-13.

Australia's carrot and turnip exports received the highest export price from both the UAE and Qatar at \$0.79 per kg, whilst the lowest export price was Hong Kong at \$0.68 per kg.



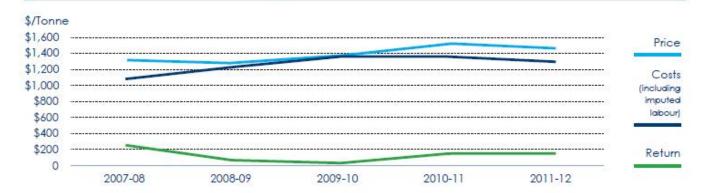
Source: Global Trade Information Service, sourced from Australian Bureau of Statistics International Trade data, various years

# VEGGIE STATS: BROCCOLI

## Broccoli Production – Key facts and figures

- Broccoli growers' returns, on average, fell considerably in 2008-09 and 2009-10 but increased the following two years.
- Since 2007-08, average domestic broccoli prices have increased by 12%, whilst average costs have increased by 21%.
- Broccoli production has been growing on average, with production levels in 2011-12 almost double the amount of broccoli produced in 2006-07.
- Fresh headed broccoli and cauliflower exports totalled around \$6.5 million in value terms in 2013.
   Australia exported \$4 million worth to Singapore and more than \$2 million to Brunei Darussalam.

## Australian Broccoli Growers' Financial Performance (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 72 Returns: The difference between price and costs (including imputed labour).

#### Current Financial Performance

Australian broccoli growers' returns on average totalled \$166 per tonne in 2011-12, up 6% on the previous year.

In 2011-12, the average price received per tonne of broccoli was \$1,453, whereas the average cost to produce a tonne of broccoli was \$1,287.

#### Long Term Trends

Broccoli growers' returns, on average, have varied considerably from year to year, with returns remaining relatively stable in 2010-11 and 2011-12.





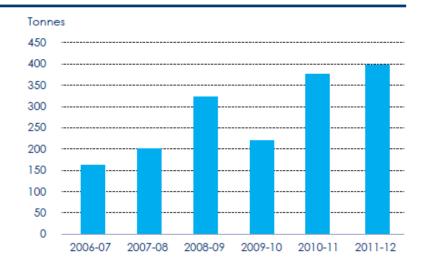
## Australian Broccoli Growers' Production (average per farm)

#### Australian Broccoli Production

Australian broccoli production per farm averaged 396 tonnes in 2011-12, up 6% on the previous year.

Average farm broccoli production has been increasing over time and has almost doubled since 2005-06.

Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 72



#### Area Planted v Yield (average per farm)



#### Australian Broccoli Production

The average area planted in 2011-12 fell by 12% from the previous year.

Broccoli growers' experienced their highest yields in 2011-12 at 13 tonnes per hectare.

Area Sown Yield

Australian Headed Broccoli and Cauliflower Exports and Export Prices Received

#### Exports

The majority of Australia's headed broccoli and cauliflower exports were sent to Singapore and Brunei Darussalam.

Australia's broccoli exports received the highest price per kg from the UAE and Malaysia, whilst the lowest export price was Papua New Guinea at \$1.80 per kg.

Unit Price per KG % of Exports \$3.50 70% \$4.0M \$3.00 60% \$2.50 50% \$2.00 \$2.4M 40% \$1.50 30% \$1.00 20% \$0.50 \$0.3M--MS:02-----MS:02-10% 0% POPUO Hew Grined **Qotor** Dorussdiom

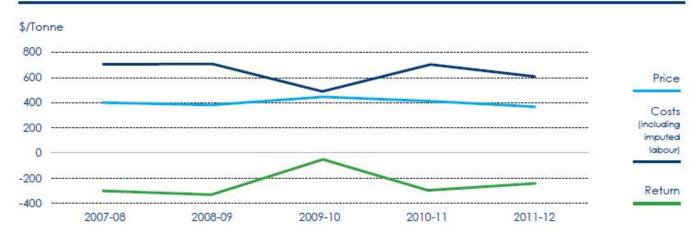
Source: UN Commtrade, 070410 Cauliflowers and Headed Broccoli

# VEGGIE STATS: PUMPKINS

## Pumpkins Production – Key facts and figures

- Pumpkin growers', on average, have been experiencing losses since 2007-08.
- Since 2007-08, average domestic pumpkin prices have fallen by 9%, whilst average costs have fallen by 15%.
- Pumpkin production has been falling on average since 2008-09 and reached its record low level of 92 tonnes in 2011-12.
- Pumpkin, squash and gourd exports totalled more than \$2 million in value in 2012-13. More than half of these exports were sent to Singapore.

## Australian Pumpkin Growers' Financial Performance (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 69 Returns: The difference between price and costs (including imputed labour).

#### Current Financial Performance

Australian pumpkin growers' averaged a loss of \$235 per tonne in 2011-12, an improvement of 23% on the previous year.

In 2011-12, the average price received per tonne of pumpkin was \$375, whereas the average cost to produce a tonne of pumpkins was \$610.

#### Long Term Trends

Pumpkin growers' on average, have experienced annual losses since 2007-08.





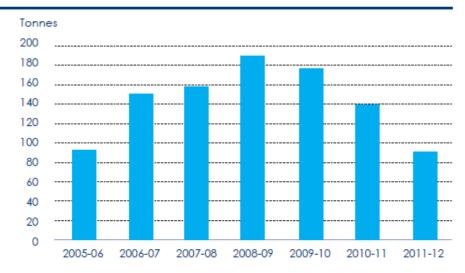
## Australian Pumpkin Growers' Production (average per farm)

#### Australian Pumpkin Production

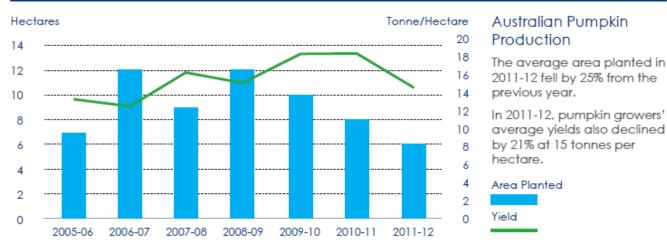
Australian pumpkin production averaged 92 tonnes in 2011-12, down 34% on the previous year.

Average farm pumpkin production has fallen by 52% since 2008-09.

Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 69



#### Area Planted v Yield (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 69

#### Australia's Pumpkin, Squash and Gourd Exports and Export Prices Received

#### Exports

The majority of Australia's pumpkin, squash and gourd exports were sent to Singapore in 2012-13.

Australia's pumpkin, squash and gourd exports received the highest export price per kg from Malaysia, whilst the lowest export price was Indonesia at \$0.94 per kg.



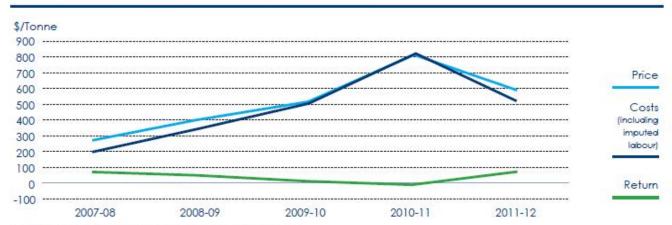
Source: Global Trade Information Service, sourced from Australian Bureau of Statistics International Trade data, various years



## Cabbage Production – Key facts and figures

- Cabbage growers' returns, on average, have been falling since 2007-08. However, returns increased in 2011-12.
- Since 2007-08, average domestic cabbage prices increased by 114%, however average costs also climbed by 160%.
- Cabbage production has increased on average by 7% since 2007-08.
- Australia's fresh cabbage, kohlrabi and kale exports are generally sent to Asia, with Singapore and Papua New Guinea the main recipients.

## Australian Cabbage Growers' Financial Performance (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 73 Returns: The difference between price and costs (including imputed labour).

#### **Current Financial Performance**

Australian cabbage growers' returns on average totalled \$67 per tonne in 2011-12.

In 2011-12, the average price received per tonne of cabbage was \$587, whereas the average cost to produce a tonne of cabbage was \$520.

#### Long Term Trends

Cabbage growers' returns, on average, have been falling since 2007-08. Although, returns increased in 2011-12.





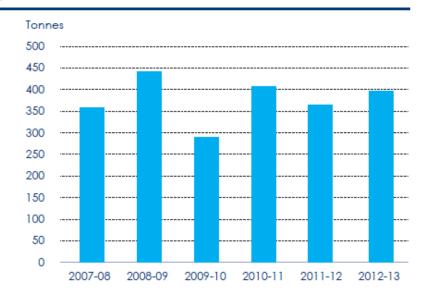
## Australian Cabbage Growers' Production (average per farm)

#### Australian Cabbage Production

Australian cabbage production averaged 399 tonnes in 2011-12, up 9% on the previous year.

Average cabbage production has varied over the years, with no clear trend.

Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 73



#### Area Planted v Yield (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 73

#### Australian Cabbage Production

The average area planted in 2011-12 fell by 25% from the previous year.

In 2011-12, cabbage growers' average yields bounced back from the previous year's low and improved by 41%.

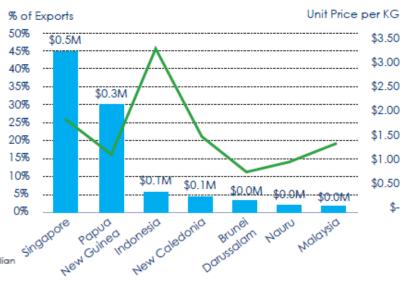
Area Planted Yield

#### Destination of Australian Cabbage Exports and Export Prices Received

#### **Exports**

More than three quarters of Australia's cabbage exports were sent to Singapore and Papua New Guinea in 2012-13.

Australia's cabbage exports received the highest export price per kg from Indonesia, whilst the lowest price was Brunei Darussalam at \$0.87 per kg.



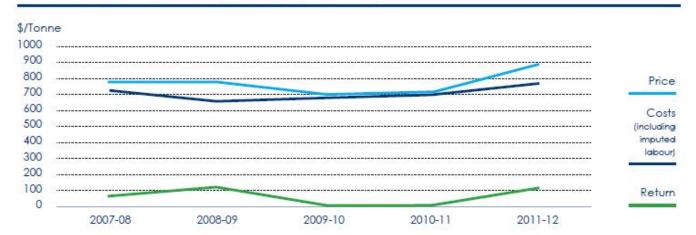
Source: Global Trade Information Service, sourced from Australian Bureau of Statistics International Trade data, various years

# VEGGIE STATS: CAULIFLOWER

## Cauliflower Production – Key facts and figures

- Cauliflower growers' returns, on average, have increased since 2007-08, despite falling considerably in 2009-10 and 2010-11.
- Since 2007-08, average domestic cauliflower prices have increased by 24%, whilst average costs have increased by 9%.
- Cauliflower production has been steadily increasing on average, although production fell in 2011-12.
- Fresh cauliflower and headed broccoli exports totalled around \$6.6 million in value terms in 2013.
   Australia exported \$4.2 million worth to Singapore.

## Australian Cauliflower Growers' Financial Performance (average per farm)



Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 71 Returns: The difference between price and costs (including imputed labour).

#### Current Financial Performance

Australian cauliflower growers' returns on average totalled \$119 per tonne in 2011-12.

In 2011-12, the average price received per tonne of cauliflower was \$889, whereas the average cost to produce a tonne of cauliflower was \$706.

#### Long Term Trends

Cauliflower growers' returns, on average, have varied from year to year, with growers' experiencing the best returns in 2008-09 and 2011-12.





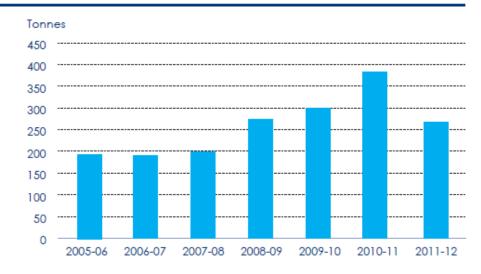
#### Australian Cauliflower Growers' Production (average per farm)

#### Australian Cauliflower Production

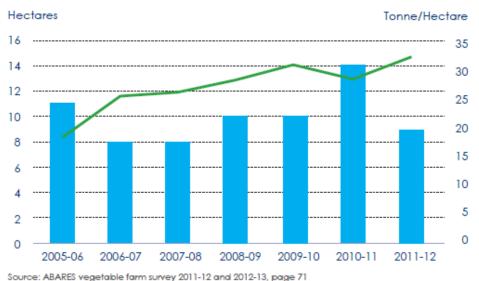
Australian cauliflower production per farm averaged 271 tonnes in 2011-12, down 30% on the previous year.

Average farm cauliflower production has trended upwards for most years with 2011-12 the exception.

Source: ABARES vegetable farm survey 2011-12 and 2012-13, page 71



#### Area Planted v Yield (average per farm)



#### Australian Cauliflower Production

The average area planted in 2011-12 fell by 36% from the previous year.

Overall, Cauliflower growers' yields have been generally improving with the best yields experienced in 2011-12.

Area Planted Yield

Source: ABAKES vegetable farm survey 2011-12 and 2012-13, page 71

#### Australian Cauliflower and Headed Broccoli Exports and Export Prices Received

#### **Exports**

- Over 60 per cent of Australia's cauliflower and headed broccoli exports were sent to Singapore, with Malaysia receiving just over 5 per cent.
- Australia's cauliflower and headed broccoli exports received the highest export price from UAE at \$3.52kg, whilst the lowest export price was Papua New Guinea at \$1.86kg.

% of Exports Unit Price per KG \$4.00 70% \$4.2M \$3.50 60% \$3.00 50% \$2.50 40% \$2.00 30% \$1.50 20% \$1.00 10% \$0.50 \$0:34M \$0.27M 0% POPUO UAE **Gotor** HEN GUIRED

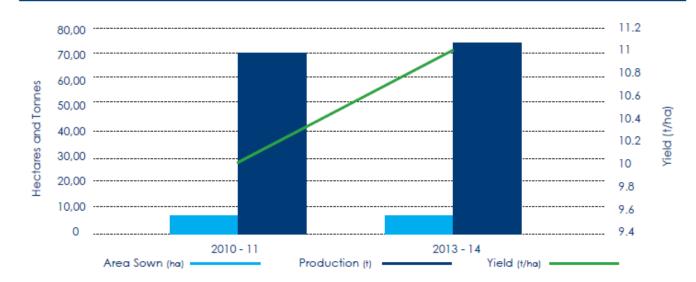
Source: Global Trade Information Service, sourced from Australian Bureau of Statistics International Trade data, various years

# VEGGIE STATS: SWEET CORN

## Sweet Corn Production – Key facts and figures

- Since 2010-11, sweet corn production has increased by 5 per cent to 2013-14.
- The number of sweet corn growers has decreased by 38 per cent since 2010-11, to 183 growers in 2013-14.
- The yield of sweet corn has increased from 10 tonnes per hectare to 11 tonnes per hectare from 2010-11 to 2013-14.
- Queensland produces the highest value of sweet corn production out of any state.
- The value of frozen corn exports in 2013-14 were five times greater than in 2009-10.

#### Farm-Gate Statistics



- Sweet corn production has increased from 70,808 tonnes in 2010-11 to 74,483 tonnes in 2013-14.
- Despite sweet corn production increasing, area sown has remained relatively stable which has contributed to an increase in yield.
- Price per kilo\* has decreased from \$1.21 to \$1.12 since 2010-11.

Horticulture Innovation Australia

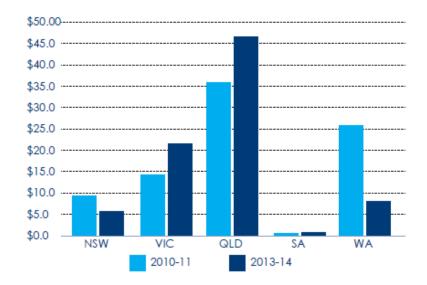


<sup>\*</sup> Price per kilo as calculated by Gross Value divided by Production

The gross value of sweet corn production declined by 2.7 per cent since 2010-11, to \$83.5 million in 2013-14.

Queensland accounted for over 55 per cent of Australia's gross value in 2013-14.

The gross value of production in Western Australia decreased by 70 per cent from 2010-11 to 2013-14.



#### Key Export Markets in 2013-14



Japan was Australia's biggest frozen sweet corn export market in 2013-14, accounting for 94 per cent of total export value.

Papua New Guinea received the cheapest price per kilo of Australian frozen sweet corn at \$2.57.

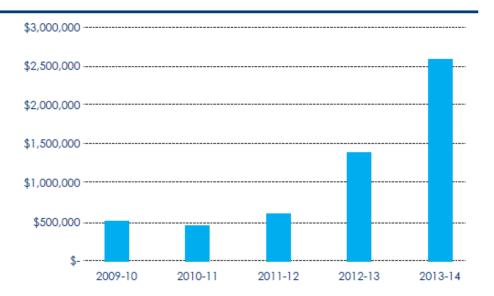
Value Price/Kg

#### Total Exports

#### Exports

Export value of frozen sweet corn increased by 84 per cent from 2012-13 to 2013-14.

Frozen sweet corn exports increased every year except in 2010-11, where a slight decrease of 9 per cent was seen from the previous financial year.



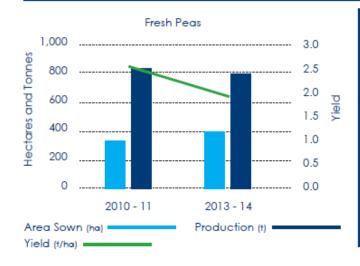
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# VEGGIE STATS: PEAS

## Pea Production – Key facts and figures

- Since 2010-11, the gross value of fresh pea production has increased by 5 per cent, whereas the gross value of processed pea production has increased by 22 per cent.
- The production in tonnes of processed peas is almost 18 times greater than fresh peas, however the gross value of production for processed peas is less than two times greater.
- Yield has increased for processed peas, but decreased for fresh peas.
- Since 2011-12, exports of fresh and frozen peas have decreased by 76 per cent and 54 per cent respectively.
- Exports for frozen peas were more than double the value of exports for fresh peas in 2014-15.

#### Farm-Gate Statistics





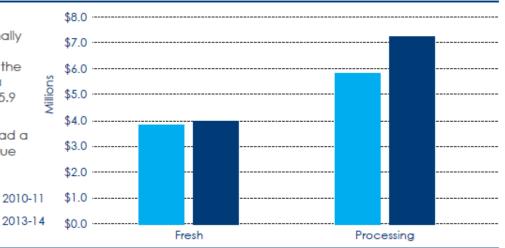
- Since 2010-11, production for fresh peas decreased from 813 tonnes to 793 tonnes in 2013-14, with area sown increasing from 327 hectares to 406 hectares over the same time period. This led to a decrease in yield.
- Since 2010-11, production for processed peas increased slightly from 13,392 tonnes to 14,151 tonnes in 2013-14. This led to a slight increase in yield as the area sown had decreased over the time period.

This project has been funded by Horticulture Innovation Australia Limited using the National Vegetable Levy and funds from the Australian Government. Horticulture Innovation Australia

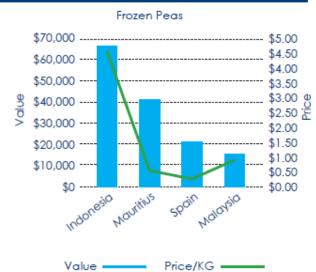


The gross value of fresh pea production increased marginally from \$3.8 million to \$4 million from 2010-11 to 2013-14, with the gross value of processed pea production increasing from \$5.9 million to \$7.2 million.

In 2013-14, processed peas had a 64 per cent share of gross value out of total pea production.





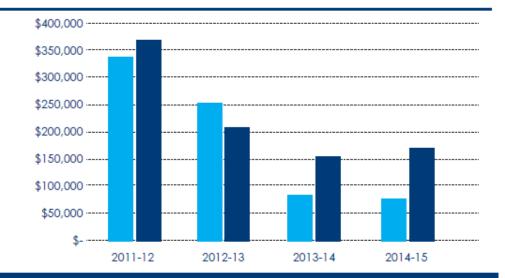


- Malaysia was Australia's largest fresh pea export market in 2014-15, having a 27 per cent share of total fresh pea exports. Papua New Guinea had a 25 per cent share.\*
- Indonesia was Australia's largest frozen pea export market in 2014-15, having a 38 per cent share of total frozen pea exports.
- It can be seen that prices for fresh peas tend to be much higher than prices for frozen peas.
- \* In August 2015, the Papua New Guinean Government instituted a ban on the import of selected Australian vegetables, including peas. This had no impact on the 2014-15 financial year.

#### Total Exports

In 2014-15, fresh pea exports were valued at over \$80,000 while frozen pea exports were valued at over \$170,000.

Frozen pea exports increased over the last financial year by 11 per cent, from \$156,000 to \$173,000.



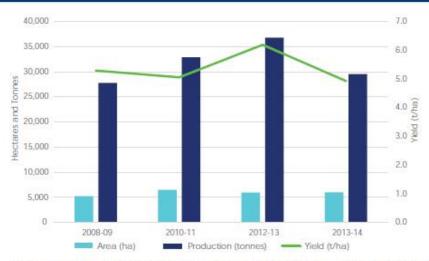
Fresh Frozen

# VEGGIE STATS: BEANS

## Bean Production – Key facts and figures

- Since 2010-11, bean production has decreased by 11.3 per cent, while the gross value of bean production has also decreased by 12.3 per cent.
- Prices for beans on the domestic market are on average 10.4 per cent higher than the New Zealand export market.
- Average yield has remained steady at 4.9 tonnes per hectare in 2013-14.
- Fresh beans are experiencing an expanding export market. Since 2011-12, fresh bean exports have increased by over 52.4 per cent.
- The export market for fresh beans is over 40 times larger than the export market for frozen beans.

#### Farm-Gate Statistics

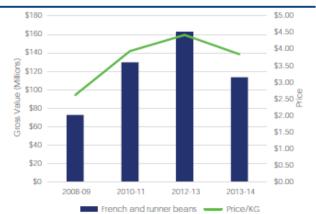


Source: Australian Bureau of Statistics catalogue 7121.0 - Area, production and yield of agricultural commodities, 2013-14, 2012-13, 2010-11 and 2008-09. Note: Data is for both fresh and frozen beans.

- Since 2010-11, production of beans has decreased from 32,886 to 29,543 tonnes (11.3 per cent) in 2013-14.
- The area sown has also decreased from 6,504 to 5,997 hectares (8.5 per cent) over the same period.
- Average yield has decreased from 6.2 to 4.9 tonnes per hectare (21 per cent).

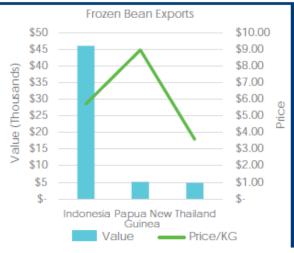
Horticulture Innovation Australia

- Gross value of bean production has decreased from \$129.6 million to \$113.6 million between 2010-11 and 2013-14. This could be due to the 1.4 per cent decrease in the local price per kilo over the same period.
- The local price per kilo of beans represents an estimation of the prices received by growers. The local price per kilo has decreased by 13 per cent since 2012-13.



Source: Australian Bureau of Statistics catalogue 7503.0 -Value of agricultural commodities, 2013-14, 2012-13, 2010-11 and 2008-09.

#### Key Export Markets in 2014-15



Source: Global Trade Information Service, sourced from Australian Bureau of Statistics International Trade data, various years.

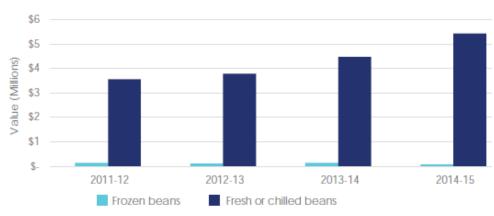


Source: Global Trade Information Service, sourced from Australian Bureau of Statistics International Trade data, various years \*Export Market Value is less than \$30,000

- New Zealand was Australia's largest fresh bean export market in 2014-15, with a 98.4 per cent share of total fresh bean exports. All other export countries have export market values of less than \$30,000.
- Indonesia was Australia's largest frozen pea export market in 2014-15, having a 77.6 per cent share of total frozen pea exports. The second largest was Papua New Guinea with an 8.6 per cent share of total exports.
- Export prices for frozen beans tend to be higher on average than fresh beans this is likely due to higher production costs associated with frozen bean production.

#### Total Exports

- In 2014-15, fresh bean exports were valued at over \$5,432,726, which was an increase of 21.3 per cent on the previous year's estimates.
- The export market for fresh beans has been in an upward trend over the past three years, with an overall increase in value of 52.4 per cent since 2011-12.
- Frozen bean exports have decreased by 46 per cent from \$143,115 in 2011-2012 to \$77,331 in 2014-15.



Source: Global Trade Information Service, sourced from Australian Bureau of Statistics International Trade data, various years.

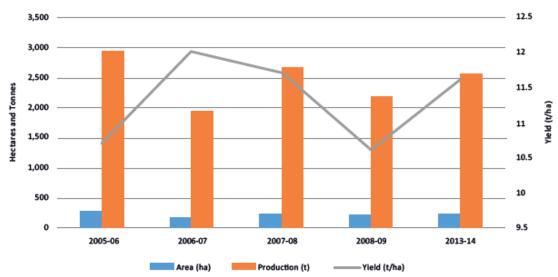
#### 6.10 Chillies (January/February 2016)



## Chilli Production – Key facts and figures

- Production of chillies has increased by 17.2 per cent over the period 2008-09 to 2013-14.
- The gross value of chilli production in 2013-14 is over four times larger than in 2008-09.
- The gross value of the chilli industry has grown slightly in New South Wales and Victoria and by 3.4 times in Western Australia over the period 2008-09 to 2013-14. Queensland's chilli industry has grown by over 4.5 times its previous 2008-09 value.
- The average farm gate value per kilo of chillies was reported to be \$9.49 per kilo in 2013-14.
- Since 2008-09, farm gate value per kilo in Western Australia has declined by 6.94 per cent; however, volumes of chilli production outside of Queensland are relatively small and prices are therefore subject to volatility.

#### Farm Gate Statistics



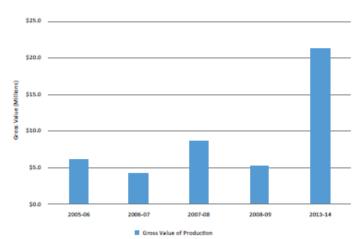
Source: Australian Bureau of Statistics catalogue 7121.0 - Area, production and yield of agricultural commodities, various years.

- Since 2008-09, production of chillies has increased from 2,191 to 2,567 tonnes (17.2 per cent) in 2013-14.
- The area sown has increased from 207 to 222 hectares (7.2 per cent) over the same time period.
- · Average yield has increased from 10.6 to 11.6 tonnes per hectare (9.4 per cent).





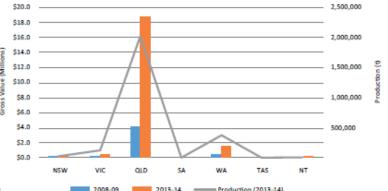
- Gross value of chilli production has increased from \$5.3 million to \$21.23 million between 2008-09 and 2013-14.
- Since 2008-09, the gross value of chilli production has grown by over 300 per cent. This is due to a 376,210 kg increase in production and an estimated \$5.23 per kilo change in farm gate value over five years.



Source: Australian Bureau of Statistics catalogue 7503.0 – Value of Agricultural Commodities, various years.

#### State Gross Value of Production

- The chilli industry in Queensland has increased its value from \$4.14 million in 2008-09 to \$18.76 million in 2013-14. This represents a 353.6 per cent increase in the gross value of production over the five year period.
- Chillies are mostly grown in Queensland, having produced 2,017,204kg in 2013-14 and representing 78.6 per cent of the total chilli production throughout Australia.
- The chilli industry has increased in value in Western Australia (242.5 per cent) and Victoria (23.1 per cent) which produced 368,734kg and 127,999kg of chillies respectively. The industry has decreased in value in New South Wales (12.8 per cent) which produced 38,618kg in 2013-14.

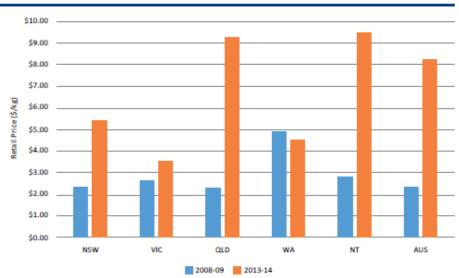


Source: Australian Bureau of Statistics catalogue 7503.0 – Value of Agricultural Commodities, various years.

Tasmania, ACT and SA are omitted from this graph due to insufficient data.

#### Value per kilo<sup>1</sup>

- The average value received per kilo of chillies at the first point of sale has increased by 244.62 per cent over five years, from \$2.40 per kilo in 2008-09 to \$8.27 per kilo in 2013-14.
- Value per kilo in Western Australia has decreased by 6.94 per cent from \$4.87 in 2008-09 to \$4.53 in 2013-14.
- Total cash costs for vegetable growers have increased by 36 per cent over the period and are a significant factor in determining farm gate returns.



Source: Australian Bureau of Statistics catalogue 7503.0 - Value of Agricultural Commodities, various years.

Tasmania, ACT and SA are omitted from this graph due to insufficient data.

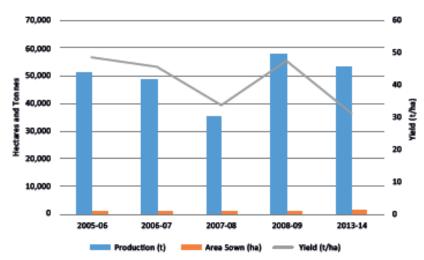
<sup>1</sup> Value per kilo is defined as the gross value divided by production and includes marketing costs incurred at the first point of sale.



## Celery Production – Key facts and figures

- Since 2008-09, celery production has decreased by 7.9 per cent. The gross value of celery production has also decreased by 5.7 per cent during the same period.
- The price for celery on the domestic market is on average 36.6 per cent lower than the Malaysian export market.
- Average yield decreased by 34.2 per cent in 2013-14.
- Celery is experiencing an expanding export market. Since 2011-12, fresh celery exports have increased by over \$1.66 million (172.2 per cent).
- Malaysia and Singapore are the two largest export markets for celery. Combined, they represent over 84.87 per cent of total celery exports.

#### Farm Gate Statistics



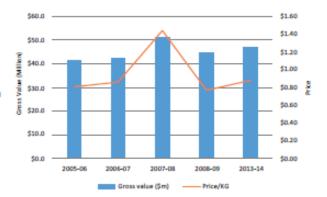
Source: Australian Bureau of Statistics catalogue 7121.0 - Area, production and yield of agricultural commodities, various years.

- Between 2008-09 and 2013-14, production of celery has decreased from 57,804 to 53,261 tonnes (7.9 per cent).
- The area sown has increased from 1,210 to 1,695 hectares (40.1 per cent) from 2008-09 to 2013-14.
- Yield average has decreased from 47.8 to 31.42 (34.2 per cent) between 2008-09 to 2014-15.





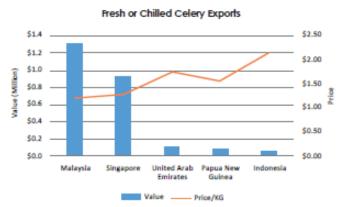
- Gross value of celery production has increased from \$44.65 million to \$49.19 million from 2008-09 to 2013-14. This could be due to the 14.7 per cent increase in the estimated value per kilo over the same period.
- The gross value of celery production reached a five-year high in 2007-08 when the industry was worth \$51.36 million.



Source: Australian Bureau of Statistics catalogue 7503.0 - Value of agricultural commodities, various years.

#### Key Export Markets in 2014-15

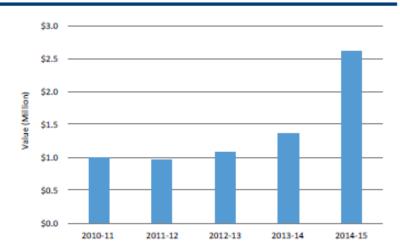
- Malaysia was Australia's largest celery export market in 2014-15, with a 49.48 per cent share of total celery exports. Australia's second largest celery export market was Singapore which held a 35.39 per cent share of total celery exports.
- The United Arab Emirates (4.17 per cent), Papua New Guinea (2.94 per cent) and Indonesia (2.96 per cent) all have export market shares of less than five per cent and export values less than \$110,000.
- Export prices are the lowest for Malaysia (\$1.21 per kilo) and the highest for Indonesia (\$2.15 per kilo). This is likely to be the reason why Malaysia is the largest export market of celery for Australia.



Source: Global Trade Information Service, sourced from Australian Bureau of Statistics Informational Trade data, various years

#### Total Exports

- In 2014-15, celery exports were valued at over \$2,621,274 – an increase of over 92.4 per cent on the previous year's estimates.
- The export market for celery has been in an upward trend over the past three years, with an overall increase in value of 172.2 per cent since 2011-12.
- Celery exports have grown, on average, by 32.1 per cent each financial year since 2010-11.

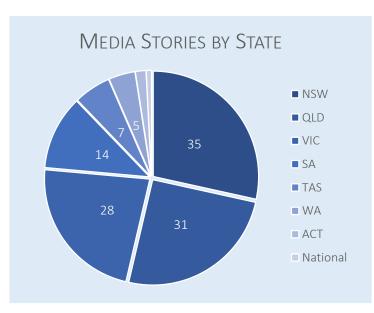


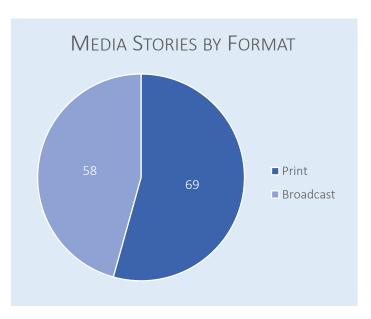
Source: Global Trade Information Service, sourced from Australian Bureau of Statistics Informational Trade data, various years.

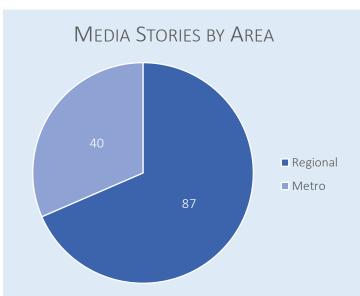
#### 7. Media generated on Project Harvest reports, July 2013 – January 2016

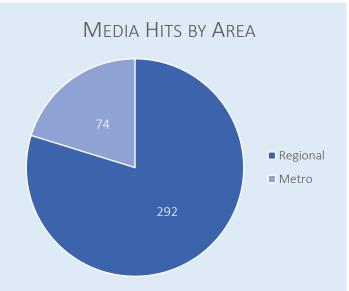
#### 7.1 Summary

Total stories	Syndicated hits	Hits per month	Known reach	Hits with reach data	Hits with reach data Total words	
127	366	12.2	2,060,256	20.22%	16,596	454









#### 7.2 Media generated – all data

Date	Hits	Reach	Source	Region	State	Words	Airtime (secs)
16/07/2013	1		ABC Riverina	Wagga Wagga	NSW		450
16/07/2013	1	39,227	The Mercury	Hobart	TAS	110	
17/07/2013	12		2TM	Tamworth	NSW		64

Date	Hits	Reach	Source	Region	State	Words	Airtime (secs)
18/07/2013	1	30,216	Queensland Country Life	Brisbane	QLD	294	
19/07/2013	1	18,334	Tasmanian Country	Hobart	TAS	203	
31/07/2013	9	5,000	2HD	Newcastle	NSW		331
31/07/2013	19		2NM	Muswellbrook	NSW		329
8/08/2013	1	7,742	Fraser Coast Chronicle	Maryborough	QLD	291	
8/08/2013	1	9,180	News-Mail	Bundaberg	QLD	292	
15/08/2013	1		702 ABC Sydney	Sydney	NSW		853
15/08/2013	1	148,037	Sydney Morning Herald	Sydney	NSW	629	
24/08/2013	1	27,000	6PR	Perth	WA		713
28/08/2013	1	14,955	Ballarat Courier	Ballarat	VIC	257	
29/08/2013	1	12,992	Farm Weekly	Perth	WA	341	
30/08/2013	1	18,334	Tasmanian Country	Hobart	TAS	153	
18/09/2013	1		2GZ	Orange	NSW		30
19/09/2013	19		2NM	Muswellbrook	NSW		32
20/09/2013	19		2NM	Muswellbrook	NSW		32
26/09/2013	1	12,992	Farm Weekly	Perth	WA	358	
27/09/2013	1	18,334	Tasmanian Country	Hobart	TAS	70	
25/10/2013	1	6,708	Border Watch	Mt Gambier	SA	75	
28/10/2013	19		2NM	Muswellbrook	NSW		35
30/10/2013	1	14,955	Ballarat Courier	Ballarat	VIC	239	
14/11/2013	1	43,571	The Land	Sydney	NSW	113	
18/12/2013	19		2NM	Muswellbrook	NSW		16
18/12/2013	1		3WM	Horsham	VIC		290
18/12/2013	1		612 ABC	Brisbane	QLD		240
18/02/2014	1		ABC South Queensland	Toowoomba	QLD		245
19/02/2014	1		2EC	Bega	NSW		35
20/02/2014	1	18,220	Northern Territory News	Darwin	NSW	378	
20/02/2014	1	13,769	Sunshine Coast Daily	Maroochydore	QLD	302	
24/02/2014	1	29,817	Queensland Country Life	Brisbane	QLD	210	
27/02/2014	1		2TM	Tamworth	NSW		42
3/03/2014	1		2TM	Tamworth	NSW		34
3/03/2014	1	13,769	Sunshine Coast Daily	Maroochydore	QLD	258	
6/03/2014	1	24,148	Queensland Country Life	Brisbane	QLD	243	
10/03/2014	1	4,404	Daily Examiner	Grafton	NSW	171	
27/03/2014	1	7,229	Good Fruit & Vegetables	National	National	360	
27/03/2014	1	28,148	Queensland Country Life	Brisbane	QLD	363	
28/03/2014	1		Radio National	Canberra	ACT		428
29/03/2014	1	31,163	Advocate	Coffs Harbour	NSW	225	
9/05/2014	1		2NM	Muswellbrook	NSW		43
9/05/2014	1		3WM	Horsham	VIC		44

Date	Hits	Reach	Source	Region	State	Words	Airtime (secs)
14/05/2014	1	13,708	Ballarat Courier	Ballarat	VIC	219	
17/07/2014	1		2NM	Muswellbrook	NSW		52
17/07/2014	1		3WM	Horsham	VIC		51
18/07/2014	12		2NM	Muswellbrook	NSW		22
1/08/2014	1	6,461	Border Watch	Mt Gambier	SA	88	
10/09/2014	1	58,582	Weekly Times	Melbourne	VIC	384	
26/11/2014	2		4GR	Toowoomba	QLD		114
16/12/2014	13		2NM	Muswellbrook	NSW		28
16/12/2014	9		ABC Southern Queensland	Toowoomba	QLD		180
16/12/2014	1	7,452	Fraser Coast Chronicle	Maryborough	QLD	148	
16/12/2014	1	5,835	Gladstone Observer	Gladstone	QLD	148	
16/12/2014	1	12,373	Morning Bulletin	Rockhampton	QLD	148	
16/12/2014	1	8,295	News-Mail	Bundaberg	QLD	148	
16/12/2014	1	8,418	Queensland Times	Ipswich	QLD	148	
16/12/2014	1	6,120	Sunraysia Daily	Mildura	VIC	106	
16/12/2014	1	13,707	Sunshine Coast Daily	Maroochydore	QLD	148	
19/12/2014	1	4,262	Daily Examiner	Grafton	NSW	288	
19/12/2014	1	12,373	Morning Bulletin	Rockhampton	QLD	152	
23/12/2014	1		936 ABC Hobart	Hobart	TAS		583
1/01/2015	1	28,329	Queensland Country Life	Brisbane	QLD	449	
23/01/2015	1	4,264	Daily Examiner	Grafton	NSW	66	
23/01/2015	1	18,160	Tasmanian Country	Hobart	TAS	70	
9/02/2015	1		SYN FM	Melbourne	VIC		423
3/03/2015	1	34,597	mX Brisbane	Brisbane	QLD	93	
3/03/2015	1	75,167	mX Melbourne	Melbourne	VIC	93	
3/03/2015	1	88,360	mX Sydney	Sydney	NSW	93	
4/03/2015	1	7,784	Queensland Times	Queensland	QLD	286	
10/04/2015	12		2NM	Muswellbrook	NSW		38
10/04/2015	1	5,449	Northern Daily Leader	Tamworth	NSW	297	
17/04/2015	1	6,137	Border Watch	Mt Gambier	SA	356	
30/04/2015	1	8,073	Stock & Land	Melbourne	VIC	226	
30/04/2015	1	35,890	The Land	Sydney	NSW	85	
14/05/2015	1		666 ABC	Canberra	ACT		655
14/05/2015	1		ABC Central Victoria	Bendigo	VIC		122
14/05/2015	3		ABC Central Victoria	Bendigo	VIC		406
14/05/2015	3		ABC Central Victoria	Bendigo	VIC		34
15/05/2015	1		3AW Melbourne	Melbourne	VIC		29
15/05/2015	1		3AW Melbourne	Melbourne	VIC		190
15/05/2015	14		3AW Melbourne	Melbourne	VIC		36
15/05/2015	1	363,384	Herald Sun	Melbourne	VIC	420	

Date	Hits	Reach	Source	Region	State	Words	Airtime (secs)
16/05/2015	1	2,589	Daily News	Warrick	QLD	90	
16/05/2015	1	9,828	Sunraysia Daily	Mildura	VIC	177	
19/05/2015	8		ABC Ballarat	Ballarat	VIC		221
19/05/2015	1		ABC Gippsland Sale	Sale	VIC		231
19/05/2015	1		ABC South East	Bega	NSW		230
20/05/2015	1	15,110	Ballarat Courier	Ballarat	VIC	197	
22/05/2015	1		Southern Cross Ten	Shepparton	VIC		24
23/05/2015	1	9,828	Sunraysia Daily	Mildura	VIC	297	
25/05/2015	1		2NM	Muswellbrook	NSW		7
25/05/2015	1		3WM	Horsham	VIC		245
29/05/2015	1		ABC Wide Bay	Bundaberg	QLD		198
29/05/2015	1		Radio 4KZ	Innisfail	QLD		35
29/05/2015	1		Radio 4KZ	Innisfail	QLD		43
3/06/2015	1	6,137	Border Watch	Mt Gambier	SA	489	
10/06/2015	1	15,110	Ballarat Courier	Ballarat	VIC	226	
11/06/2015	1	6,137	Border Watch	Mt Gambier	SA	138	
13/06/2015	1	178,350	Advertiser	Adelaide	SA	315	
13/06/2015	1	275,380	Daily Telegraph	Sydney	NSW	448	
14/06/2015	1	42,645	Sunday Tasmanian	Hobart	TAS	416	
11/07/2015	1	6,649	Shepparton News	Shepparton	VIC	237	
17/07/2015	1	6,712	Fraser Coast Chronicle	Hervey Bay	QLD	162	
17/07/2015	1		Gladstone Observer	Gladstone	QLD	162	
17/07/2015	1		Northern Star	Lismore	NSW	162	
17/07/2015	1		Queensland Times	Ipswich	QLD	162	
17/07/2015	1		Sunshine Coast Daily	Maroochydore	QLD	162	
10/09/2015	20		2NM	Muswellbrook	NSW		57
5/10/2015	14		2GB	Sydney	NSW		16
5/10/2015	2		6PR	Perth	WA		28
5/10/2015	2		6PR	Perth	WA		29
7/10/2015	1	13,160	Ballarat Courier	Ballarat	VIC	398	
8/10/2015	1	2,997	North Queensland Register	Townsville	QLD	188	
15/10/2015	1	11,858	Stock Journal	Adelaide	SA	844	
12/11/2015	1	11,858	Stock Journal	Adelaide	SA	244	
4/12/2015	12		2NM	Muswellbrook	NSW		41
9/12/2015	7		891 ABC	Adelaide	SA		37
9/12/2015	1		ABC Eyre Peninsula	Port Lincoln	SA		41
9/12/2015	1		ABC Eyre Peninsula	Port Lincoln	SA		38
9/12/2015	1		ABC Riverland	Renmark	SA		40
9/12/2015	1		ABC Riverland	Renmark	SA		36
9/12/2015	1		ABC Riverland	Renmark	SA		39

Date	Hits	Reach	Source	Region	State	Words	Airtime (secs)
16/12/2015	1		3BA	Ballarat	VIC		221
22/12/2015	1	6,463	Sunraysia Daily	Mildura	VIC	287	
24/12/2015	1	36,350	The Land	Sydney	NSW	201	
5/01/2016	13		2TM	Tamworth	NSW		37

#### 8. 1800 Agronomist Pilot - Final Report - June 2014

The 1800 Agronomist service was a free service, for Vegetable Levy payers, aimed to link growers with the latest research and development via AUSVEG's database. A specialist agronomist used this information and their experiences with the aim to answer any questions by growers.

Since the 13th May 2013 to the end of May 2014 there was a total number of 96 calls. The majority of calls were responded to by a specialist agronomist within 24 hours, except the growers of non-levy paying crops were declined. After the initial interest in who was awarded the contract to run the 1800 Agronomist service, there was on average between 4-6 calls a month.

The types of crop grown by the growers were varied, for example: Parsley, Leeks, hydroponic Cucumber, Lettuce, Cucurbits, Sweet Corn, Zucchinis, Capsicums, Cauliflower, Zucchinis, Seedlings, Pumpkins, Spring Onions, Witlof, Pawpaw, Garlic, Lettuce, Silver beet, Singapore daisy and leafy green vegetables, Organic vegetables, Chilli, Kale, Watermelon and Chinese Cabbage (Wombok).

The topic or issue being discussed was also varied, for example: herbicides, downy mildew, powdery mildew, water quality, bore water, bolting, parsley curly leaf tip, green house whitefly, crop nutrition, Sclerotinia, wetting agents, Rutherglen bugs and leaf curl.

Despite several excellent attempts by AUSVEG to promote the 1800 Agronomist service, including electronic and paper promotional material, and a field day, the number of calls remained relatively low.

The operational component of the service was successful given the majority calls were answered promptly and the callers who were provided the latest research and development, and technical advice. All growers reported that they were happy with the information provided. The growers always thanked the agronomist for their rapid response and the technical advice given.

If there was a failure, it was when growers did not leave a message, did not accept our return calls or the crop/grower was non levy paying. In these situations it was considered no fault of the service. There is also limitations as to what can be done over the phone. When a grower provide only verbal information, the agronomist may have to interpret the problem and this can mean critical information is often omitted. Often evaluating the situation first hand in the field will allow the agronomist to make a full assessment and provide tailored advice to give the best results. Despite this, there was not reported problems with any of the advice agronomists gave to callers.

It could be thought that with the continued downsizing of the government primary industries that there may have been a gap in information and services. However, given growers often have access to agronomists, as paid consultants or via agribusiness, the requirement for an over the phone service is significantly diminished. Having face to face on farm advice for your particular situation is very powerful when compared to talking to someone over the phone. AUSVEG also contributes by representing the interests of growers to government and assist growers with research and development that meets the needs of the vegetable industry.

In summary, 1800 Agronomist service fundamentally worked well and if there was greater uptake by growers to utilise the service it most likely would have continued. The main reason for the projects demise was that there was not enough growers utilising the service. It became apparent that industry service providers are better able to meet the growers on farm agronomic requirements, when compared to an over the phone service.

\* The Vegetable IAC determined that the 1800 Agronomist service be discontinued in May 2014.