

Australian Government

Department of Agriculture and Water Resources ABARES

Australian vegetable-growing farms An economic survey, 2014–15 and 2015–16

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Research by the Australian Bureau of Agricultural and Resource Economics and Sciences



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Cataloguing data

Ashton, D & Weragoda, A 2017, *Australian vegetable-growing farms: an economic survey, 2014–15 and 2015–16,* ABARES research report 17.1, Canberra, February, CC BY 3.0.

ISSN 1447-8358

ISBN 978-1-74323-320-7

ABARES project 43189

Internet

Cataloguing data

Ashton, D & Weragoda, A 2017, *Australian vegetable-growing farms: an economic survey, 2014–15 and 2015–16 is available at <u>agriculture.gov.au/abares/publications</u>.*

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Acknowledgements

ABARES relies on the voluntary cooperation of farmers participating in the annual Australian vegetablegrowing farms survey to provide data used in the preparation of this report. Without this assistance, the survey would not be possible. Information presented in this report was mainly collected from farmers via on-farm interviews conducted by ABARES farm surveys staff. This project was made possible by Horticulture Innovation Australia Limited (through the National Vegetable Levy) and funding from the Australian Government.

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Key points

The vegetable-growing industry

• The Australian vegetable-growing industry is an important part of Australian agriculture, contributing around 6 per cent (\$3.4 billion) to the gross value of agricultural production in 2014–15 (ABS 2016).

Farm cash income

- Between 2006–07 and 2014–15, the estimated average farm cash income of Australian vegetable growers remained relatively steady, although both average total cash receipts and average total cash costs increased. This reflects an increase in the average size of vegetable-growing farms.
- In 2015–16 (the most recent survey year) average farm cash income of Australian vegetable-growing farms is estimated to have increased to around \$249 000 per farm. The financial performance of vegetable farmers improved in all states except South Australia and Western Australia.

Rate of return

- The estimated average rate of return (excluding capital appreciation) of Australian vegetable-growing farms increased from 2006–07 to 2007–08 but then declined until 2013–14. The average rate of return (excluding capital appreciation) increased to 3.0 per cent in 2014–15 and 3.6 per cent in 2015–16.
- The estimated average rate of return (excluding capital appreciation) for top performing vegetable growing farms (that is, the top 25 per cent of farms ranked by their rate of return on capital) was almost 11 per cent in 2014–15. These farms were typically large and had a high level of capital investment. Top performing vegetable growing farms are also high-cost, high-return producers compared with bottom performing farms.
- The estimated average rate of return (excluding capital appreciation) for bottom performing vegetable growing farms (that is, the bottom 25 per of farms ranked by their rate of return on capital) was –8 per cent in 2014–15. These farms were typically small and reported below average seasonal conditions, and farmers were more likely to report an intention to retire or leave the industry in the next five years.

Investment and debt

- In 2014–15 an estimated 12 per cent of vegetable-growing farms made additions to total capital. These consisted primarily of land purchases but also included plant, machinery and equipment.
- The majority of debt held by Australian vegetable-growing farms is for working capital management and land purchases. Nationally, farm debt fell by 7 per cent during 2014–15 to an average of \$454 200. Estimated average farm debt held by vegetable-growing farms declined across all states except New South Wales, which recorded a small increase.
- The interest-to-receipts ratio—a measure of ability to service debt from farm revenue shows that vegetable-growing farms, on average, have little financial pressure from debt. Reduced debt, lower interest rates and higher cash receipts all contributed to reductions in the interest-to-receipts ratio. On average, farms used around 4 per cent of total cash receipts to make interest payments over the nine years to 2014–15. In 2015–16 farms used around 3 per cent of total cash receipts to make interest payments.

1 Introduction

The Australian vegetable-growing sector is an important source of food. It supplies most of the fresh vegetables consumed in Australia and provides inputs for the processed vegetable products consumed in Australia or exported.

Horticulture Innovation Australia Limited commissioned ABARES to conduct annual surveys of Australian vegetable growers to monitor the performance of vegetable-growing farms. Since 2007 ABARES has conducted an annual survey of vegetable-growing farms to provide industry and government with information about farm-level production and the financial situation of vegetable growers.

The survey provides comprehensive information on the physical, financial and socioeconomic characteristics of vegetable-growing farms in each state. The information collected in the survey provides a unique time series that can be used to make evidence-based decisions and monitor changes in the industry.

This report contains results from the ABARES survey of vegetable-growing farms conducted from March to May 2016. The survey collected data on the characteristics of vegetable farms for 2014–15 and 2015–16. Financial performance results in this report are shown at the whole farm level and include income and expenditure from all activities, not just vegetable-growing (see Appendix A: Survey methods and definitions). The report also draws on data from previous ABARES surveys of vegetable-growing farms to show trends where appropriate. All survey variables and Australian Bureau of Statistics (ABS) data are available up to and including 2014–15. Results for 2015–16 are only available for key physical and financial performance measures based on provisional estimates made by farmers at the time of the survey.

2 Overview of the vegetable industry

Vegetable growing is the fifth-highest value agricultural industry in Australia (**Figure 1**), accounting for around 6 per cent of the gross value of agricultural production (\$3.4 billion) in 2014–15 (**Figure 2**). Vegetable exports contributed about 1 per cent (\$293 million) of agricultural export income in 2014–15, with export of fresh vegetables contributing to around 60 per cent (\$173 million) of total vegetable exports in 2014–15 (ABARES 2016).



Figure 1 Top 10 Australian agricultural industries, by gross value of production, 2014–15

Source: ABARES 2016



Figure 2 Gross value of Australian vegetable production, 1988–89 to 2015–16

s ABARES estimate. Source: ABARES 2015, 2016

The gross value of vegetable production increased from 1988–89 to 2007–08 before stabilising at around \$3.5 billion (in 2015–16 dollars) in the subsequent eight years to 2015–16. Structural

adjustment was a key factor contributing to the increased gross value of vegetable production in the 1990s and 2000s. Since the 1990s increases in average farm size and ongoing capital investment in new technologies have contributed to increased productivity and output.

The total number of farms growing vegetables tends to vary from year to year, with many opportunistic growers participating when prices and/or seasonal conditions are suitable. The number of Australian vegetable-growing farms with an estimated value of agricultural operations (EVAO) greater than \$40 000 decreased by 6 per cent to 2 466 farms in 2014–15. The number of vegetable-growing farms that planted less than 70 hectares is estimated to have declined, while the number of farms that planted more than 70 hectares of vegetables remained relatively stable (**Table 1**).

Category	Units	Less than 5 hectares	5–20 hectares	20–70 hectares	More than 70 hectares
2013-14					
Area planted to vegetables a	ha	2	10	38	206
Sample	no.	94	73	77	61
Population	no.	904	813	586	316
2014–15p					
Area planted to vegetables a	ha	3	10	38	179
Sample	no.	85	72	78	69
Population	no.	786	807	552	321

Table 1 Area planted to vegetables, sample and population, Australian vegetable-growing farms, 2013–14 and 2014–15

a Average per farm. **p** Preliminary estimate.

Note: ABARES surveys vegetable-growing farms with an estimated value of agricultural operations of \$40 000 or greater. Source: ABARES Australian vegetable-growing farms survey

Most vegetable-growing farms grow vegetables exclusively outdoors. In 2014–15 an estimated 87 per cent of Australian vegetable-growing farms had exclusively outdoor vegetable operations. Some farms used hydroponics (3 per cent) or under-cover systems such as glass or shade cloth (10 per cent). Vegetable-growing farms with more than 20 hectares of vegetables had exclusively outdoor operations.

Under-cover systems often generate higher yields for a range of vegetable crops, giving farmers more control over output quality and ensuring a more reliable supply. However, farms using these systems require higher receipts to cover the increased input costs. A range of vegetable crops are grown under-cover, but ABARES surveys show that mostly tomatoes and cucumbers are grown in these environments.

The vegetable-growing industry makes an important contribution to many regional economies across Australia. The wide range of climates and soils enables farmers to grow many types of vegetables. Queensland and Victoria are the two largest vegetable-growing states, together accounting for 55 per cent of the total value of vegetable production in 2014–15 (ABS 2016).

The average proportion of a farm's total area planted to vegetables varies considerably between states (**Table 2**). In 2014–15 Western Australia and Victoria recorded the highest vegetable cropping intensity, with 69 per cent and 66 per cent, respectively, of the total area planted to crops being planted to vegetables.

verage per farm							
Selected physical characteristics	Units	NSW	Vic.	Qld	SA	WA	Tas.
Area planted to vegetables	ha	22	52	43	29	33	30
Total area planted to crops	ha	50	79	81	59	47	85
Total area operated	ha	107	213	365	242	191	368
Total volume of water irrigated	ML	118	215	236	221	210	181
Beef cattle on hand 30 June	no.	26	33	78	52	63	85
Sheep on hand 30 June	no.	118	225	_	141	172	357

Table 2 Selected farm physical characteristics, Australian vegetable-growing farms, by state, 2014–15

Source: ABARES Australian vegetable-growing farms survey

Australian growers produce a range of vegetables. More than 35 individual commodities contributed to a total industry value of production of around \$3.4 billion in 2014–15. Potatoes have the highest gross value of production, contributing about \$620 million (**Figure 3**) or 18 per cent of the total value of vegetables, followed by tomatoes (\$311 million), mushrooms (\$274 million), onions (\$240 million) and melons (\$216 million). These five largest crops (by value of production) made up half of the total value of vegetable production in 2014–15. The next largest crops by value of production were lettuces, carrots, beans and capsicum (**Figure 3**). The remaining value is the sum of less commonly grown vegetables. These include beetroot, brussels sprouts, eggplant, leek and radish.

Figure 3 Value of Australian vegetable production, by commodity, 2014–15



Source: ABS 2016

Box 1 Recent changes in vegetable prices and production

Changes in the quantity of vegetables produced and prices received account for most changes observed in farm cash income in the vegetable-growing industry. The financial performance data outlined in this report should be viewed in the context of production quantities and market prices faced by vegetable growers at the farm gate.

Australian vegetable farms mostly produce for the domestic market (**Table 3**). As a result, changes in vegetable prices tend to vary inversely with domestic production, with little influence from developments in export markets. Supply has a stronger influence on prices than demand in the short term. Consumer demand for vegetables tends to be relatively steady. Supply changes more frequently because growers have flexibility in enterprise mix, especially compared with other agricultural industries such as cattle grazing or dairy farming. However, some individual vegetable commodity prices are more volatile than others. A weighted index of farmgate prices received for the main vegetables produced by Australian vegetable-growing farm businesses increased by around 0.5 per cent in 2015–16 (**Figure 4**).

Table 3 Markets for vegetable produce, Australian vegetable-growing farms, 2013–14 and 2014–15

percentage of farms

Vegetables sold	20	2013–14		4–15p
For export	1	(38)	2	(40)
Direct to food services	0	(89)	0	(43)
Interstate	14	(18)	14	(13)
State capital wholesale	43	(8)	41	(6)
Local market	12	(26)	12	(19)
Direct to processor	25	(10)	26	(8)
Direct to retail	7	(20)	6	(20)

p Preliminary estimate.

Note: Percentages have been rounded to the nearest whole number. Percentages will not equal 100 because farms can sell vegetables to multiple markets. Figures in parentheses are standard errors expressed as a percentage of the estimate. Source: ABARES Australian vegetable-growing farms survey

Figure 4 Farmgate price index, vegetable commodities, Australian vegetable-growing farms, 2006–07 to 2015–16



Box 2 Seasonal conditions

Seasonal conditions, rainfall and availability of irrigation water have considerable influence on the financial performance of vegetable-growing farms. Seasonal conditions and rainfall typically vary across the main vegetable-producing regions. To offset the effects of seasonal conditions on vegetable production, most vegetable-growing farms source irrigation water using a combination of irrigation schemes, groundwater and on-farm storage.

Seasonal conditions varied across the main vegetable-growing areas in 2013–14 and 2014–15. In all states except South Australia a majority of vegetable growers reported average seasonal conditions in both years. Most regions also had some growers reporting below average conditions in both years. In South Australia, most vegetable growers reported below average seasonal conditions in both 2013–14 and 2014–15 (Figure 5).

Figure 5 Seasonal conditions, Australian vegetable-growing farms, by region, 2013–14 and



Note: Farmers were asked to report prevailing seasonal conditions during the financial year to indicate the combined effects of rainfall, temperature and evapotranspiration.

Source: ABARES Australian vegetable-growing farms survey

In 2015–16 seasonal conditions were generally less favourable in most vegetable growing region because of below average to average rainfall and some localised extreme weather events (**Map 1**). This reduced water availability in these regions.



Map 1 Australian rainfall deciles, 1 July 2015 to 30 June 2016

3 Financial performance of the vegetable-growing industry

Farm cash income

From 2006–07 to 2015–16 the average farm cash income of Australian vegetable-growing farms fluctuated around an average of \$194 000 per farm, with rising cash receipts generally being matched by increases in total cash costs (**Figure 6**).

Figure 6 Total cash receipts, total cash costs and farm cash income, Australian vegetablegrowing farms, 2006–07 to 2015–16



average per farm

p Preliminary estimate. y Provisional estimate.
 Note: Financial results are expressed in 2015–16 dollars.
 Source: ABARES Australian vegetable-growing farms survey

In 2014–15 the estimated average farm cash income of vegetable-growing farms increased by 25 per cent to \$218 400 (**Table 4**). Vegetable cash receipts increased as a result of higher vegetable production, mainly from an increase in crop yields. Average total cash costs increased by 15 per cent to \$832 500, reflecting increased expenditure required to plant and harvest a larger vegetable crop.

In 2015–16 the estimated farm cash income of Australian vegetable-growing farms rose by 14 per cent to an average of \$249 000 (**Table 4**). Total vegetable receipts increased by around 5 per cent to \$907 000, mainly driven by higher receipts for potatoes and tomatoes. Total cash costs rose by around 2 per cent to \$1 106 000, with small increases in all cost categories.

average per farm					
Financial estimates	Units	2013-14	2014-15p	RSE	2015-16y
Cash receipts					
Vegetable receipts	\$	736 390	864 700	(17)	907 000
Other cash receipts	\$	159 760	186 300	(11)	195 000
Total cash receipts	\$	896 150	1 051 000	(15)	1 106 000
% cash receipts from vegetables	%	82	82	-	82
Cash costs					
Hired labour	\$	116 890	161 700	(29)	176 000
Fertiliser	\$	54 970	68 000	(8)	71 000
Fodder	\$	1 890	1 700	(35)	2 000
Seed	\$	55 520	60 000	(16)	65 000
Crop and pasture chemicals	\$	31 700	37 900	(10)	39 000
Fuel, oil and grease	\$	39 990	41 300	(14)	43 000
Electricity	\$	21 840	21 600	(10)	22 000
Repairs and maintenance	\$	53 430	60 100	(9)	67 000
Total freight costs	\$	43 900	59 200	(22)	61 000
Contracts paid	\$	78 260	82 000	(36)	90 000
Interest paid	\$	31 930	29 000	(17)	30 000
Packing charges and materials	\$	27 380	52 900	(24)	54 000
Total cash costs	\$	721 980	832 500	(16)	853 000
Farm financial performance					
Farm cash income	\$	174 170	218 400	(16)	249 000
Farm business profit	\$	50 560	83 700	(40)	109 000
Rate of return a					
-excluding capital appreciation	%	2.3	3.0	(27)	3.6
-including capital appreciation	%	5.1	5.1	(18)	na
Farm capital at 30 June b	\$	4 004 420	4 198 300	(7)	na
Farm debt at 30 June c	\$	489 300	454 200	(10)	na
Equity ratio cd	%	85	87	(1)	na

 Table 4 Financial performance, Australian vegetable-growing farms, 2013–14 to 2015–16

a Rate of return to farm capital at 1 July. b Excludes leased plant and equipment. c Average per responding farm. d Equity is expressed as a percentage of farm capital. p Preliminary estimate. RSE Relative standard error. y Provisional estimate.

na Not available.

Note: Figures in parentheses are standard errors expressed as a percentage of the estimate.

Source: ABARES Australian vegetable-growing farms survey

Box 3 Major financial performance indicators

Total cash receipts: total revenues received by the business during the financial yearTotal cash costs: payments made by the business for materials and services and for permanent and casual
hired labour (excluding owner-manager, partner and family labour)Farm cash income: total cash receipts - total cash costsFarm business profit:farm cash income + change in trading stocks - depreciation - imputed labour costsProfit at full equity: return produced by all the resources used in the businessfarm business profit + rent + interest + finance lease payments - depreciation on leased items

Total cash receipts

In 2015–16 receipts from the sale of vegetables accounted for an average of 82 per cent of the total receipts of Australian vegetable-growing farms (**Table 4**). Sales of potatoes, tomatoes, carrots, broccoli, lettuces and onions contributed most to cash receipts from the sale of vegetables.

Increases in estimated average total cash receipts between 2006–07 and 2015–16 can be explained partly by a shift towards larger farms (**Figure 7**). For example, average area planted to vegetables between 2006–07 and 2008–09 was 29 hectares, compared with 36 hectares in 2014–15 and 2015–16. The intensity of vegetable production (area planted to vegetables as a proportion of total area planted to crops) also increased.

Figure 7 Area planted to vegetables and intensity of vegetable production, Australian vegetable-growing farms, 2006–07 to 2015–16

Rate of return: return to all capital used (profit at full equity/total opening capital) x 100



average per farm

p Preliminary estimate. **y** Provisional estimate. Source: ABARES Australian vegetable-growing farms survey

Between 2009–10 and 2013–14, the mix of vegetables grown shifted towards high-value vegetable crops (for example, broccoli and green beans, green peas and lettuce) and away from high-volume but lower value vegetable crops (for example, carrots, onions, potatoes, tomatoes). Since 2009–10 the average area planted to carrots, onions, potatoes and tomatoes remained

relatively constant. The average area planted to other vegetables increased between 2009-10 and 2013–14, however is estimated to have decreased in 2014–15 and 2015–16 (Figure 8). Less commonly grown vegetables accounted for an increasing proportion of total cropping receipts between 2006–07 and 2011–12, however has been declining since then (Figure 9).



Figure 8 Area planted to vegetables, Australian vegetable-growing farms, 2006–07 to 2015-16

p Preliminary estimate.

Source: Source: ABARES Australian vegetable growing farms survey

Figure 9 Contribution to total cropping receipts, Australian vegetable-growing farms, 2006-07 to 2015-16



p Preliminary estimate.

Source: ABARES Australian vegetable growing farms survey

Total cash costs

Vegetable-growing farms incur many costs in vegetable production that are closely linked with changes in area planted to vegetables. Such costs include planting, maintaining and harvesting crops.

Nationally, average cash costs increased by 2 per cent in 2015–16 to \$853 000 per farm. This followed a 15 per cent increase in 2014–15 to an average of \$832 500 per farm. Average total cash costs followed a similar pattern to average area sown to vegetables and average total cash receipts over the ten years to 2015–16. The largest components of cash costs of Australian

vegetable growers are typically labour, contracts paid, fertiliser, repairs and maintenance, seed, and freight (**Figure 10**).

Figure 10 Major components of cash costs, Australian vegetable-growing farms, 2014–15 and 2015–16



p Preliminary estimate. y Provisional estimate.
 Note: Financial results are expressed in 2015–16 dollars.
 Source: ABARES Australian vegetable-growing farms survey

Rate of return

The estimated average rate of return (excluding capital appreciation) of Australian vegetablegrowing farms increased from 2006–07 to 2007–08 but then declined until 2013–14 (**Figure 11**). The average rate of return (excluding capital appreciation) increased to 3.0 per cent in 2014–15, and 3.6 per cent in 2015–16.

Figure 11 Rate of return, Australian vegetable-growing farms, 2006–07 to 2015–16



average per farm

p Preliminary estimate. y Provisional estimate.Note: Rate of return excluding capital appreciation.Source: ABARES Australian vegetable-growing farms survey

From 2005–06 to 2009–10, the vegetable-growing industry had the highest rate of return of any agricultural industry surveyed by ABARES (beef, sheep, grains and dairy). This in part reflected vegetable producers' greater control over inputs to production and their flexibility in dealing with variable seasonal and market conditions. Vegetable growers also made greater use of irrigation than many other agricultural industries, making them less likely to experience reduced production during the widespread drought of the mid to late 2000s.

ABARES has ranked vegetable-growing farms by their rate of return (excluding capital appreciation) to compare the characteristics of top performing farms with those of other farms. Farms are allocated to one of three categories: top 25 per cent, middle 50 per cent and bottom 25 per cent. Rate of return to capital (excluding capital appreciation) is a relatively complete measure of farm economic performance that values all farm inputs and outputs and is not as strongly correlated with farm size as other measures, such as total cash receipts or total cash costs. To reduce year-specific effects on farm performance such as extreme weather events, a three-year moving average for each farm has been calculated.

Top performing vegetable-growing farms are classified as the top 25 per cent of farms, measured by rates of return excluding capital appreciation. These farms made an estimated average rate of return (excluding capital appreciation) of almost 11 per cent in 2014–15. Top performing farms were characterised by high levels of capital investment but were not necessarily larger when measured by average area planted to vegetables (**Figure 12**). Some top performing vegetable-growing farms produced vegetables under cover or by using hydroponics. This meant they used a small physical area but required expensive capital items. At 30 June from 2012–13 to 2014–15, 45 per cent of top performing vegetable growing farms had on average more than \$3 million in total capital compared with 5 per cent of bottom performing farms.

Figure 12 Total capital value and area planted to vegetables, Australian vegetable-growing farms, 2012–13 to 2014–15



percentage of farms

Note: Farms ranked by rate of return excluding capital appreciation. Source: ABARES Australian vegetable growing farms survey

The area planted to vegetables was relatively evenly spread across size categories for top performing vegetable-growing farms. Between 2012–13 and 2014–15, 24 per cent of top performing vegetable-growing farms planted at least 70 hectares to vegetables while 17 per cent

planted less than 5 hectares. In comparison, 2 per cent of bottom performing vegetable-growing farms planted at least 70 hectares of vegetables and 61 per cent planted less than 5 hectares.

Top performing vegetable-growing farms also generated substantially larger receipts than bottom performing farms. Between 2012–13 and 2014–15. Estimated average total cash receipts of top performing vegetable-growing farms were \$2.4 million compared with \$193 000 for bottom performing vegetable-growing farms (**Figure 13**). Total cash receipts are volatile because of variation in seasonal conditions and prices but capture all the ways farmers increase the size of their business. These include farm area, intensification and switching to production of higher-value outputs.

Bottom performing vegetable-growing farms were classified as the bottom 25 per cent of farms measured by rates of return on capital excluding capital appreciation. These farms made an average rate of return (excluding capital appreciation) of –8 per cent in 2014–15. Bottom performing farms were affected by below-average seasonal conditions and market prices and were generally smaller in scale of operation, and farmers were more likely to report an intention to retire or leave vegetable production in the next five years.

Between 2012–13 and 2014–15, 29 per cent of bottom performing farms reported that the overall season was poor—compared with 19 per cent of top performing vegetable-growing farms (**Figure 13**). Seasonal conditions reported by farmers capture their experiences of crop growing conditions. Irrigated and undercover vegetable-growing farms can manage hot and dry conditions, but outdoor and non-irrigated vegetable growing farms are susceptible to one-off extreme events such as flooding or disease.

Figure 13 Selected characteristics of top and bottom performing farms, Australian vegetable-growing farms, 2012–13 to 2014–15



percentage of farms/average per farm

Note: Farms ranked by rate of return excluding capital appreciation. Source: ABARES Australian vegetable growing farms survey

The market price for some vegetables can fluctuate significantly over the year and returns generated from the sale of vegetables can be influenced by the timing of harvest. Most vegetables (unlike grains) cannot be stored on-farm until prices improve.

Many bottom performing vegetable-growing farms rely on off-farm income to offset low or negative farm cash income. Between 2012–13 and 2014–15, estimated average off-farm income of vegetable growing farms was \$28 600 for bottom performing vegetable-growing farms compared with \$18 700 for top performing farms.

Vegetable growers were asked whether they intended to continue vegetable production, leave agriculture or pursue other agricultural activities in the next five years. Between 2012–13 and 2014–15, 19 per cent of bottom performing vegetable-growing farms intended to leave agricultural production compared with 6 per cent of those in the top performing farms. Seventeen per cent of bottom performing farms intended to pursue other agricultural activities compared with 5 per cent of top performing farms. Farmers who do not have a long-term plan for their vegetable-growing business are unlikely to make any large, up-front fixed capital expenditure to improve the productivity of their business.

Financial performance by state

In 2015–16 the financial performance of vegetable farmers improved in all states except South Australia and Western Australia (**Figure 14**). In South Australia, higher receipts for potatoes and carrots were more than offset by lower average receipts for all other vegetable types. In Western Australia, average receipts fell for all major vegetable types because of lower crop yields.

Rates of return excluding capital appreciation are estimated to have been positive across all states in 2015–16. The highest rate of return excluding capital appreciation was estimated for Victoria at 6.1 per cent, followed by Tasmania with an average of 5.5 per cent (**Figure 15**).



Figure 14 Farm cash income, Australian vegetable-growing farms, by state, 2014–15 and 2015–16

average per farm

p Preliminary estimate. **y** Provisional estimate.

Note: Financial results are expressed in 2015–16 dollars. Rate of return excluding capital appreciation. Source: ABARES Australian vegetable-growing farms survey

Figure 15 Rate of return, Australian vegetable-growing farms, by state, 2014–15 and 2015–16



average per farm

p Preliminary estimate. **y** Provisional estimate.

Note: Financial results are expressed in 2015–16 dollars. Rate of return excluding capital appreciation. Source: ABARES Australian vegetable-growing farms survey

New South Wales

In 2014–15 an estimated 520 vegetable-growing farms were operating in New South Wales, accounting for around 21 per cent of Australian vegetable-growing farms. Most farms were in Greater Sydney, the Murrumbidgee Irrigation Area and the Far North Coast. The average area of vegetable farms in New South Wales in 2014–15 was around 107 hectares, of which 22 hectares was planted to vegetables. Vegetable production accounted for 3 per cent of the gross value of agricultural production in New South Wales, compared with 6 per cent nationally (ABS 2016).

Farm cash income is estimated to have increased to an average of \$189 000 in 2015–16 (**Table 5**), 128 per cent higher than the nine-year average farm cash income (in real terms) to 2014–15. Total vegetable production declined marginally as a result of a slight decline in the average area planted, but higher receipts for tomatoes resulted in an increase in total vegetable cash receipts in 2015–16.

Victoria

In 2014–15 an estimated 500 vegetable-growing farms were operating in Victoria, accounting for around 20 per cent of Australian vegetable-growing farms. Most farms were located around Melbourne, extending east through the Gippsland region and into the irrigated regions along the Murray River. The average area of vegetable-growing farms in Victoria in 2014–15 was around 213 hectares, of which 52 hectares was planted to vegetables. Vegetable production accounted for 6 per cent of the gross value of agricultural production in Victoria (ABS 2016).

Estimated farm cash income was around \$473 000 in 2015–16, 18 per cent higher than in 2014–15 (**Table 5**). This estimate was 118 per cent higher than the nine-year average farm cash income (in real terms) for Victoria to 2014–15. Total vegetable receipts increased by 7 per cent in 2015–16. Higher crop yields contributed to increased receipts for potatoes, tomatoes and broccoli.

Queensland

In 2014–15 an estimated 600 vegetable-growing farms were operating in Queensland, accounting for around 24 per cent of Australian vegetable-growing farms. Most farms were located in the Darling Downs, around Bundaberg and Bowen and in the Burdekin delta. The average area of vegetable farms in Queensland in 2014–15 was around 365 hectares, of which 43 hectares was planted to vegetables. Vegetable production accounted for 8 per cent of the gross value of agricultural production in Queensland, compared with 6 per cent nationally (ABS 2016).

Average farm cash income is estimated to have increased by around 30 per cent to \$163 000 in 2015–16 (**Table 5**), in line with the nine-year average farm cash income (in real terms) for Queensland to 2014–15. In the same year, higher receipts for potatoes were partly offset by lower receipts for tomatoes.

South Australia

In 2014–15 an estimated 320 vegetable-growing farms were operating in South Australia, accounting for around 13 per cent of Australian vegetable-growing farms. Most farms were located in the Mallee, the Riverland and the Adelaide Plains to the north of the city. The average area of vegetable farms in South Australia in 2014–15 was around 242 hectares, of which 29 hectares was planted to vegetables.

Average farm cash income fell by 21 per cent to around \$172 000 in 2015–16 (**Table 5**), 15 per cent lower than the nine-year average (in real terms) for South Australia to 2014–15. In 2015–16, despite an increase in potato receipts, lower prices for most vegetables resulted in lower average receipts.

Western Australia

In 2014–15 an estimated 260 vegetable-growing farms were operating in Western Australia, accounting for around 11 per cent of Australian vegetable-growing farms. Most farms were located along the coast north and south of Perth, around Carnarvon along the Gascoyne River and in the far north of the state in the Ord River irrigation area. The average area of vegetable farms in Western Australia in 2014–15 was around 191 hectares, of which 33 hectares was planted to vegetables. Vegetable production accounted for 4 per cent of the gross value of agricultural production in Western Australia, compared with 6 per cent nationally (ABS 2016).

Estimated average farm cash income declined by 46 per cent in 2015–16 to around \$207 000 (**Table 5**), 21 per cent lower than the estimated average farm cash income (in real terms) for vegetable-growing farms in Western Australia over the nine years to 2014–15. Vegetable receipts declined after lower potato yields resulted in a fall in receipts for potatoes. This was partly offset by increased lettuce receipts.

Tasmania

In 2014–15 an estimated 270 vegetable-growing farms were operating in Tasmania. Most were located in the north of the state, along the coastal fringe and through the northern midlands. The average area of vegetable farms in Tasmania in 2014–15 was around 367 hectares, of which 30 hectares was planted to vegetables.

Average farm cash income is estimated to have increased by 40 per cent to around \$267 000 in 2015–16 (**Table 5**). This estimate was 129 per cent higher than average farm cash income (in real terms) for vegetable-growing farms in Tasmania over the nine years to 2014–15. This was

largely the result of an increase in area planted to potatoes and increased yields resulting in higher receipts for potatoes.

Table 5 Selected physical and financial results, Australian vegetable-growing farms, by state, 2014–15 and 2015–16

average per farm						
Indicator	Units		2014-15p	% change from 2013-14	2015-16y	% change from 2014–15
Vegetable cash reco	eipts					
New South Wales	\$	341 900	(104)	41	451 000	32
Victoria	\$	1 432 800	(31)	21	1 539 000	7
Queensland	\$	876 100	(15)	6	905 000	3
South Australia	\$	775 400	(82)	11	754 000	-3
Western Australia	\$	1 311 000	(16)	6	1 150 000	-12
Tasmania	\$	439 700	(12)	54	539 000	22
Australia	\$	864 700	(17)	17	907 000	5
Area planted to veg	getables					
New South Wales	ha	22	(9)	-5	22	-3
Victoria	ha	52	(16)	-9	51	-1
Queensland	ha	43	(18)	-10	40	-7
South Australia	ha	29	(8)	-18	30	3
Western Australia	ha	33	(13)	18	33	3
Tasmania	ha	30	(8)	21	31	6
Australia	ha	36	(7)	-2	36	-2
Quantity of vegetab	oles prod	uced				
New South Wales	t	609	(17)	23	596	-2
Victoria	t	1 919	(17)	26	1 900	-1
Queensland	t	909	(16)	10	886	-3
South Australia	t	1 493	(12)	16	1 540	3
Western Australia	t	1 301	(15)	15	1 285	-1
Tasmania	t	1 527	(10)	44	1 690	11
Australia	t	1 235	(7)	23	1 245	1
Farm cash income						
New South Wales	\$	81 300	(46)	59	189 000	133
Victoria	\$	400 600	(36)	58	473 000	18
Queensland	\$	125 400	(25)	-3	163 000	30
South Australia	\$	217 100	(47)	50	172 000	-21
Western Australia	\$	382 100	(20)	-1	207 000	-46
Tasmania	\$	190 400	(18)	97	267 000	40
Australia	\$	218 400	(16)	27	249 000	14

p Preliminary estimate. **y** Provisional estimate.

Note: Figures in parentheses are standard errors expressed as a percentage of the estimate.

Source: ABARES Australian vegetable-growing farms survey

4 Investment and debt

Investment in farm capital (land, fixed structures, plant and equipment) is important to all aspects of farm business management, including financial performance, production efficiency and farm productivity.

Vegetable growers are motivated to make new investments by factors affecting relative net returns from the alternative options available. They are also motivated by their expectations of future profitability, existing debt and debt servicing requirements, farm business liquidity and access to non-farm income. Investment in land to increase farm scale and additions to other capital to increase productivity are significant determinants of a producer's capacity to generate future farm income.

Changes in the size and composition of investment each year tend to reflect fluctuations of vegetable production and incomes as well as the structure of the vegetable-growing industry. Vegetable production typically occurs on small parcels of high-value land, is labour intensive, requires high input use and has several crop cycles a year with a short turnaround between each. As a result, a large proportion of investments made by vegetable-growing farms is in land and labour-saving technology.

Land

The value of land owned and operated by vegetable growing farms is higher on average than for other agricultural industries. Between 2012–13 and 2014–15, the estimated average value of land owned by vegetable farmers was \$17 100 a hectare, compared with \$10 200 a hectare for dairy farmers, \$1 600 for cropping farmers and \$300 for livestock farmers (**Figure 16**). This reflects highly productive soils, a high proportion of farms in close proximity to metropolitan areas and pressures from urbanisation. Encroaching residential development often results in land used for vegetable production being rezoned to facilitate housing expansion. As a result, land value may also reflect potential value from housing development rather than vegetable production alone.



Figure 16 Land values, by selected industries, 2012–13 to 2014–15

Source: ABARES Australian vegetable growing farms survey; ABARES Australian Agricultural and Grazing Industries Survey; ABARES Australian Dairy Industry Survey.

Note: Financial results are in 2015–16 dollars.

Capital additions

Vegetable growers make new investments when they purchase new items to replace capital items that have deteriorated and/or outlived their useful life. 'Capital additions' refers to investment by businesses in new assets or improving existing assets. The difference between the total value of plant, vehicles, machinery and farm infrastructure purchased and the total value of those items sold is referred to as 'net capital additions'.

Net capital additions (excluding land) between 2008–09 and 2009–10 were relatively high (**Figure 17**). This partly reflected the availability of the Australian Government's temporary investment allowance, which was designed to help small business weather the global financial crisis. The allowance encouraged investment in capital equipment and farm infrastructure.

In 2014–15, investment in tractors, crop harvesting and handling equipment, cultivation, sowing and planting equipment accounted for 54 per cent of net capital additions; irrigation equipment 14 per cent; accommodation, buildings, yards, structures, including irrigation structures and livestock handling equipment 14 per cent; vehicles 11 per cent; and computing and workshop equipment 6 per cent (**Figure 17**).

Figure 17 Composition of non-land net capital additions, Australian vegetable-growing farms, 2006–07 to 2014–15



average per farm

p Preliminary estimate.
 Note: Financial results are expressed in 2015–16 dollars.
 Source: ABARES Australian vegetable-growing farms survey

Average farm non-land net capital additions fluctuated over the period broadly in line with changes in farm incomes. Non-land net capital additions show an increasing trend since 2012–13, following a sharp decline since 2008–09. Non-land net capital additions in 2014–15 are estimated to have increased to \$50 500 (in real terms). This is almost 80 per cent higher than the average non-land net capital additions from 2006–07 to 2013–14. In 2014–15, 12 per cent of vegetable-growing farms made additions to total capital. The majority of capital additions were made by vegetable growers who already had large amounts of capital invested in their businesses (**Figure 18**).

Figure 18 Proportion of farms making capital additions, by total capital value, Australian vegetable-growing farms, 2012–13 to 2014–15



percentage of farms

The proportion of vegetable-growing farms changing the area they operate in any one year is relatively low. In 2014–15 around 3 per cent of farms increased total area operated either by purchasing or leasing additional land. For many vegetable producers it is more cost-effective to lease than purchase land if they need only a short-term change in area (such as to respond to short-term price fluctuations). However, they prefer to buy if a long-term increase in land area is required. In 2014–15 around 2 per cent of farms reduced the area of their farms, by either leasing out or selling land.

Sources of capital

Most farms have two principle ways of funding capital investment: reinvested income (equity) from farm and off-farm earnings and debt. Some large, publicly listed corporate farms can also derive capital from offering shares, but most vegetable-growing farms are family owned and operated businesses.

The average capital value of Australian vegetable-growing farms was around \$4 million at the end of 2014–15 (**Figure 19**). Vegetable farms in Western Australia and Victoria had the highest average capital values at \$6.5 million and \$5.9 million respectively. Farms in New South Wales had the lowest total value at under \$3 million.

Figure 19 Total capital value at 30 June, Australian vegetable-growing farms, by state, 2014–15 p



average per farm

p Preliminary estimate. Source: ABARES Australian vegetable-growing farms survey

p Preliminary estimate.

Source: ABARES Australian vegetable-growing farms survey

Equity

A farm business's equity ratio is a major determinant of the amount of debt finance it can access. Generally, a farm business must have an equity ratio greater than 70 per cent to access additional debt finance.

The average equity ratio of Australian vegetable-growing farms has remained relatively high since ABARES began surveying the vegetable industry in 2006–07, fluctuating between 83 per cent and 90 per cent. Nationally, the average farm equity ratio of vegetable-growing farms increased to 87 per cent at 30 June 2015, from 85 per cent at 30 June 2014. Vegetable-growing farms in New South Wales had the highest equity ratio of all the states in 2014–15 (97 per cent). The average equity ratio of vegetable-growing farms in South Australia (91 per cent), Victoria (89 per cent), and Western Australia (86 per cent) was also relatively high. Farms in Queensland (84 per cent) and Tasmania (78 per cent) had the lowest equity ratios.

Generally, institutional lenders only allow large operations—with high farm cash incomes or access to substantial off-farm assets or income—to operate with an equity ratio of less than 70 per cent. The proportion of Australian vegetable-growing farms holding less than 70 per cent of their business as equity fluctuated between 9 and 17 per cent between 2006–07 and 2014–15 (**Figure 20**).

Figure 20 Proportion of farms with less than 70 per cent equity, Australian vegetablegrowing farms, 2006–07 to 2014–15



percentage of farms

p Preliminary estimate.

Note: Equity ratio is expressed as a percentage of farm capital. Results are not available for the 2015–16 provisional year. Source: ABARES Australian vegetable-growing farms survey

Debt

Debt is an important source of funds for on-farm investment and working capital management. Estimated average total debt of Australian vegetable-growing farms increased (in real terms) between 2006–07 and 2010–11 and has declined each year since then—except in 2012–13 (**Figure 21**). In 2014–15 the estimated average debt of Australian vegetable-growing farms at 30 June was \$454 200—7 per cent lower than in 2013–14. Figure 21 Total farm business debt at 30 June, Australian vegetable-growing farms, 2006–07 to 2014–15



p Preliminary estimate.

Note: Farm debt results are not available for the 2015–16 provisional year. Financial results are expressed in 2015–16 dollars.

Source: ABARES Australian vegetable-growing farms survey

In 2014–15 land purchases accounted for the majority of debt held by vegetable-growing farms (40 per cent), while working capital accounted for 35 per cent. Debt for buildings and structures, land development, reconstructed debt, machinery, plant and vehicles accounted for the remaining 25 per cent.

Between 2013–14 and 2014–15, estimated average farm debt fell by 6 per cent (to \$776 000) in Tasmania and 11 per cent in Western Australia (to \$616 200). Queensland recorded the largest decline to \$504 700 (31 per cent). Average debt held by vegetable-growing farms in New South Wales increased in 2014–15 by 18 per cent to \$74 200 (**Figure 22**).



Figure 22 Total farm business debt at 30 June, Australian vegetable-growing farms, by state, 2013–14 and 2014–15

average per farm

Note: Farm debt results are not available for the 2015–16 provisional year. Financial results are expressed in 2015–16 dollars.

Source: ABARES Australian vegetable-growing farms survey

p Preliminary estimate.

Debt held by most vegetable-growing farms in Australia was less than \$50 000 in 2014–15 (**Figure 23**). The proportion of Australian vegetable-growing farms with debt of less than \$50 000 fell from 48 per cent in 2006–07 to 40 per cent in 2009–10, before increasing to 51 per cent in 2013–14. Around one-third of farms in 2014–15 had debts of between \$50 000 and \$700 000. The increase in the proportion of farms with debt exceeding \$700 000 reflects the increased size of farm operations and contributed to increases in estimated average debt between 2006–07 and 2014–15.

Figure 23 Distribution of debt, Australian vegetable-growing farms, 2006–07 to 2014–15



p Preliminary estimate.

The distribution of debt among Australian vegetable-growing farms varied considerably between states (**Table 6**). In New South Wales, around 78 per cent of vegetable-growing farms had debts of less than \$50 000. Around 10 per cent of vegetable-growing farms in New South Wales had debts of between \$50 000 and \$100 000, and only 12 per cent had debts of greater than \$150 000. In all other states the proportion of farms with high levels of debt was much greater. In Tasmania, around 25 per cent of farms had debts of greater than \$700 000 as at 30 June 2015.

percentage	e of farms	5								
State	<\$5	50 000	≥\$50 00 <\$15	00 and 50 000	≥\$150 0 <\$3	00 and 00 000	≥\$300 0 <\$7	00 and 00 000	≥\$70	0 000
	%	RSE	%	RSE	%	RSE	%	RSE	%	RSE
NSW	78	(9)	10	(52)	3	(82)	7	(71)	2	(76)
Vic.	37	(26)	15	(57)	6	(59)	26	(32)	15	(27)
Qld	50	(15)	8	(49)	6	(57)	16	(26)	20	(23)
SA	49	(14)	13	(67)	19	(43)	8	(67)	10	(37)
WA	34	(27)	20	(41)	6	(63)	17	(44)	23	(18)
Tas.	34	(32)	11	(53)	6	(74)	24	(39)	25	(33)
Aus	49	(7)	12	(23)	7	(25)	16	(16)	15	(12)

Table 6 Distribution of total debt at 30 June, by state, 2014–15

Note: Preliminary estimates. Farm debt results are not available for the 2015–16 provisional year. RSE Relative Standard Error. Figures in parentheses are standard errors expressed as a percentage of the estimate. Source: ABARES Australian vegetable growing farms survey

Note: Farm debt results are not available for the 2015–16 provisional year. Source: ABARES Australian vegetable-growing farms survey

Reasons for changes in farm debt in 2014–15

The annual change in average farm business debt is the balance between the amount of principal repaid over the year and the increase in principal owed (new borrowing). Around 34 per cent of Australian vegetable-growing farms reduced overall farm debt in 2014–15, particularly in Victoria (49 per cent) and Western Australia (40 per cent). In contrast, debt increased across 26 per cent of vegetable growing farms in 2014–15, particularly in South Australia (35 per cent) and Western Australia.

Cash-flow surplus (profit) was the main source of funds used to reduce farm debt in 2014–15, accounting for 60 per cent of the reduction in principal owed by vegetable producing farms. A further 6 per cent was repaid from a reduction in liquid assets and farm management deposits; 6 per cent from the sale of farm assets; 2 per cent from off-farm income; and 25 per cent from other sources (**Figure 24**).

Most of the increase in principal owed by vegetable growing farms in 2014–15 was for land purchases (31 per cent) and the purchase of farm machinery and vehicles (29 per cent). A further 17 per cent went to cash-flow shortfalls (business losses); 9 per cent to farm development; and around 14 per cent to other purposes (**Figure 24**).

Figure 24 Reason for change in farm business debt, Australian vegetable-growing farms, 2014–15



average per farm

Note: Preliminary estimate. FMD Farm Management Deposit. Source: ABARES Australian vegetable growing farms survey

Debt servicing

The estimated proportion of farm receipts needed to fund interest payments has remained relatively unchanged over the last 12 months. On average, farms used around 4 per cent of total cash receipts to make interest payments over the nine years to 2014–15. The ratio of interest payments to receipts was relatively stable from 2007–08 to 2012–13, fluctuating between 4.6 per cent and 5.4 per cent (**Figure 25**) over this period. From 2013–14 to 2015–16 the ratio fell as a result of higher farm receipts, reduced interest rates and lower total debt. In 2015–16 the proportion of farm receipts needed to meet interest payments is projected to fall to around 3.1 per cent.

Figure 25 Ratio of interest paid to total cash receipts, Australian vegetable-growing farms, 2006–07 to 2015–16



p Preliminary estimate. **y** Provisional estimate. Source: ABARES Australian vegetable-growing farms survey

5 Farms growing vegetables under the National Vegetable Levy

The National Vegetable Levy (NVL) is payable on specific vegetables grown in Australia by producers who either sell the product or use it in the production of other goods. Vegetables subject to the NVL are shown in **Table 7**. The levy is used to fund Horticulture Innovation Australia—a grower-owned research and development company that invests in horticultural research, development and marketing. The analysis in this chapter covers only growers who produced vegetables subject to the NVL (**Table 7**).

Included under NVL	Exempt from NVL a
Carrots	Potatoes
Pumpkins	Onions
Sweet corn	Tomatoes
Peas and beans	Asparagus
Lettuces	Mushrooms
Broccoli	-
Cauliflower	-
Capsicums	-
Other vegetables	-

Table 7 National Vegetable Levy—inclusions and exemptions

a Statutory R&D levies apply to mushrooms, onions and potatoes.

Note: The ABARES Australian vegetable-growing farms survey does not collect information on asparagus and mushrooms as individual vegetable commodities.

Source: AUSVEG 2012

Farms paying the NVL accounted for an estimated 68 per cent of vegetable-growing farms in 2014–15 (**Table 8**). Many of those farms also produced vegetables not covered by the levy.

Area planted to vegetables	All vegetable-growing farm businesses (no.)	Proportion of farms that pay NVL a
<5 hectares	786	81
5–20 hectares	807	69
20–70 hectares	552	45
>70 hectares	321	74
All farms	2 466	68

Table 8 Australian vegetable-growing farms, by area planted to vegetables, 2014–15 p

a Population excludes farms that only grow asparagus, mushrooms, onions, potatoes and tomatoes. **p** Preliminary estimate. Source: Australian Bureau of Statistics

NVL-paying farms are on average smaller than the average for all vegetable-growing farms. The average area operated by NVL-paying farms was estimated to have been around 178 hectares, compared with 246 hectares for the whole population. NVL-paying farms also tend to be more diversified than the average vegetable-growing farm, producing various vegetable crops and running non-vegetable enterprises such as livestock. In comparison, non-NVL farms tend to be larger and specialise in one or two vegetable enterprises.

The average farm cash income of NVL-paying vegetable farms in Australia was estimated to have been \$235 400 in 2014–15 (**Table 9**), 55 per cent higher than the eight-year average (in real terms) to 2013–14. The area of vegetables planted in 2014–15 was around 22 per cent higher than the eight-year average. Carrot plantings were the main driver of the increase in total vegetable plantings in 2014–15.

Table 9 Financial performanc	e, National	Vegetable	Levy-paying	farms,	2013–14 to) 2015–
16						

Financial estimates	Unit	2013-14	201	4-15p	2015-16y
Cash receipts					
Vegetable cash receipts	\$	818 320	954 400	(8)	1 065 000
Other cash receipts	\$	105 180	166 000	(13)	178 000
Total cash receipts	\$	923 500	1 120 400	(8)	1 236 000
% cash receipts from vegetables	%	89	85	(3)	86
Cash costs					
Hired labour	\$	129 970	175 400	(11)	207 000
Fertiliser	\$	49 910	66 000	(11)	76 000
Contracts paid	\$	86 670	94 800	(16)	119 000
Seed	\$	53 480	64 300	(12)	76 000
Fuel, oil and grease	\$	38 130	39 700	(12)	45 000
Crop and pasture chemicals	\$	30 900	38 800	(11)	44 000
Repairs and maintenance	\$	54 790	61 400	(9)	74 000
Interest	\$	30 480	29 300	(11)	34 000
Electricity	\$	22 850	22 800	(9)	25 000
Packing charges and materials	\$	31 850	69 000	(15)	80 000
Freight	\$	42 700	67 600	(15)	75 000
Total cash costs	\$	748 600	885 100	(8)	991 000
Farm financial performance					
Farm cash income	\$	174 900	235 400	(10)	245 000
Farm business profit	\$	55 720	105 400	(10)	106 000
Rate of return a					
- excluding capital appreciation	%	2.6	3.9	(14)	3.9
- including capital appreciation	%	3.7	5.6	(11)	na
Farm capital at 30 June b	\$	3 690 030	3 746 300	(6)	na
Farm debt at 30 June c	\$	402 770	438 700	(12)	na
Equity ratio cd	%	87	86	(2)	na

a Rate of return to farm capital at 1 July. b Excludes leased plant and equipment. c Average per responding NVL-paying farm. d Equity expressed as a percentage of farm capital. p Preliminary estimate. y Provisional estimate. na Not available. Note: Figures in parentheses are standard errors expressed as a percentage of the estimate. Population excludes farms that are specialist asparagus, mushroom, onion, potato and tomato growers. Source: ABARES Australian vegetable-growing farms survey

The average quantity of vegetables produced per NVL-paying farm in 2014–15 was 46 per cent higher than the eight-year average to 2013–14. This was the result of higher than average plantings and increased crop yields.

Estimated average farmgate prices increased for cabbages, broccoli, carrots, lettuces and green beans but declined for cauliflower, green peas and Asian vegetables. Overall, higher estimated average receipts from the sale of vegetables offset increased expenditure associated with planting and harvesting a larger vegetable crop.

Average farm cash income of NVL-paying vegetable farms rose by 4 per cent in 2015–16 to \$245 000 (**Table 9**), 52 per cent higher (in real terms) than the nine-year average to 2014–15. High total cash costs in 2015–16 were outweighed by increased cash receipts, particularly vegetable crop receipts.

Appendix A: Survey methods and definitions

Target population

The vegetable-growing industry definition is based on the Australian and New Zealand Standard Industrial Classification (ANZSIC). Farms assigned to a particular ANZSIC class have a high proportion of their total output characterised by that class (ABS 2006).

For this survey, ABARES selected vegetable farms in the sample from units classified in ANZSIC 0122 Vegetable growing (under cover) and 0123 Vegetable growing (outdoors). These classes consist of units engaged mainly in growing vegetables, with primary activities including the production of capsicum, cucumbers, herbs, lettuces, tomatoes, asparagus, beans, carrots, garlic, zucchinis, onions, peas and potatoes.

The sample population for the vegetable survey was selected from a population list drawn from the Australian Business Register (ABR) and maintained by the Australian Bureau of Statistics (ABS). The ABR includes agricultural businesses registered with the Australian Taxation Office and lists their corresponding statistical local area, industry classification and size of operation.

To be eligible for participation in the surveys, a vegetable grower must have had an estimated value of agricultural operations in 2014–15 of at least \$40 000. In 2014–15 Australia had an estimated 2 467 vegetable farm businesses with an estimated value of agricultural operations of at least \$40 000 (**Table 1**). These farms accounted for 49 per cent of all vegetable-growing farms.

State	Unit		2013-14		2014-15
		Sample	No. of growers	Sample	No. of growers
New South Wales	no.	51	574	56	516
Victoria	no.	49	506	52	503
Queensland	no.	63	526	79	604
South Australia	no.	50	405	41	315
Western Australia	no.	40	322	42	264
Tasmania	no.	38	227	34	265
Australia	no.	291	2619	304	2 467

Table A1 Population and sample numbers, Australian vegetable-growing farms, 2013–14 and 2014–15

Note: ABARES surveys vegetable-growing farm businesses with an estimated value of agricultural operations of at least \$40 000.

Source: Australian Bureau of Statistics

A sample of 304 vegetable farming businesses was selected from a total population of 2 467 commercial vegetable farming businesses. New South Wales, Victoria and Queensland had the largest numbers of commercial vegetable farms surveyed, accounting for around two-thirds of vegetable farms across Australia. The Northern Territory and Australian Capital Territory have been excluded from the survey since 2009–10 due to the small number of commercial vegetable farms in each territory and associated confidentiality requirements.

Results are reported at national, state and industry-size levels. Industry size was categorised into four groups according to the area planted to vegetables: less than 5 hectares, 5 to 20 hectares, 20 to 70 hectares and more than 70 hectares.

Survey design and sample weighting

The target population is grouped into strata defined by state and size of operation. The size of each stratum was determined using the Dalenius and Hodges method (Lehtonen & Pahkinen 2004). The sample allocation to each stratum is a compromise between allocating a higher proportion of the sample to strata with high variability in the size variable and an allocation proportional to the population of the stratum.

Farm-level estimates published in the report are calculated by appropriately weighting the data collected from each sample farm and using that data to calculate population estimates. Sample weights are calculated so that population estimates from the sample for numbers of farms and areas of vegetables planted correspond as closely as possible (by state and by groups of farms by area of vegetables planted) to the most recently available ABS estimates from data collected in the Agricultural Census and associated agricultural sample surveys. This weighting process ensures estimates are applicable for all commercial vegetable-growing farms rather than just those in the sample.

The weighting methodology for the vegetable survey uses a model-based approach, with a linear regression model linking the survey variables and the estimation benchmark variables. Bardsley and Chambers (1984) detail this method. Benchmark variables used to weight the ABS data include total numbers of farms in scope and total area planted to vegetables for human consumption.

Generally, larger farms have smaller weights and smaller farms have larger weights, reflecting the strategy of sampling a higher proportion of larger farms than smaller farms and the relatively lower number of large farms. Larger farms have greater variability of key characteristics and account for a much larger proportion of total output.

ABARES collects information on all vegetable commodities but does not weight the sample of farms collected by type of vegetables produced. Consequently, some vegetable commodities may be over- or under-represented in the survey compared with their relative contribution to the overall gross value of vegetable production.

Survey samples of specific vegetable commodities are sometimes too small to report physical and financial information. To protect confidentiality, commodity-specific results collected from the ABARES survey of vegetable-growing farm businesses are only reported for Australia overall and limited to the main vegetable commodities sampled.

Survey questionnaire

The survey of vegetable-growing enterprises included pre-interview questions to determine eligibility and stratification level, establish business structure and activities, confirm address and location and check availability of financial and production data.

Farm-level financial and physical information collected included vegetable production types, business receipts and costs, labour use, debts and assets and market value of business capital. The survey also included supplementary questions on irrigation water and chemical usage, pests and diseases, farm sale outlets, sources of information, future intentions, industry challenges and growers' relationships with main buyers.

Reliability of estimates

Reliability of the estimates of population characteristics presented in this report depends on design of the sample and accuracy of the measurement of characteristics for individual sample farms.

Preliminary estimates and provisional estimates

Estimates for 2013–14 and all earlier years are final. All farmer data, including accounting information, have been reconciled and final production and population information from the ABS has been included. No further change is expected in the estimates.

The 2014–15 estimates are preliminary, based on full production and accounting information from farmers. However, editing and addition of sample farms may be undertaken.

The 2015–16 estimates are provisional developed from the data collected through on-farm interviews undertaken between March and May. Provisional estimates are for crop and livestock production, receipts and expenditure up to the date of interview, and expected production receipts and expenditure for the remainder of the year.

ABARES modifies expected receipts and expenditure where significant production and price changes have occurred post-interview. Provisional estimates are subject to greater uncertainty than final estimates.

Preliminary and provisional estimates of farm financial performance are produced within a few weeks of completing survey collections. However, ABARES may update these several times at later dates. Subsequent versions are more accurate because they are based on updated information and slightly more accurate input datasets.

Sampling errors

Only a subset of the total number of farms in a particular industry is surveyed. Data collected from each sample are weighted to calculate population estimates. Estimates derived from these farms are likely to be different from those that would have been obtained if information had been collected from a census of all farms. Any such differences are called 'sampling errors'.

The size of the sampling error is most influenced by the survey design, estimation procedures, sample size and variability of farms in the population. The larger the sample size, the lower the sampling error is likely to be. Therefore, national estimates are likely to have lower sampling errors than industry and state estimates.

As a guide to reliability of survey estimates, standard errors are calculated for selected estimates. These estimated errors are expressed as percentages of the survey estimates and termed relative standard errors (RSEs).

Comparing estimates

When comparing estimates between two groups, it is important to recognise that the differences are also subject to sampling error. A conservative estimate of the standard error of the

difference can be constructed by adding the squares of the estimated standard errors of the component estimates and then taking the square root of the result.

For example, suppose the estimates of total cash receipts were \$100 000 in Victoria and \$125 000 in Tasmania—a difference of \$25 000—and the RSE was given as 6 per cent for each estimate. The standard error of the difference could be estimated as:

$$\sqrt{(6 \times \$100\ 000/100\)^2 + (6 \times \$125\ 000/100\)^2} = \$9605$$

A 95 per cent confidence interval for the difference is:

$$25000 \pm 1.96 \times 9605 = (6174, 43826)$$

Therefore, if a larger number (towards infinity) of different samples are taken, approximately 95 per cent of the time the difference between the two estimates will be between \$6 174 and \$43 826. Also, since zero is not in this confidence interval, it is possible to say that the difference between the estimates is statistically significantly different from zero at the 95 per cent confidence level.

Australian vegetable-growing farms: an economic survey, 2014–15 and 2015–16 ABARES

6 Glossary

Term	Definition
Owner-manager	Primary decision-maker for the farm business. This person is usually responsible for day-to-day operation of the farm and may own or have a share in the farm business.
Physical items	
Hired labour	Excludes the farm business manager, partners and family labour, and work done by contractors. Expenditure on contract services appears as a cash cost.
Labour	Measured in work weeks, as estimated by the owner-manager or manager. Includes all work on the farm by the owner- manager, partners, family, hired permanent and casual workers and sharefarmers but excludes work done by contractors.
Total area operated	Includes all land operated by the farm business, whether owned or rented by the business, but excludes land sharefarmed on another farm.
Financial items	
Capital	Value of farm capital is the value of all the assets used on a farm, including the value of leased items but excluding machinery and equipment either hired or used by contractors. The value of 'owned' capital is the value of farm capital excluding the value of leased machinery and equipment.
	ABARES uses the owner-manager's valuation of the farm property. The valuation includes the value of land and fixed improvements used by each farm business in the survey, excluding land sharefarmed off the sample farm. Residences on the farm are included in the valuations.
	Livestock are valued at estimated market prices for the land use zones in each state. These values are based on recorded sales and purchases by sample farms.
	Before 2001–02 ABARES maintained an inventory of plant and machinery for each sample farm. Individual items were valued at replacement cost, depreciated for age. Each year, replacement cost was indexed to allow for changes in that cost.
	Since 2001–02 total value of plant and machinery has been based on market valuations provided by the owner–manager for broad categories of capital, such as tractors, vehicles and irrigation plant.
	Total value of items purchased or sold during the survey year was added to or subtracted from farm capital at 31 December of

Term	Definition
	the relevant financial year, irrespective of the actual date of purchase or sale.
Change in debt	Estimated as the difference between debt at 1 July and the following 30 June within the survey year, rather than between debt at 30 June in consecutive years. This is an estimate of the change in indebtedness of a given population of farms during the financial year, so it is not affected by changes in sample or population between years.
Farm business debt	Estimated as all debts attributable to the farm business, excluding personal debt, lease financed debt and underwritten loans (including harvest loans). Information is collected at the survey interview and supplemented by information contained in the farm accounts.
Farm liquid assets	Assets owned by the farm business that can be readily converted to cash. Includes savings bank deposits, interest bearing deposits, debentures and shares but excludes real estate, life assurance policies and other farms or businesses.
Receipts and costs	Receipts for livestock and livestock products sold are determined at point of sale. Selling charges and charges for transport to point of sale are included in costs of sample farms.
	Receipts for crops sold during the survey year are gross of deductions made by marketing authorities for freight and selling charges. These deductions are included in farm costs. Receipts for other farm products are determined on a farmgate basis. All cash receipt items are the revenue received in the financial year.
	Farm receipts and costs relate to whole area operated, including that operated by on-farm sharefarmers. Cash receipts include receipts from sale of products produced by sharefarmers. If possible, on-farm sharefarmers' costs are amalgamated with those of the sample farm. Otherwise, the total sum paid to sharefarmers is treated as a cash cost.
	Some sample farm businesses engage in off-farm contracting or sharefarming, employing labour and capital equipment also used in normal on-farm activities. It is not possible to accurately allocate costs between off-farm and on-farm operations, so income and expenditure attributable to such off-farm operations are included in receipts and costs of sample farm business.
Total cash costs	Payments made by the farm business for materials and services and for permanent and casual hired labour (excluding owner– manager, partner and other family labour). Includes value of livestock transfers onto the property and any lease payments

Term	Definition
	on capital, produce purchased for resale, rent, interest, livestock purchases and payments to sharefarmers. Capital and household expenditures are excluded from total cash costs.
	Handling and marketing expenses include commission, yard dues and levies for farm produce sold.
	Administration costs include accountancy fees, banking and legal expenses, postage, stationery, subscriptions and telephone.
	Contracts paid refers to expenditure on contracts such as harvesting. Capital and land development contracts are not included.
	Other cash costs include stores and rations, seed purchased, electricity, artificial insemination and herd testing fees, advisory services, motor vehicle expenses, travelling expenses and insurance. 'Other cash costs' may comprise a large proportion of total cash costs, but individually the components are small overall and are not listed.
Total cash receipts	Total of revenues received by the farm business during the financial year, including from sale of livestock, livestock products and crops and value of livestock transfers off a property. Includes revenue received from agistment, compensation, contracts, government assistance payments, insurance claims, plant hire, rebates, refunds, royalties and sharefarming.

Financial performance measures

Build-up in trading stocks	Closing value of all changes in inventories of trading stocks during the financial year. Includes value of any change in herd or flock size or in stocks of wool, fruit and grains held on the farm. It is negative if inventories are run-down.
Depreciation of farm improvements	Estimated by the diminishing value method, based on replacement cost and age of each item. Rates applied are standard rates allowed by the Commissioner of Taxation.
Farm business equity	Value of owned capital less farm business debt at 30 June. Estimate is based on those sample farms that have complete data on farm debt.
Farm business profit	Farm cash income plus build-up in trading stocks, less depreciation and the imputed value of the owner–manager, partner(s) and family labour.
Farm cash income	Difference between total cash receipts and total cash costs.

Term	Definition
Farm equity ratio	Calculated as farm business equity as a percentage of owned capital at 30 June.
Imputed labour cost	Payments for owner-manager and family labour may not indicate actual work input. An estimate of the labour input of the owner-manager, partners and their families is calculated in work weeks and a value is imputed at the relevant Federal Pastoral Industry Award rates.

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