Growing the Australian vegetable industry by diversifying products and improving quality

Haydn Valle, Shiji Zhao, Tom Jackson and Will Chancellor

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

September 2022

Research Report 22.15
Ownership of intellectual property rights

Unless otherwise noted, copyright (and any other intellectual property rights) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

Creative Commons licence

All material in this publication is licensed under a Creative Commons Attribution 4.0 International Licence except content supplied by third parties, logos and the Commonwealth Coat of Arms.

Inquiries about the licence and any use of this document should be emailed to copyright@awe.gov.au.

Cataloguing data

This publication (and any material sourced from it) should be attributed as: Valle, H., Zhao, S., Jackson, T., and Chancellor, W. 2022, Growing the Australian vegetable industry by diversifying products and improving quality, ABARES, Canberra, September, DOI: https://doi.org/10.25814/mj6t-5085

ISSN 1447-8358

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

GPO Box 858 Canberra ACT 2601
Telephone 1800 900 090

Disclaimer

The Australian Government acting through the Department of Agriculture, Fisheries and Forestry, represented by the Australian Bureau of Agricultural and Resource Economics and Sciences, has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Agriculture, Fisheries and Forestry, ABARES, its employees and advisers disclaim all liability, including liability for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on any of the information or data in this publication to the maximum extent permitted by law.

Professional independence

The views and analysis presented in ABARES publications reflect ABARES professionally independent findings, based on scientific and economic concepts, principles, information and data. These views, analysis and findings may not reflect or be consistent with the views or positions of the Australian Government or of organisations or groups that have commissioned ABARES reports or analysis. Learn more about ABARES professional independence.

Acknowledgements

The authors acknowledge the valuable contributions and insights from Rohan Nelson, Lindsay Hogan, Charley Xia, Fred Litchfield, and Peter Gooday.

Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.
Contents

Key points ............................................................................................................................................. 5
Summary ................................................................................................................................................. 6
Australian vegetable industry — an overview ..................................................................................... 10
Decomposing growth in the value of vegetable production ................................................................. 16
Quality improvement in the Australian vegetable industry ............................................................... 19
Conclusion .............................................................................................................................................. 24
References ........................................................................................................................................... 25
Footnotes ............................................................................................................................................. 27

Tables

Table 1: Value, volume, inflation, and quality improvements at different years .. 18

Figures

Figure 1: Growth in the nominal gross value of production by industry, Australia, 1969-70 to 2020-21 ............................................................................................................................................. 6
Figure 2: Growth of the Australian vegetable industry: volume, inflation and output mix / quality improvement 1969-70 to 2020-21 .............................................................................................................. 7
Figure 3: Potato prices, premium versus standard, 2002 to 2020 ......................................................... 8
Figure 4: Farm capital ($) across farm size deciles, 2018-19 ................................................................. 11
Figure 5: Average business profit by farm type, 2016-17 to 2018-19 .................................................... 12
Figure 6: Average business rate of return excluding capital appreciation (%) by farm type, 2016-17 to 2018-19 ............................................................................................................................................. 12
Figure 7: Output share by farm size decile, 2018-19 ............................................................................. 13
Figure 8: Profit by farm size decile, 2018-19 ......................................................................................... 14
Figure 9: Production (Kt) by selected vegetable types, 1994-95 to 2019-20....................................... 15
Figure 10: Vegetable production, consumption, and trade, 1990-91 to 2019-20 .16
Figure 11: Average weekly household vegetable expenditure, by net worth quintile, 1998-99 and 2015-16 ............................................................................................................................................. 20
Figure 12: Average area planted for vegetable crops, Australia, 2016-17 to 2020-21 ..........................................................
Maps
Map 1: Location of vegetable growing farms surveyed.................................10

Boxes
Box 1: Two technical issues in the measurement of ‘quality improvements’ ....17
Box 2: Vertical and horizontal integration — response of vegetable supply chain to consumer preferences..........................................................22
Key points

• The Australian vegetable industry has grown significantly over the last 5 decades by taking advantage of changes in consumer incomes and tastes. Unlike most other agricultural sectors which have relied primarily on increases in volumes and prices this has occurred through changes in the mix of products produced (toward higher value products) and improvements in the quality of what is provided (through a variety of means – packaging, fresher, ready to eat, more consistency etc).

• This channel for growth is facilitated by a combination of factors. Rising incomes, changing tastes and increasing population diversity have led to changes in consumer demand towards higher quality, variety, and convenience with only modest increases in volumes — broadly in line with population growth.

• Vegetable prices overall have not experienced a large increase according to the ABS consumer price index (CPI). Average weekly household vegetable expenditure increased slightly between 2009-10 and 2015-16 for all household net worth quintiles.

• The lesson for other agricultural sectors is that there can be significant gains from meeting changes in consumer demand that do not require selling greater quantities or a reliance on price rises for ‘traditional’ products. Increased demand for quality attributes (such as provenance and freshness) can lead to significant increases in sector value and be a driver of structural change.

• Demand for a wider range of vegetable varieties, increased quality and convenience has resulted in closer relationships along vegetable supply chains and a greater degree of vertical integration. It has also driven more horizontal integration that has seen more producers growing multiple vegetable outputs, sometimes across a variety of locations, and combined with other factors has increased pressure for farm consolidation.
Summary

The Australian vegetable industry has grown considerably in recent decades, mainly through changes in the mix of products produced and adding value to products at the farmgate through quality improvement. This article unpacks this mechanism of growth and draws implications for the growth of agriculture more broadly.

The nominal value of vegetable production has increased by 6.6 per cent per year on average over the last 5 decades (from $138 million to $4.79 billion between 1969–70 and 2020–21). This rate of growth is faster than the overall agriculture sector of 5.3 per cent per year (Figure 1).

Figure 1: Growth in the nominal gross value of production by industry, Australia, 1969–70 to 2020–21

![Graph showing growth in nominal gross value of production]

Source: ABARES, forecast estimate.

While good seasonal conditions and temporarily high prices are significant drivers of growth in some years, the main drivers of long-term value growth are business decisions leading to increased output, higher prices received, or both. Understanding how long-term value growth is achieved is important for policy and industry decision-making, particularly as Australian agriculture works towards its target of $100 billion in output value by 2030.
Our analysis of trends in the value of Australian vegetable production over time reveals that changes in product mix and quality improvements have been the main driver of growth, accounting for nearly 60 per cent of output value growth since the 1970s (Figure 2). Aggregate price movements for vegetables contributed to approximately 35 per cent of total vegetable output growth, while increased production volume made up less than 6 per cent.

**Figure 2: Growth of the Australian vegetable industry: volume, inflation and output mix / quality improvement 1969-70 to 2020-21**

Changes in output mix and quality improvement takes many forms — wider range, longer shelf life, more convenience, better flavour, and greater availability throughout the year and across regions. Some changes are achieved by farmers and others working collaboratively with firms downstream from farms. Consumers value higher quality regardless of how it is generated, and this has translated into significant differences in the growth in retail prices paid for vegetables in Australia. For example, **Figure 3** tracks average 10kg potato prices from the Melbourne fresh fruit and vegetable market and highlights the growth in the gourmet premium variety of potatoes compared to the standard washed red variety.
Australian vegetable farmers have benefitted from both changes made on-farm and through working with partners along the supply chain in processing, packaging, storage, transport, and retail. These improvements have translated into increased prices for some premium vegetable outputs and higher profits for vegetable farmers, which have been relatively high in recent years compared with those in other sectors of Australian agriculture.

Improving profitability by adjusting the product mix and improving quality is different to the dominant mechanisms that have generated recent value growth in most other sectors of Australian agriculture — such as increased output quantities and productivity growth in the grains industry and higher prices globally for meat and livestock products. Vegetable producers and others in the supply chain are likely to continue innovating to grow output value by matching products to ever-changing and increasingly sophisticated and personalised consumer preferences.

There are three key observations from the changes that have occurred in the vegetable industry.
First, the vegetable industry has demonstrated the capacity to generate increased value by successfully altering production systems in response to changing consumer preferences. This includes sufficiently strong signals along the supply chain for changing preferences to be apparent to producers, and then for producers and other firms to have sufficient access to capital — including human, technological and financial — to alter farm and other systems.

Second, a rise in consumer incomes and changing preferences has gradually led to a shift in demand toward higher quality and greater variety, which in turn has driven a response from producers and enabled an increase in value generated for consumers and producers. This has involved consolidation in some parts of the vegetable farm sector and closer relationships along many supply chains.

Third, research and development (R&D) has been a crucial driver since technology improvements have made increases to product quality possible and assisted to reduce the cost of production for farmers and others in the supply chain. Importantly, not all of the relevant R&D has occurred in the agriculture sector — for example plant breeding efforts have expanded the range of crops available to farmers, more efficient transport systems have improved product freshness and availability, and better packaging and storage technologies have extended shelf life and appearance.

The experience of the largely domestic focussed Australian vegetable sector is likely to have lessons for other, export focussed, agricultural sectors. For example, the Australian livestock and cropping sectors have achieved significant growth from raw and minimally transformed exports. Responding to emerging consumer preferences and unlocking market access will facilitate future value creation for all agricultural sectors. Changes in demand for many other agricultural products are likely to be influenced in a similar way to that of vegetables as consumer incomes and preferences change in export markets.
Australian vegetable industry — an overview

Vegetable growers are spread across the country. Map 1 provides an indication of the main vegetable growing farm locations, based on the vegetable farms surveyed by ABARES. In 2015–16, Queensland and Victoria were the two largest vegetable growing states, collectively accounting for 57 per cent of the value of vegetable production.

Map 1: Location of vegetable growing farms surveyed

Vegetables are produced in 73 (out of 85) statistical regions across Australia. In part, the widespread nature of vegetable production is a consequence of the perishable nature of the goods, and the need for quick access to local markets. According to Mifsud and Valle (2015), many vegetable growers, particularly smaller farms with less than $200,000 in total cash receipts, are located relatively close to large capital cities. For some commodities, production is concentrated in regions that have specific climate conditions and natural resource endowments. For example, lentils are predominantly grown in semi-arid regions of South Australia and Victoria where there is an optimal balance of temperature, low humidity and rainfall (GRDC, 2018).
Across all vegetable growing farms, 46 per cent are located within 100km of an Australian capital city. The proportion of farms that are close to capital cities is considerably lower in other industries — 7 per cent for both grain cropping and livestock farms and 12 per cent for dairy farms.

**Figure 4: Farm capital ($) across farm size deciles, 2018-19**

![Chart showing farm capital across farm size deciles from 2018-19](chart.png)

Source: Boult 2020 (ABARES - Disaggregating farm performance statistics by size)

Vegetable farms are typically smaller in scale and less land intensive than livestock and cropping farms but use more water and labour. This smaller scale is reflected in the generally lower capital by farm size compared to other agricultural sectors across all size deciles (**Figure 4**). Vegetable growing businesses are also relatively flexible and can enter or exit the industry easily. Production can require relatively little specific capital and hence technical and financial barriers to entry can be lower. Most vegetables also have a sub-annual growing season. For example, some grain farms opportunistically plant potatoes as a break crop for the main purpose of improving soil nutrients between growing seasons. As a result, vegetable farms are found in many regions when soil and climate conditions are suitable.

Vegetable growing in Australia is relatively profitable when compared with other agricultural industries (**Figure 5**). Average vegetable farm profits exceeded dairy, beef and sheep farms in each of the three financial years from 2016 to 2019 — yet was consistently lower than cropping farm profits. In addition, average vegetable farm profitability over this period appears to be more reliable than the other farming types which experience large profitability swings between years. This in part reflects the greater control of vegetable farmers over inputs to production and flexibility to deal with variable seasonal and market conditions.
For example, greater use of irrigation reduces exposure to seasonal volatility such as drought. More consistent profits may also partly reflect the industry composition, where a smaller number of large and highly diversified vegetable farms account for most of the production output. Rate of return is also strong for vegetable farms, exceeding the other farm types except cropping as compared in Figure 6.

**Figure 5: Average business profit by farm type, 2016-17 to 2018-19**

**Figure 6: Average business rate of return excluding capital appreciation (%) by farm type, 2016-17 to 2018-19**

*Source: ABARES Australian vegetable-growing farms survey

p Preliminary estimate. y Provisional estimate.*
While average vegetable farm profitability and rate of return are high, production in the vegetable industry is heavily skewed, with most of the output concentrated amongst relatively large farms (Figure 7). In 2018–19, the largest vegetable farms (in decile 10) accounted for 68.7 per cent of total production. In the same year, the smallest vegetable farms (in decile 1) made up only 0.4% of production. The largest vegetable farms also dominate in terms of profitability (Figure 8), outperforming all other farm type categories in 2018-19 to achieve an average profit of almost $1.8 million.

**Figure 7: Output share by farm size decile, 2018-19**

Source: Boult 2020 (ABARES - Disaggregating farm performance statistics by size)
The vegetable industry produces a wide range of different products. The Australian Horticulture Statistics Handbook (HIA 2020) lists data for more than 30 different types of vegetables such as potatoes, tomatoes and onions. The unit price varies significantly across different vegetable types, and, over time, the proportion of higher value niche vegetable crops has increased in the total value of vegetables produced (Mifsud and Valle 2015).

A widening in the range of vegetables produced in Australia was formally confirmed in the 2013–14 Australian Bureau of Statistics agricultural census data (ABS 2015). For that census collection, Horticulture Innovation Australia provided the ABS with extra funding to collect an exhaustive breakdown of the value of different vegetable types. The ABS subsequently produced estimates for 37 different categories of vegetables, which included a further breakdown of some production types (for example, fresh market compared with processed) and a catch-all category for other vegetables not elsewhere reported. Other vegetables (such as garlic, rhubarb, asparagus and herbs) were produced by too few farms to publish estimates separately. Despite this, ‘other vegetables’ was still the second largest category of vegetables in 2013–14 (measured by nominal value), accounting for 10 per cent of the total value of vegetables. More recent ABS data indicated that a declining trend for the main vegetable produced in terms of volume (potatoes) and an increasing trend for others (for example lentils) — reflecting the shift in consumer preferences (Figure 9).
Outputs from the Australian vegetable industry are mostly for domestic consumption with international trade playing a significantly smaller role (Figure 10). In 2018-19, vegetable exports only accounted for 10 per cent of domestic production. Vegetable imports made up approximately 21 per cent of domestic consumption in the same period and consist mainly of varieties either not grown in Australian or not currently in season. Less than 2 per cent of imported vegetables consumed were ‘fresh’, implying that most imported domestic vegetable consumption was either frozen or canned. This gradual growth in vegetable imports has broadly followed growth in the estimated resident population for Australia. Changes in consumer preferences and demand for increased variety are also likely to have contributed to this import growth.
Decomposing growth in the value of vegetable production

The growth in the value of Australian vegetable production over the last 5 decades (see Figure 2) can be decomposed into:

- changes in the volume (quantities) of outputs — growth in output value that would have occurred if there had been no change in the quality or mix of products produced or prices received (vegetable price inflation)
- inflation (pure price effect) — the increase in output value arising from higher prices of identical vegetable products (measured using the vegetable component of the consumer price index)
- changes in output mix and quality — the additional output value induced by improvements in quality (taste, appearance, freshness, convenience etc.), the availability of new varieties and increases in the production of high value crops (for example, exotic mushroom varieties).

Change over time in the volume (or quantity) of vegetables produced is obtained by dividing current values of total output by the vegetables component of the Consumer Price Index (CPI) (ABS 2021). Like other components of the CPI, the vegetable price index is constructed and maintained by the ABS and is a measure of price changes of identical vegetable products over time. The remaining growth in output value is a ‘price effect’ which can be further decomposed into vegetable price inflation and ‘other’ changes. These ‘other’ changes are calculated as the difference between the price effect and vegetable price inflation (i.e., the vegetable component of CPI) and capture growth in the market value of vegetable production that cannot be explained by the growth of volume and vegetable price inflation. ‘Other’ changes can be categorised broadly as a combination of changes in output mix and changes in the quality of specific products. Data limitations have prevented separation of these effects.

**Box 1: Two technical issues in the measurement of ‘quality improvements’**

Using CPI to construct the decomposition has two implications for the accuracy of the results. First, as CPI is a measure of vegetable prices paid by Australian consumers, it is determined by both farmgate vegetable prices and value added by firms downstream from farms. Hence, it is likely that our measure of ‘quality improvements’ may contain some contributions from businesses involved in transport, storage, processing, wholesaling and retailing, and others in the vegetable supply chain. For example, if the inflation of the services provided by the non-farm businesses was lower than the growth of the farmgate price of vegetables, then our measure of volume would be understated, and quality improvements overstated. Of course, if it was higher, then the measure of volume would be overstated, and quality improvement understated. In this study, we assume that the inflation of farmgate vegetable prices and other services in the downstream industries were similar.

Second, it can be shown that the estimates of volume may capture some effect of quality improvements. This is because the CPI measures price movements
of identical products. However, the quality of these products may change over time. If quality improves, our measures would understate the price effect (and possibly quality improvements) and overstate the volume. The reverse is true if quality deteriorates but the more likely scenario is that quality has improved, and the measure of quality improvements is underestimated.

While these assumptions cannot be tested rigorously due to data limitations, the potential margin of inaccuracy is expected to be too small to alter the overall findings and conclusions in this study.

Between 1969–70 and 2020–21, the value of Australian vegetables production increased (in nominal terms) by $4.65 billion (from $138 million to $4.79 billion). Of this growth:

- 5.6 per cent ($259 million) was due to increased volume
- 34.7 per cent ($1.615 billion) was caused by vegetable price inflation
- 59.7 per cent ($2.779 billion) was attributable to changes in output mix and/or quality improvements

The contribution of output mix and quality changes was uneven over the period 1969-70 to 2020–21 (Table 1, Figure 2). From 1969–70 to 1984–85 output mix and quality change was not particularly significant, accounting for 9.8 per cent of the growth in output value. Pure price effect was the main driver of output value during this period. The role of output mix and quality accelerated in later periods (from 1984–85 to 2003–04 and from 2003–04 to 2020–21) and its share increased to 46.6 and 59.7 per cent in these two periods, respectively.

| Table 1: Value, volume, inflation, and quality improvements at different years |
|-----------------------------|-------------|-----------------|-----------------|-------------------|
|                             | OUTPUT VALUE | GROWTH          |                  |
|                             | Total value  | Contributed by  |                  |
|                             | Volume       | Inflation       | Output mix / quality improvements |
|                             | $M           | $M              | %                | $M                | %                | $M               | %                |
| 1969–70                     | 138          | 0               | 0.0              | 0                 | 0                 | 0               | 0.0              |
| 1984–85                     | 629          | 490             | 21               | 43%               | 421               | 85.9            | 48               | 9.8              |
| 2003–04                     | 2,356        | 2,217           | 159              | 7.2               | 1,025             | 46.2            | 1,032            | 46.6             |
| 2020–21F                    | 4,792        | 4,654           | 259              | 5.6               | 1,615             | 34.7            | 2,779            | 59.7             |

Source: Authors calculation
Quality improvement in the Australian vegetable industry

Improvements in vegetable quality were brought about by changes in both demand and supply. On the demand side, population growth, increases in incomes and changes in other socio-economic conditions and demography (such as urbanisation) were the main drivers. Vorrasi (2018) noted that urbanisation presents opportunities for further value-adding to vegetable products as high-income and time-poor consumers seek convenience. These changes have provided opportunities for growers and others in the supply chain to generate more value from products that consumers value more.

In addition, demand shifts were driven by changes in increasingly sophisticated and individualised consumer preferences – for example relating to health, the environment, trade, working conditions and many other factors. Income and wealth are also related to food consumption. Hogan (2018) found that households in the highest income quintiles had the highest vegetable expenditure (Figure 11). This does not necessarily suggest that high income households are consuming greater quantities of vegetables — rather they are more likely purchasing high quality vegetables or luxury varieties (e.g., shiitake mushrooms versus button mushrooms). Average weekly household vegetable expenditure increased slightly between 2009-10 and 2015-16 consistently for all household net worth quintiles.
The Australian vegetable industry has responded to the shift in consumer demand by supplying a greater variety of products — the output mix has changed. The largest six vegetable crops contributed $1.3 billion or 60 per cent of total vegetable production in 2000-01, however by 2018-19 these same crops contributed only 52 per cent of total production (ABARES, 2020). As the Productivity Commission (PC 2005, p. 46) writes “[in the 1980s] there was only one variety of lettuce grown (iceberg), now the range grown in Australia also includes—cos, coral green, butter, mixed leaves—to name just a few.”

Concurrently, the composition of vegetables available has shifted towards what consumers consider ‘high-quality’ products. Mifsud and Valle (2015) also noted that less commonly grown high-value vegetables have accounted for an increasing proportion of Australian vegetable farm cropping receipts. Over time, the mix of vegetables grown has shifted towards high-value vegetable crops (for example, broccoli and green beans, green peas and lettuce) and away from high-volume vegetable crops (for example, carrots, onions, potatoes, tomatoes). From 2016–17 to 2020–21, the average area planted to carrots, onions, potatoes

---

**Figure 11: Average weekly household vegetable expenditure, by net worth quintile, 1998-99 and 2015-16**

Source: Hogan (2018), ABARES

Note: Each quintile comprises 20% of households based on gross household income where, for example, quintile 1 is the lowest 20% of households
and tomatoes remained relatively constant, while the area to other vegetables increased (ABS Agricultural Commodities) (Figure 12). Weragoda et al. (2017) attribute the change in vegetable crop area planted to increased plantings of a range of more intensive vegetable crops such as Asian greens and other speciality vegetables.

**Figure 12: Average area planted for vegetable crops, Australia, 2016-17 to 2020-21**

![Graph showing average area planted for vegetable crops, Australia, 2016-17 to 2020-21](image)

*Source: ABS Agricultural Commodities*

In terms of ‘quality’, producers have made changes to enhance the vegetables available to consumers. Technological progress has been the main enabler of improvement in the quality of Australian vegetables. For example, producers have introduced new systems for irrigation, control of pests and diseases, protection from physical risks such as hail and sunburn. They also introduced new crop varieties that increased the value of existing products (such as nutrition, taste, freshness, and durability). Developments in technology and information systems have also played an important role in supply chain integration.

Producers have added value by optimising the timing and regional location of vegetable supply. There is significant variation in the market price of vegetables
within each year. Unlike other commodities that conform to very specific growing periods, many vegetables can be grown all-year round in suitable regions and have comparatively short growing periods. For example, the process of planting, growing, and harvesting a grain crop can take 6 months, whereas a lettuce crop can be produced and harvested in 6 weeks. This provides vegetable growers with opportunities to put their products on the market when they are most valued by consumers.

Improvements in vegetable quality are also reflected in the way vegetable products are delivered and presented to consumers. These improvements are assisted by or achieved through collaboration with firms involved in packing, transport, storage and distribution, and in some cases by vertically integrated vegetable-producing firms (Box 2). The involvement of firms in other parts of the vegetable supply chain is significant. ABARES survey of vegetable growing farms estimated that between 2015–16 and 2017–18, 55 per cent of vegetable growing farms undertook some value adding activities and 9 per cent classified the extent of on-farm value adding activities as high. An estimated 10 per cent of vegetable growing farms intended to increase the amount of on-farm value-adding activities over time.

Box 2: Vertical and horizontal integration — response of vegetable supply chain to consumer preferences

Increases in average income and an increasingly diverse population have had implications for the nature of demand for vegetables. Rather than increases in the volume consumed per person, it is apparent that Australian consumers are now willing to pay more for increased quality, variety and convenience.

Changes in consumer demand have changed the structure of vegetable industry value chains (Richards et al. 2012). This is evident in Australian supermarkets, which were once dependent on wholesale arrangements with a large number smaller farms. Today, vegetable products supplied to supermarkets are regularly sourced from a small number of very large vertical and horizontally integrated farms (Jie and Gengatharen, 2018). Smaller fruit and vegetable retailers began to disappear approximately 20 years ago when supermarkets improved their ability to deal with fresh products and contract with larger growers.
At the same time, many smaller vegetable farms were gradually replaced by a small number of very large farms which generated most of the vegetable output (the largest 20 per cent of vegetable farms generated 81 per cent of total output in 2018-19). An example in Price et al. (2005) from Pritchard et al. (2005) describes the Australian tomato sector in 1984 as supplying 183,000 tonnes of processing tomatoes from 350 growers — by 2004 just 32 growers were producing 360,000 tonnes.

Part of the consolidation and structural adjustment story is vertical integration, which has enabled large farms to consolidate their supply chains and benefit from new technology. Vertically integrated vegetable producing firms are often large businesses, producing a diversified range of crops over multiple farm locations and delivering products through an independent network. These firms often use sophisticated technologies and flexible workforce arrangements to employ large numbers of people with varying skills – for example, in vegetable production, packing, storage, marketing. They also have well-developed brands with strong direct links to consumers.

Horizontal integration has offered another source of growth for large farms, whereby they diversify their operations (location and output mix) to increase market share and manage price volatility. Supermarkets may also benefit from horizontal integration since they need to deal with fewer farms to stock their shelves which in turn reduces supply and contractual complexity.

The ability of firms to differentiate vegetable products based on quality, and the capacity for them to capture the benefits from doing so through direct involvement in the post-farm parts of the supply chain is key to these firms investing in quality improvement. Their relatively large size and the strength of their brands also likely provides an increased capacity to negotiate with buyers. Where these large farms are also horizontally integrated (i.e., can offer supermarkets a diverse range of vegetables), supermarkets may only need to contract with a small number of large growers.
Conclusion

Since 1969-70, the nominal value of Australian vegetable production has increased rapidly. More than half of the growth (59.7 per cent by our estimation) was due to improvements in the quality and mix of vegetable products delivered to consumers. The remaining growth was due to an increase in production volume (5.6 per cent) and general vegetable price inflation (34.7 per cent). To a large extent, growth was achieved by improving the intrinsic qualities of the vegetables produced, increasing product varieties, offering consumers greater convenience and lifting other consumption experiences. This was made possible by advances in production and other technologies and, in many circumstances, through collaboration along supply chains.

The experience of the vegetable industry offers useful insights for Australian agriculture more broadly as it seeks to continue to grow, with a goal of reaching $100 billion in output value by 2030. Beyond the agricultural growth engine of raw and minimally transformed exports, responding to emerging consumer preferences and improving market access will become increasingly important for additional future growth (Greenville et al. 2020). Seeking higher-valued markets, adding value through quality improvements and changing the output mix has already proven to be an effective strategy for vegetable industry growth. This has involved adoption of new technologies and practices but also development of strong relationships along supply chains.

An important experience of the vegetable industry has been the value created by effectively responding to changes in consumer preferences and the role that close relationships along supply chains have played. This looks to have resulted in some structural change within the vegetable sector toward larger and more integrated operations.

The experience of the largely domestic focussed vegetable sector may not be fully applicable for other, export focussed, agricultural industries. However, it seems likely that for a wide range of products in major export markets a capacity to differentiate based on quality attributes is likely to be increasingly important as consumer incomes increase and tastes evolve.
References


ACCC (Australian Competition & Consumer Commission) 2020, Perishable agricultural goods inquiry, Commonwealth of Australia, Canberra.

Boult, C 2020, Disaggregating farm performance statistics by size, 2018–19, ABARES research report, Canberra, March. CC BY 4.0. DOI: https://doi.org/10.25814/5e4b732537b96


Greenville, J, Duver, A & Bruce, M 2020, Analysis of value creation in Australia through agricultural exports: Playing to advantages, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. CC BY 4.0. https://doi.org/10.25814/qra4-7576


Xia, C. 2022, Horticulture Outlook to 2022-23 in ABARES 2018, Agricultural commodities: March quarter 2018. CC BY 4.0

Footnotes

1 The authors acknowledge the valuable contributions and insights from Rohan Nelson, Lindsay Hogan, Charley Xia, Fred Litchfield, Peter Gooday and Jared Greenville.

1 SA4 regions, defined by the Australian Bureau of Statistics.

1 The 151 per cent and 20 per cent are the averages of the 10 years in the 1980s and 2010s respectively.

1 We compared the vegetable component of CPI with some relevant price indexes over the period from 1989-90 to 2020-21. These prices differed from time to time but did not diverge significantly over the entire period. Specifically, vegetable prices tracked the overall CPI closely and, in the 2020-21, it was 2.6 per cent lower than the price for automotive fuel (CPI) and 17.4 per cent, 18.3 per cent and 15.6 per cent higher than fruit & vegetable (PPI), private motoring (CPI) and transport (CPI) respectively.

1 Vegetable production is widely spread across many regions and many value-adding activities are conducted locally.