



AUSTRALIAN
MACADAMIAS

The world's finest nut

Spring in the orchard:
A honeybee hovering on a raceme of macadamia blossom

2019 YEARBOOK

AUSTRALIAN MACADAMIAS

v2.0

AUSTRALIAN MACADAMIA INDUSTRY TAKING INNOVATION TO NEW HEIGHTS

The Australian macadamia industry has achieved a huge amount in its relatively short 45-year history. Having risen to become global leaders in the production and marketing of macadamias, we have also come to be regarded as pioneers in horticulture more broadly, thanks to the breakthroughs our industry has made in growing, post-harvest handling, technology, food safety and marketing.



At the heart of this is a continual desire to find new ways to do things better. In 2019, we raised the innovation bar again, embracing new and more sustainable ways to improve production, while seeing the positive impact of the *Innovation Initiative* – our industry's three-year marketing plan designed to inspire manufacturers to include macadamias in new product development.

In the orchard, we are finding new ways to respond better to the environment in which our product is grown, learning how to grow with nature rather than in competition with it, and reaping the many benefits this approach brings. Far from seeing a trade-off between sustainable growing practices and productivity, we know without a doubt that the more sustainable we are, the more productive we are, and this is driving innovative thinking on-farm, better use of technology and increased biodiversity.

This year our industry achieved a perfect score in the Australian government's National Residue Survey for the 22nd year in a row, with the report concluding that "Australian macadamia producers continue to demonstrate a high degree of good agricultural practice." These results speak to the commitment and skill of Australia's macadamia growers and processors and their commitment to sustainable farming, the use of biological and cultural crop protection methods, and world-class post-harvest handling practises.

2019 saw the return of the Australian Macadamias Innovation Challenge, bringing together the food industry's most creative minds to showcase their product innovations using macadamias. This one-of-a-kind industry event showcased macadamias being used in new and exciting ways in food product concepts that spanned the confectionery, snacking, cereal and future foods categories.

New product development with macadamias continued strongly this year with more than 370 products launched globally in the 12 months to June 2019, and 88% of those products launched in the second quarter of 2019 using macadamias as a selling proposition, up from 74% in the previous quarter. We also saw a promising rise in the number of new products launched by countries not regarded as established markets for macadamias.

From the orchard to the supermarket aisle, it's exciting to see innovation delivering exciting developments across all facets of the Australian macadamia industry.



AUSTRALIA'S MACADAMIA INDUSTRY IN NUMBERS



\$267M_{AUD}

Farm-gate value



800

Growers



+\$850M_{AUD}

Retail value



\$2.5M_{AUD}

Annual investment
in Marketing



80%

Production processed
and sold as kernel



46,000T

5-year average in-shell production
at 3.5% moisture (49,000T at 10%)



\$5M_{AUD}

Annual investment in Research
& Development
(Levy plus other investment estimate)



70%

Production exported



28,000Ha

Under planting



35,000Ha

Under planting by 2025



70,000T

Forecast in-shell production
at 3.5% moisture by 2025
(75,000T at 10%)

GROWTH AND SUSTAINABILITY POWERED BY INNOVATIVE THINKING

Australia's macadamia industry has long been committed to the pursuit of excellence, from practices adopted on farm, to post-harvest processes and quality of the end product to manufacturers and consumers.

Continually striving to achieve consistent production, outstanding quality and long-term sustainability, ours is an industry powered by the collaboration and innovative thinking of its people.

A SUSTAINABLE APPROACH TO PRODUCTIVITY

Advances made by Australia's macadamia industry over the last 5-7 years have been driven largely by long-term investment in productivity improvements. Growers have adopted new industry-wide productivity initiatives which are delivering better soil and tree health and higher, more consistent yields. The best growers are continuing to push productivity barriers, with some now achieving up to five tonnes per hectare.

Australian macadamia growers see productivity and sustainability working hand in hand to produce outcomes that serve people and the environment in equal measure. As our growing and orchard management practises have become more advanced, so too has our understanding of the environment and how it is changing, and our macadamia growers remain committed to conserving the natural resources on which our product relies.

2019 has seen improvement in our growers' environmental monitoring capabilities, better use of technology than ever before and the creation of more biodiversity in the orchard. A raft of measures have been embraced that are driving productivity to help meet growing demand for our product, and prioritising the protection of the water, soil, air, native vegetation and wildlife.





PRECISION AGRICULTURE

Mapping tools, weather stations and soil moisture probes are informing orchard operations and helping to improve efficiency of water use on farm.



INTEGRATED ORCHARD MANAGEMENT

Integrated management of canopy, orchard floor and drainage.

● CANOPY

Light and ventilation in the orchard improves productivity but also supports biodiversity - the beneficial insects and birds that keep pests at bay thrive in these conditions.

● ORCHARD FLOOR

Creating organically rich and healthy soil that is cover cropped and adequately moist.

● DRAINAGE

Keeping precious soil where it's meant to be and keeping orchards resilient to adverse conditions.



INTEGRATED PEST AND DISEASE MANAGEMENT

Combining a range of strategies including biological controls and cultural farm practices IPDM continues to be a significant investment for our industry. By creating a pest suppressive landscape and monitoring and understanding pest lifecycles, growers can better discern when intervention is needed.



BIOLOGICAL CONTROL AND DIVERSITY

Collaborative research examining biological control is currently being undertaken by multiple research agencies. This will build on our industry's use of naturally occurring organisms to control pests and disease. Our orchards are now boasting more diversity than ever, with many growers establishing inter-rows in their orchards to create habitats for beneficial insects, native bees and other pollinators such as flies and beetles. This is delivering production benefits as well as a more sustainable way of growing.



IMPROVED SOIL EROSION MANAGEMENT

Significant work has been undertaken to better mitigate soil erosion using whole farm planning and re-contouring that helps to balance nutrients, prevent nutrient run-off, and monitor and manage water quality. The use of cover crops plays an important role in this area, encouraging beneficial insects while retaining soil and moisture levels.



REVEGETATION AND RESTORATION OF RIPARIAN ZONES

Riparian zones are extremely sensitive to any activity occurring in and around them, with careful management required to ensure no adverse impact on the waterways. Our industry is restoring these precious zones and planting more vegetation to control erosion and create a naturally pest-suppressive landscape.



INCREASE IN USE OF BOTH EUROPEAN AND NATIVE BEES

Insect pollination by both managed and naturally occurring bees and other insects are beneficial to the crop.



INCREASED USE OF TREE SHAKERS

Many bearing orchards in Australia's largest growing region of Bundaberg have now adopted tree shaking technology and uptake is expected to expand to other regions too. Delivering improved harvest efficiency and quality by providing access to every single nut grown, tree shaking also provides the orchard with the chance to 'reset' by removing nuts that may otherwise support pest and diseases, and physiologically preparing the tree for the next season.



NOTHING WASTED

100% of the harvested nut is used, with nothing going to waste. The husk is used as mulch and compost and the shell is used for co-generation of electricity in macadamia processing plants. Biochar is the result of burning macadamia shells at a high temperature in a special, low oxygen environment. Used as a soil enhancer, it makes soils more fertile and stores carbon in the soil so it's not released as a greenhouse gas. Biochar production creates oil and gas by-products that can be used as fuel for renewable energy plants.

FORGING NEW PATHS IN R&D

Australia's macadamia industry leads the world in terms of on-farm research and development. Three decades of commitment to R&D has laid the foundation for our growers to develop practical solutions that ensure consistent supply of premium quality macadamias.

A strong price position has provided the ability and confidence to invest consistently, and our industry now invests around \$5 million in R&D annually through levy and other industry and research agency investments. Recent years have seen a surge in grower-led innovation as well, with many growers investing in their own trials and implementing innovative new practises on farm as a result.

Adoption of new technology, enviro-monitoring and more efficient, targeted and precise irrigation scheduling are paving the way for further growth to ensure our industry remains at the forefront of world production. Several innovation projects are also underway including the *Small Tree High Productivity* initiative that aims to boost crop yield per hectare, advances in pollination, and a 20-year \$10 million breeding program that will see trees bred for better yields, higher pest and disease resistance and more manageable canopies.

Advances in pollination brought about by improved understanding of its importance and of which insects pollinate most effectively has resulted in cross-pollination becoming a significant consideration when planting new orchards. By actively creating pollinator habitats growers are producing cross-pollinated nuts which deliver high kernel recovery and quality.

Multi-origin collaboration

While the Australian macadamia industry has invested heavily in R&D for many years, we are now also collaborating with other macadamia producing origins in production and marketing research with the following projects currently underway:

Global pest and disease app development: Involving all growing origins and with the potential to deliver significant bio security and food safety benefits, this technology will instantly notify macadamia industries around the world in the event that a pest or disease issue arises in any location.

Water efficiency collaboration: We are working closely with the South African macadamia industry to leverage its learnings following the recent severe drought

High altitude feasibility study: High altitude planting is being studied in China. Tapping into their technical ability and large research community, this collaboration will enable better understanding of the feasibility of growing macadamias in areas that are topographically different to where they are typically grown. It may also improve our understanding of tree physiology.

Macadamia health research project: the global macadamia industry has invested in a world-first research project aimed at providing strong evidence to support the role of macadamias in a healthy diet. Findings are due for release in mid to late 2020.

SERIOUS ABOUT SAFETY AND QUALITY

Food safety is a top priority for Australia's macadamia industry. Our approach is underpinned by sophisticated production processes, generations of knowledge about quality on farm and in factory, a commitment to biological pest control, and Australia's reputation as a clean and green environment. We were the first macadamia producer to implement rigorous quality standards and testing protocols that remain unmatched by any other producing region. All processors are HACCP accredited and most have further quality management systems.

Australia's macadamia industry is active in the food safety space internationally as well, particularly in relation to post-harvest handling. Our strong record has led to other origins seeking out Australian processors to handle their product, meaning the food safety and quality standards enjoyed in Australia are now extending to other origins too.

Our standing as the producer of premium quality macadamias is validated by the results of the Australian Government's National Residue Survey, a program that screens Australian crops for a range of chemical pesticides and environmental contaminants. In 2019 Australian macadamias achieved 100% compliance in the NRS for the 22nd consecutive year – a record unmatched by any other Australian fresh product.

CONSERVING THE PAST TO SECURE THE FUTURE

As with many crop industries, the macadamia industry is based on a very small number of tree varieties, selected for their favourable characteristics, such as plentiful crops and thin shells. What makes our crop different is that while most horticultural food products have undergone tens, if not hundreds of generations of breeding to produce the crops that we consume today, macadamias are still relatively new and little more than three generations separated from wild trees.

The Macadamia Conservation Trust

In order to secure our industry's future, it's important to preserve the past. Wild macadamias offer a wealth of genetic diversity - a living gene bank. Many of the commercially grown macadamia varieties our industry rely on today are from a very narrow genetic base. This means the rest of the DNA from all the other wild macadamias has untapped potential for development of the international macadamia industry.

As the home of the only wild macadamia trees, Australia is at the forefront of this important work. Our industry established The Macadamia Conservation Trust (MCT), a not-for-profit environmental organisation that aims to conserve remaining wild macadamia trees in their native habitat for future generations, through a program called *Wild About Macadamias*.

The Trust is a reflection of how seriously our industry takes its environmental responsibilities and its passion for conservation, research and education – all of which are vital for the ongoing successful future of the macadamia industry.

Some of the major activities undertaken by the Trust in 2019 include a Wild Macadamia Hunt to track down old wild macadamia trees in Brisbane before they're lost forever, as well as plans for the largest arboretum of wild macadamias in the world.



New MCT macadamia tree variety launched

New macadamia varieties were released for sale in 2019, the most notable being the MCT variety. The result of 20 years of breeding, this new variety was gifted to the MCT and is a smaller, more open tree that enables excellent light penetration, and is a good producer. It is also playing a direct role in conservation, with all the royalties from sales of the new variety going to the MCT to further its breeding program and preservation of the diversity of the macadamia species. Industry uptake has been high, with orders for the new MCT variety exceeding those of all the other new varieties combined.

AUSTRALIAN GROWING REGIONS

Macadamias are grown along the eastern coast of Australia from Nambucca Heads in the south to Mackay in the north. Collectively Bundaberg and the Northern Rivers region produce more than 80% of the Australian crop.



PRODUCTION IS BROKEN DOWN BY REGION AS FOLLOWS:

| NORTHERN RIVERS | NAMBUCCA | SOUTH EAST QLD | GYMPIE | BUNDABERG | TOPICAL QLD | ATHERTON | OTHER (WA) |
|-----------------|----------|----------------|--------|-----------|-------------|----------|------------|
| 18,345 | 2,050 | 2,600 | 2,850 | 19,975 | 715 | 65 | - |
| 39% | 4% | 6% | 6% | 43% | 2% | 0.1% | 0% |

Table 1: Australian macadamia production by growing region for 2019. Tonnes in shell, 3.5% moisture content.
Source: Australian Macadamia Handlers Association

Australia is home to approximately 800 macadamia growers and 8.7 million macadamia trees on 28,000 hectares.

In 2019 Australia produced 43,500 tonnes in-shell at 3.5% moisture content. This was a smaller crop than usual due to an unusually long, hot and dry summer.

Good nut set and flowering has occurred across all growing regions throughout Spring, laying the groundwork for a solid 2020 crop, however dry conditions are continuing and this may impact the coming crop.

Over the next two years we expect significant new plantings in Queensland and in the Clarence Valley just south of the Northern Rivers in New South Wales.

Around one third of macadamia trees currently under cultivation are yet to reach full production.



SEASON

The macadamia growing season can be broken down into three main periods:

| | |
|----------------------------|--|
| August - September: | Flowering begins |
| December – January: | Nuts begin to form in clusters, their shells harden, and oil rapidly accumulates |
| February – August: | Mature nuts fall to the ground and are harvested with purpose-built harvesting machinery |

WEATHER CONDITIONS

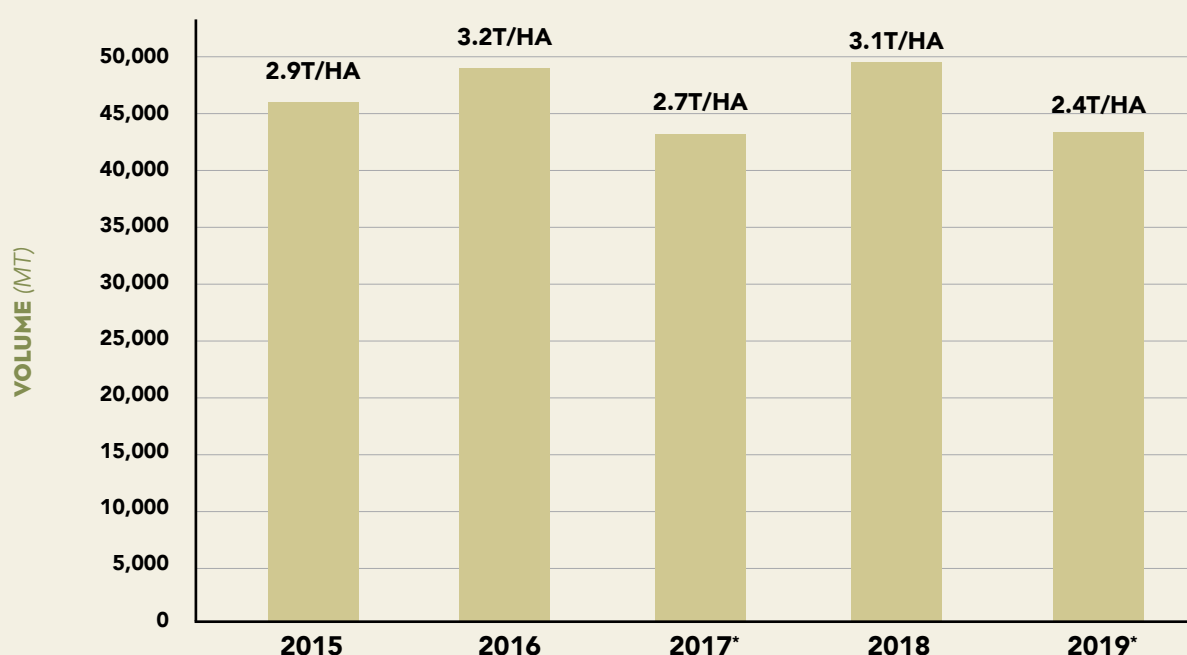
Weather conditions were dry for much of the year, creating favourable conditions for harvesting and crop protection. All major growing regions experienced a particularly harsh summer, with very hot temperatures accompanied by abnormally low rainfall and humidity.

PRODUCTIVITY

The Australian macadamia crop has grown steadily since 2013, driven largely by sustained investment in productivity improvements. Growers have adopted new industry-wide productivity initiatives including Integrated Orchard Management and Integrated Orchard Nutrition, which are delivering better soil and tree health and higher yields. Average yields have been as high as 3.2 tonnes over the last five years with the best Australian growers achieving 5.0 tonnes per hectare.

Innovative orchard practices, coupled with substantial investment in new plantings and the establishment of large new orchards, means the Australian macadamia crop is set for consistent, steady growth in the coming years.

FIGURE 1: AUSTRALIAN PRODUCTION VOLUME (IN SHELL, 3.5% MOISTURE)



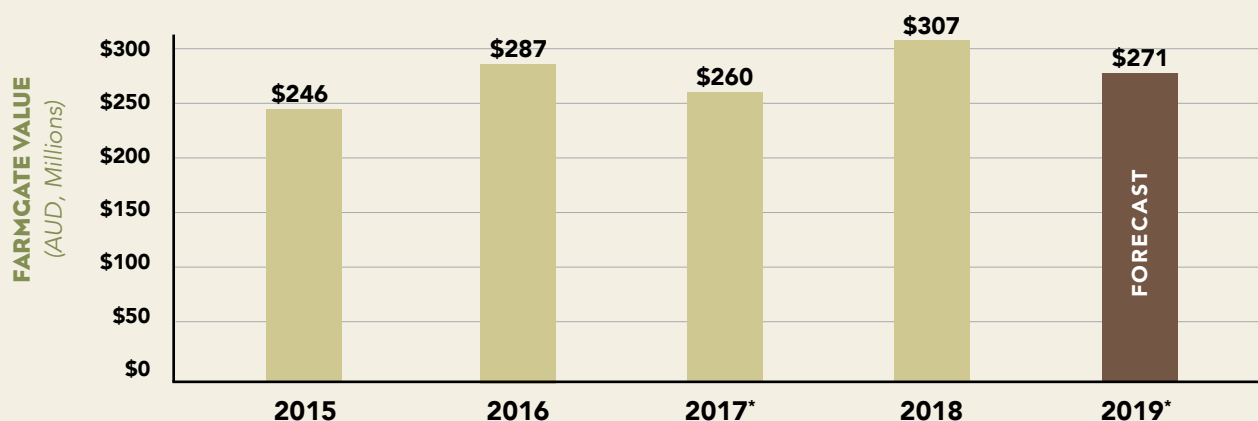
*2017 and 2019 were impacted by major weather events

Source: Australian Macadamia Handlers Association (production volumes) Benchmarking report - Mature farms 10+ years (yields)

AUSTRALIAN INDUSTRY VALUE

The Australian macadamia industry farm-gate value has more than tripled in the last 10 years, translating to around AUD \$850 million at retail. The export value of Australian macadamias grew by 23% in the 12 months to June 2019.

FIGURE 2: AUSTRALIAN PRODUCTION VALUE (AUD, IN SHELL)



*2017 and 2019 were impacted by major weather events

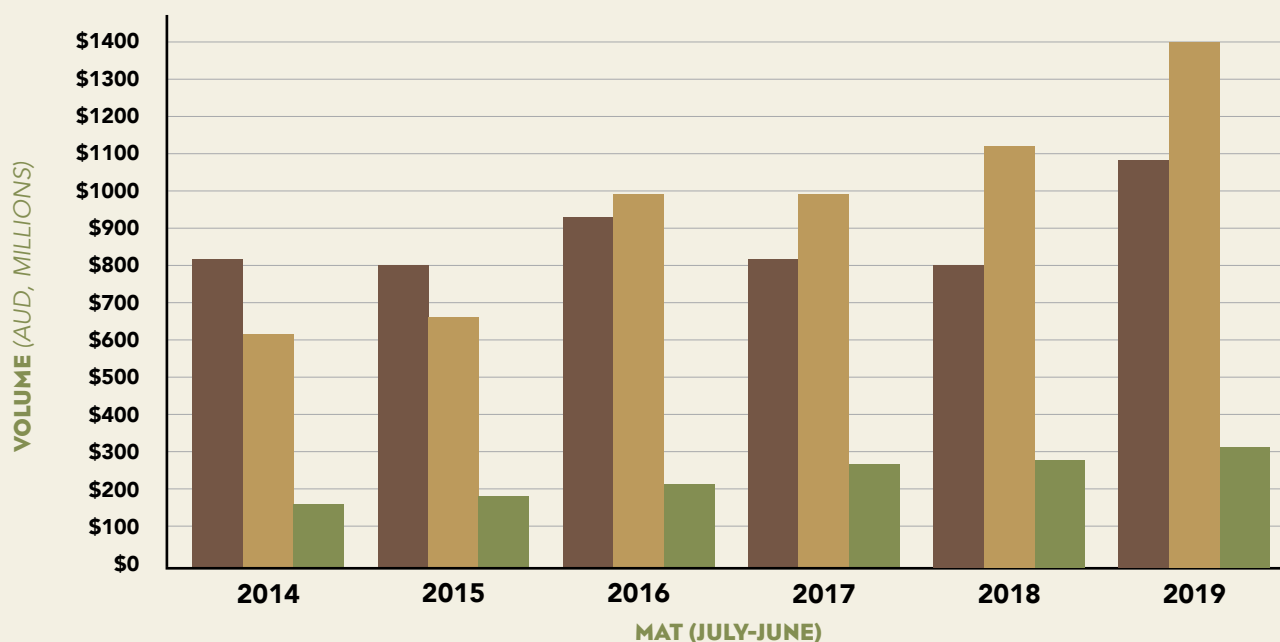
Source: Australian Macadamia Handlers Association

AUSTRALIAN NUT INDUSTRY

Nuts play a vital role in Australia's horticultural export program and the 12 months to June 2019 saw their export value tip \$1 billion for the first time. During this period the total export value of tree nuts grew 34% compared to the same period the year before, making them the fastest growing of all Australian horticultural exports. Almonds and macadamias represent the vast majority of Australia's nut export value at 92%.

Growth is being driven by strong prices, an increasingly health-conscious consumer mindset and rising consumption by emerging markets within Asia. Australian nut producers have invested heavily in expanding output volume while maintaining an unwavering focus on quality. Export markets in Asia, Europe and the US recognise Australia as a source of premium quality product.

FIGURE 3: AUSTRALIAN HORTICULTURAL EXPORTS (AUD, VALUE)



Source: Australian Bureau of Statistics

■ Nuts ■ Fruit ■ Vegetables

GLOBAL TREE NUT PRODUCTION

In the 2018/2019 season, world tree nut production reached 4.5 million metric tons (kernel equivalent) - an overall increase of 47% from 10 years ago. When compared against the prior 10-year average, macadamias, pistachios, walnuts and cashews recorded the highest production growth in 2018/19.

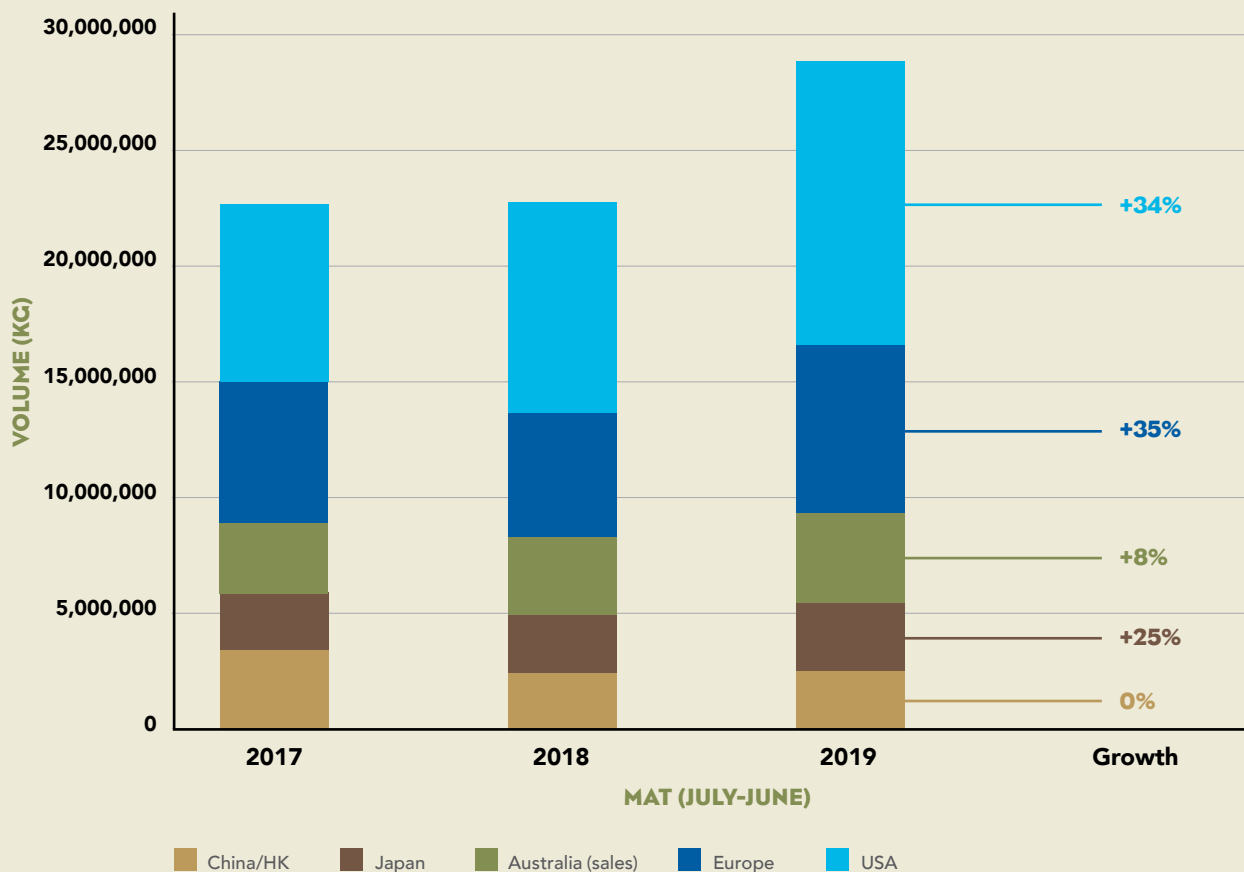


GLOBAL MACADAMIA PRODUCTION

Macadamias represent less than 2% of global tree nut production. Global macadamia production is on the rise, with established growing regions continuing to expand their plantings and emerging regions, particularly China, expected to feature significantly in future global production.

Production of macadamias is currently more evenly distributed than the major tree nut varieties, with no single producer representing more than 30% of production. However, this has not made the supply of macadamias immune to the effect of major weather events.

FIGURE 4: MACADAMIA KERNEL IMPORTS/WHOLESALE SALES – TOP 5 COUNTRIES



Source: AMHA, USDA, Eurostat, Japan Customs, China Customs, Hong Kong Census & Statistics Department (all via IHS Markit Inc. except AMHA)

GLOBAL MACADAMIA CONSUMPTION

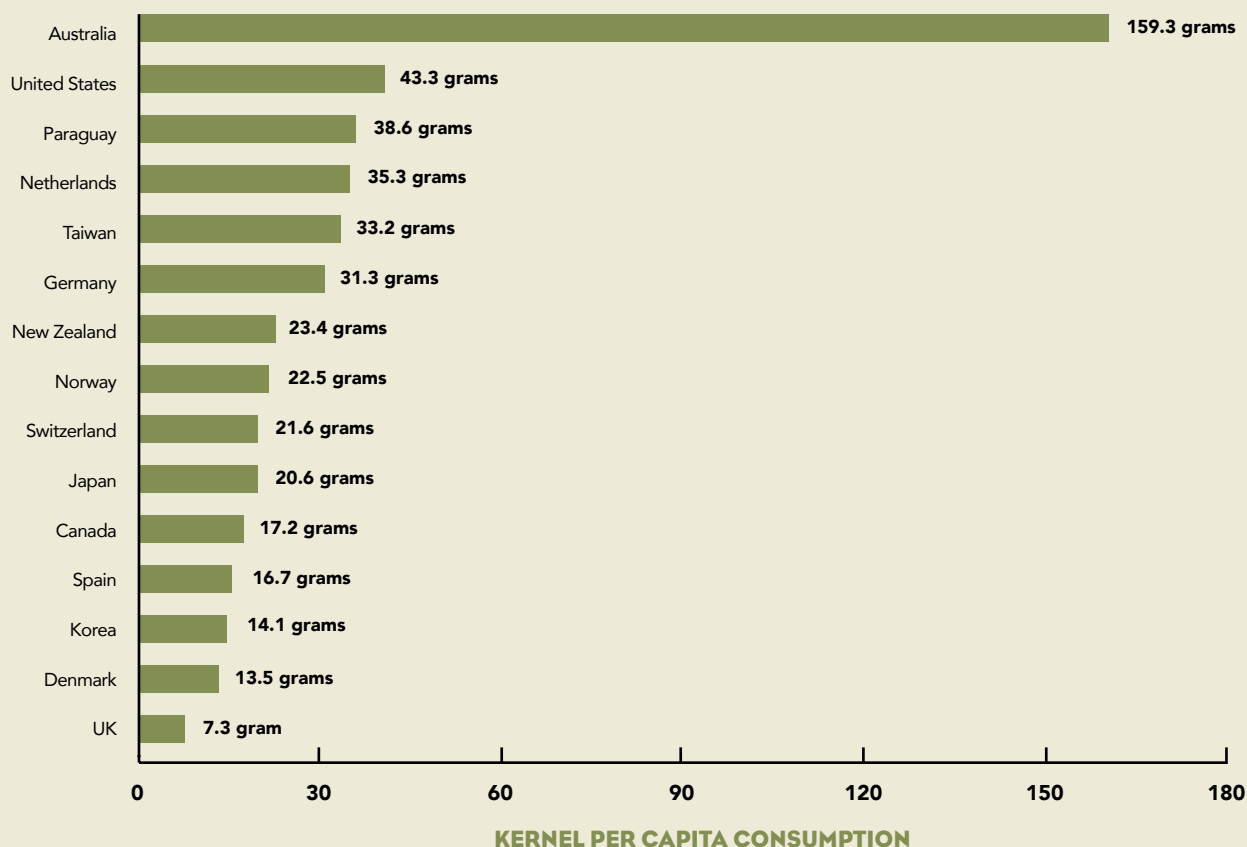
Globally more than 35,000 tonnes of macadamia kernel are produced and consumed each year. Producing origins United States and Australia are the largest consumers of raw macadamia kernel.

Australia continues to have the highest per capita consumption in the world and 7 European countries represent almost half of the top 15. Per capita consumption in Asia still has a long way to go with Taiwan coming in at #5.

China consumes almost all the in-shell macadamia product sold globally, estimated at 50,000 - 60,000 tonnes in shell per annum.



FIGURE 5: MACADAMIA KERNEL PER CAPITA CONSUMPTION - TOP 15 COUNTRIES



Source: AMHA, IHS Markit Inc., World Bank, Industry analysis



LONG TERM MARKETING STRATEGY CONTINUES TO SUPPORT NEW PRODUCT INNOVATION

2019 has marked year two of the Australian macadamia industry's current three-year international marketing strategy.

This has seen our trade campaign focused on implementing activity that forms the strategy's centrepiece, the Innovation Initiative. With more robust supply expected to become available in coming years, this supply shift will open up new opportunities for commercial product development, and the Innovation Initiative is helping to support food manufacturers who are eager to incorporate macadamias in their new product development plans. The Initiative delivered a number of marketing highlights throughout the year.



MACADAMIA INNOVATION CHALLENGE 2

Following the success of the first Challenge in 2018, professionals and students from the food technology field were once again invited to submit creative concepts for new packaged food products using macadamias, with the competition opened up to participants from China and Japan for the first time, as well as Australia. The best concepts from the Challenges are available for trial by food manufacturers globally.



ICE CREAM CONSUMER INSIGHTS

New consumer research revealed fresh insights that highlight key innovation opportunities for macadamias in the ice cream category in both Asian and Western markets. The research identified a close alignment between macadamias and ice cream, identifying that the way consumers experience these foods and the indulgent and luxury associations they both possess are almost mirror images of each other. This unique alignment, unlike that of any other ingredient pairing, is one that consumers and influencers are eager to see more of, particularly in the premium ice cream category.



CHOCOLATE CONFECTIONERY CONSUMER INSIGHTS

New consumer research revealed macadamias are perfectly positioned to disrupt the chocolate category. Nuts and chocolate have an established relationship, especially with peanuts, hazelnuts and almonds. However the research found that while these are popular pairings, they have also become commonplace and routine. Macadamias were identified as the ideal disruptor as they can build on the established nut and chocolate relationship but also inject extra excitement. They are also ideally suited to meet the growing demand for chocolate products that offer 'permissible indulgence' as their health benefits add a level of permissibility, while their status as a sophisticated ingredient answers the need for indulgence, more so than any other nut.



WHY DO CONSUMERS LOVE MACADAMIAS?

From their exquisitely creamy taste and perfectly round form to their unique soft crunch and health benefits, there's a lot to love about macadamias. Years of research have told us that consumers love a daily handful of raw or roasted macadamias. We have also found they love discovering them in their favourite products.

MACADAMIAS IN BAKERY PRODUCTS



MACADAMIAS IN SNACK PRODUCTS



MACADAMIAS IN ICE CREAM PRODUCTS



MACADAMIAS IN CHOCOLATE CONFECTIONERY PRODUCTS



- Macadamias elevate the eating experience of any bakery product they're added to, making it more luxurious, unique, healthy, balanced and desirable

- When macadamias are present in a bakery product, consumers feel less guilt, can more easily justify a higher price point, and perceive the product as more interesting and trust-worthy



- Consumers love nuts in snack products, but macadamias deliver more than other nuts
- Macadamias satisfy hunger without being heavy, they're nutrient dense but don't compromise on taste, and even a small quantity of macadamias can make a snack tastier and more indulgent

- Macadamias are ideally suited to consumers' emotional snacking needs, making snack products more rewarding, exciting and mood-boosting and ensuring there's no compromise on taste



- Consumers love the way both macadamias and ice cream offer a uniquely luxurious, uplifting and sensorial eating experience.
- Consumers associate macadamias in ice cream with conscious indulgence, luxury, taste and integrity

- Consumers want ice cream that is simultaneously rich, indulgent and better-for-you. Macadamias cater to both these needs more effectively than any other ingredient



- Some chocolate and nut combinations have become a bit routine, but not macadamias! As a rarer ingredient in chocolate products, they inject extra excitement as well as accessible luxury, intrigue and a superior flavour profile

- Macadamias cater to demand for chocolate products that offer 'permissible indulgence' thanks to their health benefits and status as a sophisticated ingredient



Source:

1: Bakery Category and Macadamias: Western and Asian Consumer Insights, GALKAL, 2018

2: Snack Category and Macadamias: Western and Asian Consumer Insights, GALKAL, 2018

3: Ice Cream Category and Macadamias: Western and Asian Consumer Insights, GALKAL, 2018

4: Chocolate Confectionery Category and Macadamias: Western and Asian Consumer Insights, GALKAL, 2019

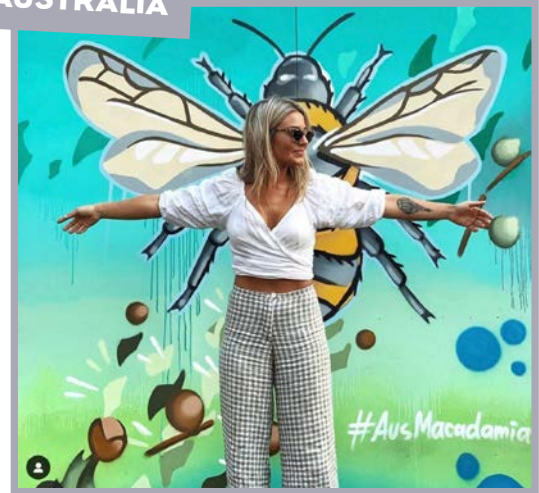
PROMOTION HIGHLIGHTS

The Australian Macadamias consumer promotion campaigns in Australia, Germany, Japan, China, South Korea and Taiwan have delivered a host of highlights in 2019, as we showed our audience the many ways that Australian grown macadamias can elevate food and life.



Macadamia bee mural at Sample Food Festival

AUSTRALIA



COLLABORATIONS AND PR

CHINA

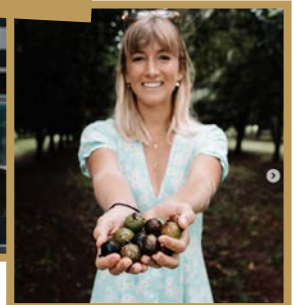


Collaborations with lifestyle, fitness, travel and creativity influencers appealed to our Chinese audience's desire to live their best life

AUSTRALIA



SBS Food Lab featured 4 macadamia recipes and a macadamia science segment



Collaboration with food and lifestyle influencer Ellie Bullen of Elsa's Wholesome Life

GERMANY



Macadamia-inspired 'Emperor's Mess' recipe from popular German food blogger

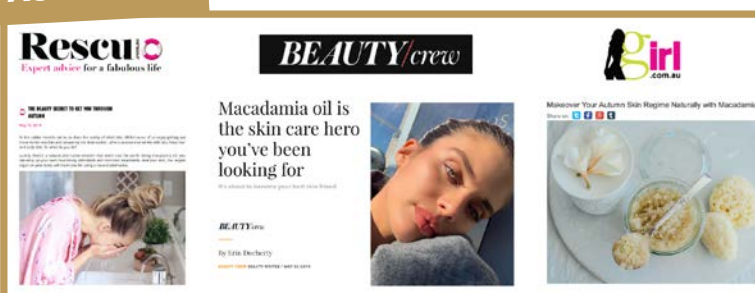
SOUTH KOREA



Collaborations with Korean food and health influencers produced unique content like this Macadamia Tangerine Latte

AUSTRALIA

Macadamia beauty PR campaign





OCCASIONS



Celebrating female macadamia growers on social media, blog and PR

SOUTH KOREA



Valentine's Day Facebook competition in Korea

CHINA



Chinese New Year macadamia character

TAIWAN



Taiwan Facebook campaign encouraged fans to enjoy screen-free time outdoors with macadamia picnic recipes



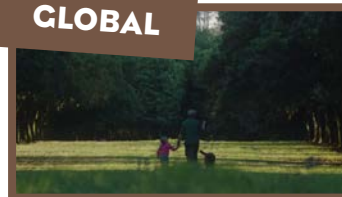
VIDEOS

GLOBAL



Bees and flowering in the orchard

GLOBAL



Meet macadamia farmer Austin

GLOBAL



Macadamia processing

AUSTRALIA



How to make crazy macadamia Halloween cupcakes

GLOBAL

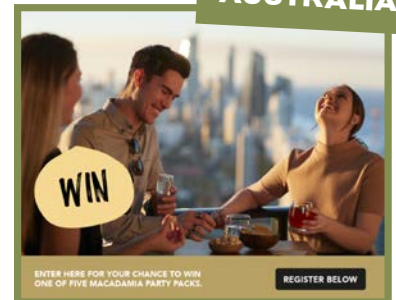


Macadamia sensory video



COMPETITIONS

AUSTRALIA



Win a macadamia party pack competition

JAPAN



Japanese fans shared their favourite macadamia recipe on Twitter for a chance to win a prize

GERMANY



Apple-macadamia energy bar giveaway

CHINA



Chinese Spring Festival competition gave fans the chance to win hampers containing macadamias and lifestyle gifts

HEALTH AND MACADAMIAS



Consumers are more interested in health and wellbeing than ever, and the body of evidence to support the role of nuts in living a long, healthy and happy life has grown substantially in recent years.

With the low-fat diet movement now a thing of the past and plant-based eating on the rise, nuts have become one of the most relevant foods for today's consumer – and macadamias are no exception. Enjoyed as a snack, as part of a main meal or applied as oil to the skin, macadamias offer a host of essential nutrients. They're also ideal as part of a Mediterranean or low FODMAP diet, as well as keto, paleo and vegan eating.

Macadamias are the richest source of healthy monounsaturated fats of all tree nuts and are abundant in phytochemicals that support a healthy heart and brain as well as protein and fibre.

ANTIOXIDANT POWER

Oxidative stress is caused by harmful free radicals that form in the body due to the numerous chemical reactions occurring. It contributes to inflammation, premature ageing and chronic diseases.^{1,2}

Studies show that eating naturally antioxidant-rich macadamia nuts as part of a diet filled with fruits, vegetables and wholegrains improves markers of oxidative stress therefore reducing your risk of chronic disease and premature ageing.³

Macadamias contain some of the highest levels of antioxidants of all tree nuts, including the antioxidant minerals manganese, magnesium and copper, which help keep the immune system healthy. They are also rich in tocotrienols – a form of vitamin E that shows antioxidant properties – that may help lower cholesterol and protect against cancer and brain diseases.^{4,5,6,7}

SKIN SUPPORT

The manganese in macadamias is essential for your skin to produce the collagen it needs to stay plump and wrinkle free. They are also high in palmitoleic acid to help replenish your skin's youthful glow¹⁹.

Macadamias are an excellent source of protein, calcium, potassium, dietary fibre and a number of antioxidants – all of which we need to maintain glowing skin, strong nails and shiny hair.

HEART HEALTH

In 2019, a systematic literature review around nuts and heart health⁸ showed that eating nuts, including macadamias, every day is associated with improvements in several aspects of heart health.

- **Macadamias and healthy cholesterol:** Regular consumption of nuts like macadamias has been shown to improve the ratio of 'good' (HDL) and 'bad' (LDL) cholesterol. Macadamia nuts are a rich source of phytosterols - natural, cholesterol-like substances found in many plant foods. Plant sterols can reduce cholesterol levels by being absorbed instead of some of the 'bad' (LDL) cholesterol, which results in reductions in blood cholesterol levels.⁹
- **Macadamias and blood pressure:** Macadamias contain the amino acid arginine, which acts as a precursor to the chemical messenger nitric oxide that causes blood vessels to dilate and remain elastic. This can reduce blood pressure among other benefits.¹⁰

HEALTHY WEIGHT

Eating a handful of macadamias every day can play a role in helping maintain a healthy body weight. They satisfy hunger and make us feel fuller for longer.

While many people used to think the high fat content of nuts would lead to weight gain, we now know this is not the case. The PREDIMED Trial found eating nuts as part of a balanced diet resulted in a reduction in participants' waist circumferences.¹¹

BRAIN AND MENTAL HEALTH

The copper, magnesium and manganese in macadamias help maintain healthy neurotransmitters in the brain, while their palmitoleic acid forms an important component of the myelin sheath that insulates and protects nerve cells to allow electrical impulses to transmit efficiently around the whole body, including in the brain.¹² Macadamias contain vitamin B1 (thiamine) that is essential for the proper functioning of your nervous system.

Having a healthy heart is linked to brain health¹⁴ and so the monounsaturated fats, vitamin E, antioxidants and other compounds in macadamias that are good for our heart will support our brain function too. Macadamias contain oleic acid (omega 9) which helps keep blood pressure low, reducing the risk of stroke.

A recent research trial showed that people who ate nuts regularly had a lower risk of depression.¹⁸

DIABETES MANAGEMENT AND PREVENTION

Macadamias are an ideal food for those with diabetes or raised blood glucose levels. Eaten on their own, they are a low-GI snack packed with healthy monounsaturated fats. They're also a perfect companion food to help lower the GI of carbohydrate-containing meals and snacks.¹³

- **Good for blood sugar levels:** containing only small amounts of carbohydrate, macadamias have a positive influence on blood glucose levels. The fat, protein and fibre they contain also helps lower the GI of a meal or snack that contains carbohydrates by slowing the digestion and therefore the release of glucose from carbohydrate-containing foods.¹³
- **A diabetes-friendly choice:** Nuts like macadamias also contain nutrients, fat, fibre and polyphenols that can help improve insulin function, meaning blood glucose levels don't rise as much after eating.
- **Diabetes prevention:** Eating nuts like macadamias can help with the prevention of type 2 diabetes. An analysis of multiple studies found eating 30g of nuts four times a week reduced the risk of developing type 2 diabetes by 13%.^{15,16,17}

GUT HEALTH

Just one handful of macadamia nuts contains 2g of dietary fibre, similar to a slice of wholemeal bread. Dietary fibre is important for bowel regularity.

Nuts like macadamias also contain prebiotic fibre. This is fibre that is a fermentable food for your gut's natural bacteria and fungi (called microflora). When this prebiotic fibre is fermented by gut bacteria, short chain fatty acid gases are produced that are beneficial to the lining of the gut. This activity plays a role in the production of the 'happy hormone' serotonin as well as influencing hormones that affect weight management, appetite, blood sugar levels and the immune system. So by eating prebiotic fibre you are stimulating a healthy colony of gut bacteria to benefit your overall health.

HEALTH AND WELLBEING REFERENCE LIST

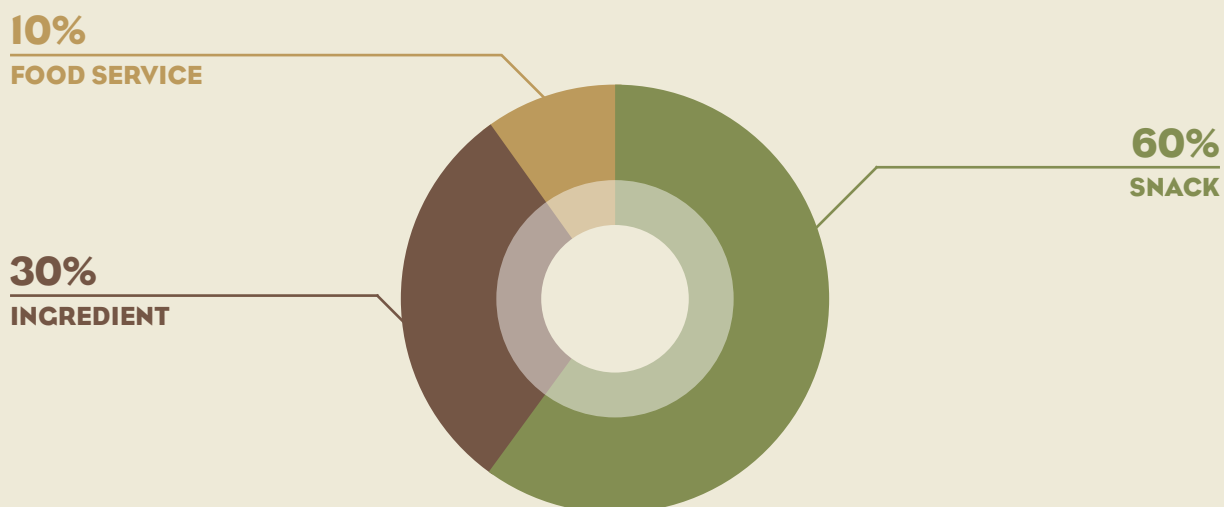
1. Bolling BW, Chen C-YO, McKay DL, Blumberg JB. Tree nut phytochemicals: composition, antioxidant capacity, bioactivity, impact factors. A systematic review of almonds, Brazils, cashews, hazelnuts, macadamias, pecans, pine nuts, pistachios and walnuts. *Nutr Res Rev*. 2011;24(2):244-275. doi:10.1017/S095442241100014X
2. Rahman K. Studies on free radicals, antioxidants, and co-factors. *Clin Interv Aging*. 2007;2(2):219-236. <https://www.ncbi.nlm.nih.gov/pubmed/18044138>
3. Garg M, et al. Macadamia Nut Consumption Modulates Favourably Risk Factors for Coronary Artery Disease in Hypercholesterolemic Subjects. *Lipids*. 2007;42(6):583-7
4. Bolling BW, McKay DL, Blumberg JB. The phytochemical composition and antioxidant actions of tree nuts. *Asia Pac J Clin Nutr*. 2010;19(1):117-123. <https://doi.org/10.1017/S095442241100014X>
5. Wall MM. Functional lipid characteristics, oxidative stability, and antioxidant activity of macadamia nut (*Macadamia integrifolia*) cultivars. *Food Chemistry*. 2010;121(4):1103-1108. doi:10.1016/j.foodchem.2010.01.057
6. Sen CK, Khanna S, Roy S. Tocotrienols: Vitamin E Beyond Tocopherols. *Life Sci*. 2006;78(18):2088-2098. doi:10.1016/j.lfs.2005.12.001
7. Garg ML, Blake RJ, Wills RBH, Clayton EH. Macadamia nut consumption modulates favourably risk factors for coronary artery disease in hypercholesterolemic subjects. *Lipids*. 2007;42(6):583-587. doi:10.1007/s11745-007-3042-8
8. <https://www.nutsforlife.com.au/resource/nuts-and-heart-health-a-summary-of-the-evidence/>
9. Rocha, M., et al., A review on the role of phytosterols: new insights into cardiovascular risk. *Curr Pharm Des*, 2011. 17(36): p. 4061-75.
10. Boger, R.H., The pharmacodynamics of L-arginine. *Altern Ther Health Med*, 2014. 20(3): p. 48-54.
11. Estruch, R., et al., Effect of a high-fat Mediterranean diet on bodyweight and waist circumference: a prespecified secondary outcomes analysis of the PREDIMED
12. Kim E, Ko HJ, Jeon SJ, et al. The memory-enhancing effect of erucic acid on scopolamine-induced cognitive impairment in mice. *Pharmacol Biochem Behav*. 2016;142:85-90. doi:10.1016/j.pbb.2016.01.006
13. Vigiiliouk E et al. Effect of tree nuts on glycemic control in diabetes: a systematic review and meta-analysis of randomised controlled trials. *PLoS One* 2014;9(7):e103376
14. Grodstein F. Cardiovascular risk factors and cognitive function. *Alzheimers Dement*. 2007;3(2 Suppl):S16-22. doi:10.1016/j.jalz.2007.01.001
15. Afshin A, et al. *Am J Clin Nutr*. 2014 Jul;100(1):278-88
16. Fleischer, D.M., Conover-Walker, M.K., Matsui, E.C. and Wood, R.A. The natural history of tree nut allergy. *Journal of Allergy and Clinical Immunology*. 2005 Nov;116(5):1087-93
17. Allen KJ, Hill DJ, Heine RG. Food allergy in childhood. *Med J Aust*. 2006;185:394-400.
18. Jacka FN, et al. A randomised controlled trial of dietary improvement for adults with major depression (the 'SMILES' trial). *BMC Medicine*, 2017. 15(1): p.23.
19. <https://www.nutsforlife.com.au/resource/macadamias/>

AUSTRALIAN MACADAMIA SALES

Australian kernel sales grew strongly, up 28% in the 12 months to June 2019, with more than 70% of the total crop exported.

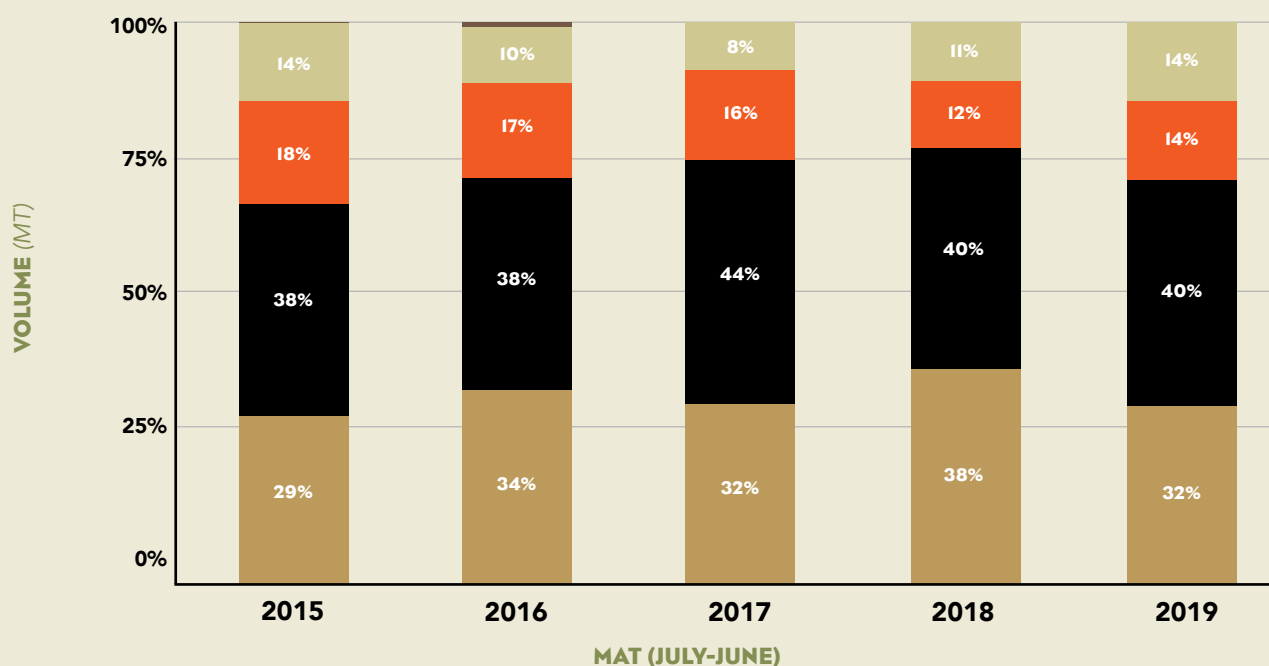
Growth was across the board with the strongest being in sales to USA (+72%), Germany (+62%) and Japan (+38%). Sales to other Asian and European markets also grew strongly indicating a broadening of distribution beyond established markets. In-shell sales fell by 16% in the period, aligning with Australia's focus on developing and supporting kernel markets.

FIGURE 6: GLOBAL USAGE OF AUSTRALIAN KERNEL BY SEGMENT



Source: Industry estimates

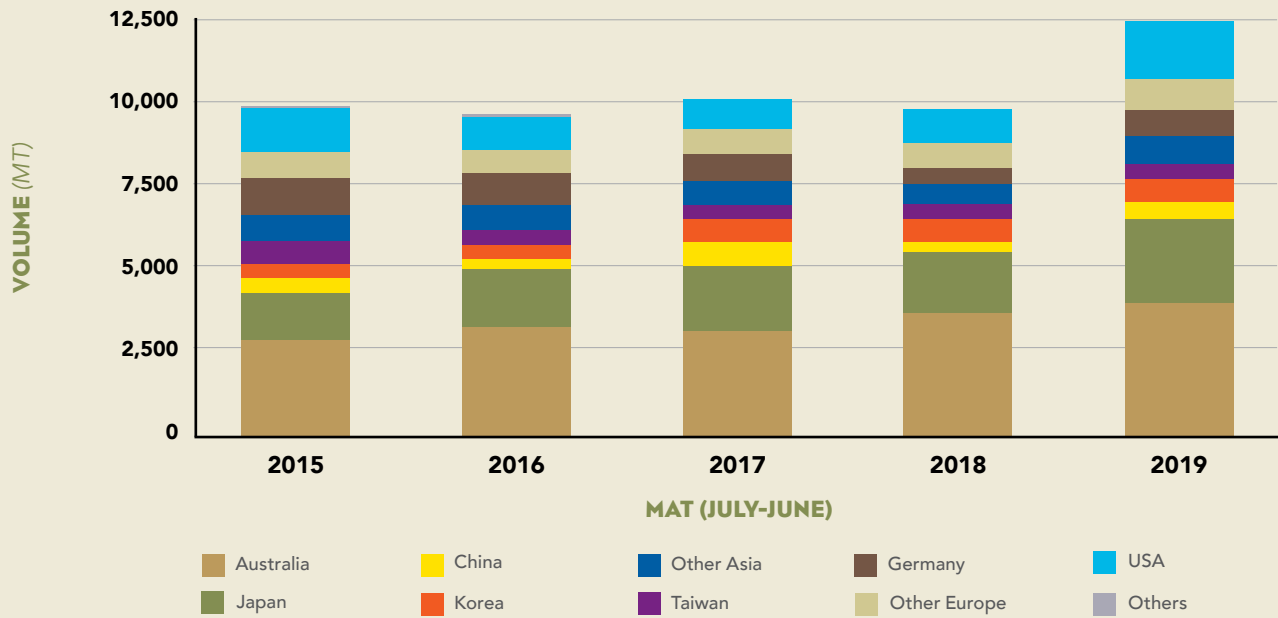
FIGURE 7: AUSTRALIAN KERNEL SALES DISTRIBUTION BY REGION (VOLUME): MAT



Source: Australian Macadamia Handlers Association

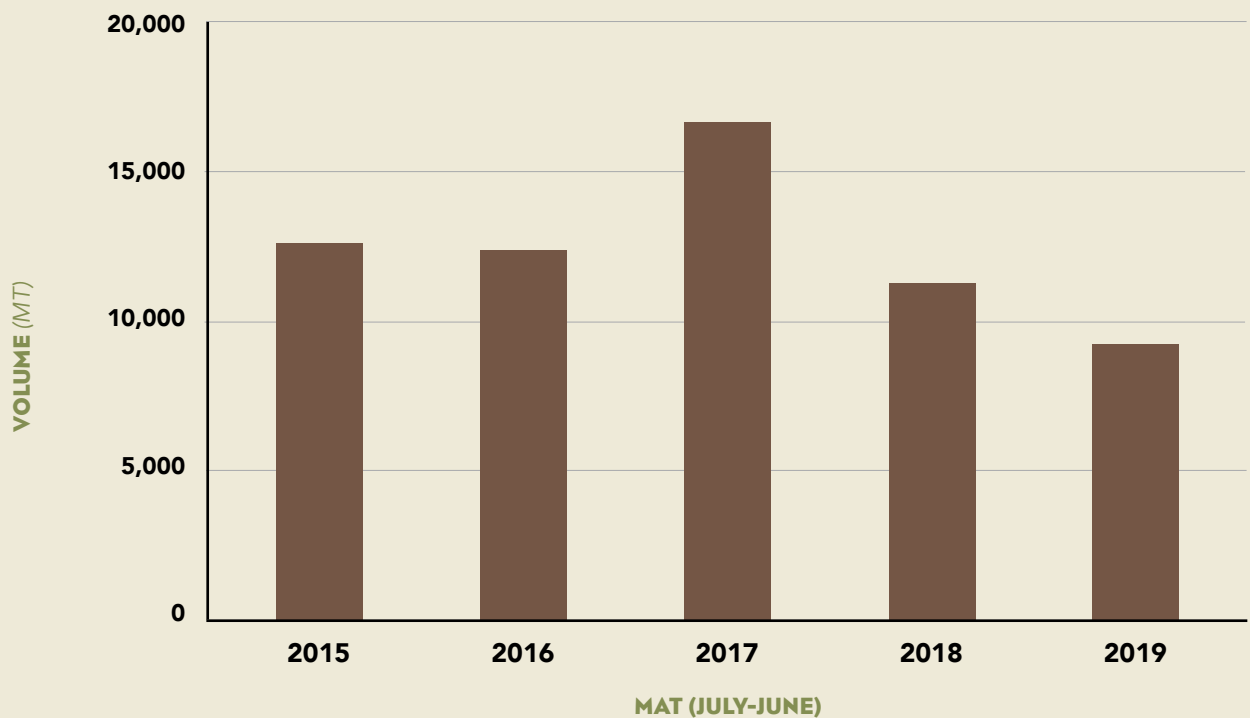
Australia Asia Europe US Other

FIGURE 8: AUSTRALIAN KERNEL SALES BY MARKET (VOLUME) MAT



Source: Australian Macadamia Handlers Association

FIGURE 9: TOTAL AUSTRALIAN IN SHELL SALES (VOLUME AT 3.5% MOISTURE) MAT

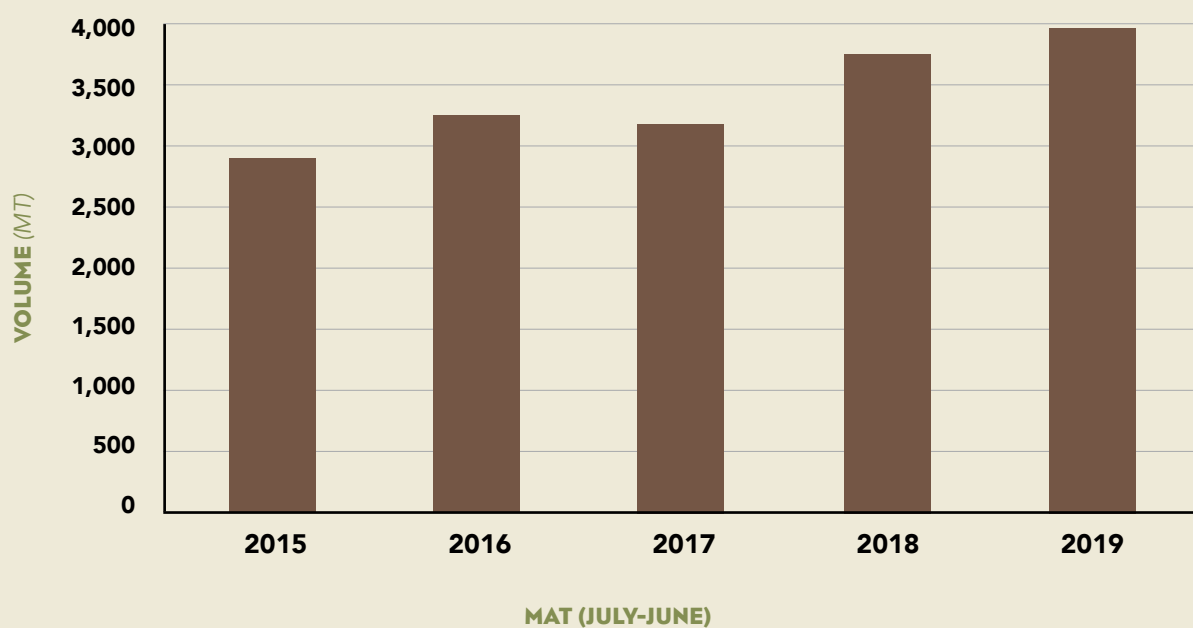


Source: Australian Macadamia Handlers Association

AUSTRALIA

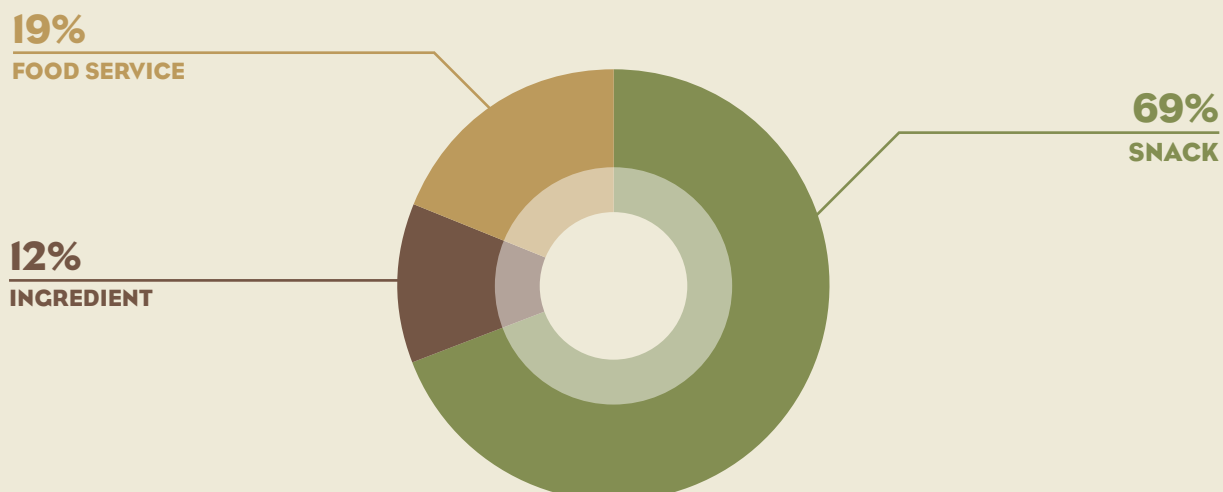
Australia is the second largest consumer of macadamia kernel in the world behind the United States and more than 95% of the kernel consumed in this market is Australian origin. Sales rose to this market over the last 12 months. Penetration into Australian households has remained relatively stable, however the number of shopping occasions has risen by 5% and dollars spent per occasion has risen by 3%. Average volume purchased per occasion was flat.

FIGURE 10: AUSTRALIAN MACADAMIA KERNEL SALES (VOLUME) TO THE DOMESTIC MARKET



Source: Australian Macadamia Handlers Association

FIGURE 11: MACADAMIA KERNEL USAGE BY SEGMENT, AUSTRALIA



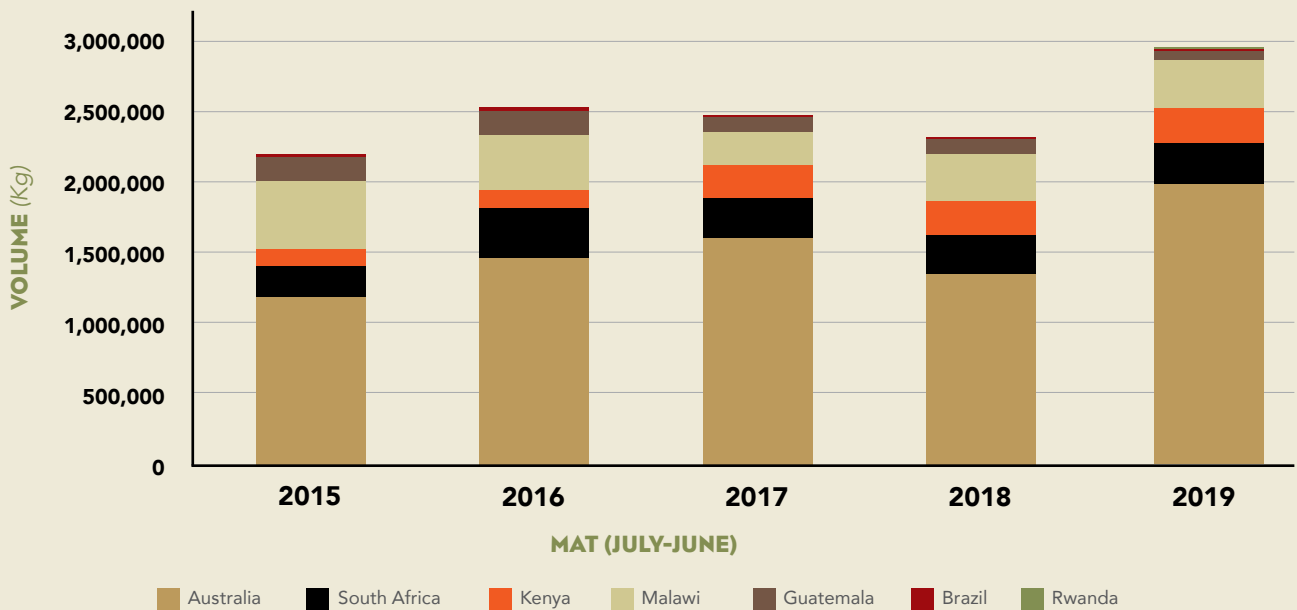
Source: Industry estimates

JAPAN

Macadamia imports to Japan reached their highest level ever in the 12 months to June 2019, up by 27% overall. Australian imports grew 36%, and Australia continued to be the major supplier with 67% of imports.

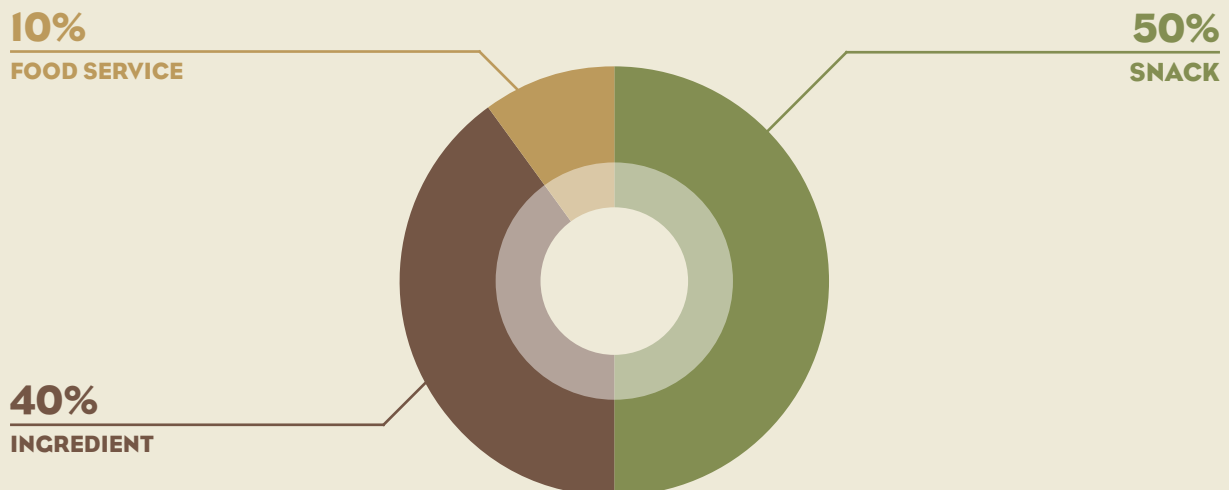
Japan is a well-established market that has traditionally used macadamias primarily as an ingredient (in chocolate confectionery) however in recent years there has been considerable expansion into use in snacking, especially in premium nut mixes, there has also been an increase in use in bakery products such as cookies.

FIGURE I3: MACADAMIA KERNEL IMPORTS (VOLUME) TO JAPAN



Source: Macadamia kernel imports (volume) to Japan

FIGURE I2: MACADAMIA KERNEL USAGE BY SEGMENT, JAPAN



Source: Industry estimates

CHINA

Total macadamia kernel imports to China and Hong Kong were flat in the 12 months to June 2019. Australia continued to be the major supplier with 74% of imports.

Total macadamia in shell imports to China and Hong Kong were down significantly in the 12 months to June 2019. South Africa and Australia were the major suppliers with 36% and 31% of imports respectively.

Increases in the domestic China crop is a major factor contributing to reduced in shell imports.

Kernel use in China is still low compared to in-shell, however this segment is expected to develop strongly in coming years.

Macadamia usage in China is currently skewed heavily to snack format.

FIGURE 14: MACADAMIA USAGE BY SEGMENT, CHINA

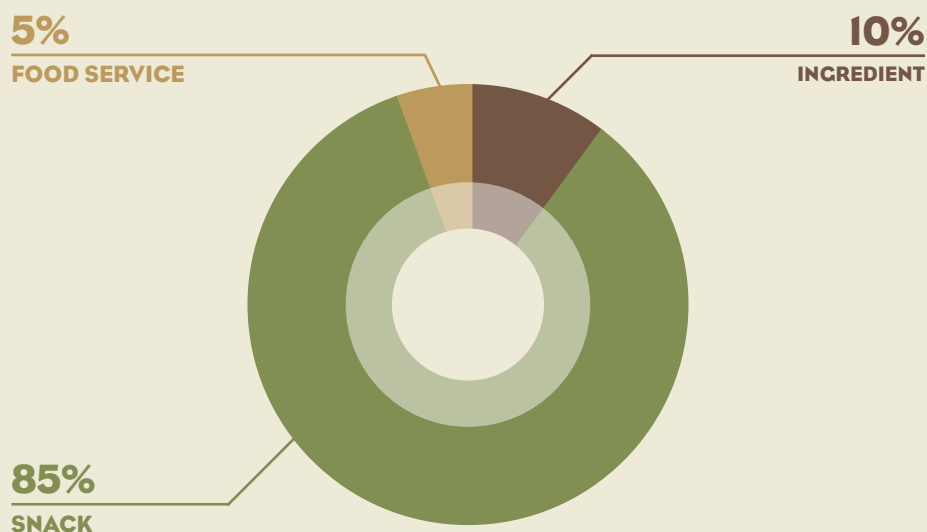


FIGURE 15: MACADAMIA USAGE ESTIMATE, CHINA

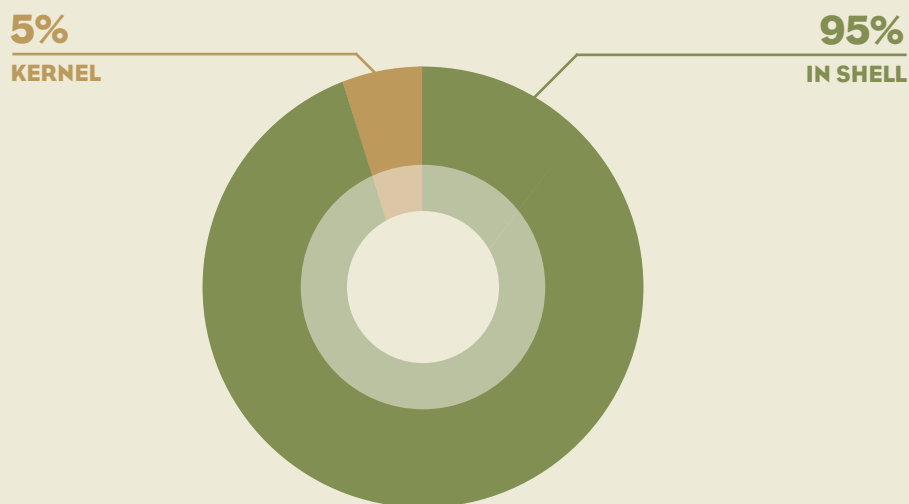


FIGURE 16: MACADAMIA KERNEL IMPORTS (VOLUME) TO CHINA AND HONG KONG (SUMMED)

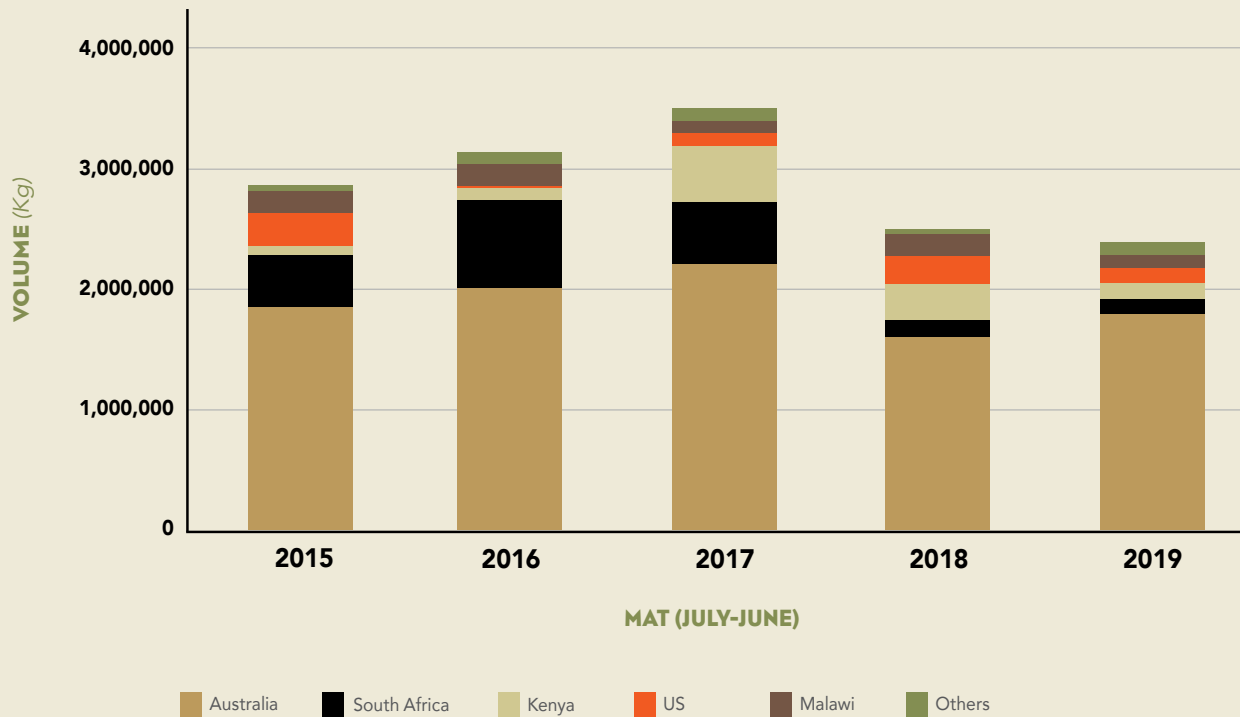
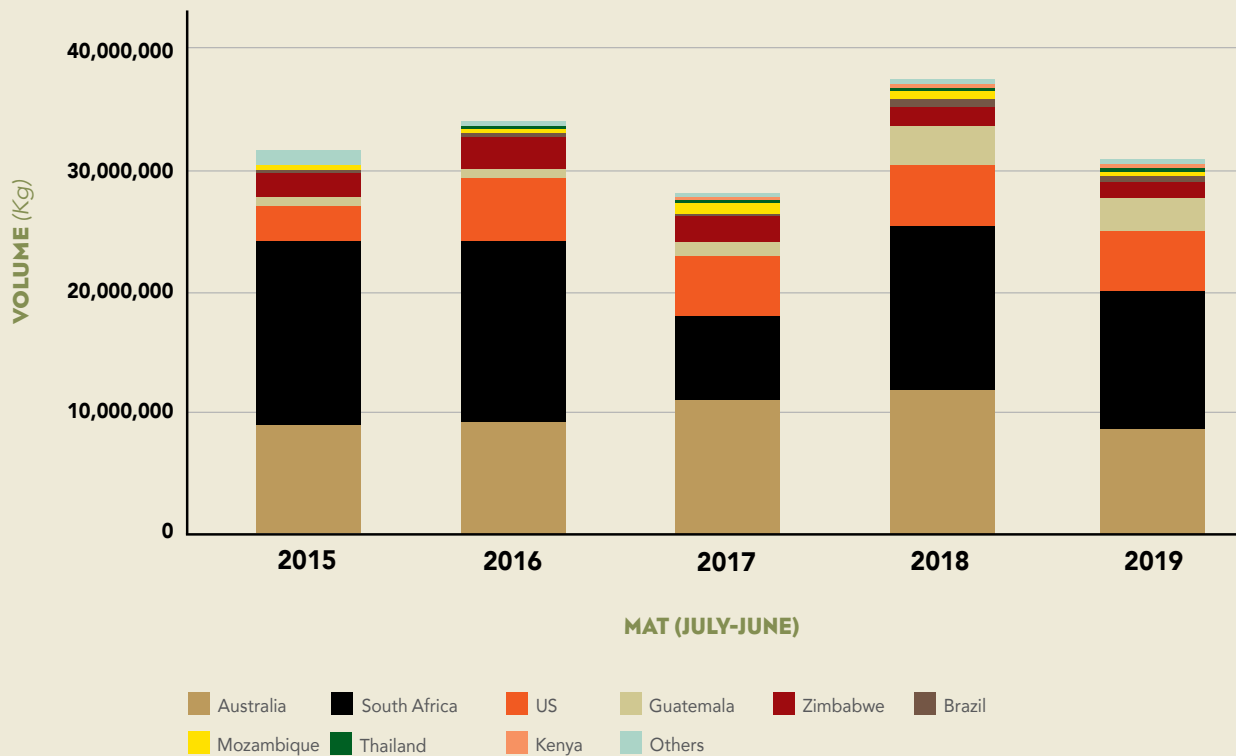


FIGURE 17: MACADAMIA IN SHELL IMPORTS (VOLUME) TO CHINA AND HONG KONG (SUMMED)

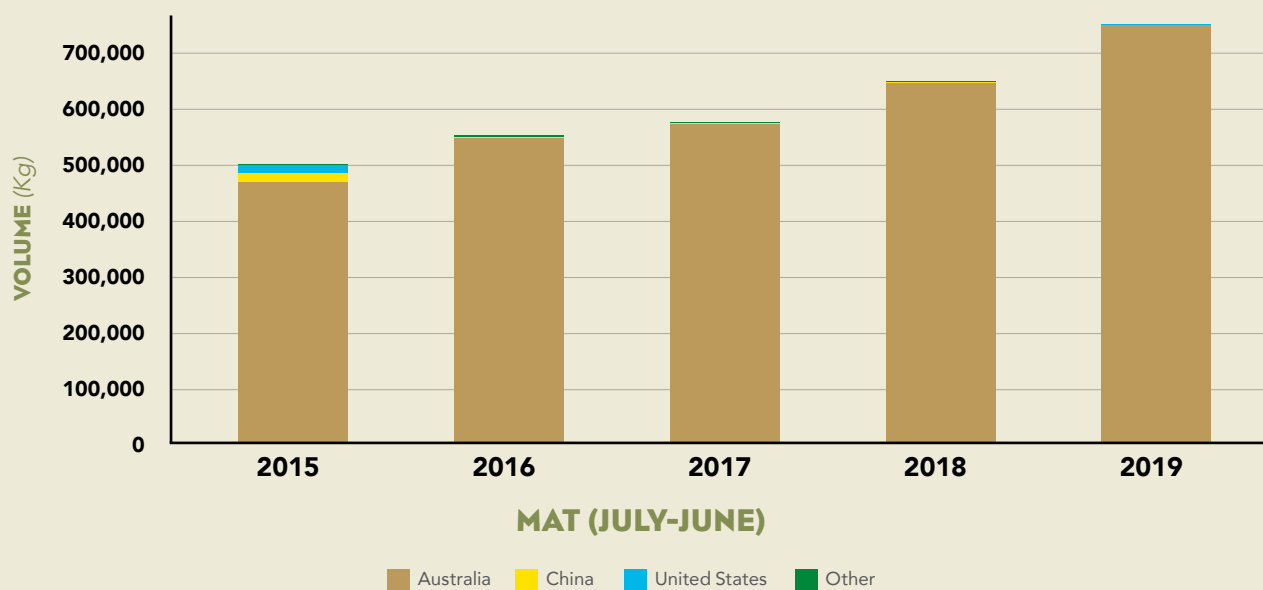


SOUTH KOREA

Total macadamia kernel imports to South Korea continued to rise in the 12 months to June 2019, up 13% over the prior year. Australia continued to be the dominant supplier with 99% of imports.

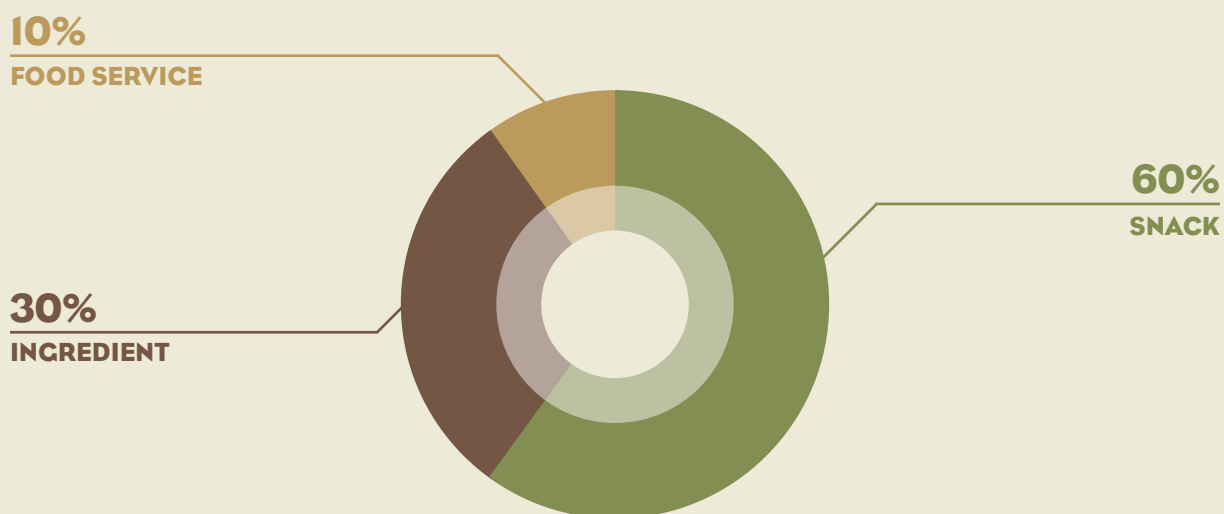
Macadamia usage in South Korea is primarily in a snack format, often in daily nut mixes. There is considerable scope and expectation of further growth in this market.

FIGURE 18: MACADAMIA KERNEL IMPORTS (VOLUME) TO SOUTH KOREA



Source: Korea Customs and Trade Development Institution

FIGURE 19: MACADAMIA KERNEL USAGE BY SEGMENT, SOUTH KOREA



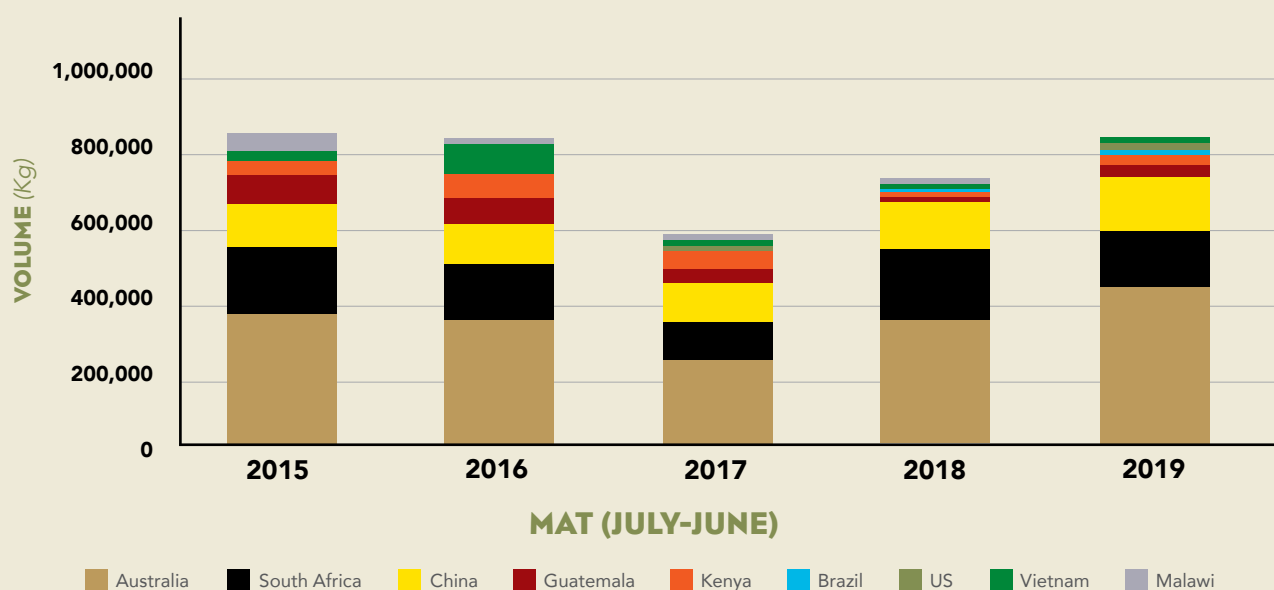
Source: Industry estimates

TAIWAN

Total macadamia kernel imports to Taiwan continued to rise in the 12 months to June 2019, up 15% over the prior year. Australia continued to be a major supplier with 53% of imports.

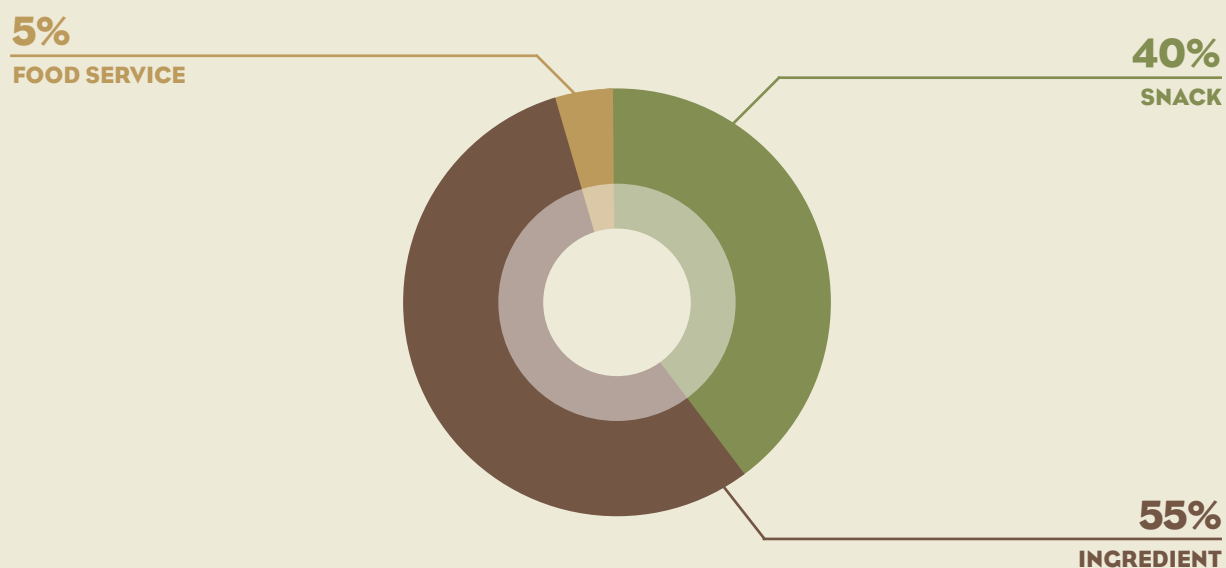
Macadamia usage in Taiwan is primarily as an ingredient in nougat and bakery products. Usage in snack is growing in both straight macadamia and mixed nut lines.

FIGURE 20: MACADAMIA KERNEL IMPORTS (VOLUME) TO TAIWAN



Source: Taiwan Directorate General of Customs

FIGURE 21: MACADAMIA KERNEL USAGE BY SEGMENT, TAIWAN



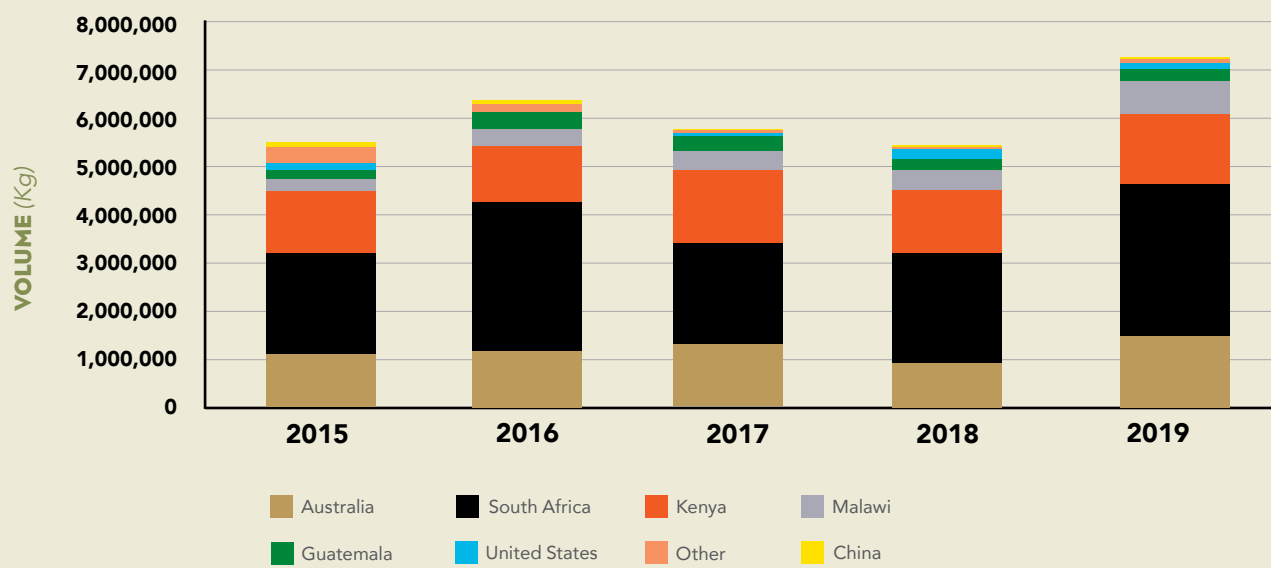
Source: Industry estimates

EUROPE

Total macadamia kernel imports to Europe rose significantly in the 12 months to June 2019, up 35%, reaching the highest volume on record. Australian share of imports rose slightly to 20% with South Africa the major supplier to this market at 43% of imports.

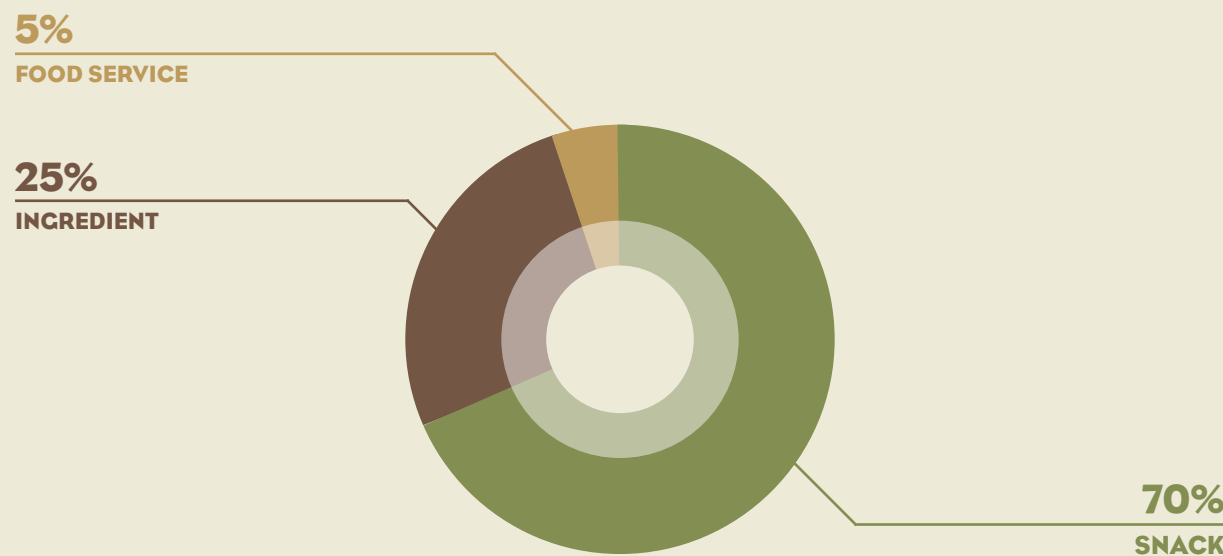
Macadamia usage in Europe is primarily as a snack product.

FIGURE 22: MACADAMIA KERNEL IMPORTS (VOLUME) TO EUROPE



Source: Eurostat

FIGURE 23: MACADAMIA KERNEL USAGE BY SEGMENT, GERMANY



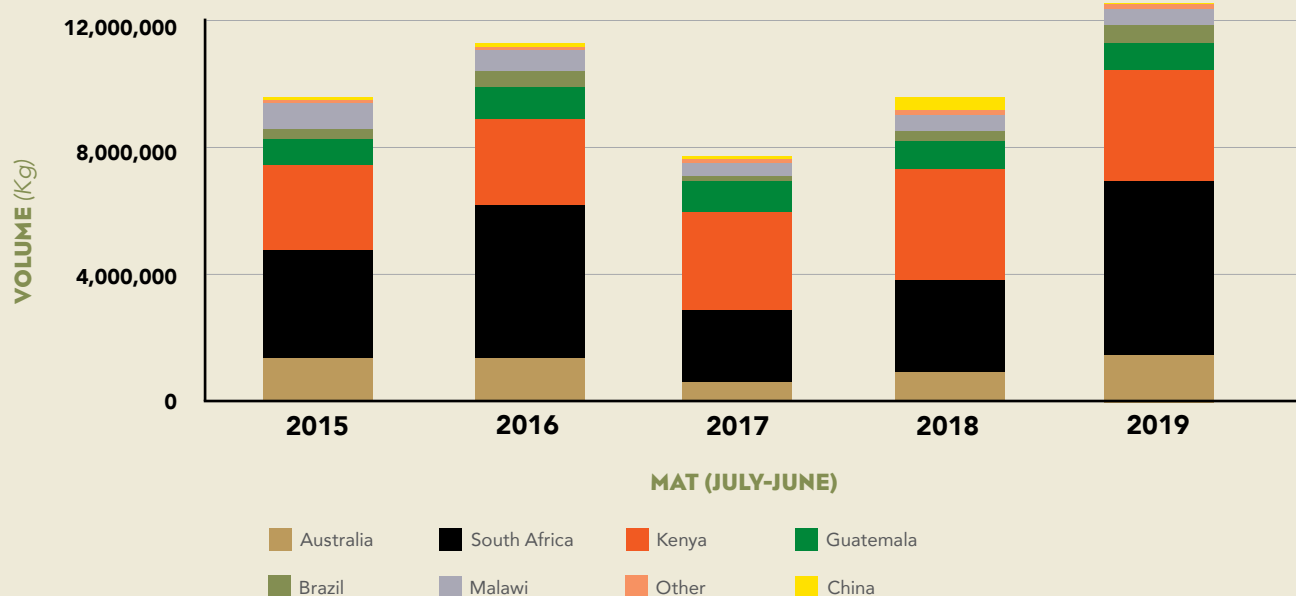
Source: Industry estimates

UNITED STATES

Total macadamia kernel imports to the United States rose significantly in the 12 months to June 2019, up 34%, reaching the highest volume on record. Australian share of imports rose slightly to 12%. South Africa is the major supplier followed by Kenya at 45% and 28% respectively.

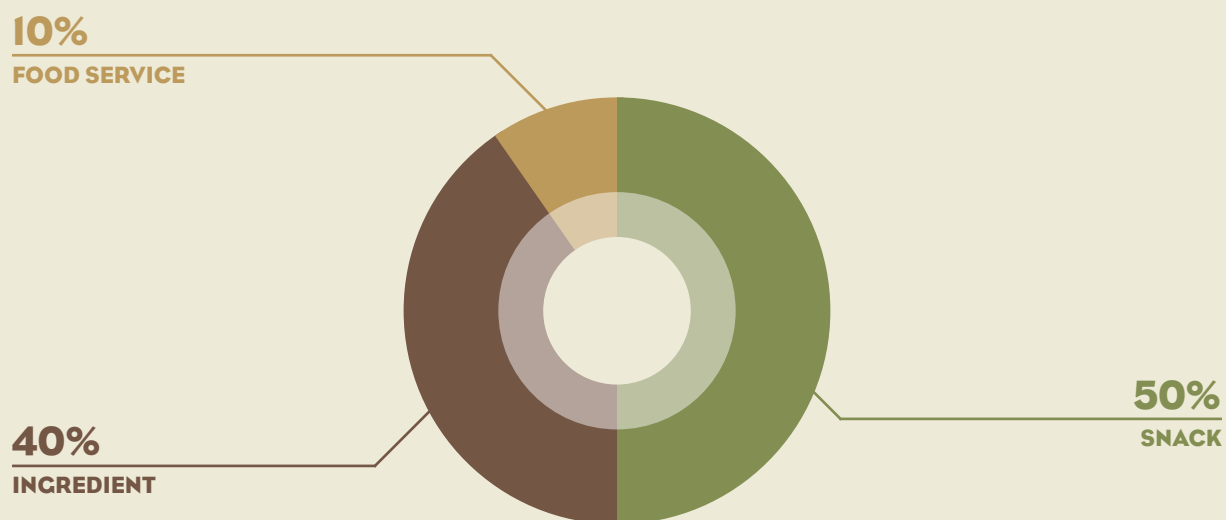
Macadamia usage in the United States is fairly evenly split between snack and ingredient.

FIGURE 24: MACADAMIA KERNEL IMPORTS (VOLUME) TO USA



Source: USDA

FIGURE 25: MACADAMIA KERNEL USAGE BY SEGMENT, UNITED STATES



Source: Industry estimates

Keep up to date with our latest news by subscribing to our trade newsletter at:

[Australian-Macadamias.org/trade](https://australian-macadamias.org/trade)

For further information please contact:

Lynne Ziehlke

Australian Macadamias General Manager Marketing

T: +61 2 6622 4933

E: lynne.ziehlke@macadamias.org