

Unlocking innovation: technical tools driving new macadamia applications

Words by Kerridyn Hooker



Application Solutions Guide – chocolate macadamia spread (Image courtesy of Australian Macadamia Society).

Global macadamia production is rising rapidly, with supply projected to double over the next five years¹ as new orchards mature and on-farm productivity improves. This growth presents major opportunities for food manufacturers and Australia's macadamia industry – a leading supplier of premium-quality kernels.

While demand for whole kernels and large halves continues to dominate established markets, the anticipated surge in production will increase the supply of smaller kernel pieces, known in the industry as ingredient styles (styles 4S to 8). Ingredient-style macadamias deliver distinctive texture, flavour and visual appeal to sweet or savoury applications, offering a broad scope for product innovation across all meal occasions.

Recognising the need to unlock this

potential, the Australian Macadamia Society (AMS) partnered with the Queensland Department of Primary Industries (QDPI) Food Innovation team and Hort Innovation to develop a range of cornerstone resources: the *Australian Macadamias Technical Guide*² and 13 *Application Solutions Guides* (ASGs).³

Designed as practical tools for the food sector, the guides provide a structured framework for food technologists and product developers to incorporate macadamias into diverse applications – from bakery and confectionery to savoury snacks, chocolates, dips and spreads. Together, they streamline product development and support the creation of high-value macadamia-based foods. By combining robust technical data with applied product development concepts, the guides enable manufacturers to

reduce innovation risk, fast-track raw material approvals, shorten development timelines, accelerate speed-to-market and elevate premium product positioning.

Australian Macadamias Technical Guide: a foundational resource

The *Australian Macadamias Technical Guide* was designed to equip food professionals with an accessible, comprehensive reference on the technical properties of macadamias. Developed through an iterative, evidence-based process involving extensive desktop research, stakeholder consultation and multiple rounds of refinement, it provides a robust foundation for industry use. The guide consolidates essential technical information to support food technologists in confidently introducing macadamias into food production facilities while ensuring safety and quality.

Key sections include:

- **Macadamia industry overview** – a summary of the Australian industry, including seasonality, nut life cycle, anatomy, crop management practices and quality standards
- **Kernel specifications** – detailed descriptions of grades, styles and processing options, including nutritional profile, quality attributes, shelf-life and compliance requirements
- **Storage and handling** – best practice guidelines for maintaining kernel integrity during processing and storage
- **Application considerations** – guidance on the suitability of macadamias across various value-added foods, supported by a matrix linking styles to specific product categories, and highlighting their functional and sensory contributions.

The guide provides food industry professionals with clear, reliable technical data to inform risk assessments, storage and handling protocols, and quality compliance prior to the approval and utilisation of macadamias in food manufacturing.

Application Solutions Guides: incorporating macadamias in food innovation

Building on the foundational knowledge provided in the *Australian Macadamias Technical Guide*, the 13 ASGs take a more targeted and application-focused approach. They were designed for food technologists, quality teams and brand managers seeking practical, step-by-step solutions for incorporating macadamias into value-added foods.

Developed through extensive market analysis, concept definition, product development, process optimisation and technical validation, the ASGs translate industry insights into ready-to-implement product concepts. Each ASG focuses on a specific product category, providing detailed technical direction tailored to real-world manufacturing environments. These guides translate macadamia functionality into actionable solutions, facilitating the creation of category-relevant, commercially viable end products.

The development began with a review of more than 600 macadamia-containing products, which QDPI consolidated into 60 concepts of interest. Through collaborative industry workshops, the concepts were prioritised based on their alignment with consumer trends and market needs, the likelihood of commercial uptake, technical and operational complexity, and gaps in publicly available information.

From this process, five high-potential focus areas were identified: nut pastes, dips, bakery, praline fillings, and snacks. These categories were refined to develop the 13 ASGs, each showcasing technically robust product concepts designed for depth, relevance and practical utility across Australian and Asian markets. Each ASG includes base formulations, detailed processing flowcharts, shelf-life considerations and recommendations for macadamia format, dosage rate and pre-treatments. They also outline key functional attributes, specific manufacturing considerations and flavour suggestions for line



Macadamia nut mini tarts (Image courtesy of Australian Macadamia Society).



Macadamia pesto (Image courtesy of Australian Macadamia Society).

extensions and related products.

Throughout the project, QDPI drew on their extensive industry and innovation experience to ensure the solutions were consumer-relevant, technically feasible, reproducible and aligned with food safety and quality standards. The concepts in the ASGs are versatile and can be readily adapted to meet end-user, consumer and market needs. By integrating guidance on formulation, processing and sensory optimisation, the ASGs provide a framework for developing and adapting macadamia-based

products across varied manufacturing environments.

Applications and innovations

Ingredient-style macadamias demonstrate remarkable versatility, as demonstrated by the product concepts explored in the ASGs. They are well suited to both sweet and savoury applications, across all parts of the day, meal occasions and market sectors. Macadamia products also align closely with current consumer trends for nutritious yet indulgent foods, convenient snacking,



Sweet raspberry coated macadamia pieces on cheesecake (Image courtesy of Australian Macadamia Society).

balanced nutrition, global flavours, premiumisation and transparent provenance.^{4,5,6}

Nut pastes, for example, showcase macadamias' ability to deliver creaminess, richness and natural indulgence, making them ideal for spreads or fillings. Smooth and chunky variations offer flexibility for different applications, while chocolate macadamia spreads highlight compatibility with premium, decadent ingredients. Such products cater to the growing demand for clean-label, plant-based options that maintain strong sensory appeal. From a technical perspective, macadamias perform well in paste applications due to their naturally high monounsaturated oil content, which imparts a smooth, creamy texture and rich mouthfeel. The high fat content and fine particle size achieved through milling promote excellent spreadability and emulsion stability, while maintaining a clean, decadent sensory profile.

Dips, such as macadamia-based pesto and hummus, provide another avenue for innovation.

Inspired by mainstream favourites, the incorporation of macadamias elevates product positioning by adding a creamy texture, new flavour dimension and favourable nutritional profile. The ASGs outline precise formulations and processes to support shelf-life stability, offering manufacturers solutions tailored to both fresh and extended shelf-life products.

In bakery applications, macadamias enhance both functionality and presentation. The ASGs provide market-specific solutions for Australian and key Asian markets, addressing processes where macadamias are exposed to direct or indirect heat. Products like cookies, brownies, and crumbles benefit from the nut's ability to add crunch and richness, while smaller kernel styles enhance the visual appeal and perceived quantity of inclusions. Regional specialties, such as Taiwanese mini tarts and mooncakes demonstrate macadamia's adaptability to cultural preferences, blending premium positioning with traditional formats.

Praline fillings, whether used in chocolate or bakery products, leverage the macadamia's rich flavour and smooth texture to deliver high-quality, stable formulations. Their mild, buttery flavour complements a wide range of sweet bases – from caramel and chocolate to spice blends – enhancing formulation flexibility across product types. Technically, macadamias perform well under both thermal and mechanical processing, supporting stable emulsions and reliable performance throughout extended shelf-life. These attributes make macadamia pralines highly adaptable for both pre- and post-bake use, combining sensory indulgence with process reliability.

Snack applications represent a rapidly expanding market segment where macadamias excel. Coated macadamia snack concepts were developed with both wet and dry coating systems, showcasing their versatility. Seasoning options such as Korean Bulgogi and salted maple illustrate the nut's ability to align with global flavour trends while maintaining textural integrity and flavour balance. The ASGs provide detailed guidance on coating processes and ingredient interactions to ensure the macadamias retain their distinct crunch and buttery flavour throughout production and storage.

Across all applications, the ASGs offer comprehensive, practical guidance on processing techniques to preserve macadamia quality and ensure consistent performance during industrial-scale production.

Implications for the food industry

The *Australian Macadamias Technical Guide* and ASGs mark a significant advancement in supporting industry to utilise smaller macadamia styles effectively. By providing clear, scientifically grounded guidance, these resources enable food technologists to optimise formulations, shorten development timelines and improve operational efficiency. Detailed recommendations on kernel selection, processing methods, and sensory optimisation equip manufacturers

with the confidence to incorporate macadamias into both existing and novel food products.

The guides also foster innovation by demonstrating macadamias' multifunctionality across diverse applications. Whether enhancing creaminess in a dip, adding crunch to a bakery filling or elevating the flavour profile of a praline, macadamias offer a unique combination of functional and sensory benefits. By increasing the utilisation of ingredient-style kernels, manufacturers can diversify product offerings, meet consumer expectations for premium and clean-label foods, and respond to the growing global supply of macadamias. For the macadamia industry, this translates to greater market demand, improved grower returns and enhanced resilience in an increasingly competitive landscape.

In summary, as global macadamia supply continues to expand, innovative approaches to utilising smaller kernel styles are increasingly important. Often overlooked, these smaller kernels hold considerable potential to drive value-added innovation. The *Australian Macadamias Technical Guide* and ASGs provide a robust framework to help product developers overcome technical challenges and unlock the full potential of macadamias as a versatile food ingredient.

By bridging technical knowledge and practical application, the guides enable food technologists to explore macadamias' versatility and functionality with confidence. Whether developing a new bakery product, a snack, or savoury dip, macadamias offer a distinctive ingredient capable of transforming formulations and creating unique consumer experiences. Equipped with these resources, the food industry is well-positioned to harness the opportunities presented by macadamias and drive innovation in a dynamic, evolving market.

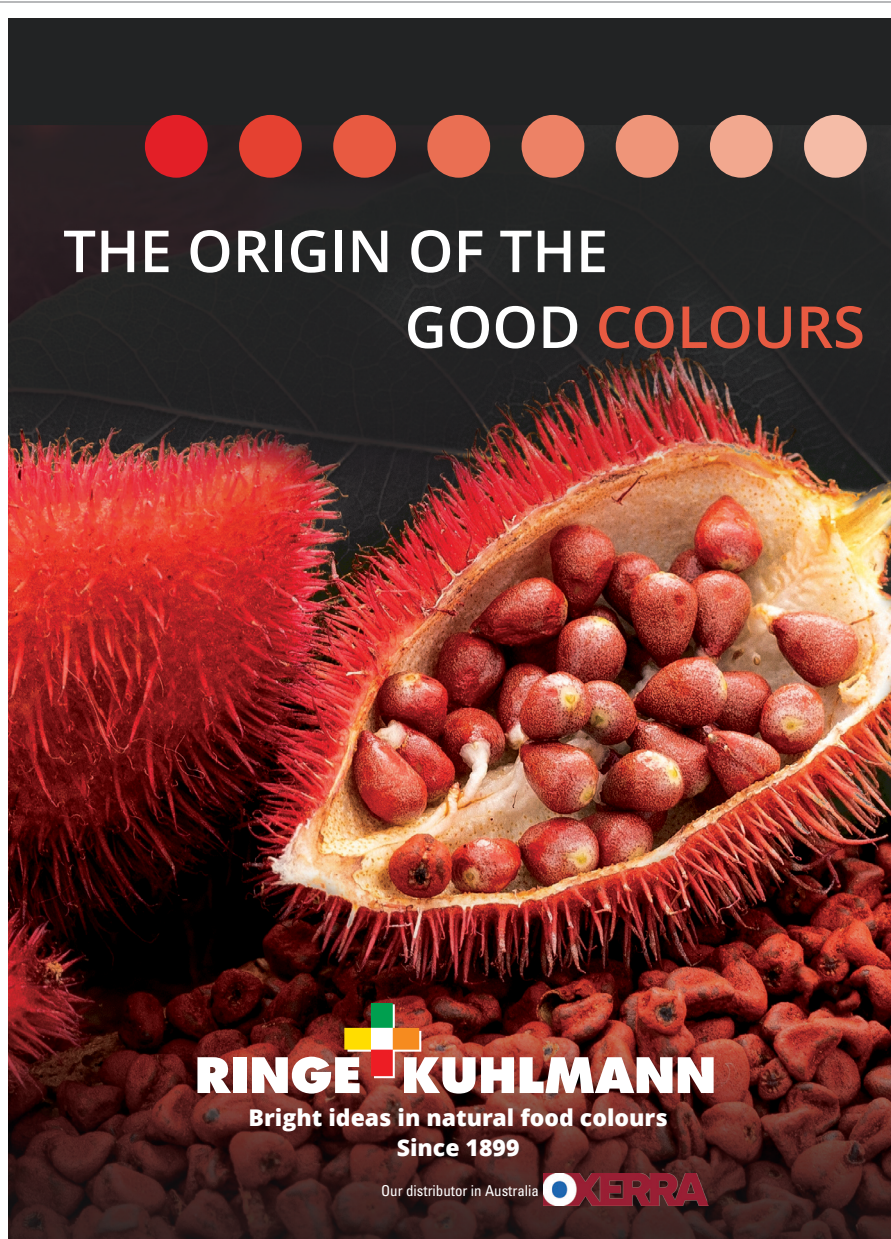
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