Horticulture Innovation Australia

Final Report

Vital Vegetables 2 - Australian Component

Bruce Tomkins
The Dept of Economic Development& Resources

Project Number: VG08142

VG08142

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vitalvegetables™

HAL Final Report

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Project Leader:
Bruce Tomkins,
Department of Primary Industries, Victoria
Knoxfield Centre
Private Bag 15 Ferntree Gully DC
Victoria 3156
Australia
Tel: +61392109222
Fax: +6198003521
Mob: 0409772994
e-mail: bruce.tomkins@dpi.vic.gov.au

Other key personnel included Rod Jones, Graeme Thomson, Russell Sully, Michael Slater, Andrew Grace, Christine Frisina, Sonja Winkler, Janet Tregenza, Janine Jaeger & Craige Trennery.

Purpose of Report: This final report describes the outcomes of the Australian component of a four year research project that developed and commercialised functional vegetable products for the Australian and New Zealand vegetable industries. It provides the process and proof of concept to support the commercialisation and marketing of differentiated vegetable products in the global market that have naturally high nutrient levels, great taste, flavour and long shelf life.

Funding Sources:
The research programme described here was funded through HAL by the Australian national vegetable levy and funding from voluntary contributions from the Department of Primary Industries Victoria, Horticulture New Zealand and Plant and Food Research with matched funds from the Australian Government

Date: 31st December 2012

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Abbreviations

R&D	Research & development
PFR	New Zealand Institute for Plant & Food Research Limited
DPI	Department of Primary Industries, Victoria
HAL	Horticulture Australian Limited
AUSVEG	National Peak Industry Body for Australian Vegetable and Potato Growers
VVEM	Vital Vegetables Executive Manager
VVOT	Vital Vegetables Operations Team
VVMP	Vital Vegetables Marketing Partners
VVRP	Vital Vegetables Research Partners
VVGP	Vital Vegetables Genetics Partners
VVGG	Vital Vegetables Governance Group
VVI	Vital Vegetables Programme I
VV2	Vital Vegetables Programme 2
ItL	Idea to Launch Process
RDI	Recommended Dietary Intake
NIP	Nutrition Information Panel
FSANZ	Food Standards Australia New Zealand
P293	FSANZ proposal 293 – nutrition, health & related claims

VG08142 **vital**vegetables® 2 – Australian Component

Media summary

The **vital**vegetables® programme is a trans-Tasman collaborative research and development joint venture charged with developing and commercialising new high value, health promoting vegetables for the Australian and New Zealand horticulture industries. At its inception, the philosophy of **vital**vegetables® was to provide a research, germplasm and marketing framework to enable Australian and New Zealand vegetable growers to move their industry towards differentiated, higher value products that deliver enhanced health benefits to consumers. This shift in thinking was in part driven by recognition of the growing strength of low-wage economies in the international vegetable market which is reducing the viability of commodity vegetable production in Australia and New Zealand coupled with the desire to grow profitability of the local vegetable industry. Addressing this trend remains a priority for both the Australian and New Zealand vegetable industries.**vital**vegetables® products have been developed for their naturally high nutrient levels, great taste, flavour and long shelf life. To achieve this, the project first established research principles and analytical methods that supported production of high health vegetables. Each step of production from seed selection, agronomy, harvesting, processing, packaging to distribution was investigated and optimised to ensure consistent year-round quality of **vital**vegetables® products.

The major outcome is a mechanism and proof of concept that supports the commercialisation and marketing of differentiated vegetable products in the global market. The ultimate goal of this programme is to increase vegetable consumption by providing consumers with a series of new health benefit value propositions. The benefits are embodied in the **vital**vegetables® sub-brands: **vital**heart™, **vital**sight™, **vital**bones™, **vital**fibre™ and **vital**immunity™.

vitalvegetables® is a new category of vegetables that has a strong focus on consumer health and has been launched on a trial basis in Australia (August 2009) and successfully introduced to the New Zealand market (October 2012). The category will be relaunched in Australia when the expression of interest for the commercial rights to the vitalvegetables® brand is completed and the commercial marketing partner appointed. Five products have been launched in NZ, **vital**heart™, **vital**sight™ and **vital**bones™ salad mixes; **vital**immunity™ slaw; and **vital**immunity™ medley. Another four products have been developed to the Launch-Ready Phase of product development for the Australian market: **vital**immunity™ Booster™ fresh broccoli florets, **vital**sight™ carrots and **vital**immunity™ fresh **vital**medley™. Around 30 more products are in the product development pipeline at various stages of development. Each product contains naturally high levels of nutrients known to be good for health and each serve contains at least 25% of the suggested daily intake of antioxidants.

Technical summary

The **vital**vegetables® programme is a trans-Tasman collaborative research and development joint venture charged with developing and commercializing new high value, health promoting vegetables for the Australian and New Zealand horticulture industries. At its inception, the philosophy of **vital**vegetables® was to provide a research, germplasm and marketing framework to enable Australian and New Zealand vegetable growers to move their industry towards differentiated, higher value products that delivered enhanced health benefits to consumers. This shift in thinking was in part driven by recognition of the growing strength of low-wage economies in the international vegetable market threatening the viability of commodity vegetable production in Australia and New Zealand coupled with the desire to grow profitability of the local vegetable industry. Addressing this trend remains a priority for both the Australian and New Zealand vegetable industries.

The **vital**vegetables® products have been developed for their naturally high nutrient levels, great taste, flavour and long shelf life. To achieve this, the project first established research principles and analytical methods that supported production of high health vegetables. Each step of production from seed selection, agronomy, harvesting, processing, and packaging to distribution was investigated and optimised to ensure consistent year-round quality of **vital**vegetables® products. Technologies in the form of production and postharvest protocols were taken up by the industry partners during pre-commercial and commercial trials. The technologies were improved to fit the needs of commercial practice and embedded in product manuals for a suite of viable **vital**vegetable® products.

The primary outcome is a mechanism and proof of concept that supports the commercialisation and marketing of differentiated vegetable products in the global market. The ultimate goal of this programme is to increase vegetable consumption by providing consumers with a series of new health benefit value propositions. The benefits are embodied in **vital**vegetable® sub-brands: **vital**heart™, **vital**sight™, **vital**bones™, **vital**fibre™ and **vital**immunity™.

vitalvegetables® is a new category of vegetables that has a strong focus on consumer health, and has been successfully introduced to the New Zealand market (October 2012). Four products have been developed to the Launch-Ready Phase for the Australian market: They are **vital**immunity™ Booster™ fresh broccoli florets, **vital**heart™ **vital**salad™ mix, **vital**sight™ carrots and **vital**immunity™ fresh **vital**medley™. Each product contains naturally high levels of nutrients, particularly vitamins known to be good for health, and each serve contains at least 25% of the suggested daily intake of antioxidants.

The success of designing mixed products was a turning point for the product development strategy. It became clear that mixed products provided:

- Product differentiation through a mixture of unique components and clearly labelled packaging.
- Consumer value through convenience.

- Greater branding opportunities.
- Value to the growers by providing a channel for minor crops (e.g. purple cauliflower) or less viable mainstream crops (e.g. high-lycopene tomato).

The **vital**vegetables® programme has provided a path to market for functional fresh vegetable products that are a significant step above commodity vegetables. We recommend that HAL monitors the progress of **vital**vegetables® commercialisation and provides support where specific research requirements are identified. We also recommend that HAL continues to support the development of differentiated vegetable products to enable the industry to add premium products to their offer.

Introduction

The **vital**vegetables® programme is a trans-Tasman collaborative research and development joint venture charged with developing and commercialising new high value, health promoting vegetables for the Australian and New Zealand horticulture industries. At its inception, the philosophy of **vital**vegetables® was to provide a research, germplasm and marketing framework that enabled Australian and New Zealand vegetable growers to move their industry towards differentiated, higher value products that delivered enhanced health benefits to consumers. This shift in thinking was in part driven by recognition of the growing strength of low-wage economies in the international vegetable market that are threatening the viability of commodity vegetable production in Australia and New Zealand coupled with the desire to grow profitability of the local vegetable industry. Addressing these issues remains a priority for both the Australian and New Zealand vegetable industries.

The project outcomes of **vital**vegetables® 2 were:

- A range of phytochemical-specific agronomy, post-harvest and bioefficacy protocols that can be applied to a wide range of vegetable crops.
- Competitive and sustainable Australian and New Zealand vegetable industries marketing differentiated products in a global market.
- Increased consumption of vegetables.
- Decreased economic health burden on government and the community due to increased health of the population.

The **vital**vegetables® programme has been supported by Horticulture Australia Limited (HAL), Plant and Food Research NZ, DPI Victoria and the Australian and New Zealand vegetable industries. The first **vital**vegetables® programme contract (VV1) was funded for five years (2002-06), receiving additional transition funding through to mid 2008. A second programme (VV2) was funded under a separate contract for a further period to December 2012. VV1 established research principles and analytical methods that supported target vegetable crops (primarily Brassica). Fundamental and applied knowledge was generated to support the programme and a strong relationship with the primary genetics partner (Vilmorin & Cie) was established. VV2 built on this platform of scientific capabilities but focused more on developing and commercialising vegetable products that embody high-health functionality along with flavour and freshness.

Since 2008 and following the lessons learned from the launch of Booster™ Broccoli in 2009, the programme was redesigned to address the commercial realities of new product development. The operational structure changed from one that was science driven to a product development framework. VV2 had stronger commitment to pursuing commercial opportunities and building relationships with partners and collaborators. A streamlined product development decision making process was established (**vital**vegetables® Idea to Launch process). In particular, VV2

saw the adoption and development of marketing partners in Australia and New Zealand. These partners are leaders in the horticultural foods industry, hold a significant market share and have the appropriate infrastructure in place to support product development from production to market. They are enthusiastic and committed to the **vital**vegetables® strategy, willing and able to trial new cultivars and support research and development (R&D) initiatives by adopting new ideas and innovations.

Materials and Methods

Funding and Research Investment

The **vital**vegetables® programme is jointly owned by the **vital**vegetables® Research Partners (VVRP): Horticulture Australia Ltd (HAL), the New Zealand Institute for Plant & Food Research Limited (PFR), the Department of Primary Industries, Victoria (DPIV) and Horticulture New Zealand. Prior to October 2010 the Australian Vegetable Industry was also a joint partner. The PFR voluntary contribution came from internally funded projects and from part of a New Zealand Government funded research programmes (Future Vegetables[1]). Horticulture NZ funds are sourced from grower levies. Australian national vegetable levy funding contributed to **vital**vegetables® until June 2010.

Programme Structure, Management and Governance

The management and governance structure for the VV2 programme was formed in 2008 (Fig 1). The **vital**vegetables® Research Partners (VVRP) provided the research expertise for the programme and took the initiatives required to establish genetics and marketing groups and product teams. Governance for the programme was provided by the **vital**vegetables® Governance Group (VVGG). VVGG was formed to oversee the delivery of the research program through the participation of the CEO or suitable qualified delegate from each of the research partner organisations, Plant and Food Research[2] (P. Langdon-Lane, CEO) Horticulture Australia Limited (J. Lloyd, CEO), Department of Primary Industry (R. Prestidge, Executive Director Future Framing Systems Research Division) and Hort NZ (C. Smyth, Board Director). At the April 2008 meeting of the VVGG the VV Charter was agreed to establish and monitor:

- Strategic directions and policy framework to guide the science programme, commercialisation, communication and IP management.
- The science programme based on reports from the **vital**vegetables® Executive Manager on progress towards milestones contained in the science plan.
- Progress in the management and commercialisation of intellectual property generated by the science programme.
- Performance of marketing and genetics partners.

The **vital**vegetables® Executive Manager (VVEM), Russell Sully, was responsible for the delivery of all aspects of the program which included the Science Team, Commercialisation Team and coordination of activities with the genetics and research partners. This role did not have line

[1] Future Vegetables was a negotiated research agreement between FRST, PFR and the vegetable sector that supported the development of high value vegetables produced sustainably and exported to world markets, including development of product concepts with enhanced consumer values and underpinned by new and improved production technologies that support economic and environmental sustainability.

[2] Formerly Crop & Food Research until Dec 2008.

management responsibility as that was the responsibility of the research organisations who had the contracts with HAL.

The **vital**vegetables® Operations Team (VVOT) was tasked with the day-to-day management of the programme and interfaced between science, marketing and commercialisation. VVOT was composed of VVEM**,** Research Leaders from PFR (J. Hayes, then J. Eason) and DPI (R. Jones, G. Thomson, B. Tomkins), Commercialisation/Marketing Managers (J. Howson then M. Slater, D. Hughes then A. Bourhill), ex-officio observers from HAL (P. Roeth, D. Moore, K. Lee). Key responsibilities of VVOT included:

- Science planning, monitoring and reporting.
- Aligning science with product development (in line with commercial and marketing needs).
- Implementing and managing a formal product development decision making process that involved all key partnering organisations.
- Risk assessment and mitigation planning.
- Managing the commercialisation of intellectual property generated by the program.
- Managing the research delivery obligations as set out in the **vital**vegetables® contract research agreement (CRA) and project agreements.
- Managing the relationship and commercialisation of IP between the partners and stakeholders.
- Supporting coordination, sound governance and management for the project.
- Communications with all stakeholders.

Operational plans were developed on an annual basis. Activities were drawn into an agreed plan at the annual research meeting (alternating between Australia and New Zealand). After the transition to a product focus (October 2010), project team teleconferences were scheduled regularly[3] and meeting minutes were lodged on the research website. The R&D actions that arise from specific products were drawn into the annual science plan, along with other generic research that future-proofed the programme. This plan was agreed by the operations team, governance group, and HAL.

Within VVRP the Commercialisation Team directed the development of the **vital**vegetables® brand and business model that involved genetics and marketing partners. The transition to a product focused structure for VV2 led to the establishment of Project Teams. The role of the project team was to draw on research, genetics and marketing partner expertise to co-ordinate science, production and marketing that underpinned the successful development and commercialisation of the product. As each new product idea was developed a new project team was established.

[3] Monthly or quarterly depending on the stage of the project.

The **vital**vegetables® Genetics Partners (VVGP) were Vilmorin & Cie (Groupe Limagraine) and Rijk Zwaan. The genetics partners provided access to global breeding programmes and selections of germplasm for targeted screening.

The **vital**vegetables® Marketing partners (VVMP) were grouped by territory (Australia or New Zealand). The role of the marketing partners was to provide growing, processing and marketing capabilities. VVMPs identified individual product preferences and could be the sole grower, processor and marketer of the vegetable product, or license growing and processing with selected suppliers. In all situations, the intention was that the marketing partner would be responsible for distributing and marketing specific products in their territory.

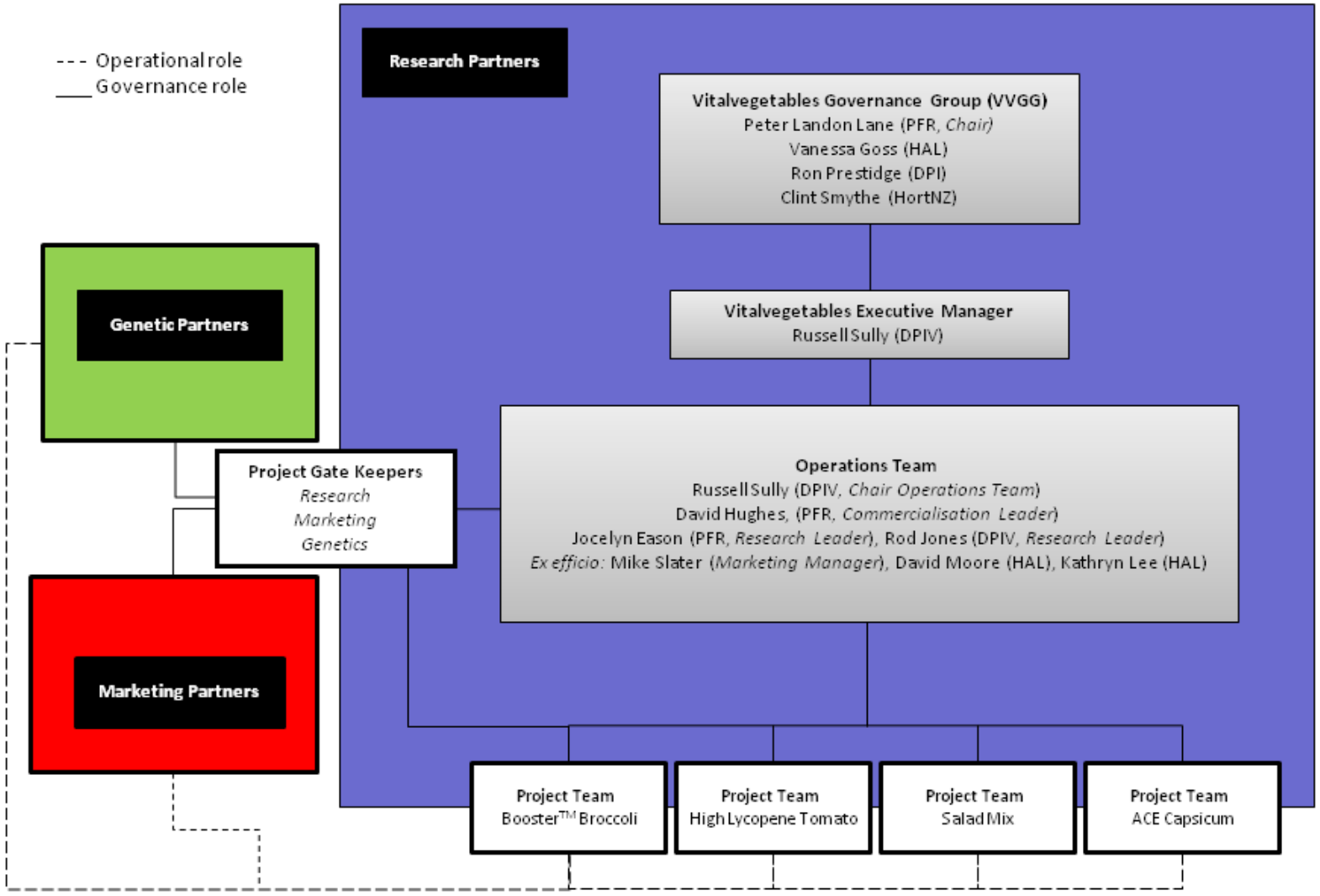

Figure 1. Structure and governance of vitalvegetables**® programme (2008)**

Stakeholder Engagement and Communication

A stakeholder engagement plan was developed and implemented after the mid-term review in December 2010. The plan provided a critical path to launch in Australia and New Zealand and included reporting schedules, product manual preparation, product development status updates and meetings specific to Project Gate Keepers and Marketing Partners (both within territory and trans-Tasman), research meetings (both within territory and trans-Tasman) and VVGG meetings.

Two separate websites were developed as part of the communication strategy.

1. A secure VVRP site built to retain all IP generated as part of the programme.
2. A consumer website was developed for marketing purposes (http://www.vitalvegetables.co.nz/)

Risk Assessment Process

A risk management process was put in place in May 2011 to generate a comprehensive list of events that might affect objectives and operations within VV. The process ranked risks and ensured treatments were implemented. The risk plan was reviewed quarterly by the Operations Team.

Table 1. vitalvegetables® **risk register**

Risk Category	Specific Risk	Description of Risk
Management of stakeholder relationship	Marketing partners & retail sector do not commit to the success of VV2.	The programme is unable to successfully commercialise the products. Partners cannot cover & support the product range with adequate marketing &promotion. VVMP Do not sign agreement, which can lead to leakage of IP.
Planning & delivery	Marketing claims are not robust, meaningful & permissible.	The products do not have strong enough point of difference to encourage purchase at a premium price. Partners are at risk of litigation. Marketing approach lacks substance & consistency.
Planning & delivery	Difficulty creating differentiated product portfolio, competitive advantage & economic returns.	VV products may not achieve required economic yields. Products are not distinctively different. Products do not have economically viable turnover levels (i.e. not composed of cornerstone vegetables).
Management of stakeholder relationship	Loss of genetic partner.	Cannot use exclusive rights to create competitive advantage. Difficulty in obtaining suitable germplasm, which is distinctive & commercially viable.
Governance & strategy with partners	Governance & stakeholder relationship management poor.	Program goes off track & does not achieve the desired goal. Partners are not all working towards the same goal. Inefficiencies created that undermine momentum. Poor communication & collaboration.
Planning & delivery	Weak product portfolio.	Product concepts do not transition into a firm product portfolio & viable range. Business cases & product manuals do not progress to Launch-Ready stage. Trials fail to produce scientific evidence to support robust claims. Partners do not contribute in a timely way to enable the product to progress to next phase & meet deadlines. Products are not commercially viable.

Market Research

Generic market research conducted in VV1 provided some valuable insights into the potential for value added 'functional' vegetable products (Richards, 2009[4]), further market research was seen to be necessary in VV2 (**vital**vegetables® Research Results, August 2011[5]). The decision was taken in part due to the review conducted in April 2010 following the launch of Booster™ Broccoli in Australia in August 2009. In addition, the development of the risk mitigation plan identified market research as a key approach to managing some of the specific risk the programme faced.

The purpose of the consumer market research conducted in 2011 was to get consumer's reactions to the **vital**vegetables® concept, confirm brand positioning and identify factors that would stimulate the initial launch and repeat purchases in order to establish and grow the brand and category. A qualitative consumer research approach, in the form of focus groups, was conducted in Australia and New Zealand. A total of 10 groups of vegetable purchasers and users (i.e. young singles/couples no children: mums with children <12 years; mums with children >12 years; older singles/couples (empty nesters) were assessed in each country with 7-8 participants and a 1.5 hour duration.

The overall research objective was to explore consumer response to the **vital**vegetables® concept in order to ensure optimisation of the launch of **vital**vegetables® into the marketplace. The key outputs from the study were:

- An understanding of the overall reactions of target audience to the **vital**vegetables® concept.
- Establishing the most effective way/s of positioning **vital**vegetables®.
- An understanding of the factors that stimulate initial trial and on-going repeat purchase.
- Identifying the claims (health vs. lifestyle) that are most relevant to the concept.
- Identifying how best to differentiate **vital**vegetables® from regular vegetables.
- An assessment of pricing options.
- Evaluation of the creative directions that had been developed.

[4] Richards, Dennis Ed (2009). Horticultural Products as Functional foods – a Consumers ' Perspective.
[5] Anon (2011). Project **vital**. Presentation of Key Findings. Brainjuicer, August 2011. 62pp.

Product Development - VV Idea to Launch (Phase and Gate) Process

To address the key success factors of broadening the product range to develop a **vital**vegetables® category and to gain greater commitment from all partners, a phase and gate process was implemented from July 2010. The **vital**vegetables® Idea to Launch Process (ItL) was designed to support the commercialisation of all new product ideas generated by the research partnership. The purpose of ItL was to provide a transparent system to guide and facilitate rapid and successful development and commercialisation of new product ideas. A user guide clearly defined the process, roles and responsibilities and provided templates (e.g. business case template, pre-concept template) and tools (e.g. risk analysis, cost benefit analysis, integrated product development, project planning tool, PESTE analysis) to ensure objective decision making, to allow a consistent strategic approach and to provide streamlined execution and transparency for all stakeholders.

The ItL process provided a consumer and marketing focus to product development (e.g. IPD tool). It also ensured commercial activities, logistics and production and postharvest activities were integrated into the project. ItL was designed to enable the core project team to ask key questions in a timely way, capture the core knowledge generated from the research programme and deliver products with consistent composition and quality that had acceptable or enhanced flavour and optimum shelf life/freshness. Key members of the Project Teams were provided with training to identify opportunities, clearly define the product and identify and evaluate risks associated with the products in order to increase the chances of success.

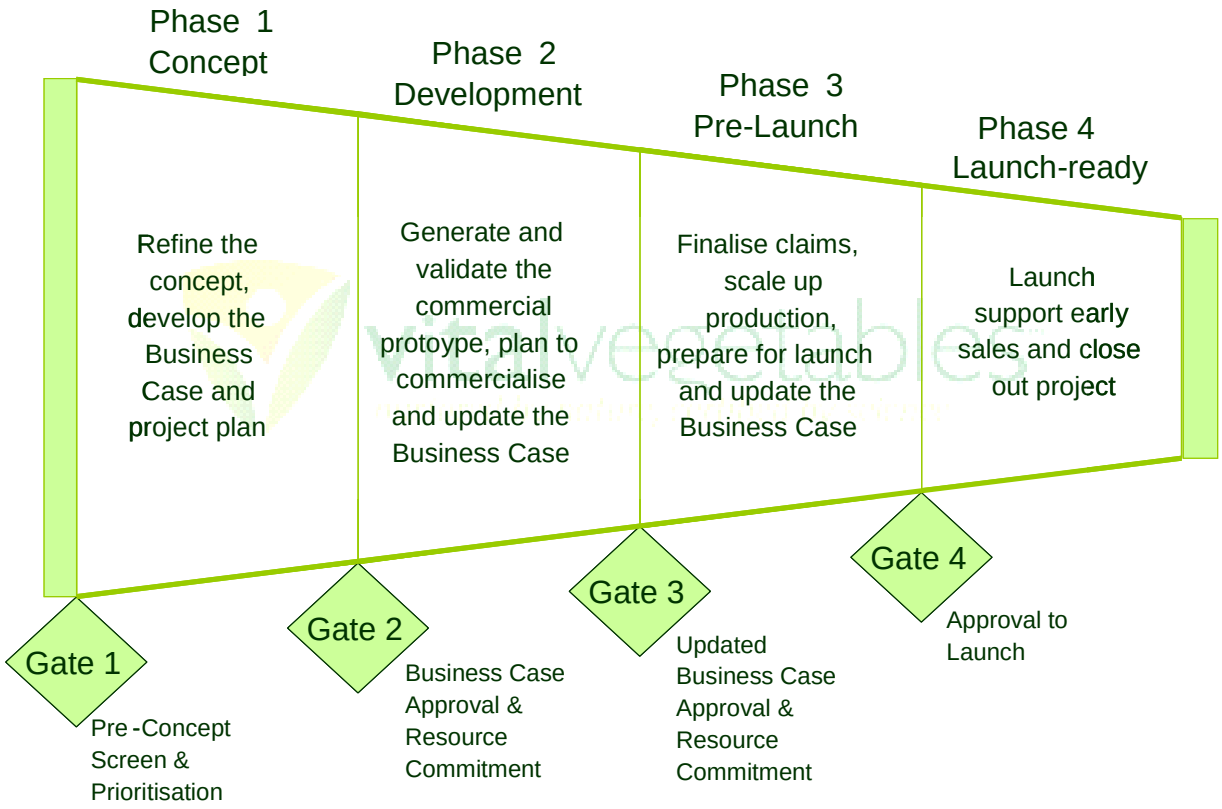

Figure 2. vitalvegetables® **'Idea to Launch' (ItL) Process, implemented July 2010**

Results

Business Goal – Naturally Healthier Vegetables, Industry and Community

The purpose of the **vital**vegetables® programme was to grow the market for high value vegetables that deliver scientifically verified benefits to the entire supply chain, health and well being for consumers and financial prosperity for all stakeholders. The experience of releasing and withdrawing of Booster™ Broccoli from the Australian market led to a significant reconfiguration of the business model and a redesign of the approach to differentiation and marketing **vital**vegetables® products. The reconfigured business model was composed of six strategic elements that supported development of a **vital**vegetables® category.

1. **Market-driven product innovation.** Our strategy was to drive the programme by consumer demand, creating visibility at the store level and providing consumer choice through a range of products. We have focused on generating sustainable volumes by targeting popular large selling products (e.g. leafy salad mixes) that provide the potential to achieve a reasonable market share and create critical mass for the **vital**vegetables® brand. A feature of these targeted products is that they provide relevant nutrients with specific consumer health benefits, while still being fresh and good to eat.
2. **Strength through strategic partnerships.** Strategic partners provided research expertise, supply chain expertise, commercial and marketing expertise and consumer intelligence. The programme attracted partners that would benefit from the growth and success of the **vital**vegetables® brand. This is achieved by:
   - **Investing and aligning risk and reward**. Establishing a commercial model that ensured protection of intellectual property, trademarks and brand value by providing guidelines that defined and monitored the standards, testing and approval protocols;
   - **Exclusivity**. Partners have exclusive rights to the brand and product information for their territory;
   - **Engagement**. Partners are engaged in planning, decision making and meeting performance targets;
   - **Roles and responsibilities**. Clearly defined and agreed roles and responsibilities for each of the stakeholder group were communicated (Appendix 1), together with their roles and responsibilities in product development (Appendix 2).
3. **Brand development and management.** The brand essence (Figure 3) was developed in collaboration with all partners in 2008 and is supported by the Brand Usage Manual (version 3, September 2012). The marketing programme differentiates **vital**vegetables® products from regular vegetables through consumer benefit claims, product format, packaging, branding and content labels. Planning, investment and execution of marketing plans was through marketing partners in each territory.
4. **Scientific innovation.** The programme established scientific data to support production and marketing of **vital**vegetables® products. Evidence based dossiers link specific

nutrients in vegetable products to consumer health benefits under a series of strategic benefit claims: **vital**heart™ to support heart health, **vital**sight™ to support healthy vision, **vital**bones™ to support bone health, **vital**immunity™ to support the immune system and **vital**fibre™ for digestive health.

5. **Leadership and a Sustainable Business Model:** Although we envisaged a long-term management and commercialisation body for seeding R&D investment to support ongoing product development after the current HAL funding stopped, it has not yet become a reality. The development of a sustainable business for **vital**vegetables® product development required a successful category launch which has occurred in New Zealand in 2012 but not in Australia. This seriously limited the use of royalties for ongoing R&D and a financing/resourcing model to provide a revenue stream for R&D in the future still under investigation.

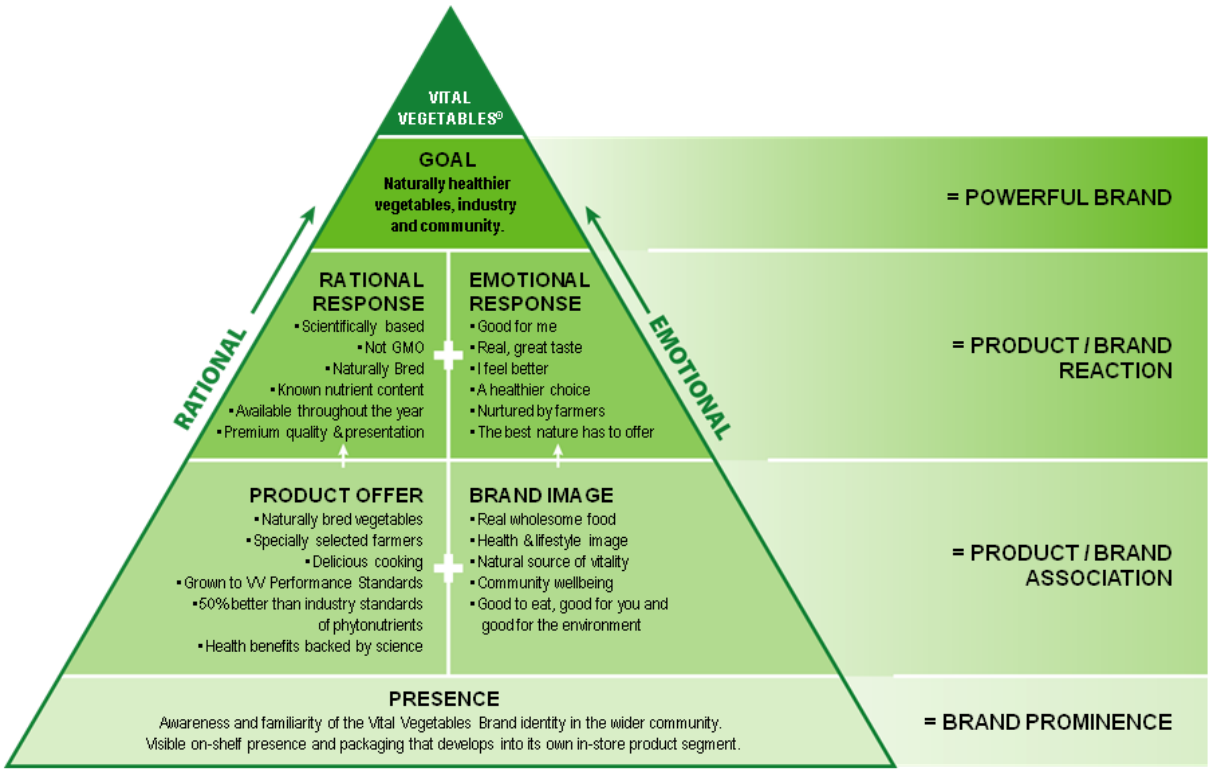

Figure 3. vitalvegetables® **brand loyalty pyramid**

Product Development - VV Idea to Launch (Phase and Gate) Process

A **vital**vegetables® product is defined as a vegetable that, after rigorous testing, has been proven to deliver a guaranteed minimum content of a signature nutrient that is superior to the industry standard and delivers a measurable benefit to the consumer in a standard serving size. The health benefit of these products is in addition to the nutritional benefits that vegetables normally provide. **vital**vegetables® products must meet the following criteria:

1. A known content of nutrient (at least 25% greater than the industry standard) that delivers a specific health benefit to consumers based on current knowledge.
2. Taste equal to or more acceptable to consumers than industry standard.
3. Shelf life equal to or greater than the industry standard product.

The purpose of Idea to Launch Process (ItL) was to provide a transparent process to guide and facilitate rapid and successful development and commercialisation of new product ideas in the form of **vital**vegetables® concepts. The process was developed to address the following critical success factors for **vital**vegetables®:

- Widespread adoption of the process across the **vital**vegetables® partnerships.
- Continued commitment of senior management, including involvement at critical decision points in the process.
- Quality decision making based on reliable and compelling information.
- Market driven, consumer focused development.
- Integrated planning and development through effective and competent cross-functional project teams.
- Use of skilled, competent project leaders trained in project management practices.
- Adequate resource allocation to projects and the optimal number of projects in the pipeline.
- Provision of on-going training and support for the Idea to Launch Process.
- Process metrics to evaluate the effectiveness of the Idea to Launch Process.
- Continued evolution of the process to meet the changing needs of the **vital**vegetables® partnership.

ItL is a phase and gate methodology that describes a framework that divides product development into discreet investment phases. A decision to commit to the required investment for the next phase is

made at the gates between each phase. Training of Project Leaders was initiated in July 2010 and a printed ItL User Guide provided them with:

- Clearly defined process.
- Objective decision making.
- Consistent application.
- Streamlined execution.
- Alignment with currently recognised world 'best practice'.
- Transparency for all stakeholders.

Each gate provides a critical decision point to manage business risk by pre-determining a time to stop, review and decide whether or not to release resources (people, equipment and funding) to work on the next phase. Formalising these decision points helps to minimise risk and to ensure focus for resources on high quality project opportunities. Gates are structured with deliverables from the previous phase, gate decision criteria and outputs (Appendix 3).

vitalvegetables® concepts progressed through ItL as described (Table 2) and by the end of September 2012, the programme had five products in Launch-Ready phase (Table 3). It is anticipated that these products will be introduced into the retail market in Australia in spring 2013. The products were launched in the New Zealand retail market in October 2012.

The product development pipeline grew significantly over time with viable products moving through the ItL process to Launch-Ready (Phase 4) and non-viable products stopping when it became apparent they had critical faults (e.g. low yield, insufficient nutrient content to make a claim, limited product differentiation). A snapshot of the portfolio was provided in each quarterly report (for 30th September see Table 4).

Table 2. Progression of Australian vitalvegetables® **products through the 'Idea to Launch' process (As at 30th September, 2012).**

Product Number	Name	Entry into ItL phases				Summary
		1 Concept	2 Develop-ment	3 Pre-Launch	4 Launch-Ready	
A001	broccoli Booster™ florets (fresh)	*	Dec-10	April-11	Oct-12	**PRODUCT MANUAL COMPLETED** - **vital**immunity™
A003	salad mix	*	April-11 on-hold	Dec-11	Oct-12	**PRODUCT MANUAL COMPLETED** - **vital**heart™ **vital**salad™
A004	ACE capsicums	*	Dec-10	April-11		**PRODUCT MANUAL COMPLETED** - high vitamin A, C & E.
A005	tomatoes	April-11, on-hold				Yield too low for commercial viability.
A006	broccoli Booster™ florets (frozen)	Dec-10, Dec-11 on-hold		March-12		Marketing partner input required.
A007	carrots (large)	Dec-10	April-11		Oct-12	**PRODUCT MANUAL COMPLETED** - **vital**sight™
A008	orange cauliflower	April-11, July-11 killed				Market share potentially too small, niche only; limited production period; health claims limited.
A009	white cauliflower (floretted)	Dec-10	Dec-11			Lack of suitable elite germplasm; cannot link a health benefit claim to glucosinolate content; opportunity for mixed product.
A010	coleslaw	April-11	July-11		Oct-12	Develop final health claims & market proposition; analyse industry standard product for benchmarking; design & test new high health formulations & mixing of key ingredients to deliver benefits.
A011	small sweet cabbage					Killed as pre-concept April-11.
A012	coloured potatoes	April-11	Jul-11			Final experimental plantings needed under a range of growing conditions for crop evaluation; licensing agreement needs consideration.
A014	sweet corn					On-hold as pre-concept Dec-10.
A015	calebrini					Killed as pre-concept Dec-10.
A016	broccoli Booster™ 2 (florets & heads)	*	Dec-10	Dec-11		Germplasm requires on-going evaluation of performance (size, yield, phytonutrient levels, storage potential 'shelf-life') of whole heads for the different Booster™ 2 types. There is a need to continue growing Booster™ 2 types on commercial properties, under commercial conditions to evaluate all traits (& seasonal influences).
A017	fancy head lettuce					Killed as pre-concept April-11.
A018	vegetable medley (fresh)	*	April-11 on-hold	Dec-11	Oct-12	**PRODUCT MANUAL COMPLETED** - **vital**immunity™ **vital**medley™
A019	asparagus					On-hold as pre-concept April-11.
A020	stir-fry (fresh)	*	April-11	March-12		Germplasm performance requires assessment at southern & northern growing sites within AUS; & at cooler & warmer times of the year. Determine seasonal variation in availability & quality of mix

Product Number	Name	Entry into ItL phases				Summary
		1 Concept	2 Develop-ment	3 Pre-Launch	4 Launch-Ready	
						components. Finalise stir-fry types, composition, health claims. Validate packaging & use-by dates. Analyse additional new non-VV ingredients (e.g. purple carrot).
A021	vegetable medley (frozen)	*	April-11	March-12		Marketing partner input required.
A022	stir-fry (frozen)	*	April-11	March-12		Marketing partner input required.
A023	baby 'Dutch' carrots	*	July-11			Available germplasm needs further evaluation under a range of field conditions.

* Product was migrated into phase 2 of ItL process.

Table 3. Changes in the Australian vitalvegetables® **product development pipeline over time***

Pre-Concept	Concept (phase 1)	Development (phase 2)	Pre-Launch (Phase 3)	Launch-Ready (Phase 4)
Milestone 108: May 2011				
• sweet corn • asparagus • baby 'Dutch' carrots	• orange cauliflower • tomatoes • coloured potatoes • white cauliflower • coleslaw • Booster™ broccoli florets (frozen)	• carrots (large) • salad mix • stir-fry (fresh) • veg medley (fresh) • Booster™ 2 broccoli • veg medley (frozen) • stir-fry (frozen)	• ACE capsicum • Booster™ broccoli florets (fresh)	
Milestone 109: November 2011				
• sweet corn • asparagus	• tomatoes • white cauliflower • Booster™ broccoli florets (frozen)	• carrots (large) • salad mix • stir-fry (fresh) • veg medley (fresh) • Booster™ 2 broccoli • baby 'Dutch' carrots • veg medley (frozen) • stir-fry (frozen) • coloured potatoes • coleslaw	• ACE capsicum • Booster™ broccoli florets (fresh)	
Milestone 110: May 2012				
• sweet corn • asparagus	• tomatoes	• carrots (large) • coloured potatoes • coleslaw • white cauliflower • baby 'Dutch' carrots	• ACE capsicum • Booster™ broccoli florets (fresh) • salad mix • stir-fry (fresh) • veg medley (fresh) • Booster™ 2 broccoli • baby 'Dutch' carrots • veg medley (frozen) • stir-fry (frozen)	
Milestone 111: September 2012**				
• sweet corn • asparagus	• tomatoes	• coloured potatoes • white cauliflower • baby 'Dutch' carrots	• ACE capsicum • stir-fry (fresh) • Booster™ broccoli florets (frozen) • veg medley (frozen) • Booster™ 2 broccoli • stir-fry (frozen)	• **vital**heart™ **vital**salad**™** mix • **vital**immunity**™** Booster™ broccoli florets (fresh) • **vital**immunity™ **vital**medley™ veg medley (fresh) • **vital**sight**™** high vitamin carrots (large) • **vital**slaw™ (coleslaw)

* Active products only during each reporting period.

**Data following October 2012 Gating Meeting that was originally scheduled for September.

Table 4. Australian vitalvegetables® product portfolio, 30th September 2012

Pre-Concept					• sweet corn • asparagus
Concept				• tomatoes	
Development		• white cauliflower	• coloured potatoes	• baby 'Dutch' carrots	
Pre-Launch		• stir-fry (fresh) • Booster™ broccoli florets (frozen) • ACE capsicum	• veg medley (frozen)	• Booster™ 2 broccoli	• stir-fry (frozen)
Launch-Ready	• **vital**heart™ **vital**salad**™** mix • **vital**immunity**™** Booster™ broccoli florets (fresh) • **vital**immunity™ **vital**medley™ veg medley (fresh) • **vital**sight**™** high vitamin carrots (large) • **vital**slaw™ (coleslaw)				
Proposed Launch Period	**Spring 2013**	**Autumn 2014**	**Winter 2014**	**Spring 2014**	**Autumn 2015**

Product manuals

Product manuals specific to the Australian territory were developed by the project team and had input from both research and marketing partners. A template for the product manual is provided in Appendix 6. The product manuals for five **vital**vegetables® products that had reached Pre-Launch and Launch-Ready stages were prepared:

- **vital**immunity™ Booster™ fresh broccoli florets.
- **vital**heart™ **vital**salad™ mix.
- **vital**immunity™ ACE Capsicums.
- **vital**sight™ carrots.
- **vital**immunity™ **vital**medley™ fresh vegetable medley.

Business cases

The business cases were developed as part of the ItL process with input from both the research and marketing partners. A template for the business case is provided in Appendix 7. Business cases for the following five product concepts were prepared for Gate 4:

- **vital**immunity™ Booster™ fresh broccoli florets.
- **vital**heart™ **vital**salad™ mix.
- **vital**immunity™ ACE Capsicums.
- **vital**sight™ carrots.
- **vital**immunity™ **vital**medley™ fresh vegetable medley.

A number of other business cases were prepared for products presented at earlier Gate meetings (See Appendix 9).

Case study – Booster™ broccoli heads

Introduction

Booster™ broccoli is given as an example of the **vital**vegetables® development process. Note that this example is for whole heads. Separate Business Cases have been developed for fresh and frozen Booster™ broccoli florets as well as mixes containing Booster™ broccoli florets, including vegetable medley and Asian stir fry mixes. The Booster™ broccoli whole head product was launched in the Australian market in August 2009. Despite an encouraging start, sales did not meet expectations and the product was voluntarily withdrawn from the market in late Jan 2010. In this time, sales were approximately $0.73 million. The launch was a valuable exercise with many important lessons learnt for the future launch of **vital**vegetables® in Australia and New Zealand.

Market opportunity[6]

- 77.5% of Australian household purchase broccoli on average 10 times per year and spend $1.80 per trip
- Retail sales are about $190 million per year
- Woolworths have 33% of market share which is growing at 4% per year

[6] Nielsen Homescan data until 11th of June 2011, Nielsen Scantrack data (National Woolworths) until 05th June 2011

Product concept

Booster™ broccoli is:

- 100% natural with the same fresh, natural taste as regular broccoli
- Packed with up to 200% more active antioxidants as normal broccoli
- Maximum benefit obtained if 70g of Booster™ is consumed at least 3 times per week

Nutrition and health benefit (on pack)

- "Naturally rich in antioxidant vitamins that maintain a healthy immune system".
- Booster ™ broccoli is a good source of vitamin C and contains glucosinolates.
- This vitalvegetables® Booster™ broccoli has been regularly tested to ensure each 70g serve contains a more than 100% of your suggested daily intake of vitamin C.

Research trials

Booster™ broccoli was discovered in 2003 by screening approximately 264 broccoli breeding lines and 14 commercial varieties. It stood out as being substantially higher in glucosinolates than any other genotype tested. Since then Booster™ broccoli has been grown in trials on around 90 occasions at 11 sites in Victoria, Tasmania, Western Australia and Queensland. It has consistently shown up to 200% more glucosinolates than other broccoli varieties tested (Table 5) and has been consistently shown to be a good source of vitamin C. During 2011 and 2012 vitamin C levels were generally above 100mg/100g FW. Levels dropped to 88.2 mg/100g in June 2012 and were highest at 154.7 mg/100g in August 2012. The daily recommended intake for vitamin C is 45mg/day.

Table 5. Summary of glucoraphanin (GR) content (umol/g DW; +/- SE) in Booster™ and other common cultivars across all Australian trials from 2003 to 2008. Trials were harvested in autumn/winter.

Cultivar	**Number of times grown**	**Mean GR content** (μmol/g DW)
Booster	**26**	**20.6 (±1.1)**
***Marathon**	**16**	**11.6 (±0.9)**
Viper	**9**	**13.2 (±2.2)**
Atomic	**8**	**11.1 (±1.5)**

*Marathon is generally considered the "universal" industry standard variety for broccoli but new varieties Viper and Atomic are introduced on a regular basis.

Although Booster™ generally performed very well there were some quality issues, particularly if grown in warmer production regions over the summer period. Consequently, 3 new varieties were developed to

find a replacement for Booster™, particularly for summer production. Of these, one of the elite breeding line showed phytonutrient levels at least as high as Booster™ in all trials and showed substantially better head quality when grown over the summer months in warmer production areas. Furthermore, this elite variety showed vitamin C levels as high as Booster™. Consequently it is recommended that this variety be developed to replace Booster™ particularly for summer production.

Organoleptic quality of Booster™ broccoli

Sensory analyses showed that Booster™ broccoli is liked by consumers at least as much as the existing industry standard varieties. Major comment from members of the trained taste panels was that Booster™ was sweeter than the other varieties. This observation was supported by carbohydrate analyses which showed that Booster™ had twice the sucrose content of the industry standard Marathon variety at 24.1µmol/g DW compared to 10.7µmol/g DW respectively.

Postharvest and packaging trials

A number of postharvest handling and packaging trials have been summarised in the Booster™ product manual[7]. When the Booster™ production, postharvest handling and packaging protocol is used Booster™ broccoli heads can be stored for up to 28 days with no significant loss of nutrient content. A comprehensive review of the effect of postharvest handling on the quality and nutrient value of broccoli was done and published to identify gaps in knowledge and to develop the research methodology used to develop the Booster™ production manual[8].

Booster™ launch

Booster™ broccoli heads was selected as the first **vital**vegetables® product to be launched in August 2009. Despite an encouraging start the product was withdrawn voluntarily from the market in January 2010. During this time sales were around $730,000. The launch and marketing strategy was reviewed with key learnings and issues identified and recommendations for future launches made (Slater, 2010[9]).

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[7] Jones, Rod et al (2012). Booster™ broccoli Product Manual. Australian Territory. Department of Primary Industries, Victoria, Trade Secret Document to the **vital**vegetable® program. September 2012, 47pp.

[8] Rod B. Jones, John D. Faragher, and Sonja Winkler. (2006) A Review of The Influence of Postharvest Treatments On Quality And Glucosinolate Content In Broccoli *(Brassica oleracea var. italica*) Heads. Postharvest Biol. & Technol. 41(1):1-8.

[9] Slater, Mike (2010). Review Booster Broccoli, June 2010 Ppt presentation 4pp.

Project status

The current broccoli whole head project is at the prelaunch phase. Progress to the Launch phase requires:

- Development of commercial quantities of seed of the elite variety or "Booster2"variety to compliment the Booster™ MS seed reserves.
- Implementation of the findings from the Slater review of the first Booster™ launch in 2009
- Confirmation of the "Booster 2" head quality and nutrient content when grown in summer in warmer production zones

Nutrition and Health Benefit Claims

Legislation regarding making nutrition and health claims

There are a number of regulations that may apply to claims on foods:

- Fair Trading Act.
- Advertising Standards.
- 'Labelling Logic' recommendations.
- The Food Standards Code (Food Standards Australia New Zealand, FSANZ).

Nutrition claims are claims that tell consumers about a nutritional property of a food, i.e. how much of a particular compound (e.g. a phytochemical[10]) is in a food. These claims can indicate the presence of a particular nutrient or biologically active substance in the food and they can also indicate the amount. Certain nutrition claims have special conditions and these are regulated by Standard 1.2.8. Health claims are currently regulated by a transitional Standard 1.1A.2. Under Standard 1.1A.2 the only health claim that can be made about a serious disease is a claim about the benefit of maternal folate consumption for women i.e. that folate may reduce the risk of having a baby with a neural tube defect, such as Spina bifida.

FSANZ is currently working on a new health claims standard (Proposal P293 - Nutrition, Health and Related Claims). Claims have to be scientifically substantiated and not misleading. It is proposed that foods carrying general and high level health claims will need to meet certain

[10] Compounds found in vegetables that have functionality such that they may support good human health, e.g. maintain a healthy immune system, contribute to heart health, be necessary for normal vision, contribute to building healthy bones and healthy digestion. The phytonutrient(s) used to define **vital**vegetables® products are the compound(s) or class of compounds directly responsible for the health benefits, e.g. vegetables contain a class of compounds known as carotenoids, some of which are directly related to health benefits. Some carotenes (primarily beta-carotene) found in orange/yellow/green vegetables can be converted by the body to vitamin A. Consuming the pro-vitamin A carotenoids found in vegetables supports healthy vision.

eligibility criteria and all products will have to be put through the Health Claims Nutrient Profiling Calculator to make sure they are eligible to make a claim (this is particularly important for products with a dressing/sauce). The new standard will regulate three types of claims:

- Nutrition content claims - statements about the presence or absence of a nutrient, energy or a biologically active substance in the food.
- General level health claims - claims about the effect of a nutrient or substance in a food on a health function or a non-serious disease.
- High level health claims - claims about the effect of a nutrient or substance in a food that make reference to a serious disease or biomarker of a serious disease (biomarkers of serious disease include blood cholesterol and blood pressure).

Only the first two categories of claims will be used when marketing **vital**vegetables® products, i.e. nutrition content claims and general level health claims (also called nutrient function statements).

Applying nutrition content claims to vital*vegetables®* ***products***
Content claims require justification that a nutrient is present in a product at the stated level. The nutrient and the amount present must then be listed in the Nutrition Information Panel (NIP) on the pack. Content claims are the type of claims best suited for use when marketing **vital**vegetables® products.

Products that contain nutrients that have a RDI may have 'source'/ 'good source' claims and general level health claims made for them. For products that contain nutrients that do not have a RDI (i.e. non-core nutrients like phenolics, anthocyanins, glucosinolates) only presence claims may be made (i.e. 'contains').

- ***Source -*** a vegetable product can be termed a 'source' of a key nutrient (vitamin or mineral) when the key nutrient is present at 10% of the recommended dietary intake (RDI) per serve.
- ***Good Source -*** a vegetable product can be termed a 'good source' of a key nutrient (vitamin or mineral) when the key nutrient is present at 25% of the recommended dietary intake (RDI) per serve.

Applying general level health claims to vital*vegetables®* ***products***
For core nutrients (i.e. where there is a RDI) there are published nutrient function statements that may be used under P293 (the current P293 recommendation includes 115 pre-approved food-health relationships (http://www.foodstandards.gov.au/). It has also been stated verbally that 'claims' approved under EFSA (European Food Safety Authority) will be allowed (personal communication, Carolyn Lister, P&FR, Lincoln). It is important that health claim statements are

linked to the particular nutrient rather than the vegetable. For example, we cannot say '**vital**vegetables® salad is good for the immune system' but we can say '**vital**vegetables® salad is a good source of vitamins A & C which contribute to a healthy immune system'.

Health claims cannot be made for non-core nutrients (phytochemicals such as phenolics, anthocyanins, glucosinolates). Care also needs to be taken with wording of claims. For example:

- We cannot refer to disease – so we talk about bone health not osteoporosis.
- We must refer to health maintenance not reduction or enhancement of function. This means avoiding verbs like 'inhibit', 'reduce', 'boost', 'increase' as they all imply either inhibition or acceleration of a normal function.

Nutrition and health claims used in product communications

Health claim information for all forms of product communication (e.g. articles, websites, point of sale pamphlets, brochures etc) falls under the same regulatory framework as information appearing on packaging and products. The messages must be consistent with the product, however there is opportunity to be more expansive. References and research reports may be cited as well as provision of information regarding scientific support for the nutrient and its effects. Consumers are better at comprehending non-technical terms and those they are familiar with. Hence the terms 'phenolics' or 'glucosinolates' will require careful explanation whereas 'nutrients' and 'antioxidants' are immediately accepted.

Evidence dossiers to support the use of nutrition and health claims for marketing vital*vegetables®*

The pre-approved list of nutrition and health claims relevant to **vital**vegetables® together with the overarching regulatory support for nutrients linked to healthy heart, healthy vision, healthy bones, digestive health and immunity support health benefits have been summarised into a dossier (Lister and Eason, 2012). A separate evidence support dossier has been compiled to support the '25% suggested daily intake of antioxidant' claim (Lister, 2012). Any claims not included in the pre-approved list require further rigorous application in order to be added and used on-pack. In this context, the substantiation framework (pre-approval process) for new claims has been defined (Lister and Eason, 2012). An external expert dietitian (Angela Berrill, ABC Nutrition) and a regulatory consultant (Anny Dentener-Boswell, Adecron Food Tech Consulting) were used to finalise the health benefit messages. The **vital**vegetables® Brand User Manual (version 3, September 2012) guides use of nutrient and health claim messages for marketing of the products.

Quality assurance procedures to support nutrition and health claims

A quality assurance procedure for each product supports the following **vital**vegetables® product criteria:

1. A known content of nutrient (at least 25% greater than the industry standard[11]) that delivers a specific health benefit to consumers based on current knowledge.
2. Taste equal to or more acceptable to consumers than industry standard.
3. Shelf life equal to or greater than the industry standard product.

The quality assurance procedure for each product includes:

- Appropriate replicated end of shelf life sampling.
- Analytical protocols (analytical methods, data analysis).
- Regular analysis of products by approved laboratories.
- Defined industry standard to benchmark nutritional quality against.
- Procedures for off-spec product (product that does not meet nutritional content claims).

[11] The industry standard is defined as the highest volume selling product in the category (Gate Keepers Meeting Minutes, 10th February 2012) and is based on Neilson scan data where possible.

Communicating vital*vegetables®* ***concept to consumers***

Market Research

The VV market research (Anon, 2011) highlighted the need for **vital**vegetables® concepts to move towards convenient packaged mixed products that are effective in delivering meal solutions linked to recommended serving size and help consumers achieve daily intakes of key nutrients. The key outputs of the research were as follows.

1. *Overall reaction to **vital**vegetables® concept*

   There was universal endorsement of both the **vital**vegetables® name and logo. The word vital conjures up both functional and emotional benefits giving consumers a feeling that they are necessary for vitality. The logo created images of the sun (sunset, sunrise), vitality, vibrancy, health, natural (green, growing, fields) and a tick of endorsement (like the heart tick). Many consumers also saw the 'V' in the logo and felt it represented vegetables, vital and a vital, alive and healthy person.

2. *Positioning of **vital**vegetables®*

   The general belief of consumers is that the **vital**vegetables® product range will sit somewhere between standard vegetables and organic vegetables and the price will reflect this. When pushed, consumers nominated the price premium they were prepared to pay was somewhere between 10 and 30%. Pricing is an issue. If **vital**vegetables® are priced on parity with standard vegetables then the appeal of higher nutrients, health benefits and local farmers is very strong. With a price premium the claims, benefits and rationale must be justified.

3. *Factors that stimulate trial and repurchase*

   The issue of price also has implications for repurchase. How will a **vital**vegetables® customer be able to judge whether the price premium is justified and repurchase warranted? To achieve repurchase it will be crucial that all produce carrying the **vital**vegetables® logo is consistently of the highest quality standards requiring an excellent QA process:

   - Has to look good (no discolouration; good, vibrant colour).
   - Has to feel good (firm texture; not limp).
   - Has to taste great (is an expectation that more nutrients = better tasting. In the absence of any immediate/visible 'proof' of more nutrients, taste will be a key measure/indicator).

- Has to last/keep fresher for longer (storage and handling of the product by the distribution and retail outlet will be an important link in the chain).

4. Assessment of claims (language, layman terms, communication)

Terms such as phytonutrients, bioactive nutrients, bionutrients and actives were unknown by the majority of consumers. They either ignore information when unfamiliar terms are used or assume this is a science project rather than a natural process to produce vegetables. In contrast, terms such as nutrients and antioxidants are well known, understood and accepted by consumers. Terminology used for content and health claims must be consumer friendly and the story needs to be simply told.

5. Differentiation from regular vegetables

The appeal of **vital**vegetables® lies in the two core platforms of:

- Increased nutritional content - so even better for you.
- 100% grown in Australia - the emotional pull of local origin.

At the emotional level there is little anyone can argue about with either of these benefits, however at a rational level the notion of **vital**vegetables® raises many questions which, if left unanswered, potentially lead to consumer rejection. Thus, the communication challenge facing **vital**vegetables® is significant and requires a committed and ongoing information and promotional campaign to ensure success. The success of the **vital**vegetables® project will be dependent upon the success of the communications program developed and implemented in support of the **vital**vegetables® concept, and the products that are launched. It will need to be multifaceted, and work at both a rational and an emotional level.

6. Assessment of pricing options

A key issue in all of this is price. If the price of **vital**vegetables® was the same as regular vegetables then there would be much greater consumer acceptance, however when asking consumers to pay more there must be an accompanying justification for the price premium. It is difficult with qualitative research to pinpoint an actual price premium that consumers will be prepared to pay, however 30% appeared to be the absolute maximum that would be paid on a single (non-packed) vegetable. On a broader scale, the universal agreement was that **vital**vegetables® would need to be priced below organics to gain acceptance. There may well be an easier case for justifying a price premium on pre-packed, convenience vegetables as these products already command a higher price.

***Positioning of vital**vegetables®*

A good range of pre-packed, pre-prepared vegetables may also be a way of encouraging increased vegetable usage and consumption, especially if accompanied with recipe ideas and tips for quick and easy meals (something as simple as a 'stir-fry' pack may trigger a purchase). However, packaged and pre-packed does not appeal to everyone and many preconceptions exist about these types of vegetable products which may limit off-take.

VVRP communication strategy

A communications strategy was developed by VVRP to build awareness of the **vital**vegetables® brand with primary audiences and to support the initial launch of products in New Zealand in October 2012. The strategy provided a solid basis for product marketing activities undertaken by VVMP, however it was not the purpose of the VVRP communication plan to directly promote the products. Product promotion is the role of the VV Marketing Partners in each territory at the time the product enters the market. The VVRP communication strategy was implemented in the three months leading up to the October 2012 launch in parallel with VVMP pre-launch activities. The objective of the communication strategy was to:

- Build awareness of and generate interest in **vital**vegetables® concept by telling the science and research story in a simple, yet engaging way.
- Build a compelling story for consumers about the value of **vital**vegetables® by differentiating the product's benefits over regular vegetables and dispelling the myths raised in the consumer market research.

The communications strategy used media relations and social media as key communication tools. The media plan did not include communication with the supply chain, such as supermarkets, grocers and wholesalers, as this is considered direct product marketing rather than concept awareness. The messages were primarily of interest to consumers but, through the media relations campaign, also built awareness with the secondary audiences.

- Primary audiences
    - Educated, health conscious vegetable shoppers.
    - Mothers responsible for household shopping.
    - Healthy life-stylers.
- Secondary audiences
    - Food health and nutritional professionals.
    - Growers/vegetable industry.
    - Retailer trade.

To gain media interest, the Communications Team drafted press releases designed to provide science support for the **vital**vegetables® category consumer messages.

- How to keep your vegetables fresh?
- If you are low in selenium, then make sure you eat your broccoli.
- Consumers confused about vegetables (Myths).
- What plants should I grow?
- Eat the rainbow.
- All vegetables are created equal, aren't they?
- What's so good about vegetables anyway?
- Vegetable vitamins.

The previous **vital**vegetables® consumer website (which focused on the single Booster™ Broccoli product) was taken offline in 2012. A new consumer website that focused on the products for release in New Zealand (with a separate skin designed for the Australian territory) was developed to meet the pre-launch and launch needs of the **vital**vegetables® category. The research and marketing partners developed a brief that described the requirements of the consumer face of the website and quotes for building the website were sought. Cactuslab produced the successful quote and the website was built and went live on 14 September 2012 (http://www.vitalvegetables.co.nz/). The website pages provided consumers with information about:

- The **vital**vegetables® story.
- Products.
- Health benefits.
- Questions and answers.
- Recipes.
- Where to buy.
- Contact (postal address, free phone and email).

The website also encouraged consumers to subscribe to the email newsletter to get the latest news and updates, to join us on Facebook (Facebook Inc.) and to follow us on Twitter (Twitter Inc.). YouTube videos were produced as part of the communications plan.

Intellectual Property (Brand, Trademarks, Trade Secret)

Form of Intellectual Property

The form of IP that was considered most valuable and commercial was collated packages of knowledge specific to a particular product concept i.e. Product Manuals. Some of this information was in the public domain and not all was proprietary to the partners, but the value was in the collation of the data into a relevant and useful format. There is some copyright protection for the collation into a report, manual or spreadsheet but trade secret was the primary protection mechanism adopted by the programme. The IP captured in the IP register during VV2 is listed as Confidential Commercialisation Reports in Appendix 9. It includes product manuals that contain protocols covering crop production, postharvest handling, phytochemical analysis and nutrition and health claims. As well, numerous entries identify the capability and know-how relating to **vital**vegetables®.

vitalvegetables® is based on a closed loop system. Marketing partners, genetics partners and growers have specific agreements that ensure the know-how associated with the various protocols remains trade secret. To avoid infringement of intellectual property rights, the **vital**vegetables® IP strategy ensures that PFR intellectual property specialists provide a 'freedom to operate' report for each project, and these are used to make informed recommendations for each project.

Protecting the Brand and Trademarks

In 2003, the New Zealand Vegetable & Potato Growers Federation Inc. on behalf of the **vital**vegetables® Research Partners registered **vital**vegetables® trademarks in New Zealand and Australia. The registrations covered the term 'VITAL VEGETABLES' (946203) and Symbol extended form (logo) (1025460) in four classes of goods:

Class: 5 - Dietetic substances adapted for medical use; food for babies; nutritional additives for medical purposes; medical and health preparations.

Class: 29 - Preserved, dried, frozen, tinned, cooked and processed fruits and vegetables; soups; juices in this class; jellies, jams, compotes, and sauces; all prepared food products in this class.

Class: 31 - Fresh fruits and vegetables.

Class: 32 - Non alcoholic drinks; syrups and other preparations for making beverages.

In September 2008 a brand essence workshop, with representatives from the VVRP, VVMP, VVGP, defined the essence of the **vital**vegetables® brand (Figure 3). The brand essence then guided the

development and management of the brand, logo and trademark registration (summarised in the Brand Users Manual, version 3, September 2012).

With the marketing partners keen to explore the potential for exports of **vital**vegetables® products it was agreed in April 2007 to develop an international commercialisation strategy. This also created the need for international protection of trademarks and IP. International registration of trademarks is cheaper if the country of the holder of the trademark is a signatory of the Madrid Protocol. As Australia had signed the Madrid Protocol and New Zealand had not, it was agreed that all trademarks would be assigned to Horticulture Australia Limited and registered in Australia on behalf of VVRP. This facilitated cheaper international registration in a number of key territories. The assignment of trademarks to HAL was completed on April 30th 2008.

The decision on which countries to register the trademark in was a compromise between an estimate of which countries were most likely to be best for exploitation of **vital**vegetables® with refinement using more detailed information from the international commercialisation strategy. The **vital**vegetables® trademarks and device are listed in the programme trademark register (Trademark Register, October 2010).

Brand Usage Manual and Policy on Use of Trademarks

Preparation of a Brand Usage Manual (and Style Guide) was necessitated by development of the new **vital**vegetables® logo, associated trademarks and underlying brand essence. The manual has three main components:

- Information about the **vital**vegetables® brand.
- Criteria for appointment of a product as a **vital**vegetables® product including rules on making public nutritional claims.
- Use of the trademarks consistent with the brand style.

The use of trademarks has been defined in the Brand Usage Manual (version 3, September 2012).

Key performance indicators

Progress against the science plan was reported quarterly to the Operations Team and to VVGG. All reports are circulated within VVRP and lodged on the research website. Research outputs were lodged on the research website and included literature reviews, seasonal production reports within each territory, health benefit dossiers, product information (e.g. production protocols, postharvest/storage protocols, quality assurance protocols), travel reports, minutes of Project Team meetings, operations plan, quarterly reports and annual reports.

Key performance indicators (KPIs) were identified in the Collaborative Research Agreement as targets to be achieved by the mid-term review. These targets are tabulated in Table 5 and outputs are listed in Appendix 10. A refresh of the contracted milestones after the VV2 mid-term review identified new KPIs that were more closely aligned with product development and commercialisation to be completed by December 2012.

Table 5. Key performance indicators for the VV2 contract: Australia

Key Performance Indicators (to December 2012)		Target	Achieved
Products	Germplasm – proposals to PBR	1	0
	Products to commercial agreement	5	1
	Commercial information releases	4	5
Science	Science publications, internal reports and presentations	30	116
	Analytical and crop protocols	9	20
	Staff exchanges and visitors	4	4
	Key phytochemical data linked to consumer health benefits for products assembled.	1	1
	Develop robust claims and messages which comply with regulatory requirements in Australian and New Zealand	5	5
	Hold Gate Keepers meetings	*	6
	Prepare and present **vital**vegetables® category plans to the trade	*	1
	Quarterly reports completed	8	8
	Business cases for **vital**vegetables® products for gate 4 (Launch-Ready)	4	5
	Product manuals for **vital**vegetables® products for gate 4 (Launch-Ready)	4	5

Achievement of KPIs was excellent for science publications, internal reports and presentations with 116 to December 2012. The development of analytical and crop protocols was also good. These protocols largely contain a body of material from earlier work that we have consolidated into formal protocols as part of the product development process. In the area of products and commercial agreements we have learned much about the processes involved.

Discussion

All milestones and deliverables for the project were achieved. Project deliverables were to move four products through the ItL process to the Launch-Ready phase and develop product manuals and business cases to support the commercial launch of these products. This has been achieved for Booster™ broccoli florets, **vital**heart™ **vital**salad™ mix, high vitamin **vital**sight™ carrots and **vital**immunity™ **vital**medley™ mix. In addition, a product manual has been developed for ACE capsicum which is ready for progression through Gate 4. Two high antioxidant salad mixes designed to provide a specific health benefit, **vital**bones™ and **vital**sight™, are ready to pass through Gate 4 to Launch-Ready phase and a **vital**immunity™ **vital**slaw™ mix is ready to launch. There are a number of other products at various stages of development in the product development pipeline (See Tables 2 and 4). These are ready to be developed in the future to expand and refresh the **vital**vegetables® category.

The purpose of the **vital**vegetables® 2 Programme was to grow the market for high value vegetables that deliver scientifically verified benefits to the entire supply chain, health and well being for consumers, and financial prosperity for all stakeholders. VV1 provided a significant body of material that was critical to the success of VV2, namely:

- Crop science and understanding of critical production processes.
- Gemplasm screening and selection of elite cultivars.
- Analytical methods for key nutrients (e.g. vitamins A, C, E; lycopene; glucosinolates).
- Phytochemical content per serve for a range of vegetable crops (e.g. broccoli, cauliflower, tomato, capsicum, carrots, leafy salad vegetables).
- Vegetable nutrient databases that allowed the design of mixed products.

Research activity in VV2 saw the consolidation of this body of material into formal protocols that were then integrated into product manuals for a range of **vital**vegetables® products. This activity resulted in the achievement of the first project outcome for VV2 – '*To develop a range of phytochemical-specific agronomy and post-harvest protocols that can be applied to a wide range of vegetable crops'.*

We anticipate the subsequent outcomes will be achieved through scientific research embodied in a new vegetable category called **vital**vegetables®. This new range of products provides the Australian

vegetable industry with the opportunity to market differentiated products in a global market. The lofty goal of '*increasing consumption of vegetables and decreasing the economic health burden on government and the community due to increased health of the population'* lies in consumer acceptance of specific health-benefits that can be targeted with vegetable products. For **vital**vegetables® products they are heart health, healthy vision, bone health, digestive health and support of the immune system.

What Worked Well

As one of the largest and most complex horticultural research projects undertaken in Australia there have been many valuable lessons learnt from the **vital**vegetables® research programme. A highlight of the project was the excellent trans-Tasman science collaboration between Plant & Food Research and DPI Victoria to meet project milestones. In addition, strong collaborations have been forged with other Australian research providers, such as DEEDI, QLD, when extra science capability was required. Both trans-Tasman teams have built world-class capabilities in the area of health attributes in vegetables and fruit. Through work conducted in this project, DPI Victoria now has excellent vitamin and phytonutrient analytical capabilities and expertise, as well as a very strong understanding of the plant physiology behind production and postharvest protocols required to produce high health fresh produce. The close trans-Tasman science collaboration ensured a good spread of world class scientific capability covering project needs for basic and strategic research using molecular tools and sophisticated biochemistry through to very applied agronomy, postharvest technology and processing and packaging research.

The strength of the scientific collaboration is reflected in the KPI's (Table 5) with 15 refereed scientific papers, 46 conference presentations and seminars, and 55 confidential reports. It is worth noting that much of the work conducted on both sides of the Tasman since 2008 contains valuable IP and is therefore contained in protected, confidential reports, rather than papers published in the public domain. Scientific projects conducted in Australia since 2008 were at the applied end of the science capability spectrum and designed to answer specific commercial questions. This work has been highly successful and has resulted in specific production and postharvest handling protocols that are outlined in the Product Manuals. Of particular note is the work conducted to design sophisticated packaging systems that optimise quality and shelf life and also accurately reflect and support the brand and health messages.

Regular communication between the Australian and NZ research partners, specialist advisers and the HAL Program Manager was particularly effective over the last four years of the project. Regular

operational phone meetings provided ample opportunities for issues to be raised and resolved. Communications and direction from the VVGG also worked very well. Establishment of a protected website for project partners to share information, and instigation of a consumer website to promote the **vital**vegetables® concept to consumers also worked well.

The Idea to Launch (ItL) process has proved to be a valuable tool for both research and development methodology. All stakeholders had input and ownership of decisions at critical steps in the research, development and commercialisation of products. Regular Gate meetings provided an opportunity for all partners to critique progress at predetermined stages of product development. ItL provided a fully documented process that could be easily followed to ensure all aspects of product development were covered at appropriate stages and strengthened the rigour involved in developing products and bringing them to Launch-Ready phase.

The Product portfolio approach provided a visual picture of what was on the table at any time and progress of each product through the ItL process and the product development pipeline. Through this process, product development demanded stronger inputs from the VVMP, particularly in commercial proofing of production protocols, packaging and processing. Development of Product Manuals for individual products provided a single document containing all relevant IP for each product reaching the Launch-Ready phase.

A further strength of the project was the ability to bring in specialist expertise, particularly in commercial, marketing and process development, when required. For example, Mike Slater provided valuable business and marketing expertise to the VVRP and VVMP at a critical stage in the project. Specialist expertise also provided valuable inputs into the ItL process development, health claims and FSANZ regulations, website development and market research.

The focused consumer research conducted in Australia and NZ in 2011 was extremely valuable in reassuring VVMP that there was a significant market opportunity for products and provided direction on how products could best be marketed. It is recommended that all similar projects in the future undertake targeted market research at the start of each project.

The regular progress reviews at critical stages and the Stop/Go review by independent reviewers provided valuable advice from experienced researchers and food industry experts. This ensured the project remained focused, relevant and on track.

<u>Areas that Require Improvement</u>

After adoption and implementation of the ItL process addressed operational and process issues, the major factor hindering a launch of products within the timeframe of this project in Australia was an inability to get engagement and commitment from the VVMP to attend Gate meetings at crucial times. These times appeared to coincide with occasions when the VVMP had important commitments and were travelling overseas. Greater commitment by VVMP to attend Gate meetings is essential to move products to Launch-Ready in a timely fashion. It should be noted though that all the VVMP members have confirmed their commitment to the **vital**vegetables® concept.

In order to remedy this situation in future projects, it is important to ensure commitment and investment from marketing partners from the start of the project. If possible, this includes retailer commitment, even though this may involve a degree of exclusivity. Retailers have the power to 'pull through' new products that growers and wholesalers simply do not possess. In future, it is also critical that all contracts with commercial partners are agreed to and signed early in the project. Business aspects of the project, such as development of Business Cases should be conducted by VVMP and VVGP partners, not science staff. More regular consumer research is needed especially early in projects, to build on a limited knowledge base and grow opportunities by developing new consumer value propositions. This will allow all partners to better understand and act on consumer drivers.

While the launch of Booster™ broccoli heads in August 2009 was a success, failure to follow up with additional advertising and quality problems caused by poor packaging resulted in its withdrawal in February 2010. In future, a range of products needs to be launched together and a long-term advertising campaign must be planned and undertaken by the VVMP in order to better capture the prospective market. The planned launch for **vital**vegetables® products in 2013 will ensure a range of products with credible health attributes aligned to the **vital**vegetables® brand will be launched simultaneously.

Technology Transfer

Establishment of the **vital**vegetables® Marketing Partnership (VVMP) indicated a strong willingness for the wholesale and retail sectors to adopt the results of this project.

Knowledge was transferred between the partners using a number of mechanisms, for instance:

1. Scientific knowledge generated by the research partner organisations was shared quarterly through the reporting mechanisms and at face-to-face annual meetings. All data and outputs were maintained on a searchable password protected website.
2. Phytochemical-specific agronomy and postharvest protocols were translated from science-heavy reports into end-user appropriate reports and procedures for VVMP.
3. Product development knowhow was shared between key stakeholders at regularly scheduled gate keeper meetings.
4. Product information was captured in business cases and product manuals that remain trade secret within territory for the sole purpose of generating **vital**vegetable® branded products.
5. Market research was shared and debated between VVRP, VVMP and VVGP at focused face-to-face meetings to ensure the messages were understood and acted upon.
6. Nutrition and health benefit information was collated into scientific dossiers to support product health claims. The information was translated into product communications and developed into consumer-friendly messages with VVMP. Expert dietician and regulatory consultant opinion on the messages was sought to ensure they complied with FSANZ regulations.
7. Social media tools (website, facebook, twitter) were used to build awareness of and generate interest in the **vital**vegetables® concept within primary audiences. This was achieved by telling the science and research story in a simple but compelling way.
8. A media relations campaign built awareness of the **vital**vegetables® concept in secondary audiences by providing science news stories that supported the launch of the new category of vegetable products.

Industry Engagement

Due to its closed loop system, the project engaged with growers and other industry members via the VVMP. Production protocols were extensively tested with field trials of prospective products on VVMP supplier properties. From 2008 to spring 2012, 77 crops of Booster™ broccoli were grown, mainly in Victoria (Werribee South), but also in

Tasmania and Queensland. Poly-house and field production of ACE capsicums were tested in four trials, cauliflower in six trials, and two carrot trials were conducted in Victoria and Tasmania. These trials were all grown by VVMP suppliers and staff with DPI advice and input with regards to nutrient content and other quality issues, when needed. In addition, **vital**heart™ salad processing and formulation was successfully tested commercially by Salad Fresh (VVMP) in 2012.

Media

Brand & Booster™ Launch – 2009

The **vital**vegetables® brand was launched in Sydney to key media leaders on July 28, 2009. Dr Rod Jones (DPI Vic), in association with Dr Joanna MacMillan-Price, **vital**vegetables® media spokesperson, gave an overview of the science behind **vital**vegetables® and conducted several media interviews. Booster™ broccoli, was launched in Melbourne on Tuesday 17/8 with Dr Jones taking the lead role as media representative. Media interest was intense and continued for several days, resulting in 65 media segments in all; highlights included coverage in the prime time news on all five TV networks (ABC, 7, 9, 10 & SBS), Sky News, Sky Business News (separate interview screened world-wide), live interview on '9 am with David & Kim' (Ch 10), Today Tonight (Ch 7), articles in The Age, The Australian and Herald-Sun, and repeated news segments on ABC and Macquarie radio networks. Later analysis by Edelman indicated that 24 million Australians were exposed to the launch, which was equivalent to over $8 million in advertising. The launch is now considered the most successful media launch of any horticultural product in Australia and resulted in significant exposure for DPI Victoria and the R&D conducted by the **vital**vegetables® team.

A selection of Australian media articles :

- The quest to build a better vegetable. The Age 18/11/12.
- Vital veggies on the fresh menu. Retail World, August 17-28, 2009.
- 'Booster broccoli bursts onto domestic market. Hortlink Winter 2009.
- Broccoli: now better than ever for your health. Werribee Banner, 1/9/09.
- **vital**vegetables®. Cover story: Vegetables Australia Sept/Oct 2009.
- Look up in the sky! Is it a bird? Is it a plane? No, it's super broccoli. The Age 20/9/09.

- Aussie scientists develop super vegies. Herald Sun 17/8/09.
- ‘Super’ broccoli cancer hope. The Weekly Times 9/4/08.
- Vital veggies boost the market. Vegetables Australia Mar/Apr 2008.

Recommendations

We recommend:

- That HAL accepts the **vital**vegetables® 2 final report.
- That HAL monitors progress of **vital**vegetables® product commercialisation and provides support where specific research requirements are identified.
- That HAL participates in the ongoing commercialisation process for **vital**vegetables® intellectual property.
- That HAL continues to support the development of differentiated vegetable products to enable the Australian vegetable growers to add premium products to their offer.

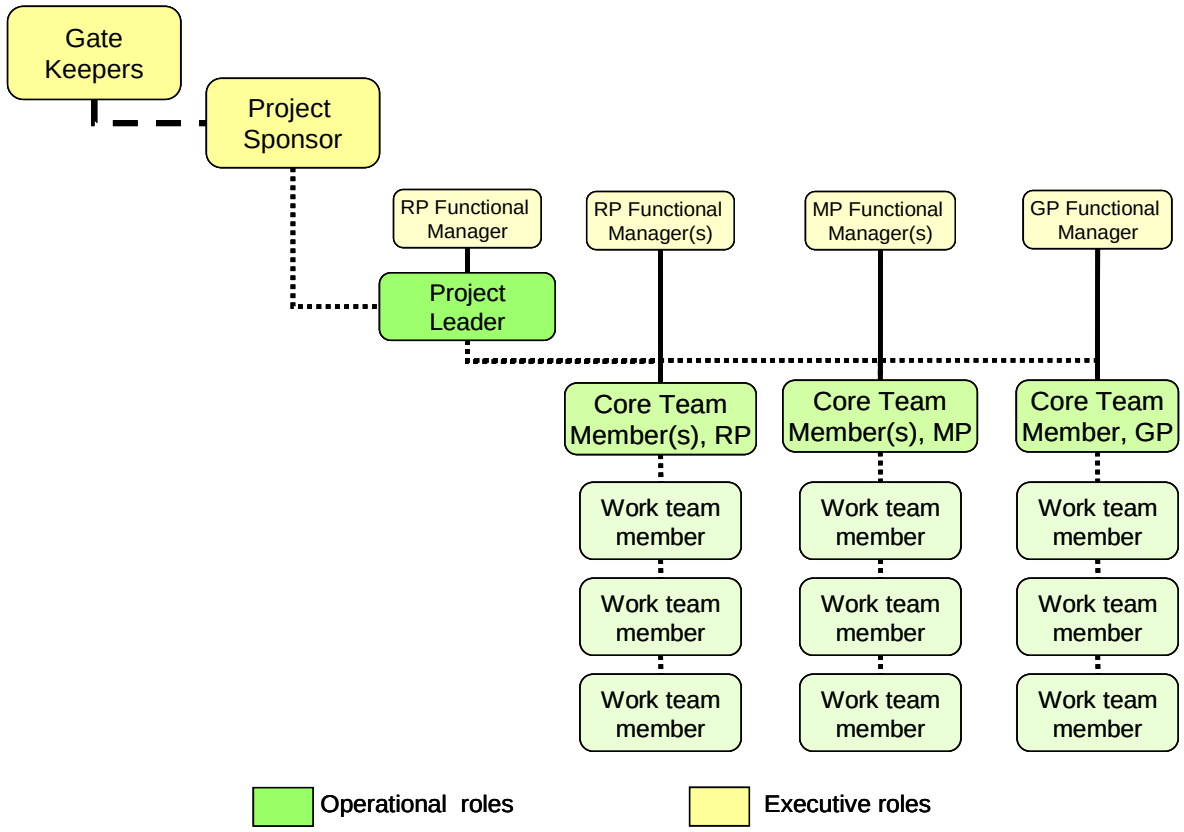
Appendices

Appendix 1 – Roles and Responsibilities of vitalvegetables® Partners

vitalvegetables® **Marketing Partner (Geographic)**	**vital**vegetables® **Research Partner (International)**	**vital**vegetables® **Germplasm Partner (International)**
• Owns brand, upon achievement of agreed turnover targets (partners are shareholders). • Pays royalties for use of IP • Prepares, executes and finances an integrated marketing plan: o Advertising o Promotions o Public relations • Acts as contact point with VVRP – prepares annual plan and manages all required processes and procedures.	• Owns IP. • Passes ownership of the brand to VVMP in each geographic territory, upon achievement of agreed turnover targets. • Manages agreed science/R&D programme and provides support required for health claims. • Has final approval for treatment and usage of the **vital**vegetables® brand, and all claims made in respect of any branded products. • Registers and has oversight of the website.	• Develops elite germplasm – commercially viable and with functional attributes that deliver the brand proposition. • Works with the VVRP in the conduct of breeding efforts to maximise the potential for creation of new nutritionally enhanced or functional cultivars. • Supplies seeds exclusively to VVMP for cultivars identified as satisfying requirements for **vital**vegetables®.
Joint Responsibilities ● Agree Annual Plan, including products, commercial targets, support levels, R&D. ● Provides senior level input at critical stages in the Idea to Launch Process. ● Management of website – consumer interface (marketing) and stakeholder management .		

Appendix 2 – Roles and Responsibilities within ItL Process

The following diagram illustrates the ItL project roles, their inter-relationships and reporting lines.



Idea to Launch Process Sponsor - The ItL Process Sponsor is an executive who has overall accountability for the ItL Process. This requires oversight of the implementation, use and maintenance of the ItL Process as well as the ongoing review and evolution of the process to ensure it continues to be relevant, efficient and effective.

Gate Keepers - Gate Keepers are executives representing the partner organisations who are equipped with the knowledge and experience, and have the authority to make sound gate decisions and who understand the strategic goals and overall portfolio. They are a multi-functional group representing the partners.

Project Sponsor - The Project Sponsor is an executive who has the ultimate authority and responsibility for a specific project, on behalf of the research partners' Operations Team. The Project Sponsor is primarily responsible for providing guidance and mentorship to a specific project to ensure it delivers high quality work in line with the agreed business case.

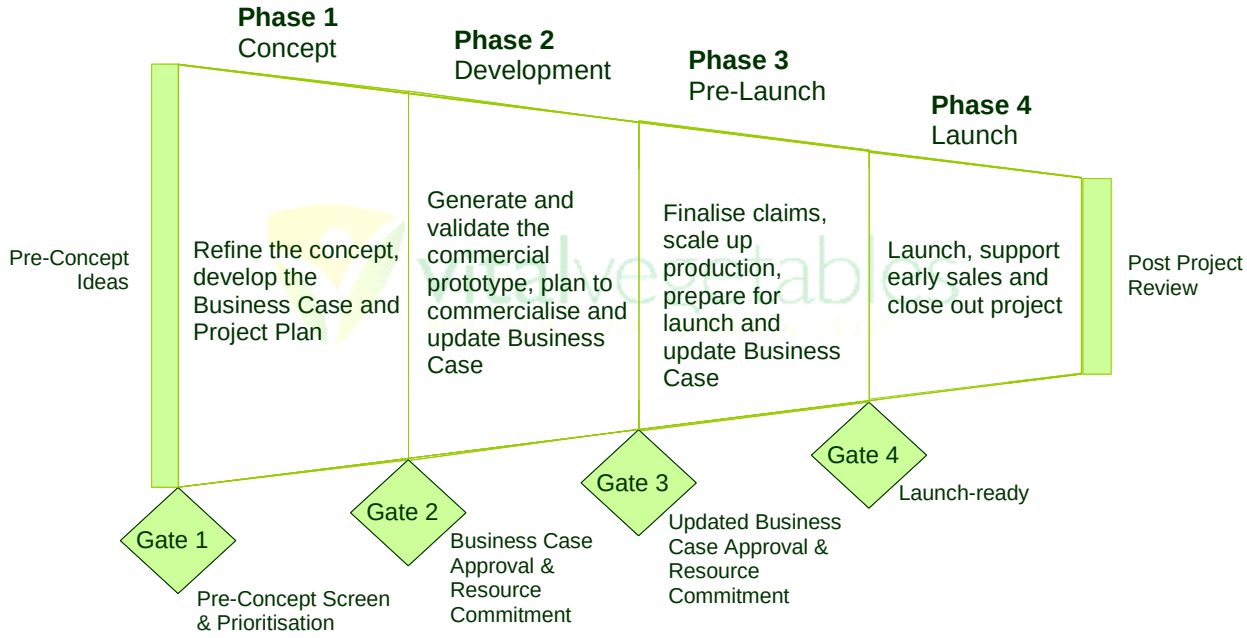
Project Leaders - These Project Leaders are held accountable for the planning, management and successful delivery of the project.

Core Project Team - The Core Team Members are primarily responsible for contributing high quality work to the project and for actively contributing to a highly effective cross-functional team and/or multi-disciplinary team. They are ultimately accountable for any recommendations they make and for the quality of the work that they deliver.

Work Teams- Core team members need to manage small work teams outside the core project team structure to deliver their key tasks. These work teams are typically made up of a Core Team Member and 'support persons' or 'peripheral team members', who are not part of the Core Team. These teams are task orientated and are focused on the successful delivery of particular project activities, generally relating to a functional discipline or a particular project

deliverable. They are a means of ensuring experts are contributing to a project as required, while avoiding tying up non-essential staff.

Appendix 3 – ItL Outputs



Gate 1 is a soft screen that provides decision criteria for determining which pre-concepts merit the commitment of the resource to develop the business case in the next phase. This judgement decision is based on minimal information at this early stage:

- Strategic fit
- Strategic leverage *(leverages off the rest of portfolio, skill sets, strengths, resources, partner)*
- Market attractiveness *(channels and size)*
- Product advantage/impact *(health benefit, credibility to consumer, competition, differentiation)*
- Technical and commercial feasibility
- Potential financial reward *(small, medium, high)*

At each subsequent gate, the Project Leader with core team prepares a business case and project plan to be submitted to gate keepers prior to the gate keepers meeting. The following information is developed during the previous phase to support the project passing the gate:

- Integrated project timeline
- Phase budget and resource needs
- Cost benefit analysis
- Integrated risk analysis
- Updated business case

Outputs from Gate Keepers Meeting:

- Consensus decision which has the following potential outcomes:
  - GO – commitment of resources enabling project to proceed through the next phase.
  - CONDITIONAL GO – commence next phase but continued work is conditional on an agreed condition being met in a given timeframe.
  - KILL – cease project work, review and archive the project.
  - MODIFY – redo outputs to improve quality, resolve an issue or fill in gaps, or

- HOLD – project to GO but all work is delayed until it is given the green light, usually when waiting for resources to become available.

- An approved work plan for the next phase leading to the next gate.
- Project prioritisation and the commitment of resources.

Appendix 4 – Pre-Concept Template

PRE-CONCEPT NAME:

Author:

Date:

Approved:

Score:

PRE-CONCEPT DESCRIPTION:
Briefly describe the Pre-concept.

FIT WITH STRATEGY
In few words, describe how this concept fits with the **vital**vegetables® strategy.

STRATEGIC LEVERAGE
In few words, describe how this leverages off the rest of portfolio, skill sets, strengths, resources and partners.

MARKET ATTRACTIVENESS
In few words, describe the likely sales channels, target group and size of opportunity.

PRODUCT BENEFITS
In few words, describe what advantage the product will likely have over competing products. For example, consider health benefits, customer credibility and differentiation.

TECHNICAL AND COMMERCIAL FEASIBILITY
In few words, describe your initial assessment of the technical and commercial feasibility. Are you confident it can be achieved? Is it possible for science to substantiate it?

POTENTIAL FINANCIAL REWARD
Estimate the magnitude of the financial reward. At this early stage, this is ball park only.

Appendix 5 – Idea to Launch Gate 1 Score Card

Project name:		**Project Code:**	
Date:		**Evaluator name:**	

1. **vital**vegetables® STRATEGIC FIT

	Score = 0	Score = 5	Your score	Comments
1.1 Alignment with VV strategy	Outside scope or peripheral fit with current VV strategy	Strongly aligned with current VV strategy		
1.2 Strategic importance	Minimal impact on VV business strategy	Mission critical		
		Mean score:	0	

2. MARKET ATTRACTIVENESS

	Score = 0	Score = 5	Your score	Comments
2.1 Market channels & size	Limited: single channel/ region; niche market	Multiple channels, countries, common needs		
2.2 Margins in this market	Poor margins (<X%)	Lucrative margins (>Y%)		
2.3 Market growth	Market showing no growth	Evidence of strong growth		
2.4 Competitor situation	Competition intense, market saturated, at best a follower	Scope to show leadership & dominate category		
		Mean score:	0	

3. NEW PRODUCT ADVANTAGE

	Score = 0	Score = 5	Your score	Comments
3.1 Unique consumer benefits	Proposed product is a copycat product only	Product has unique features not easily copied		
3.2 Meets consumer needs	Weak claim; Does not meet consumer needs well	Meets consumer needs & supported by strong claim		
3.3 Perceived value for money	Unlikely to be perceived to be worth price paid	Consumer will recognise value & pay a premium		
		Mean score:	0	

4. LEVERAGES CORE COMPETENCIES / RESOURCES

	Score = 0	Score = 5	Your score	Comments
4.1 Research/ technical synergies	Does not leverage current core competency / portfolio	Capitalises on existing core strengths in portfolio		
4.2 Marketing & Sales synergies	Does not leverage current partner core competency	Capitalises on existing partner core strengths		
4.3 Production/post harvest synergies	Does not leverage existing equipment & capabilities	Leverages current equipment & capabilities		
		Mean score:	0	

5. TECHNICAL AND COMMERCIAL FEASIBILITY

	Score = 0	Score = 5	Your score	Comments
5.1 Product development	Highly complex & significant uncertainty	Not complex & confident can produce robust product		
5.2 Commercial partnerships	Difficult partnership, poor track record, lack of confidence	Trusted partnership, good track record, very confident		
5.3 Regulatory /claims	Highly complex with significant uncertainty	Highly confident of substantiating claims /regulatory approval		
		Mean score:	0	

6. FINANCIAL REWARDS

	Score = 0	Score = 5	Your score	Comments
6.1 Estimated potential returns	Comparatively low <$	Comparatively high > $		
6.2 Estimated yield & royalty stream	Low <$	High > $		
		Mean score:	0	
		Total project score:	**0**	

Recommendation: (Go/Conditional Go/Kill/Redo/Hold)	Overall Comments:

*Appendix 6 – vital*vegetables® *Product Manual Template*

*Appendix 7 – vital*vegetables® *Business Case Template*

SECTION 1 – APPROVAL
SECTION 2 - TABLE OF CONTENTS
SECTION 3 - EXECUTIVE SUMMARY
SECTION 4: PROJECT DESCRIPTION
- THE CONCEPT
- FIT WITH STRATEGY
- PROJECT OBJECTIVE
- PROJECT SCOPE

SECTION 5: MARKET ANALYSIS
- CONSUMER NEED
- MARKET & SALES CHANNEL(S) EVALUATION
- MARKET SIZE
- COMPETITOR ANALYSIS

SECTION 6: THE PRODUCT
- PRODUCT STRATEGY
- PRODUCT CLAIMS
- MARKET PARTNER(S) OPTIONS
- CONSUMER MARKETING STRATEGY

SECTION 7: LEGAL POSITION
- REGULATORY POSITION
- IP STRATEGY

SECTION 8: GERMPLASM AND PRODUCTION
- GERMPLASM OPTIONS
- GROWER STRATEGY AND AGRONOMY
- ANALYTICAL METHODS AND VALIDATION

SECTION 9: POST HARVEST PLANS
- POST HARVEST STRATEGY
- PROCESSING STRATEGY
- PACKAGING FORMATS
- STORAGE AND DISTRIBUTION

SECTION 10: SALES AND LAUNCH STRATEGY
- LAUNCH STRATEGY
- TRADE STRATEGY

SECTION 11: COST BENEFIT ANALYSIS
- FINANCIAL MODEL SUMMARY
- ASSUMPTIONS
- INTANGIBLE BENEFITS

SECTION 11: RISK ANALYSIS
- SUMMARY OF CRITICAL PROJECT RISKS

SECTION 10: PROJECT PLAN & RESOURCING
- KEY MILESTONES
- RESOURCE REQUIREMENTS FOR THE NEXT PHASE

*Appendix 8 – **vital**vegetables® **Quarterly Report Template***

PROJECT NAME:
PHASE:
PROJECT LEADER:
DATE:

EXECUTIVE SUMMARY

PORTFOLIO STATUS

- PRODUCT SUMMARIES THAT CONSIDER PROGRESS ON:
    - CONSUMER & MARKETING
    - PRODUCTION & POSTHARVEST
    - COMMERCIAL & LOGISTICS

OUTPUTS

- SCIENTIFIC PUBLICATIONS
- CONFERENCE PRESENTATIONS
- CONFIDENTIAL **vital**vegetables® REPORTS
- MEDIA RELEASES

STATUS OF RELATIONSHIPS

- VVMP
- VVGP
- INVESTORS

INTELLECTUAL PROPERTY

- IP
- FREEDOM TO OPERATE
- TRADE SECRET

PROJECT ACTIVITIES

PROJECT MILESTONES
ACTIVITIES WITHIN REPORTING PERIOD

Appendix 9 – Confidential Commercialisation Reports

In order to build a new **vital**vegetables® category that the range of products could be clearly identified within, generic cross-product work was carried out to achieve a brand proposition with consistent use of trademarks and health claims. Licensing arrangements were sought to ensure brand usage was agreed and consistent across different marketing partners in different territories.

1. Brand Proposition – post research (24th November 2011).
2. Confidentiality agreements with VVMP-NZ: VVNZ001, VVNZ002, VVNZ003.
3. Consumer Benefit Claims (18th July 2012). Uploaded onto VVRP website.
4. Eason J, Lister C (2012) Use of **vital**vegetables® trademarks. Confidential report prepared for VVRP, 2 July 2012.
5. Lister C (2012) Antioxidant Claims - Evidence Dossier. PFR Trade Secret Document SPTS No. 7573.
6. Slater (2011) **vital**vegetables® Project Vital. Presentation of key findings of market research. August 2011.
7. Brainjuicer, August 2011 **vital**vegetables® Project Vital. Qualitative research findings of market research. August 2011. 62pp
8. Trademark Registration Summary updated 19th September, 2012. Lodged on VVRP website.
9. **vital**vegetables® interim license agreement, VVNZ004.
10. **vital**vegetables® master license agreement (draft), VVNZ005.
11. **vital**vegetables® brand usage manual, version 3, September 2012. Lodged on VVRP website.
12. **vital**vegetables® brand usage manual (21 March 2011). Lodged on VVRP website.
13. **vital**vegetables® style guide (17 March 2011). Lodged on VVRP website.
14. **vital**vegetables® trademark registration summary (13 April 2012). Lodged on VVRP website.
15. **vital**vegetables® trademark registration summary (21 June 2012). Lodged on VVRP website.
16. **vital**vegetables® trademark registrations summary (19 September 2012). Lodged on VVRP website.
17. Willets J (2010) **vital**vegetables®: product options research. Internal report for **vital**vegetables®.

The protocols for crop production, handling and quality assurance along with the supporting analysis on health benefits provide the know-how package that underpins **vital**vegetables® products. These protocols have been developed from research information generated in both VV1 and VV2 as well as from public domain information but represent our

development of that knowledge. The product manuals and business cases listed below are a collation of the protocols which have been recognised as IP in the IP register.

Product Manuals for Australian Territory

1. High Glucosinolate **vital**immunity™ Booster™ Broccoli Florets Product Manual
2. High Vitamin **vital**sight™ Carrot Product Manual
3. **vital**heart™ **vital**salad™ Mix Product Manual
4. **vital**immunity™ **vital**medley™ Product Manual
5. ACE Capsicum Product Manual

Business Cases Australian Territory

1. ACE Capsicum Business Case. Gate 3
2. **vital**heart™ **vital**salad™ Mix Business Case. Gate 4
3. **vital**immunity™ Booster™ Broccoli Florets Business Case. Gate 4
4. **vital**immunity™ Slaw Business Case. Gate 4
5. **vital**immunity™ **vital**medley™ Business Case. Gate 4
6. **vital**sight™ Carrot Business case. Gate 4
7. Stir-Fry Business Case. Gate 3
8. White Cauliflower Business Case. Gate 2
9. Orange Cauliflower Business Case. Gate 2 – *Product discontinued*
10. Booster™ 2 Broccoli Heads Business Case. Gate 3
11. Frozen Booster™ Broccoli Florets Business Case. Gate 3
12. Frozen Stir-Fry Business Case. Gate 3
13. Frozen Vegetable Medley Business Case. Gate 3
14. Coloured Potatoes. Gate 2
15. Baby 'Dutch' Carrots. Gate 2
16. High Lycopene Tomatoes. Gate 1

Analytical Methods

1. **vital**vegetables® Analytical Methods Summary. PFR Trade Secret Document SPTS No. 7555.
2. **vital**vegetables® Analytical Methods Summary. PFR Trade Secret Document SPTS No. 7555.
3. VVM001 – Protocol for ORAC analysis of salads and slaws (August 2012). PFR Trade Secret Document SPTS No. 7556.
4. VVM002 – Protocol for total phenolics of salads and slaws (August 2012). PFR Trade Secret Document SPTS No. 7557.
5. VVM003 – Protocol for glucosinolates in slaw (August 2012). PFR Trade Secret Document SPTS No. 7558.

6. VVM004 – Protocol for glucosinolates in medley (August 2012). PFR Trade Secret Document SPTS No. 7560.
7. VVM005 – Protocol for glucosinolates in broccoli (August 2012). PFR Trade Secret Document SPTS No. 7561.
8. VVM006 – Protocol for vitamins A & E in capsicum (July 2010). PFR Trade Secret Document SPTS No. 7562.
9. VVM007 – Protocol for vitamin C in capsicum (July 2010). PFR Trade Secret Document SPTS No. 7563.
10. VVM008 – Brix Method for capsicum (July 2010). PFR Trade Secret Document SPTS No. 7564.
11. VVM009 – Capsicum sampling protocol (July 2010). PFR Trade Secret Document SPTS No. 7565.
12. VVM010 – Protocol for total carotenoids in salads and slaws (September 2012). PFR Trade Secret Document SPTS No. 7567.
13. VVM011 – Protocol for ORAC analysis in medley (September 2012). PFR Trade Secret Document SPTS No. 7568.
14. VVM012 - Protocol for total phenolic analysis in medley (September 2012). PFR Trade Secret Document SPTS No. 7569.
15. VVM013 – Protocol for vitamin C of tomato (March 2010). PFR Trade Secret Document SPTS No. 7570.
16. VVM014 – Protocol for lycopene in tomato (July 2010). PFR Trade Secret Document SPTS No. 7571
17. VVM015 – Protocol for total phenolics in tomato (March 2010). PFR Trade Secret Document SPTS No. 7572.

Trade presentations (pre-launch range discussions)

1. 19 May 2011 – **vital**vegetables® concept presented to Progressive (Woolworths, Countdown and FoodTown). D. Hughes, A. Bourhill, A. BerrySmith, R. Georgieff, L. Dillon.
2. 15 June 2011 – **vital**vegetables® concept presented to FoodStuffs Auckland.
3. 4 August 2011 – **vital**vegetables® concept presented to FoodStuffs Wellington.
4. 14 May 2012 – Introduction to **vital**vegetables®. presentation to FoodStuffs, Christchurch South Island.
5. 1 June 2012. Product ranging meeting with FoodStuffs.
6. 8 June 2012. Product ranging meeting with Progressive, Auckland.
7. May 2012. **vital**vegetables® trade presentation. Australian Territory.

Appendix 10 – KPI outputs

Refereed publications (17)

1. Brummell DA, Schroder, R (2008) Xylan metabolism in primary cell walls. New Zealand Journal of Forestry Science 39: 125-143. Impact: 0.55
2. Imsic M, Winkler S, Tomkins RB, Jones RB (2010) Effect of storage and cooking on β-Carotene isomers in carrots (*Daucus carota* L. 'Stefano'). Journal of Agricultural & Food Chemistry 58: 5109-5113. Impact: 5.44
3. Jones RB, Frisina CL, Winkler S, Imsic M, Tomkins RB (2010) Cooking method significantly effects glucosinolate content and sulforaphane production in broccoli florets. Food Chemistry 123: 237-242. Impact: 3.15
4. Jones RB, Tomkins RB (2011) Effect of minimal processing on phytochemical and ascorbic acid Content in leafy vegetables. In: Handbook of Phytochemicals, Blackwell Publishing Ltd, Oxford UK.
5. McKenzie MJ, Hunter DA, Pathirana R, Watson LM, Joyce N, Rowan D, Matich A, Brummell DA (2009) Accumulation of an organic anticancer selenium compound in a transgenic Solanaceous species shows wider applicability of the selenocysteine methyltransferase transgene from selenium hyperaccumulators. Transgenic Research 18(3): 407- 42. Impact: 2.75
6. Matich AJ, McKenzie MJ, Brummell DA, Rowan DD (2009) Organoselenides from *Nicotiana tabacum* genetically modified to accumulate selenium. Phytochemistry 70: 1098-1106 . Impact: 3.527
7. Matich AJ, McKenzie MJ, Lill R, Brummell D, McGhie TK, Chen RK-Y, Rowan DD (2012) Selenoglucosinolates and their metabolites produced in Brassica spp. fertilised with sodium selenate. Phytochemistry 75: 140-152. Impact: 3.527
8. O'Donoghue EM, Somerfield SD (2008) Biochemical and rheological properties of gelling pectic isolates from buttercup squash fruit. Food Hydrocolloids 22(7): 1326-1336. Impact: 3.56
9. O'Donoghue EM, Somerfield SD (2009) Plant cell wall polysaccharides: a commentary on their role as agents for food structure and for health. New Zealand Journal of Forestry Science. 39: 169-185. Impact: 0.55
10. O'Donoghue EM, Somerfield SD, Watson LM, Brummell DA, Hunter DA (2009) Galactose metabolism in cell walls of opening and senescing petunia petals. Planta 229: 709-721. Impact 3.42
11. Rochfort SJ, Trenerry C, Imsic M, Panozzo J, Jones RB (2008) Class targeted metabolomics: ESI ion trap screening methods for glucosinolates based on MSn fragmentation. Phytochemistry 69(8): 1671-9. Impact: 3.527

12. Rochfort S, Jones R (2010) Broccoli seeds: Glucosinolate phytochemicals from broccoli seed (*Brassica oleracea* L. var. *botrytis* L.) and their potential health effects. In: Nuts and Seeds in Health and Disease Prevention; Eds. Victor R. Preedy, Ronald R. Watson and Vinood Patel, Elsevier Life Sciences, San Diego, USA
13. Stefanelli D, Goodwin I, Jones R (2010) Minimal nitrogen and water use in horticulture: effects on quality. Food Research International doi:10.1016/j.foodres.2010.04.022. Impact: 3.150
14. Stefanelli D, Winkler S, Jones R (2011) Reduced nitrogen availability during growth improves quality in lettuce leaves by ,minimizing nitrate content, and increasing antioxidant capacity and leaf mineral. Agricultural Sciences 2(4): 477-486. Impact: 0.67; 622 downloads.
15. Stefanelli D, Brady S, Winkler S, Jones RB, Tomkins, RB (2012) Lettuce (Lactuca sativa L.) growth and quality responses to applied nitrogen under hydroponic conditions. Acta Horticulturae 927: 353-360.
16. Rod Jones, Dario Stefanelli and Christine Frisina (2013) A Seven Day Reduction in Nitrogen Prior to Harvest Increased Phenolics in Baby Red Lettuce Leaves. HortScience (Submitted). Impact: 0.78
17. Rod Jones, Christine Frisina, & Bruce Tomkins (2013) Effect of Postharvest Storage, Packaging and Cooking on Vitamin A, C and E Content in ACE Red Bell Peppers. Postharvest Biology and Technology (Submitted). Impact: 2.94

Invitations to give Key Note Addresses and Editorial roles for journals

1. Rod Jones, FIESTA 2010. 5th Innovative Foods Conference. Food innovation: Emerging Science, Technologies and Applications, Melbourne August 2010
2. Bruce Tomkins. FAV HEALTH 2012. 5th International Symposium on Human Health Effects of Fruit and Vegetables. Goa India January 2013.
3. Rod Jones. International Life Sciences Institute (ILSI) Vegetable Nutrition: Why your Mum was right when she told you to eat your vegetables!, Melbourne 12 November 2009
4. Bruce Tomkins and Rod Jones. Postharvest Pacifica 2009, Pathways to Quality : Vth International Symposium on Managing Quality in Chains in collaboration with the Australasian Postharvest Horticultural Conference. Napier, New Zealand, November 15-19, 2009.
5. Dario Stefanelli. Invited to be Editor-in-Chief, Sustainable Agriculture Research journal.

Conference presentations

1. Biswas P, East AR, Hewett EH, Heyes JA (2009) Harvest maturity and intermittent warming interactions on the physiology and quality of tomatoes. Postharvest Pacifica, Napier, New Zealand 16-19 November 2009.
2. Chen RK-Y, de Jonge MD, Paterson D, Howard DL, Henderson B, Freestone DJ, McKenzie MJ (2009) Elemental mapping in broccoli tissue using the X-ray fluorescence microprobe at the Australian Synchrotron. Proceedings Combio 2009, Christchurch Convention Centre, Christchurch, New Zealand 6-10 December.
3. Eason JR, West P, Brummell D, Somerfield S (2008) Altering protease inhibitor activity impacts the development and senescence of broccoli. Chemistry and the Biosphere Conference, University of Otago, Dunedin, New Zealand. November 30th – December 4th, 2008. Oral presentation.
4. Eason JR, West P, Brummell D, Somerfield S, McLachlan A (2009) Manipulating cysteine protease inhibitor expression in *Brassica oleracea* influences both plant development and harvest induced plant senescence. Combio2009 Abstract. Combio2009. Christchurch Convention Centre, Christchurch, New Zealand 6-10 December 2009.
5. Heyes JA (2009) Retaining the health benefits of vegetables after harvest. SE Asia Symposium on Quality Management, Bangkok, 2-5 August 2009.
6. Heyes JA (2009) Whole, fresh and good for you: Vegetables and children's health. Functional Foods Symposium, Auckland, New Zealand 23 November 2009.
7. Imsic MI, Winkler S, Tomkins RB, Jones RB (2009) Beta-carotene isomers in carrots: the effects of storage and cooking. Postharvest Pacifica, Napier, New Zealand, 16-19 November, 2009.
8. Jones RB (2009) The R&D Challenges involved in investigating the consumption of fruits and vegetables and prevention of serious diseases in humans. Postharvest Pacifica, Napier, NZ, 16-19 November, 2009.
9. Jones RB, Tomkins B (2009) Why develop a better broccoli? ILSI Conference on Vegetable Nutrition. Melbourne, Australia, 12 November, 2009.
10. Jones RB, Winkler S, Imsic M, Frisina C, Tomkins B (2009) Cooking significantly impacts on glucosinolate content and isothiocyanate production in broccoli florets. Postharvest Pacifica, Napier, New Zealand, 16-19 November, 2009.
11. Lister CE (2010) Phytochemicals: more than just antioxidants. Dietitians Association of Australia 28th National Conference, Melbourne, Australia, 27-29 May 2010.
12. Lister CE (2010) Superfoods – what is new? Dietitians Association of Australia 28th National Conference. Abstract published in Nutrition & Dietetics 67 (Suppl 1): 16. [invited International Keynote Speaker] Melbourne, Australia, 27-29 May 2010.

13. Lister CE, Lill RE, Tomkins B, Jones R, Heyes JA (2009) The challenges in developing a functional whole vegetable. Proceedings Combio 2009, Christchurch Convention Centre, Christchurch, New Zealand, 6-10 December.
14. Lister C, Yee Collinson J, Woods M, Adaim A, Dick J, Pollard S (2009) NZFAVA: Increasing fruit and vegetable consumption for all New Zealanders. 'Food elements: putting the pieces together' NZIFST Annual Food Conference, Christchurch, New Zealand, 23-25 June 2009.
15. McKenzie MJ, Brummell DA, Chen R, Joyce NI, Hunter DA, Pathirana R, de Jonge MD, Howard DL, Paterson D (2010) Maximising the uptake and metabolism of selenium into anticancer compounds in broccoli. Invited speaker to Queenstown Molecular Biology Plant Satellite Conference, Queenstown, New Zealand, 29-31 August, 2010.
16. McKenzie MJ, Brummell DA, Hunter DA, Pathirana R, Watson LM, Joyce NI, Matich A, Rowan D (2008) Production of anti-cancer selenium compounds in plants. Conference proceedings: Chemistry and the Biosphere Conference. University of Otago, Dunedin, New Zealand, 30 November – 4 December 2008.
17. McKenzie MJ, Brummell DA, Matich AJ, Rowan DD, Joyce NI, Hunter DA, Pathirana R, Chen R K-Y, de Jonge MD, Howard DL, Paterson D (2009) The production and metabolism of anti-cancer selenium compounds in plants. Proceedings Combio 2009, Christchurch Convention Centre, Christchurch, New Zealand, 6-10 December.
18. Morrison SC, Joyce NI, Butts CA, Lister CE (2008) Absorption and metabolism of red lettuce phenolics in rats. Nutrition Society Conference, Christchurch, New Zealand, 9-10 December 2008.
19. Trenerry C, Rochfort S, Imsic M, Panozzo J, Jones R (2009) Class targeted metabolomics: screening and quantification of glucosinolates based on MS^n fragmentation. 11^{th} Government Food Analysts Conference, Melbourne, 22 – 24 February 2009.
20. Zhang P, Trenerry C, Jones R, Imsic M (2009) Raman spectroscopy: a rapid, non destructive tool for estimating the levels of lycopene and beta-carotene in tomatoes and other vegetables. 11^{th} Government Food Analysts Conference, Melbourne, 22 – 24 February 2009.
21. Jones R (2009) The R&D challenges involved in investigating the consumption of fruits and vegetables and prevention of serious diseases in humans. Abstract Postharvest Pacifica Conference, 16-20/11/09, Napier NZ.
22. Winkler S, Imsic M, Frisina C, Tomkins B, Jones R (2009) Cooking significantly impacts on glucosinolate content and Isothiocyanate production in broccoli florets. Abstract and Poster - Postharvest Pacifica Conference, 16-20/11/09, Napier NZ.
23. Olsson S, O'Donoghue EM, Brummell DA, Jameson L, McDonald R, Woolf A (2009) Effect of high pressure water-washing and hot water

drench on postharvest quality of capsicums. Postharvest Pacifica, Napier, New Zealand, 16-19 November 2009.
24. Pathirana R, West P and Eason JR (2009) Proteomic examination of stress-induced cell death in Arabidopsis. Postharvest Pacifica, Napier, New Zealand, 16-19 November 2009.
25. Sowokinos JR, McKenzie MJ (2009) Lowering acrylamide levels in processed potato products. Presentation at the 'Cooking qualities and methodology for healthier fries' workshop, 7th World Potato Congress, Christchurch, 23-25 March 2009.
26. Trivellini A, Zhou J, Zhang H, Ferrante A, Hunter D (2008) Reciprocal regulation of a novel senescence-associated gene and its tandem duplicate in Arabidopsis. Chemistry and the Biosphere Conference, University of Otago, Dunedin, New Zealand, 30 November - 4 December.
27. West P, Eason JR, Pathirana R (2008) Diploid arabidopsis cell cultures as model systems for cell death studies in plants. Oral presentation Chemistry and the Biosphere Conference, University of Otago, Dunedin, New Zealand. November 30th – December 4th, 2008.
28. Rippon P, Lister C, Lill R, Jones R, Heyes J, Eason J (2010) Development of **vital**vegetables® broccoli: Understanding the chemistry, biochemistry and health effects of the glucosinolates. Oral presentation to the 6th International Chemical Congress of Pacific Basin Societies symposium 'Understanding the chemistry of phytochemical antioxidants and their role in human health and wellness', 15–20 December 2010, Honolulu, Hawaii.
29. Stefanelli D, Winkler S, Jones R, Tomkins B, Brady S (2010) Lettuce growth and quality responses to applied N Levels. Abstract, 28th International Horticulture Conference, Lisbon, August 2010.
30. O'Donoghue EM, Rippon P, Somerfield S, Andrews F, Kerkhofs N, Hedderley D (2011) Lycopene, vitamin C and total phenolics in new tomato lines. Poster 28 (Conference Proceedings p88). 'Horticulture for the Future' Joint APHC/AuSHS/NZIAHS Conference. September 18-22, 2011, Lorne, Australia.
31. Winkler S, Frisina C, Jaeger J, Tomkins B, Jones R (2011) Water loss effects on vitamin C content of lettuce leaves. 'Horticulture for the Future' Joint APHC/AuSHS/NZIAHS Conference. September 18-22 2011, Lorne, Australia.
32. Frisina C, Winkler S, Tregenza J, Henderson B, Stefanelli D, Jones R (2011) Response of antioxidant levels to reduced nitrogen application in lettuce leaves. 'Horticulture for the Future' Joint APHC/AuSHS/NZIAHS Conference. September 18-22 2011, Lorne, Australia.
33. O'Donoghue E, Somerfield S, McLachlan A, Olsson S, Woolf A (2011) High-pressure cold-water washing enables continuous high humidity storage for capsicum. 'Horticulture for the Future' Joint

APHC/AuSHS/NZIAHS Conference. September 18-22 2011, Lorne, Australia.

34. Eason JR, West P, Brummell DA, Somerfield, S, McLachlan A (2011) A cysteine protease inhibitor regulates harvest-induced broccoli senescence. 'Horticulture for the Future' Joint APHC/AuSHS/NZIAHS Conference. September 18-22 2011, Lorne, Australia.
35. McKenzie MJ, Chen R K-Y, de Jonge MD, Paterson D, Howard DL, Henderson B, Freestone DJ, Ingham B (2011) Spatial imaging and quantification of microelements in the flowers of selenium-supplemented broccoli indicates elemental targeting to discrete tissues. Australian Synchrotron user meeting in Melbourne (8-9th December 2012), poster presentation.
36. McKenzie MJ, Chen R K-Y, de Jonge MD, Paterson D, Howard DL, Henderson B, Freestone DJ, Ingham B (2011) Spatial imaging and quantification of microelements in the flowers of selenium-supplemented broccoli indicates elemental targeting to discrete tissues. GeoPIXE Workshop (6-7th December 2011) poster presentation.

Seminar Presentations

1. Eason JR (2009) Fresh food metabolism. Presentation to Shizouka University Delegation, Food Industry Science Centre, Palmerston North, 30th March 2009.
2. Eason JR, West P, Pathirana R (2008) Modelling cell death in Arabidopsis cultures. Biology Meeting, Palmerston North, New Zealand 28 August 2008.
3. Heyes JA (2009) Future Vegetables and **vital**vegetables®. Address to HortNZ Research & Innovation Board meeting, Gisborne, New Zealand, 18 June 2009.
4. Heyes JA (2009) Future Vegetables and **vital**vegetables®. Briefing for Minister of Agriculture, David Carter, at HortNZ R&I Board meeting, Gisborne, New Zealand, 19 June 2009.
5. Heyes JA (2009) Retaining phytochemical composition after harvest. Presentation at NZIFST workshop, Palmerston North, New Zealand, 20 November 2009.
6. McKenzie MJ, Chen R K-Y (2010) Using the Australian Synchrotron to map microelements in plant tissue. Invited speaker at the Plant Biology Seminar Series, Biocommerce Centre, Palmerston North. 25th March 2010.
7. McKenzie M, Murray S, Baldwin S, Timmerman-Vaughan G, Hardacre A, Batey I (2008) Capillary electrophoresis of starch - FACE analysis. Presentation at Molecular Tools Meeting, Palmerston North, New Zealand, 24-25 September 2008.
8. Mullaney J, Heyes J, Sutherland J, Kelly B (2010) Fighting cancer: the inside story from broccoli and bacteria. Poster presentation at the Riddet Institute Conference, 29 June 2010.
9. Pathirana R, West P, Eason JR (2008) Establishment and use of a cell cycle synchronised diploid *Arabidopsis thaliana* cell culture to study programmed cell death. 4th September 2008. Laboratory of Tropical Crop Improvement, Division of Crop Biotechnics of Dept of Biosystems, Katholieke Universiteit Leuven, Leuven, Belgium, 4 September 2008.
10. Jones R, Tomkins B (2009) Why develop a better broccoli? Abstract ILSI Conference, 19/11/09, Melbourne.

Confidential vitalvegetables® **Reports**

1. Brand Proposition – post research (24th November 2011)
2. Consumer Benefit Claims (18th July 2012). Uploaded onto VVRP website.
3. Eason J, Brash D, Rippon P, Searle B, Andrews F, Feng L, Tomkins B, Jones R (2012) Field trials of high-glucosinolate broccoli in New Zealand and Australia. A confidential report prepared for **vital**vegetables® genetics partner, Plant & Food Research SPTS No. 7035.
4. Eason J, Brash D, Rippon P, Searle B, Andrews F, Feng L, Tomkins B, Jones R (2012) Field trials of high-glucosinolate broccoli in New Zealand and Australia. A confidential report prepared for MG Marketing, **vital**vegetables® marketing partner, Plant & Food Research SPTS No. 7035.
5. Eason J, Lister C (2012) Consumer health claims for **vital**vegetables®, NZ October 2012 launch products. Confidential report prepared for VVRP, 1 July 2012.
6. Eason J, Lister C (2012) Use of **vital**vegetables® trademarks, 2 July 2012 (uploaded onto VVRP website 5/07/2012).
7. Eason J, Lister C (2012). Use of **vital**vegetables® trademarks. Confidential report prepared for VVRP, 2 July 2012.
8. Eason J, West P, Sansom C, Perry N (2010) Falcarinol and falcarindiol content in selected carrot lines. PFR SPTS No. 4686.
9. Eason JR, Rippon P, Lister C, Kerkhofs N, Andrews F, Gill K, Feng L. (2010) New Zealand-grown ACE capsicum. Summary for 2010 growing season. PFR SPTS No. 4435.
10. Eason JR, Zhou J, West P, Rippon P, Feng L, Joyce N, Braun R (2010) Glucosinolate hydrolysis: Isolation and characterisation of BoESP and BoMyAP from *Brassica oleracea* and biochemical analysis of glucoraphanin hydrolysis derivatives. PFR SPTS No. 4677.
11. Eason JR (2010) Overseas travel report prepared for **vital**vegetables® Research Partners. PFR SPTS No. 3397.
12. Eason, J (2008) Phytonutrients in carrots – Falcarinol. Crop & Food Research Confidential Report No. 2269.
13. Eason J, Lister C, Berrill A (2012). **vital**vegetables® Product Portfolio – Health claims for October launch products (uploaded onto VVRP website 5/07/2012).
14. Evaluation of new **vital**vegetables® broccoli lines in NZ field trials: grower information (November 2010).
15. Heyes J, Brash D, Lister C, Rippon P (2009) **vital**vegetables® New Zealand: pre-commercial trials. PFR SPTS No. 3070 for **vital**vegetables® Marketing partnership.
16. Heyes J, Ding P, McGhie T (2012) High-vitamin carrots. A report prepared for **vital**vegetables® Research Partners, Plant & Food Research SPTS No. 6543.

17. Heyes JA, Morrison SC, Lister CE (2012) Progress report, high-vitamin carrots. A report prepared for **vital**vegetables® Research Partners, Plant & Food Research SPTS No. 7257.
18. Jones RB (2009) **vital**vegetables® - capsicum crop team report. VV Report #0911.
19. Jones RB (2009) **vital**vegetables® salad mix report. VV Report # 0910.
20. Jones R, Imsic M, Winkler S (2009) Hazera high lycopene tomato trial – DPI Knoxfield, October 2008 – March 2009. **vital**vegetables®: Technical report No. 2901.
21. Jones R, Imsic M, Winkler S (2009) Hazera high Vitamin ACE capsicum trial – Department of Primary Industries, Knoxfield, October 2008 – March 2009. **vital**vegetables®: Technical report No. 2902.
22. Lister C (2012) Antioxidant Claims - Evidence Dossier. PFR Trade Secret Document SPTS No. 7573.
23. Lister C, Rippon P (2010) **vital**vegetables®: New Zealand Salad Mix Summary 4.
24. Lister CE (2011) Developing **vital**vegetables® products - the health claim challenge. Presentation to Australian Marketing Partners, Melbourne, 8th December 2011.
25. Lister CE, Lill RE (2009) Booster™ Broccoli: target sulforaphane level and recommended dietary intake. Internal report for VVMP.
26. Lister CE (2011) Orange Cauliflower: Target phytonutrients, health benefits and suggested dietary intake. **vital**vegetables® Commercial in Confidence.
27. Lister CE (2009) The health benefits of broccoli. PFR SPTS No. 2335.
28. Lister C, Berrill A, Eason J (2012) Linking key vegetable and key nutrients to consumer health benefits (draft v12).
29. Lister, Berrill, Eason (2012) **vital**vegetables® Product Portfolio – Health Claims, 29 June 2012.
30. McKenzie MJ, Matich AJ, Lill RE, Brummell DA, McGhie TK, Chen R K-Y,Rowan DD (2012) The identification of novel selenium-containing compounds in the Brassicaceae. ComBio2012, Adelaide, South Australia (23-27 September, 2012).
31. McKenzie, MJ, Chen R (2009) Use of the ZFM beamline at the Australian Synchrotron to map selenium in broccoli tissue. Confidential Report prepared for The New Zealand Synchrotron Group, Royal Society of New Zealand. August 2009. PFR SPTS No. 3000.
32. O'Donoghue E, Somerfield S, Rippon R, Andrews F, Kerkhofs N (2010) Evaluation of high-lycopene tomatoes commercial trial, 2009-2010 season. December 2010, PFR SPTS Report No. 4858.
33. O'Donoghue E et al. (2010) Maturity-related changes in high-lycopene tomatoes- developmental trial. December 2010. SPTS Report No. 4857.

34. Rippon P,Feng L (2011) Reassessment of glucoraphanin concentrations in **vital**vegetables® broccoli samples (New Zealand trials). A report prepared for **vital**vegetables® Research Partners.
35. Perry N (2010) Falcarinol and Falcarindiol content in selected carrot lines. PFR SPTS No. 4686.
36. Reid JB, Tan Y, Trolove SN (2009) Further test of a new model of plant growth and nutrient uptake. PFR SPTS No. 2391.
37. Rippon P, Andrews F, Feng L, Scheffer J, Hedderley D, Brash D (2011) Shelf life trial of floretted Booster™ Broccoli (TB185). A confidential report prepared for the research and marketing partners of **vital**vegetables®. PFR report SPTS 6313.
38. Rippon P, Gill K, Andrews F, Hedderley D (2010) Information sensory evaluation of ACE capsicums from New Zealand glasshouse trial. Confidential PFR report No. 4477.
39. Rippon P, Searle B, Feng L, Andrews F, Bycroft B, Lister C, Brash D, Lill R (2011) VV Booster Broccoli: Production of potential sulforaphane by TB185 in New Zealand. PFR report number 5430.
40. Rippon P, Searle B, Feng L, Andrews F, Eason J, Brash D (2012) New Zealand field trials of **vital**vegetables® high glucosinolate broccoli selections TB3025, TB3055, TB3071 and Booster MS. PFR SPTS No. 7386.
41. Rippon PE, Searle B, Bycroft B, Andrews FA, Feng L, Lister CE, Brash D (2010) **vital**vegetables® Booster™ Broccoli New Zealand field trials: Progress to December 2009. PFR SPTS No. 3748.
42. Slater, M (2011) **vital**vegetables® Project Vital. Presentation of Key Findings of Market Research. August 2011.
43. Brainjuicer, August 2011 **vital**vegetables® Project Vital. Qualitative research findings of market research. August 2011.
44. Trademark registration summary updated 19th September, 2012. Lodged on VVRP website.
45. Trolove S (2011) Effect of selenium on the germination of different plant species. Oct 2011.
46. Trolove S, Tan T, Reid J, Shaw S, McKenzie M, Brummell D (2010) Methods to produce high selenium broccoli. A report prepared for the managers of the Future Vegetables Programme. PFR SPTS No. 3418.
47. **vital**vegetables® Brand users manual, version 3, September 2012.
48. **vital**vegetables® Booster™ broccoli field trial 2010-11 ELECTRONIC WORKSHEET (November 2010).
49. **vital**vegetables® Brand usage manual (21 March 2011).
50. **vital**vegetables® Brand usage manual (version 3, September 2011).
51. **vital**vegetables® Germplasm screening. Australia Update. R Jones. Oct 2011.
52. **vital**vegetables® Style guide (17 March 2011).
53. **vital**vegetables® Trademark registration summary (13 April 2012).

54. **vital**vegetables® Trademark registration summary (21 June 2012).
55. Willets J (2010) **vital**vegetables®: product options research. Internal report for **vital**vegetables®.

Confidential analytical and crop production and handling protocols

The protocols for crop production, handling and quality assurance along with the supporting analysis on health benefits provide the know-how package that underpins the **vital**vegetables® products. These protocols have been developed from research information - generated in both VV1 and VV2 as well as from public domain information but represent our development of that knowledge. The protocols have been recognised as IP in the IP register.

Product Manuals Australian Territory

1. Jones RB, Tomkins RB, Frisina C (2012) **vital**heart™ **vital**salad™ Mix Product Manual for Australia Territory.
2. Jones RB, Tomkins RB, Frisina C (2012) **vital**immunity™ ACE Capsicum Product Manual for Australia Territory.
3. Jones RB, Tomkins RB, Frisina C (2012) **vital**sight™ Carrot Product Manual for Australia Territory.
4. Jones RB, Tomkins RB, Frisina C (2012) **vital**immunity™ Booster® Broccoli florets Product Manual for Australia Territory.
5. Jones RB, Tomkins RB, Frisina C (2012) **vital**immunity™ **vital**medley™ Product Manual for Australia Territory.

Business Cases Australian Territory

1. ACE Capsicum Business Case. Gate 3
2. **vital**heart™ **vital**salad™ Mix Business Case. Gate 4
3. **vital**immunity™ Booster™ Broccoli Florets Business Case. Gate 4
4. **vital**immunity™ Slaw Business Case. Gate 4
5. **vital**immunity™ **vital**medley™ Business Case. Gate 4
6. **vital**sight™ Carrot Business case. Gate 4
7. Stir-Fry Business Case. Gate 3
8. White Cauliflower Business Case. Gate 2
9. Orange Cauliflower Business Case. Gate 2 – *Product discontinued*
10. Booster™ 2 Broccoli Heads Business Case. Gate 3
11. Frozen Booster™ Broccoli Florets Business Case. Gate 3
12. Frozen Stir-Fry Business Case. Gate 3
13. Frozen Vegetable Medley Business Case. Gate 3
14. Coloured Potatoes. Gate 2
15. Baby 'Dutch' Carrots. Gate 2
16. High Lycopene Tomatoes. Gate 1

Science Reports

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) Screening Broccoli Germplasm for Target Phytochemicals. **vital**vegetables®: Technical Report No. 1201

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) Broccoli Floret Postharvest Handling Final Report. **vital**vegetables®: Technical Report No. 1202.

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) ACE Capsicum Production. **vital**vegetables®: Technical Report No. 1203.

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) ACE Capsicum Postharvest Handling Final Report. **vital**vegetables®: Technical Report No. 1204.

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) Salad Screening Final Report. **vital**vegetables®: Technical Report No. 1205.

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) Carrot Screening Final Report. **vital**vegetables®: Technical Report No. 1206.

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) Carrot Postharvest Handling Final Report. **vital**vegetables®: Technical Report No. 1207.

Rod Jones, Christine Frisina, & Bruce Tomkins (2012) Cauliflower and Cabbage Screening Final Report. **vital**vegetables®: Technical Report No. 1208.

Media releases (12 to date for VV2)

***Media releases linked to the launch of Booster™ Broccoli*.**
Media Update in August 2009 listed 5 international, 27 national and 28 State news items related to the launch of Booster™ Broccoli. A selection of the popular articles is listed below:

1. 'Super' broccoli cancer hope. The Weekly Times, 9 April 2008.
2. Vital veggies boost the market. Vegetables Australia, Mar/Apr 2008.
3. Aussie scientists develop super vegies. Herald Sun, 17 August 2009.
4. Vital veggies on the fresh menu. Retail World, 17-28 August 2009.
5. Booster broccoli bursts onto domestic market. Hortlink, Winter 2009.
6. Broccoli: now better than ever for your health. Werribee Banner, 1 September 2009.

7. Look up in the sky! Is it a bird? Is it a plane? No, it's super broccoli. The Age, 20 September 2009.
8. **vital**vegetables®. Cover story: Vegetables Australia, Sept/Oct 2009.

Media releases linked to VV2 activities

9. Eason JR (2010) Jocelyn was interviewed about the health-promoting properties of fruit and vegetable skins for New Zealand Listener by Jennifer Bowden. http://www.listener.co.nz/issue/3665/columnists/15900/the_skinny_on_skins.html;jsessionid=5122EEC84503458786B838DDE0620A42
10. Heyes JA (2010) **vital**vegetables® – the science-business model behind new products. Food New Zealand, February 2010, page 3.
11. Heyes JA (2009) National Radio interview, **vital**vegetables®, September 2009.
12. Heyes J (2010) Radio interview: ThisWayUp, National Radio: black carrot concentrate as a food colourant, May 2010.
13. Heyes JA, West P, McKenzie MJ (2009) Interview by New Zealand National Radio about the **vital**vegetables® programme.
14. Lister CE (2010) Carolyn contributed information to a journalist from NutraIngredients for an article on super vegetables, www.nutaingredients-usa.com/Research/Super-veg-look-set-to-walk-the-antioxidant-red-carpet.
15. Lister CE, Said J (2010) Carolyn and John were interviewed for New Nutrition Business by Richard Clarke. New Nutrition Business 15, 15-17: First failure teaches Booster™ Broccoli how to differentiate: commericalisation case study.
16. McKenzie MJ (2009) Research Programme, Booster™ Broccoli and glucosinolate and selenium metabolism. The 15-minute clip was aired on Our Changing World on 22 September.
17. McKenzie MJ (2009) Marian also spoke about her Synchrotron research. The interview was aired on Our Changing World 23 September as part of a clip that featured Professor Ian Gentle, head of science at the Australian Synchrotron.
18. Dick A (2012) Super veg on the way. The Land. Retrieved 18 January 2012 from http://theland.farmonline.com.au/news/state/agribusiness-and-general/general/super-veg-on-the-way/2410874.aspx
19. Thomson G (2011) Vegetable industry annual report 2011 (AusVeg, HAL). **vital**vegetables®, Page 4 (85 pp).
20. Bob Hart, celebrity chef, highlighted ACE capsicum in a cooking program segment which will go to air on Channel 9 (Australia).

Media releases linked to NZ launch of vitalvegetables® **(October 2012)**

To gain media interest, the Communications Team has drafted press releases designed to provide science support for the **vital**vegetables® category consumer messages, together with a **vital**vegetables® Background document. This has been done as part of the pre-launch communication activities:

Press releases:

- How to keep your vegetables fresh?
- If you are low in selenium, then make sure you eat your broccoli.
- Consumers confused about vegetables (Myths).
- What plants should I grow?

Abstracts for magazine pitches:

- Eat the rainbow.
- All vegetables are created equal, aren't they?
- What's so good about vegetables anyway?
- Vegetable vitamins.

Additional requests for articles (September 2012):

- FishHead, Wellington's Magazine.
- NZ Grower Magazine.
- The New Zealand Farmers Weekly.

Media Stories:

1. **23 September 2012** - Sunday Star Times: http://www.stuff.co.nz/life-style/wellbeing/7717865/Super-veges-soar-to-the-rescue
2. **23 September 2012** - TV3: http://www.3news.co.nz/Super-veggies-hit-shelves/tabid/372/articleID/270284/Default.aspx
3. Fresh Produce Marketing (Lisa Cork) http://www.freshfruitportal.com/2012/10/03/the-packaging-pitch-the-art-of-providing-a-need-fulfilled/www.freshfruitportal.com
4. Anon (2012) NZ: 'Super veggies' hit shelves. Retrieved from http://www.freshplaza.com/news_detail.asp?id=101183#SlideFrame_1
5. **25th October 2012**. Radio New Zealand Rural News http://www.radionz.co.nz/national/programmes/morningreport/20121025

Website

The NZ Communications Team has written and uploaded a full set of information onto the **vital**vegetables® website that supports the five products going to launch under a range of headings (Our Story, Products, Health Benefits, Q&A). VVMP-NZ has provided written information for 'Recipes', 'Where to buy' and act as the 'Contact' for

the products (postal address, email and 0800 number). Each of the web-pages has 'read more' tabs where the consumers can investigate and get more information as they feel the need. The **vital**vegetables® consumer website went live on 14/09/2012, http://www.vitalvegetables.co.nz/

Staff exchanges

1. Paula Rippon spent a week at DPI in May 2009. This was a great opportunity to update each other on methodology and learn the methods DPI is using for tomato and capsicum analysis.
2. Bruce Tomkins visited Gérard Simon of Vilmorin & Cie, France, October 2009.
3. Jocelyn Eason visited the vegetable breeding groups of Vilmorin & Cie in France 2010. While there she presented information from VV2 research and discussed collaboration on carrot and broccoli development.
    - Eason JR (2010) High Falcarinol Carrots. Presentation to Jacques-Yves Guéguen and Gérard Simon, Vilmorin, La Ménitré, France.
    - Eason JR (2010) High Sulforphane Broccoli. Presentation to Grégoire Marandel and Gaëlle le Navenec, Laboratoire de Biotechnologies Végétales, Harris Moran Clause. 10th May 2010, Beaucouzé, France.
4. Bruce Tomkins visited PFR, Palmerston North, 5 October 2012.
5. Joint DPI and PFR research meeting, Lorne (Vic), September 2011.