

## **Final Report**

# **Tools and interventions for increasing children's vegetable intake**

**Project leader:**

Dr David N Cox

**Delivery partner:**

CSIRO Health and Biosecurity

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*Tools and interventions for increasing children's vegetable intake (VG16064)*

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Level 7  
141 Walker Street  
North Sydney NSW 2060

Telephone: (02) 8295 2300

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## Public summary

Consecutive national nutrition surveys have indicated that two to six-year-old children are not consuming enough vegetables with only 6% achieving recommended intakes<sup>1</sup>. Furthermore, there is evidence that low intakes in childhood track into adulthood, posing a threat to the vegetable industry and individuals' health. Broad action is needed.

This project, called "VegKIT", addressed the problem of low intake by working in partnership with vegetable growers, food service and educators across multiple settings. The project was led by CSIRO, who, with Nutrition Australia and Flinders University, created many outputs and resources which are published at [www.vegkit.com.au](http://www.vegkit.com.au).

VegKIT tested a change in traditional health messaging by implementing a 'learning to like' mechanism for growing children's acceptance of vegetables. This was done through increasing vegetable demand in key settings which influence children's exposure to vegetables, with the long-term potential impact of increasing their intake by more than half a serve of vegetables per day. VegKIT focused on the development, evaluation, dissemination and adoption of best-practice tools and resources.

VegKIT specifically targeted Australian preschool and primary school children aged two to six years old using a coordinated approach, novel product development and supply-chain initiatives.

The VegKIT project included six activities:

1. Development of best-practice guidelines to increase vegetable consumption.
2. Creation of a national online register of initiatives to increase vegetable consumption.
3. Development and coordination of the Vegetable Intake Strategic Alliance (VISA).
4. Update of current dietary advice for maternal, infant and early years, using evidence-based knowledge of flavour exposure and food preference development, to improve vegetable acceptance.
5. Execution of initiatives in the community (for long day-care settings)
6. Development of supply chain initiatives (industry innovations) and interventions in early Primary school settings

Over the course of five years, investment in VegKIT project activities resulted in:

- Almost 10,000 downloads of best practice guidelines
- An online National registry evaluating 23 national and international vegetable initiatives.
- A VISA stakeholder agreed position statement describing 'learning to like' messaging and necessary action. The promotion of best practice, and shared information on related initiatives.
- Evidence-based advice on child vegetable exposure in infancy was published in a high impact journal, ready for submission to the Australian dietary guidelines' revision process.
- Through the evaluation of the 'learning to like' intervention components in early learning long day care settings, results found that a combination of CSIRO's Taste and Learn™ for Early Years curriculum package and Educator's Training on the mealtime environment was the best way to increase children's vegetable intake.
- Successful development of new vegetable product concepts and engagement with industry stakeholders, as documented in industry resources and a high impact journal publication.
- Implemented canteen intervention strategies increased vegetable sales by 75% in primary school canteens. These results were documented in industry resources and high impact journal publications.

All resources and learnings from the VegKit project can be accessed at [www.vegkit.com.au](http://www.vegkit.com.au). (~26,000 users to date). These supporting resources are freely available to all stakeholders to use for increasing vegetable demand.

In conclusion, VegKIT successfully identified opportunities for stakeholders to increase demand within the existing vegetable supply chain. In addition, VegKIT approaches could lead to improved health outcomes. By developing new ways of framing behaviour change messages ('learning to like'), best practice, effective interventions, and novel product supply, we identified ways to increase the demand of fresh produce and directly impact vegetable industry stakeholders, health professionals, government agencies, childhood educators, school canteen operators and researchers.

## Keywords

vegetables; children; intakes; consumption; demand; schools; canteens; food service; early learning; behaviour; exposure; liking; best practice; collaboration; stakeholders; supply

## Introduction

Consecutive national nutrition surveys have indicated that two to six-year-old children are not consuming enough vegetables with only 6% achieving recommended intakes<sup>1</sup>. Furthermore, there is evidence that low intakes in childhood track into adulthood impacting on health and long-term risk of diet related chronic disease<sup>2</sup>. Low consumption also poses a threat to the vegetable industry through lack of demand for produce. In the absence of a marketing levy and minimal impact of health initiatives, there was a recognition by Hort Innovation and stakeholders that a long-term concerted effort was required to focus on increasing children's vegetable intake and improve the demand for vegetables. The project ideas originated in a strategic investment plan (VG13090) and a subsequent Implementation plan (VG15005), incorporating learnings from the VG15067 Vegetable Education Project, with six activities implemented together in the current project.

The objective of this 5-year Project (2018-2022) was to deliver an integrated program of research and development activities to increase children's intakes and acceptance of vegetables, with the long term planned impact of increasing children's intake by more than half a serve of vegetables per day. The project sought to test a paradigm shift away from health messaging to 'learning to like' as a facilitator of increasing intakes. The project was underpinned by a consortium comprising CSIRO, Flinders University and Nutrition Australia (Victorian Division) recognising that no one sector, or organisation, can address the demand problem in isolation. Activities created partnerships with industry (growers and supply chain), health promotion and canteen organisations.

The Project comprised of six key Activities:

Activity 1: Best practice guidelines to increase vegetable intake

Activity 2: A national on-line registry of initiatives to increase vegetable intake and VegKIT website

Activity 3: Development and coordination of the Vegetable Intake Strategic Alliance (VISA)

Activity 4: Updated dietary advice for maternal, infant and early years, using evidence-based knowledge of flavour exposure and food preference development, to facilitate children's vegetable intake

Activity 5: Initiatives in the community (for long day-care settings) to increase children's vegetable intake

Activity 6: Supply chain initiatives (industry innovations and early primary school settings) to increase children's vegetable intake

Generally, the implementation of the planned activities proceeded as originally intended; however, it was recognised in the first year of operation that a website would be required to create synergies between activities and promote the tools and intervention best practice. Thus vegkit.com.au was created, aligning to Hort Innovation's website design principles, and has had a huge impact on promoting the project.

The relevant Vegetable Strategic Investment Plan outcomes that the project sought to address were increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, product differentiation, increased food service revenue; and increased consumer knowledge.

## Methodology

The Project was delivered by a consortium working collectively and in collaboration with a range of stakeholders across multiple sectors (research, health, education, government, industry) to deliver six key activities focused on increasing children's vegetable intake. These included:

### **ACTIVITY 1: Development of best-practice guidelines for key stakeholders**

Development of best-practice guidelines and translation of guidelines to a set of resources for different stakeholder groups.

- Scientific review and updated findings for best practice (See publications list, journal article no 1) (Appendix 1)
- Develop and translate best-practice guidelines for different stakeholders (Appendix 2)
- Engage stakeholders and publish and disseminate best-practice guidelines (Appendix 3)

### **ACTIVITY 2: Development of a national online registry of initiatives and VegKIT website**

Development of a national online searchable database of projects, programs, resources and research designed for health professionals, educators, researchers, and people working in community or public health to explore, plan, develop and evaluate existing or future initiatives.

- Review current and past registries and available software
- Develop an evaluation tool to assess effectiveness of scientific research and public health initiatives based on best-practice guidelines (Activity 1) Appendix 4
- Develop registry and settings-based website
- Launch and promote registry to build awareness, encourage submission and stakeholder use

### **ACTIVITY 3: Establish and coordinate the Vegetable Intake Strategic Alliance (VISA)**

This activity built on previous work (VG13090 and VG15005) which identified the need for an alliance to facilitate cross-sector collaboration to increase children's vegetable intake. The VISA comprised a wide range of stakeholders including the horticulture industry, State and Commonwealth departments, nutrition and health agencies, research organisations, retailers, early learning and parenting organisations and various non-government organisations. The alliance leveraged knowledge and collaboration to achieve a shared vision of increased vegetable knowledge among children and their families.

- Identify critical success factors for a successful alliance (See publications list, journal article no. 2)
- Define the terms of reference, role, strategy, vision and action plan for a five-year sustainable VISA
- Develop and endorse a position statement on what is needed to increase children's intake of vegetables and disseminate (Appendix 5)

### **ACTIVITY 4: Update current dietary advice for maternal, infant and early years, using evidence-based knowledge of food preference development, to facilitate vegetable acceptance in children**

Previous work (VG13090) identified exposure, role modelling and conviviality (i.e. positive experiences and enjoyment) as effective strategies for establishing long term vegetable acceptance in children. Advice on how to encourage acceptance of vegetables in the early years of life is lacking. This activity targeted this issue by leveraging policy opportunities to enhance age-appropriate, evidence-based, practical advice as a sustainable way to increase longer term demand for vegetables.

- Establish international advisory committee to provide content and strategic advice
- Review scientific evidence on food preference development in the early years to encourage vegetable intake (See publications list, journal article no. 3)
- Review dietary recommendations in the early years to encourage vegetable intake and identify gaps in advice
- Develop recommendations to strengthen advice using stakeholder/expert consensus process (See publications list, journal article no. 4)
- Launch multifaceted policy and stakeholder engagement strategies to influence policy development including meetings, tailored policy briefings and advocacy materials, social media campaigns

### **ACTIVITY 5: Undertake initiatives in the community (long day care)**

This activity developed and evaluated a package of initiatives to increase vegetable acceptance and consumption in long day care centres. One component built on a previously developed vegetable education program for Primary Schools, Taste & Learn™, (VG15067) to develop a curriculum resource for long-day care centres.

- Development of a package of four innovative and scalable community initiatives (targeting vegetable availability, acceptance, enjoyment and feeding practices in long day care setting, including Cooks Training and Menu Assessment, 'Taste & Learn™ for Early Years' Curriculum, Educator Mealtime Training and Menu Box Delivery Service
- Trial the initiatives in a randomised controlled trial using a multiphase optimisation strategy (MOST framework) to determine their effectiveness and identify the optimal combination of initiatives which most effectively increases children's vegetable intake. (See publications list, journal article nos. 5,6,7 and appendix 6 for summary of results)
- Establish a pathway for larger scale rollout utilising adoption partners for self-sustaining delivery

## **ACTIVITY 6: Development of supply chain initiatives (new products, school canteen initiatives)**

This activity focused on building opportunities to increase children's vegetable intake through 1) development of new product concepts suitable for a range of settings (e.g. retail, canteen, childcare) and 2) provision of more vegetable options in school canteens.

- Development of an evidence-based model for product development of vegetable-based products for children (See publications list, journal article no. 8 and appendix 7 industry report)
- Development of new vegetable-based product concepts with desirable sensory properties suitable for a range of settings which were qualitatively evaluated with children through focus groups (Appendix 8)
- Development of two vegetable-based prototypes with desirable sensory properties suitable for a range of settings with quantitative evaluation by children in a sensory consumer acceptance test (Appendix 9)
- Conduct menu audit and qualitative interviews with canteen managers and parents to determine current vegetable offering, barriers and opportunities in primary school canteens (See publications list, journal article no. 9 and Appendix 10)
- Development of a multi-strategy behavioural intervention for primary school canteens, the VegUP program, to increase children's vegetable consumption. The program was co-designed with Healthy Kids Association and canteen operators and was evaluated in a randomised controlled trial to measure effect on canteen vegetable sales. Canteen manager acceptability was evaluated using an online survey and follow up interviews (see publication list, journal article no. 10)
- Recommendations for adaptation, adoption and larger scale roll out

## **Results and discussion**

### **Results**

VegKit has successfully identified and promoted opportunities for stakeholders to increase demand within the existing vegetable supply chain.

Evidence of adoption of best-practice interventions consisted of 9,811 (as at 20/10/2022) downloads of resources and best practice guidelines, and a functioning Registry which captured and evaluated 23 initiatives. VISA stakeholders promoted best practice and shared information on related initiatives; agreed and promoted a position statement succinctly describing the 'learning to like' message and necessary action.

The incorporation of evidence-based advice on child vegetable exposure in infancy was published in a high impact journal (Bell et al, 2021a) ready for submission to the (delayed) Australian dietary guidelines (infant feeding) revision process. An evaluation of the effectiveness of intervention components in long day care (Early Childhood Education and Care) settings found that a combination of CSIRO's Taste and Learn™ curriculum package, adapted for pre-schoolers, and an Educator's Training module on the mealtime environment was the best way, among those tested, to increase children's intakes.

Evidence for novel supply chain (direct menu-box supply to long day care) provided a proof of concept that a menu box delivery service can be adapted and implemented in the long day care sector. Further refinement, including addressing cooks' and educators' negative perceptions of children's acceptability of vegetables, is required prior to broader dissemination (See outcomes from Menu Box Delivery Service in long day care study).

Successful development of new vegetable product concepts and engagement with industry stakeholders was also documented in a high impact journal publication and industry resources. An evaluation of effectiveness of primary school canteens intervention strategies found that a multi-component strategy, including new product concepts, increased vegetable sales by 75%. This outcome was documented in high impact journal publications (Poelman et al, 2022a and 2022b) and industry advice (webinars and reports)

All resources and learnings from the VegKit project can be accessed at [www.vegkit.com.au](http://www.vegkit.com.au) These supporting resources are available at no-charge to stakeholders across settings that influence children's vegetable intake. Wide reach was evidenced by the total number of users of the VegKIT website (25,930 users as at 20/10/2022) indicating a valuable return on investment .

### **Discussion**

Collaboration across stakeholder groups that are effective and meet evidence-based best practice should form the basis of future demand-based initiatives going forward. This could include the unexplored home-based initiatives, to support out-of-home settings' approaches explored in VegKIT.

With new and tested resources, growers and other stakeholders can promote a new way for children to 'learn to like' through exposure to a variety of vegetables at an early age. By using the readily available resources, stakeholders can be confident that this approach is evidenced-based and effective.

More opportunity exists within the industry to support school canteens to incorporate greater vegetable content alongside their traditional offerings (e.g., hot meals or vegetable-rich bento boxes). Furthermore, industries can also invest in curriculum-based vegetable exposure resources in early learning settings, and advice packages for educators/carers on ways to support children to learn to like vegetables.

### Conclusion

Targeting children's intakes of vegetables is important to address stagnant low demand and VegKIT has provided evidenced-based tools, approaches and messages that can assist the vegetable industry, health and education sectors to meet this critical challenge

## Outputs

**Table 1. Output summary**

Output	Description	Detail
<b>Website</b>	Development and maintenance of VegKIT website including a collection of evidence based and expertly developed practical tools, resources and supporting evidence. Resources are targeted at the many sectors that influence children's vegetable intake including early childhood care services, primary schools, research, government, health professionals and industry.	<p><a href="http://VegKIT.com.au">VegKIT.com.au</a></p> <p>The VegKIT website and registry were built by Fusion and soft launched in November 2019 with full launch February 2020</p> <p>Available to general public with tailored messaging to target audiences and settings including Long Day Care, OSHC &amp; Schools, Industry and Growers, Researchers and Community &amp; Public Health.</p> <p><u>Dissemination and engagement</u> Communication and engagement plans were developed and executed, included dissemination via media release, media kits and social media campaigns which highlighted website refresh and launch of A1 evidence-based user guides (See appendix 11)</p> <p>Regular website and registry monitoring and reporting plan which demonstrates uptake, reach, downloads (See appendix 12)</p> <p>End of project data:</p> <ul style="list-style-type: none"> <li>• Page views 153,215</li> <li>• Total number of users 25,930</li> <li>• Downloads 9,811</li> <li>• Registry initiatives 23</li> </ul>
<b>Online registry</b>	<p>The VegKIT registry is a centralised, national, searchable database of projects, resources and research that promote increasing vegetable intake in children. It is designed to be used by health professionals, educators, researchers, people working in community or public health to explore, plan, develop and evaluate existing or future initiatives.</p> <p>All materials included in the registry have been reviewed for alignment with the <a href="#">best practice guidelines</a> and evaluated for effectiveness by an independent <a href="#">expert panel</a>.</p>	
<b>Best Practice Guidance for increasing children's vegetables consumption</b>		
<b>Best-practice guidelines</b>	Digital platform hosting best practice guidelines for 10 stakeholders and Hort Innovation	The user guides, tools and other resources are available on <a href="#">VegKIT Project – Homepage</a> . The resources are grouped by stakeholder sector so they are easy to find but also easy to



	<p>funding criteria and supporting tools and resources to support stakeholders to action the guidelines.</p> <p><i>Report: Best practice guidelines for increasing children’s vegetable consumption. A comprehensive report of the development of best practice guidelines to inform interventions aiming to increase children’s consumption of vegetables (see publications list, journal article no. 1)</i></p>	<p>browse between sectors.</p> <p>Long day care: <a href="http://vegkit.com.au">Long day care (vegkit.com.au)</a>  OSHC and Schools: <a href="http://vegkit.com.au">OSHC &amp; Schools (vegkit.com.au)</a>  Industry and Growers: <a href="http://vegkit.com.au">Industry &amp; Growers (vegkit.com.au)</a>  Researchers: <a href="http://vegkit.com.au">Researchers (vegkit.com.au)</a>  Community and Public Health: <a href="http://vegkit.com.au">Community &amp; Public health (vegkit.com.au)</a>  (See Appendix 13-25 for all user guides and supportive resources)</p> <p><u>Dissemination and engagement</u>  Media release August 2020 (See appendix 11)  Details of downloads (total 6,055 as at 21/10/2022)  See appendix 12)</p> <p>Presentations to the VISA – Nov 2019, Mar 2021  Presentations to the PRG – July 2018, March 2020, Sept 2020,  Hort Connections – 07-09 June, 2021  Presentation to the Australian Children’s Education and Care Quality Authority (ACECQA) Nov 2020</p>
<p><b>Dietary advice to increase children’s early vegetable acceptance</b></p>	<p>Review of scientific evidence on food preference development and dietary recommendations in the early years (See publication list, journal article no. 3)</p> <p>Development of 16 evidence-informed, end-user friendly and stakeholder endorsed advice statements to strengthen guidelines and policy advice. (See publication list, journal article no. 4)</p>	<p>The advice statements were translated into 4 resources to support policy and practice adoption and made available via the VegKIT website:</p> <ol style="list-style-type: none"> <li>1. Evidence Summary for policy (<a href="#">Evidence summary: Policy.pdf</a>) Appendix 26</li> <li>2. Evidence summary for health practitioners (<a href="#">Evidence summary: Health Practitioners.pdf</a>) Appendix 27</li> <li>3. Infographic: Feeding advice to support young children to learn to eat and enjoy vegetable (<a href="#">Infographic feeding advice.pdf</a>) Appendix 28</li> <li>4. Science insights for food industry: Opportunities for product development and marketing of vegetables for young children (<a href="#">Science-insights-for-food-industry.pdf</a>) Appendix 29</li> </ol> <p><u>Dissemination and engagement</u></p> <p>A multifaceted policy and stakeholder engagement and dissemination plan was executed to influence policy and practice. Including:</p> <ul style="list-style-type: none"> <li>• Sixteen stakeholder engagement activities targeting policy and practice, industry and research.</li> <li>• Supporting communication activities including: <ul style="list-style-type: none"> <li>– two one-month social media campaigns, executed by Nutrition Australia (February and July 2021), targeting parent and carers</li> <li>– Social media pitches delivered to targeted health organisations, infant food manufacturers and influential parenting brands and personalities, encouraging adoption of advice statements into communications (esp. social media) to parents and carers.</li> </ul> </li> </ul>
<p><b>Vegetable promotion programs</b></p>		
<p><b>Digital package for long day</b></p>	<p>Package of best practice initiatives to increase children’s vegetable</p>	<p><b>Package of best-practice initiatives:</b>  Tested in 2 randomised controlled trials to determine:</p>

<p><b>care (LDC)</b></p>	<p>intake in long-day care, comprising:</p> <p><u>Cooks training and Menu Assessment</u> Online healthy menu planning training module for cooks and menu assessment tool (Food Checker; licensed from adoption partner Healthy Eating Advisory Service)</p> <p><u>Curriculum</u> 'Taste &amp; Learn™ for Early Years' curriculum lesson package for teachers.</p> <p><u>Educator Mealtime training</u> Online training module for educators to support children's liking and acceptance of vegetables during mealtimes.</p>	<p>the relative effectiveness (individual and combined) for increasing children's vegetable intake in long day care.</p> <p>Study 1: To determine what combination of initiatives showed the greatest effect on children's vegetable intake. N= 32 long day care centres, 276 staff and 1039 children. (See publication list, journal article no. 6 and 7 and appendix 6) <a href="#">Infographic: Improving children's vegetables intake in long day care</a></p> <p><i>Survey data of usefulness:</i> <b>90% of educators found the Mealtime training useful</b> <i>"The strategies suggested were very useful to promote vegetables at mealtimes with the children"</i> <b>90% of cooks found the training useful</b> <i>"Overall, I enjoyed it and improved my knowledge and gave me new ideas"</i> <b>81% of teachers would recommend the Curriculum</b> <i>"The curriculum guide and additional resources that were provided were very helpful and easy to follow."</i></p> <p>Study 2: To determine the effectiveness of the <i>optimum initiative package</i> for increasing children's vegetable intake in care. N= 50 long day care centres, 120 educators and 719 children (See publication list, journal article no. 12)</p> <p><u>Dissemination and engagement</u> A comprehensive dissemination strategy was executed including initiatives made available online. Uptake since the package was launched in June 2022 (*as at 30/09/2022):</p> <ul style="list-style-type: none"> <li>• 9,757 LDC initiative package webpage views</li> <li>• 860% increase in page views from previous 2 months</li> <li>• #1 viewed webpage</li> <li>• 36.6% of total website traffic</li> <li>• 316 click throughs to Healthy Eating Advisory Service training portal</li> <li>• 307 click through to CSIRO Taste &amp; Learn™ resource</li> </ul> <p><b>Dissemination for national roll out:</b> Adoption partners: Healthy Eating Advisory Service and CSIRO.</p>
<p><b>School canteen intervention</b></p>	<p>Menu audit to determine current vegetable offering in primary school canteens.</p> <p>A multi-strategy behavioural intervention for primary school canteens to increase children's vegetable consumption, including a brochure for canteen managers to increase vegetable offerings in canteens.</p>	<p>An analysis of 112 NSW primary school canteen menu's quantifying current vegetable-containing dishes on the menu (See publication list, journal article no. 9).</p> <p>The multi-strategy behavioural intervention consisting of increasing vegetable offering and changing menu architecture was tested in a randomised controlled trial with 16 NSW primary school canteens (4302 children) and evaluated for efficacy (sales). Acceptability data were collected from canteen managers.</p> <p>Outcomes: vegetable sales increased by 75%, without negatively affecting canteen sales revenue or student vegetable waste, and good canteen manager acceptability (See publication list, journal article no. 10).</p> <p><u>Dissemination and engagement</u></p>

		<p>Recommendations for further adaptation, evaluation and large-scale roll-out was prepared. A dissemination strategy of findings was executed (November 2022) including:</p> <ol style="list-style-type: none"> <li>1. Intervention brochure made available via: VegKIT website <a href="https://vegkit.com.au/How-to-encourage-kids-to-eat-more-vegetables-from-your-school-canteen.pdf">How-to-encourage-kids-to-eat-more-vegetables-from-your-school-canteen.pdf</a> (vegkit.com.au) (Appendix 20)</li> <li>2. VegKIT registry</li> <li>3. Social media campaign and EDM</li> <li>4. Presentation at National Canteen Network meeting on 30 May and 31 Oct 2022, a national network of state and NGO representatives working in school canteens.</li> </ol>
<b>Industry products</b>		
<b>Menu box prototype for long day care (LDC)</b>	<p>A new business concept detailing the menu box delivery service prototype for long day care and opportunities for food industry business decision making.</p>	<p>Menu box delivery service for long day care was piloted in a randomised controlled trial July to December 2020, involving 8 long day care centres and measurement of food intake of 219 children aged 2-5 years (see publications list, journal article no. 5).</p> <p>Appendix 30: Menu Box Delivery Service: New Business Concept; Appendix 31 Menu Box Delivery Service: Evidence Summary</p> <p>Feedback from long day care centres was positive with respect to the delivery process and provision of menus, recipes and quality of ingredients supplied:  <i>"Trying new recipes gives parents and educators the opportunity to see that the children are willing to try new things. It changed staff and parent perception of food and menu."</i> (Centre Director)</p> <p><i>"Recipes were good, and all ingredients were there. The ingredients were also really good quality. The delivery was very useful and the process was easy to follow."</i> (Cook 7)</p> <p>Feedback from some cooks highlighted suitability of the recipes for children:  <i>"I don't think some recipes were for young children, they were more adult style recipes."</i> (Cook 4)</p>
<b>New product development tool and products for school canteens</b>	<p><u>Model for product development of vegetable-based products for children</u></p> <p>An evidence-based model (Children's Acceptance Model for Product Development of Vegetables) on product modifiable factors to increase children's acceptance of vegetable-based products that food industry, fresh vegetable processors and researchers can use in product development (see publications list, journal article no. 8).</p> <p><u>Vegetable-based concepts</u></p> <p>Twenty-two new vegetable-based concepts were developed, describing each concept and the</p>	<p>Model, concepts and evaluation results were disseminated through:</p> <p>An industry report: '<a href="#">New opportunities for developing vegetable products for children</a>' &lt;80 website downloads as at 21/10/2022&gt;</p> <p>Four webinars were held in June 2020 with 136 registrations (oversubscribed) and 88 participants attended. Majority (two-thirds) of attendants were from primary intended audience (food industry and vegetable producers).83% and 100% found the webinar and report, respectively 'useful' or 'very useful.'</p> <p>Webinar available via the VegKIT website (<a href="https://youtu.be/3-YNjMB6KyY">https://youtu.be/3-YNjMB6KyY</a>) (See appendix 32 for webinar report).</p> <p>Presentation at Hort Connections, Brisbane on 9 June 2021</p>

	<p>factors that make it appealing to children. Qualitative research (focus groups) with children (n=38) was undertaken on 14 of those concepts.</p> <p><u>Vegetable prototypes</u></p> <p>Two concepts were developed into actual food prototypes (Rainbow Dippers and veggie ice blocks) and a quantitative consumer acceptance test with children (n=105) was undertaken to determine children's acceptance and further validate the CAMPOV model.</p>	<p>Media article: Focus on food industry and vegetable-based product development, Vegetables Australia, Summer Issue 21/22, page 47-49  <a href="https://ausveg.com.au/app/uploads/2021/11/AUSVEG_VegetablesAustralia_2021_Summer_WEB_100DPI_F01v1.pdf">https://ausveg.com.au/app/uploads/2021/11/AUSVEG_VegetablesAustralia_2021_Summer_WEB_100DPI_F01v1.pdf</a></p> <p>Learnings from this study were used to select one of the prototypes (Rainbow Dippers) that was produced by Perfection Fresh for the canteen intervention study (See publications list, journal article no.10).</p> <p>Presentation at the Australia Institute of Food Science and Technology 2021 conference, resulting in 'People's Choice Award' See appendix 33.</p>
<p><b>Vegetable Intake Strategic Alliance (VISA) – network of champions</b></p>	<p>The Vegetable Intake Strategic Alliance is a national initiative that coordinates cross-sector collaboration to increase children's vegetable intake.</p> <p>The alliance comprises a wide range of stakeholders including the horticulture industry, State and Commonwealth government departments of Health and Agriculture respectively, nutrition and health agencies, research organisations, retailers, early learning and parenting organisations and various non-government organisations.</p> <p>The focus of the Vegetable Intake Strategic Alliance is to leverage knowledge, funding and collaboration to achieve a shared vision of increased vegetable intake among Australian children and their families.</p>	<p>A systematic review was conducted and published (see publications list, journal article no. 2) to guide the VISA and future multi-sector industry-public health alliances</p> <p>A position statement was developed and agreed by the stakeholders as a new evidence-based paradigm to increase children's vegetable intakes. The audience are a broad range of stakeholders including any that are involved with the provision of food to children. It was promoted through media release and uptake metrics (See appendix 11 and 12)</p> <p>Position statement downloads – 295 (as at 21/10/2022), see Appendix 5</p> <p>VISA members have shared and promoted 'Best Practice' to their contacts with the audience reflecting the stakeholder sectors of the VISA membership and their associates.</p> <p>A total of 17 VISA meetings were held quarterly as scheduled, with average attendance ~25. Typically, members or guests presented related initiatives (22 in total) and VegKIT outputs were presented at each meeting.</p>
<p><b>Communications and engagement</b></p>		<p>Summary of presentations, EDMs, website visitation, downloads, social media, media releases. (See appendix 11)</p>

## Outcomes

Table2. Outcome summary

Outcome	Alignment to fund outcome, strategy and KPI	Description	Evidence
<b>VegKIT registry &amp; integrated website promoting best practice</b>			
<b>Functioning registry and website promoting best practice</b> , tracking and supporting initiatives	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge</p> <p><b>Strategy: Stakeholder Education</b> Improve stakeholder education for vegetables such as the identification and extension of the health benefits associated with vegetables</p> <p><b>KPI:</b> More stakeholder education programs developed and piloted</p>	<p>Development and maintenance of a VegKIT website including a collection of evidence based and expertly developed practical tools, resources and interventions. Resources are targeted at the many sectors that influence children’s vegetable intake including early childhood care services, education, research, government, health professionals and industry.</p> <p><b>Relevance to FUND:</b> Increase in stakeholder knowledge and awareness regarding effective strategies to support children’s liking and acceptance of vegetables. Provides best practice so stakeholders can implement successful initiatives into their own setting.</p>	<p>Registry and website proved to be an established and valued source of information for stakeholders on best practice in programs, initiatives and research aimed at increasing children’s vegetable consumption</p> <ul style="list-style-type: none"> <li>• Large proportion of stakeholders registered</li> <li>• Registered users were active on the website</li> <li>• 23 Stakeholders submitted studies</li> <li>• An expert panel evaluated the 23 initiatives providing guidance for future studies</li> <li>• Evaluation informs development of site that encourages ongoing stakeholder involvement</li> </ul> <p>Website statistics and best practice guideline downloads (See appendix 12).</p>
<b>Vegetable Intake Strategic Alliance (VISA)</b>			
<b>Functioning Vegetable Intake Strategic Alliance (VISA) – network of champions; promoting best practice</b> , tracking and supporting initiatives	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge</p> <p><b>Strategy: Stakeholder Education</b> Improve stakeholder education for vegetables such as the identification and extension of the</p>	<p>Participation in a stakeholder alliance directly addresses closer relationships in what was originally identified as a fragmented stakeholder landscape.</p> <p><b>Relevance to FUND:</b> Increase in stakeholder knowledge and awareness</p>	<p>Alliance partners participating throughout the project was on or above target (n=20-28); membership was tracked and maintained, and turnover maintained by members nominating replacements thus indicating a value in continuity.</p> <p>Favourable testimonials were obtained from six participants, for example, <i>“I think all the things they’ve been doing so far are quite</i></p>

	<p>health benefits associated with vegetables</p> <p><b>Partnerships:</b> Development of closer relationships with industry bodies that can support vegetable consumption by providing existing information, networks and support for projects.</p>	<p>regarding effective strategies to support children’s liking and acceptance of vegetables lays the foundation to drive guideline and practice reform.</p>	<p><i>brilliant. You know, like trying to tap in to get a good media report on it, trying to get in with the health systems and in each state and territory to implement the better guidelines in” – P07</i></p> <p>But there were also some qualified remarks re. industry usage, for example, “... there’s some growing businesses ... who would potentially get benefit from some of the research that’s presented at these meetings ... Again, the vast majority of businesses in the industry are smaller scale and don’t have the resources and the capacity to do that”</p> <p>A total of 17 workshops were held, quarterly, across four years sharing 22 initiatives and VegKIT outcomes; publications included one peer-reviewed paper guiding the design of the alliance (see below) and Position Statement succinctly proving an evidence based ‘learning to like through exposure to a variety of vegetables’ and suggested actions (downloaded 295 times), meeting minutes and presentations (quarterly) are available upon request.</p>
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**Evidence to inform new policy and guidelines**

<p><b>Increased stakeholder knowledge and awareness</b> of recommended advice to support children’s liking and acceptance of vegetables</p>	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge</p> <p><b>Strategy: Consumer Insights</b> Increase knowledge to better understand consumer strands and segments</p>	<p>Stakeholders are aware of the advice statements for increasing children’s liking and acceptance of vegetables.</p> <p>Industry stakeholders are aware of evidence to inform business decision making and consistency between current product availability, marketing and promotion activities and the scientific evidence base.</p> <p><b>Relevance to FUND:</b> Increase in stakeholder knowledge and awareness regarding effective strategies to support children’s liking and</p>	<p>Uptake of policy and advice resources Total downloads of resources 1,117 at 21/10/2022 (target was 100).</p> <p>Published papers for submission to Australian Dietary Guidelines review</p> <p>Feedback from stakeholders demonstrating knowledge and awareness:</p> <p><i>“Obviously talking about variety, you know introduction of vegetables as first foods and getting them adjusted to liking vegetables. I guess through</i></p>
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	<p><b>KPI:</b> More stakeholders using consumer insights information</p> <p><b>Strategy: Stakeholder Education</b> Improve stakeholder education for vegetables such as the identification and extension of the health benefits associated with vegetables</p> <p><b>KPI:</b> More stakeholder education programs developed and piloted</p>	<p>acceptance of vegetables lays the foundation to drive guideline and practice reform.</p>	<p><i>tasting and repeating exposures” (P9-Vegetable manufacturer/retailer)</i></p> <p><i>“I think key messages are we need to consider how we create products that hit the nail on the head when it comes to health and promoting vegetables, but they also need to be enticing for the kids and parents and accessible. So that ideas of influencing across a food business from the very beginning to create new products.” (P11-Food Manufacturer nutritionist)</i></p>
<p><b>Adoption of advice statements to relevant policies/guidelines or business practice</b></p>	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge</p> <p><b>Strategy: Stakeholder Education</b> Improve stakeholder education for vegetables such as the identification and extension of the health benefits associated with vegetables</p> <p><b>KPI:</b> More stakeholder education programs developed and piloted</p>	<p>This activity aims to support adoption of evidence-based advice to facilitate children’s acceptance of vegetables in the early years and ultimately positively influence their long-term consumption.</p> <p>Case studies illustrate how the projects’ research and dissemination activities are working towards influencing both policy and practice across a range of stakeholders and settings and provides recommendations highlighting opportunities to further expand its impact.</p> <p><b>Relevance to FUND:</b> Development and dissemination of evidence to drive policy and practice reform to ultimately influence parent practices that foster increased liking and consumption of vegetables. Long term impact, increased purchasing behaviours and demand of vegetables.</p>	<p>Pathways to adoption: case studies see appendix 34.</p> <p>Feedback from stakeholder interviews regarding uptake and adoption:</p> <p><i>“I’ll develop nutrition guidelines and standards. So, I think this VegKIT is really helpful where I can just embody, like grab this information and kind of put it in where I think it fits” (P10-Infant food manufacturer nutrition representative)</i></p> <p><i>“We’ve incorporated that into our work for sure and if repeated exposure is the goal, then we look for ways that we can create repeated exposure in our work and it’s something that we will communicate quite often when we’re talking about the purpose of our program in schools.” (P14-Government Health promotion representative)</i></p>
<p><b>Scalable community and supply-chain initiatives (long day care and school canteens)</b></p>			
<p><b>Increased vegetable provision on menus of long day care centres participating in controlled trials</b></p>	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer</p>	<p>Centers participating in the Menu Box Delivery Service study provided:</p> <ul style="list-style-type: none"> <li>- twice as many vegetables (50% increase) on menu (150g vs 75g standard practice)</li> <li>- 100% menu compliance for vegetables (vs 0% standard</li> </ul>	<p>Outcomes of randomised control trial.</p> <p>See publication list, journal article no. 11; Appendix 30: Menu Box Delivery Service: New Business Concept; Appendix 31 Menu Box Delivery Service: Evidence</p>

	<p>knowledge</p> <p><b>Strategy: Food Service</b> Increase the market share for vegetables in food service such as the identification of potential product offerings specific to the sector</p> <p><b>KPI:</b> Higher production volumes for the food service sector</p>	<p>practice)</p> <p><b>KPI: % increase in provision of vegetables</b></p> <p><b>Relevance to FUND:</b> Proof of concept that a meal kit delivery service can be adapted and delivered for the long day care setting. Doubling the amount of vegetables provided on menus. Potential to increase demand for vegetables through a novel foodservice delivery model with direct supply to early childhood education services. Refinement and strengthening of the concept is required prior to being market ready.</p>	<p>Summary.</p>
<p><b>Increased vegetable consumption</b> of children attending long day care centres participating in controlled trials</p>	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge</p> <p><b>Strategy: Food Service</b> Increase the market share for vegetables in food service such as the identification of potential product offerings specific to the sector</p> <p><b>KPI:</b> More training programs offered to food service providers for the benefit of the vegetable sector</p>	<p>Package of best practice Initiatives for long day care.</p> <p><b>Study 1:</b> Centres implementing the curriculum initiative (Taste and Learn) <u>and</u> the mealtime environment initiative showed:</p> <ul style="list-style-type: none"> <li>• children consumed 3 times more veggies compared to standard practice (38g vs 12g)</li> <li>• equivalent to just over 1/3 serve increase (26g /day)</li> </ul> <p><b>Study 2:</b> Evaluation of the “optimum” package of best practice initiatives showed</p> <ul style="list-style-type: none"> <li>• no difference in usual vegetable intake in all children (0.98 serves per day control group and 1.0 serves per day in the intervention group)</li> <li>• 67 children consumed no vegetables (9.3%)</li> </ul> <p>Among children who consumed vegetables:</p> <ul style="list-style-type: none"> <li>• there was a small increase of 14%; equivalent to 0.21 serves per day (usual vegetable intake was 1.30 serves per day in the control group and 1.51 serves per day in the intervention group).</li> </ul> <p>The intervention increased educator’s self-efficacy (skills and</p>	<p>Outcomes of randomised control trials including:</p> <p>Study 1: (See publication list, journal article no. 7 and infographic appendix 6)</p> <p>Study 2: (See publication list, journal article no. 12)</p>



		<p>knowledge) for promoting vegetables and teaching a vegetable focused curriculum and there was a high level of acceptability among educators.</p> <p><b>KPI: ½ serve of vegetables consumed by children</b></p> <p><b>Relevance to FUND:</b> Development of effective training programs targeting early childhood care settings to increase children’s vegetable consumption.</p>	
<p><b>Industry stakeholders’ interest in new product development concepts and tools</b></p>	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge</p> <p><b>Strategy: Consumer Insights</b> Increase knowledge to better understand consumer strands and segments</p> <p><b>KPI:</b> More stakeholders using consumer insights information</p>	<p>All responders (n=86) who attended the webinar found the webinar useful, with 75% indicating they found it ‘very useful’. 86% of responders rated the industry report as ‘extremely useful’.</p> <p>Greater than 60% of responders (n=86) were at least ‘somewhat’ interested in further developing vegetable-based concepts for children.</p> <p>Forty-six per cent of responders said the webinar and/or report definitely helped their organisation to create further insights or ideas to develop vegetable-based products for children</p> <p>View metrics from Foods publication: 916 views as at 1 Nov 22</p> <p>Metrics industry report: 80 downloads as at 21/10/2022.</p> <p><b>KPI: 2-3 stakeholders expressing interest</b></p> <p><b>KPI: 50 downloads from industry report</b></p> <p><b>Relevance to FUND:</b> the webinars and report reached the target audience, had high interest and were evaluated very positively. There was good interest in the concepts and information can be used by participants to further develop their own concepts. This means the first steps for achieving adoption and uptake by</p>	<p>A polling was undertaken during the interactive webinars and a survey submitted to attendees (see Appendix 32).</p>

		industry with a differentiated product supply have been successfully met.	
<b>Increased vegetable sales</b> by 30% in intervention primary school canteens	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge</p> <p><b>Strategy: Food Service</b> Increase the market share for vegetables in food service such as the identification of potential product offerings specific to the sector</p>	<p>Vegetable sales increased by 75% in intervention primary school canteens. Canteen managers felt that the intervention was easy to implement. They felt children responded positive to three, and neutral about two specific strategies, and not positive about two further strategies.</p> <p><b>KPI: 30% increase in sales in intervention canteens</b></p> <p>Recommendations for adaptation, adoption and scale up of canteen strategies were provided to Hort</p> <p><b>KPI: Recommendations for adaptation, adoption and scale up</b></p> <p><b>Relevance to FUND:</b> Development of effective program targeting primary school canteens demonstrating an increase in children’s vegetable consumption</p>	<p>Outcomes of randomised control trial:</p> <p>VegUP canteen study results and process evaluation. See infographic (appendix 35 and 36).</p> <p>See publication list, journal article no. 10.</p> <p>How to encourage kids to eat more vegetables from your school canteen guidelines (appendix 37)</p> <p>Recommendations report (Appendix 37)</p>
Engagement and communication with government re the canteen initiative	<p><b>Outcome 1:</b> Increased demand and value of the domestic vegetable industry through improved grower knowledge of the market, increased food service revenue and increased consumer knowledge.</p>	<p>One pilot project secured with NSW local government for whole-of-school program to increase children’s vegetable consumption, which includes increasing vegetable offerings in canteens.</p> <p>Presentation at two National Canteen Network meeting.</p> <p>EDM and social media campaign executed beginning Nov 22.</p> <p><b>KPI: Engagement and communication with government</b></p> <p><b>Relevance to FUND:</b> Disseminating and extending the evidence-base of effective program targeting primary school canteens demonstrating an increase in children’s vegetable consumption.</p>	

## Monitoring and evaluation

Table 3. Key Evaluation Questions

Key Evaluation Question	Project performance	Continuous improvement opportunities
<p><b>EFFECTIVENESS</b></p> <p><b>1. To what extent has the project achieved its expected outcomes?</b></p> <ul style="list-style-type: none"> <li>– To what extent has the Project improved knowledge and awareness of key stakeholders and consumer insights?</li> <li>– To what extent have the outputs been accepted to inform policy, guidelines and practice by government, researchers, industry and stakeholders?</li> <li>– To what extent have the best practice guidelines been adopted by stakeholders?</li> </ul>	<p>Improved knowledge and awareness</p> <ul style="list-style-type: none"> <li>• Best practice <b>knowledge</b>: inclusion in Hort Innovation tenders (agreement by R&amp;D manager that future tenders would refer to VG16064 best practice); dissemination by stakeholders including VISA (see Appendices 11 and 12)</li> </ul> <p>Outputs accepted to inform policy, guidelines and practice (adoption)</p> <ul style="list-style-type: none"> <li>• Best practice guidelines <b>adoption</b>: Hort Innovation tenders' adoption; downloads of best practice by stakeholder sectors: Infographic-best-practice-guidelines-for-increasing-childrens-vegetable-intake.pdf 1335 downloads and Best-practice-guidelines-for-increasing-childrens-vegetable-intake---print.pdf 859 downloads.</li> <li>• Registry usage (23 registered users of website) and studies submitted; qualitative feedback</li> <li>• VISA Position statement agreed by all members (only one exception) downloaded 295 times and promoted through media (e.g., Health Translation SA newsletter).</li> <li>• Science review of exposure evidence and advice statements development papers published in high impact peer reviewed journals (12 and 4 citations respectively) ready for submission to Dietary Guidelines revision.</li> <li>• Menu Box Delivery Service: New business concept submitted to Hort Innovation for communication to members. Demonstrated proof of concept that a meal kit delivery service can be adapted and delivered for the long day care setting. Refinement and strengthening of the concept is required prior to being market ready, however potential to increase demand for vegetables through a novel foodservice delivery model with direct supply to early childhood education services</li> <li>• Initiatives targeting the long day care sector</li> </ul>	<p>Adoption at a broader level</p> <p>Registry usage by community level projects required (see future R&amp;DE recommendations)</p> <p>Children and their carers were engaged indirectly through child-care settings and primary schools. However, additional interventions to support parents, as gatekeepers at home, could enhance the outside-home settings (ECEC and school) approaches.</p>

	<p>did not demonstrate a meaningful effect for increasing children’s usual vegetable intake in care. However high uptake and positive acceptability by staff was observed. Changes in educator knowledge and skills will likely have a positive long-term impact.</p> <ul style="list-style-type: none"> <li>• Large industry interest for new products evidenced by attendance and report downloads</li> <li>• Canteen intervention exceeded % increase KPI for sales; intervention was found to be scalable</li> </ul>	
<p><b>RELEVANCE</b></p> <p><b>How relevant was the project to the needs of intended beneficiaries?</b></p> <p>Intended beneficiaries are government agencies, food industry, Hort Innovation, childhood learning educators, school canteens, health professionals, researchers, growers and the ultimate end-consumer – children and their parents/care-givers)</p> <ul style="list-style-type: none"> <li>– Was there appropriate consultation with the intended beneficiaries?</li> <li>– Was the feedback from stakeholders, partners and the PRG considered and acted upon where this was appropriate?</li> <li>– Were the needs of beneficiaries being met?</li> <li>– Are the key beneficiaries part of the VISA?</li> <li>– To what extent have the guidelines for best practice been adopted by the Hort Innovation proposal process.</li> <li>– To what extent do industry stakeholders, canteen managers &amp; long day carers see product development as a solution to increase vegetable consumption in children.</li> </ul>	<p>Project Reference Group engagement (8 meetings, three growers participated)</p> <p>Consultation through PRG, VISA and steering groups included representation from all identified sectors (limited engagement with Federal health).</p> <p>Childcare and school sector interventions included consultations with beneficiaries prior to implementation and process evaluation post-hoc</p> <p>Suggestions from PRG on dissemination activities and final report was acted upon</p> <p>Feedback from canteen managers incorporated in revised brochure after completion of intervention</p> <p>VegKIT has produced tools and resources both scientific and in lay language for all identified beneficiaries across settings and sectors.</p> <p>Stakeholder representation on VISA included all intended beneficiaries (column 1)</p> <p>Agreement by R&amp;D manager that future tenders should refer to VG16064 including best practice.</p> <p>Opportunities to enhance existing offerings were identified and found to be effective. Some novel products were found to require further work.</p>	<p>Greater frequency, consider budgeting for per diem to encourage participation as in-kind time is a challenging expectation for busy people.</p>
<p><b>PROCESS APPROPRIATENESS</b></p> <p><b>3. How well have intended beneficiaries been engaged in the project?</b></p> <ul style="list-style-type: none"> <li>– Were the engagement and</li> </ul>	<p>Project Reference Group engagement</p> <p>Stakeholder beneficiaries have been engaged through media outputs, trade articles, infographics, social media, Hort Connections presentations, dietitians and nutrition forums, catering and childcare forums and quarterly VISA</p>	<p>More growers were engaged throughout the project, but a greater pool of potential candidates should be identified at project</p>

<p>communication activities appropriately targeted and tailored for the key beneficiaries identified for each Activity? To what extent were the target engagement levels of stakeholders achieved and was this sustained over the duration of the project?</p>	<p>meetings (all stakeholder sectors) Reports on all media (appendix 11), website engagement metrics (appendix 12) and presentations are provided.</p> <p>Co-design approaches with intended audience in long day care and canteen interventions.</p> <p>Popularity of website and downloads of tools suggests high engagement (see appendix 11); adoption of veg module by HEAS, as a novel offering, is sustained by this independent adoption partner; novel vegetable concepts industry workshops/seminars; canteen intervention canteen manager feedback; National Canteen Network presentations.</p>	<p>onset in order to maintain representation.</p>
<p><b>4. To what extent were engagement processes appropriate to the target audience/s of the project?</b></p> <ul style="list-style-type: none"> <li>– To what extent did dissemination activity maximize stakeholder and other key audience engagement?</li> <li>– To what extent were communications and engagements with the target audiences tailored with the end-audience in mind (incl timings, accessibility, language, purpose, appealing webface, preferred learning style etc)</li> </ul>	<p>Dissemination engagement was maximized with stakeholders and other key audiences (see Appendix 11) on media with approximate one media story per month of the project across all stakeholder sectors.</p> <p>Target audiences received tailored communications by sector and settings. See for example, best practice guidelines.</p>	
<p><b>EFFICIENCY</b></p> <p>5. What efforts did the project make to improve efficiency?</p> <ul style="list-style-type: none"> <li>– Did the established Consortium Management Team (CMT) have regular meetings (mix of on-line and F2F) that were constructive, shared learnings across all Activities and captured synergies across interdependent Activities?</li> <li>– Were the electronic collaboration tools and project management tools useful and efficient?</li> </ul>	<p>Consortium Management Team (CMT) fortnightly meetings' contributions to:</p> <ol style="list-style-type: none"> <li>1. Learnings across activities and captured synergies</li> <li>2. Usage of MS Teams electronic collaboration tools and CSIRO's project management tools facilitated easy usage and efficiency</li> </ol> <ul style="list-style-type: none"> <li>• Broader synergies and efficiencies across interdependent Activities.</li> <li>• VISA and supplier partner networks as dissemination vehicles.</li> <li>• Webinars rather than face to face workshops for industry to reach wider audience.</li> <li>• Taste and Learn (VG15067) leverage and adoption in Long day care initiative</li> <li>• Best practice guidelines and early years advice statements informed the development of best practice initiatives for long day care and school canteen. Healthy Eating Advisory Service delivery partner utilizing existing platform to sustain asset usage for best practice initiatives for long day care</li> <li>• Development of an integrated website across</li> </ul>	

	activities, focusing on settings and sectors.	
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## Recommendations

### Practical application of the project findings

1. Children learning to like vegetables through repeated exposure to a variety of vegetables is widely communicated to all stakeholders and calls for action initiated. In other words, promote a paradigm shift from explicit health outcomes to behavioural mechanisms that would realize greater produce sales and health through effective demand.
2. Conduct activities to support stakeholders to implement best practice across all settings that influence children's vegetable consumption.
3. Strategic cross-sector collaboration to support children's vegetable intake is needed and should be included in vegetable industry strategic investment plans.

### Possibilities of future RD&E that directly flow from the work undertaken and its results

4. Develop an education program for health professionals (e.g., maternal child and family health nurses), early education, care and catering professionals on supporting children to learn to like vegetables using the VegKIT guidelines. The education program to include the practical applications as noted above through workshops and other engagement activities, with a focus on evaluation and barriers to adopting this strategy.
5. Combine a supply chain initiative (menu box delivery service) with a sensory based education program (Taste and Learn™, educators' mealtime training) to increase supply and demand of vegetables within education settings. Further opportunities to adapt and increase reach of the model are identified in other sectors such as sport and recreation, hospitality, aged care, mining, correctional facilities and direct to families.
6. Integrate CSIRO's CAMPOV model for product development of vegetable-based products with school canteen strategies. This may include development of a manual and tools for food manufacturers to create new vegetable-based ready-to-serve hot meals for school canteens.
7. Grow the impacts of community initiatives to increase vegetable consumption by supporting evaluation, effectiveness and promotion of consumer awareness and addressing purchase and consumption behaviour change.
8. Large-scale uptake of the program through canteen manager education initiatives and evaluating the effectiveness of optimised VegUP school canteen program. Using connected strategies to increase vegetable sales across states and differing canteen operating systems.

### Development and adoption activities that would ensure full value from the project's findings for industry

9. Develop a long-term strategy for maintaining digital assets and their impact in a competitive digital space. This includes on-going maintenance of the VegKIT website and registry.
10. Create and implement a strategic communications campaign targeting parents using key messages to explain the importance of early exposure to vegetables flavours and other effective strategies to increase children's liking of vegetables. Consideration also given to promotion of 'vegetable first' and vegetable-based infant and toddler products.
11. Work with stakeholders to facilitate environments conducive for new vegetable-based infant and toddler products and evidence-based recommendations on effective strategies to increase children acceptance of vegetables.

## Publications

### Journal articles

1. Hendrie, G.A., Anastasiou, K., Brindal, E., Wiggins, B., Baird, D.L., Johnson, B.J., Bell, L.K., Gardner, C., Arguelles, J.C., Kelaart, A. and Golley, R. Increasing children's vegetable consumption: An evidence-based process to develop best practice guidelines. *Frontiers in Public Health* (submitted August 2022)
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3. Bell, L. K., Gardner, C., Tian, E. J., Cochet-Broch, M. O., Poelman, A. A. M., Cox, D. N., Nicklaus, S., Matvienko-Sikar, K., Daniels, L. A., Kumar, S., & Golley, R. K. (2021a). Supporting strategies for enhancing vegetable liking in the early years of life: an umbrella review of systematic reviews. *American Journal of Clinical Nutrition*, 113(5), 1282-1300. <https://doi.org/10.1093/ajcn/nqaa384>

4. Bell, L. K., Gardner, C., Kumar, S., Wong, H. Y., Johnson, B., Byrne, R., Campbell, K. J., Liem, D. G., Russell, C. G., Denney-Wilson, E., Netting, M., Bishop, L., Cox, D. N., Poelman, A. A., Arguelles, J., & Golley, R. K., 2021b. Identifying opportunities for strengthening advice to enhance vegetable liking in the early years of life: qualitative consensus and triangulation methods. *Public Health Nutrition*, 1-16. <https://doi.org/10.1017/s1368980021001907>
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1. Beelen, J., Cochet-Broch, M., Heffernan, J., Djakovic, S., Chung, D., Golley, R., Poelman, A.A.M., 2019. Opportunities to improve vegetable offering in primary school canteens: Results from an online school canteen menu analysis. 13th NZOZ Sensory and Consumer Science Symposium. Otago, New Zealand, 3-5 February 2019.
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3. Beelen, J., Heffernan, J.E., Cochet-Broch, M., Djakovic, S., Chung, D., Golley, R., Poelman, A.A.M., 2021. Menu audit of vegetable offering in primary school canteens in Sydney, Australia. Nutrition Society of Australia Virtual Conference 2021, 2-3 December 2021.
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7. Kashef, S., Zarnowiecki, D., Brown, V., Kelaart, A., Cox, D.N., Golley, R., 2022. Menu Box Delivery food service model to improve menu compliance in Australian long day care. Dietitians Australia 2022 Conference, Adelaide Australia August 14-16th 2022.
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10. Poelman, A.A.M., Djakovic, S., Heffernan, J.E., Cochet-Broch, M., Golley, R., Cox D.N. and Beelen, J., 2022. Effectiveness of a Multi-strategy Behavioural Intervention to increase Vegetable Sales in Primary School Canteens: a Randomised Controlled Trial. Abstract submitted to Nutrition Society of Australia Annual Scientific Meeting, Perth, 29 Nov – 2 Dec 2022

### Presentations to industry groups

1. Best practice guidelines for increasing children’s vegetable intake. ACECQA/NNN Meeting October 28<sup>th</sup> 2020.
2. Hort Connections 2019, presentation and workshop
3. “Can kids learning to love veggies drive future demand?” symposium. Annual Vegetables Industry Seminar, Hort Connections, 7<sup>th</sup> – 10<sup>th</sup> June 2021, Brisbane.
4. Infant and early years feeding advice to support children to learn to eat and enjoy vegetables. Maternal Child and Family Health Nurses Association Annual General Meeting, 4<sup>th</sup> November 2020
5. Tools and interventions to increase children’s vegetable intake in early childhood education settings. Early Childhood Education and Care National Nutrition Network General Meeting November 2021
6. VegKIT and early years advice to support children to learn to eat and enjoy vegetables, EatWell Tassie December 2021
7. Feeding advice to support young children to learn to eat and enjoy vegetables. National Nutrition Network (State and Commonwealth Public Health Nutritionists), February 2022
8. Using sensory science to create new vegetable-based food products for children, AIFST Convention, October 2021.
9. Tools and interventions to increase children’s vegetable intake at schools. National Canteen Network meeting, 30 May 2022
10. Podcast to Ausveg:Video overview of the project, September, 2022
11. Presentation to Eastern Access Community Health (EACH) on VegKIT resources, September, 2022

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### Intellectual property

Refer to appendix #38

### Acknowledgements

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### Appendices

1. Translation report
2. Stakeholder engagement report
3. Best practice guidelines report
4. Evaluation tools
5. VISA position statement
6. Best practice initiatives for long day care study: results infographic
7. Industry report concepts
8. Report prototype development
9. CAT report final



10. School canteens, a shared intervention
11. Project Communications outputs
12. Project website & registry monitoring report
13. Best practice guidelines for increasing children's vegetable intake in OSHC
14. Best practice guidelines for increasing children's vegetable intake in schools
15. Best practice guidelines for increasing children's vegetable intake
16. Evidence brief- increasing children's vegetable intake
17. Best practice guidelines for increasing children's vegetable intake in long day care
18. Guidelines for research initiatives to increase children's vegetable intake
19. 7 days of veggie snacks
20. How to encourage kids to eat more vegetables from your school canteens
21. Infographic best practice guidelines for increasing children's vegetable intake
22. Product development and marketing opportunities to boost children's vegetable intake
23. Sample quality improvement plan
24. What can you do, a checklist of simple ideas that work in long day care
25. What can you do, a checklist of simple ideas that work in OSHC
26. Evidence summary for policy: Infant and early years feeding advice to support children to learn to eat and enjoy vegetables
27. Evidence summary for health practitioners: Infant and early years feeding advice to support children to learn to eat and enjoy vegetables
28. Infographic: Feeding advice to support young children to eat and enjoy vegetables
29. Science insights for food industry: Opportunities for product development and marketing of vegetables for young children
30. Menu Box Delivery Service: New business concept
31. Menu Box Delivery Service: Infographic
32. Webinar report
33. AIFST poster
34. Infant and early years advice. Pathways to adoption: case studies
35. Infographic: VegUP canteen study results
36. VegUP strategies: How to encourage kids to eat more vegetables from your school canteen
37. Recommendations for adaption, adoption and larger scale roll-out of VegUP canteen study
38. IP Register (separate document)