

Final Report

Educating the food industry about Australian mushrooms

Project leader:

Leah Bramich

Report authors:

Carly Rosewarne and Leah Bramich

Delivery partner:

Australian Mushroom Growers' Association

Project code:

MU20003

Project:

Educating the food industry about Australian mushrooms (MU20003)

Disclaimer:

Horticulture Innovation Australia Limited (Hort Innovation) makes no representations and expressly disclaims all warranties (to the extent permitted by law) about the accuracy, completeness, or currency of information in this Final Report.

Users of this Final Report should take independent action to confirm any information in this Final Report before relying on that information in any way.

Reliance on any information provided by Hort Innovation is entirely at your own risk. Hort Innovation is not responsible for, and will not be liable for, any loss, damage, claim, expense, cost (including legal costs) or other liability arising in any way (including from Hort Innovation or any other person's negligence or otherwise) from your use or non-use of the Final Report or from reliance on information contained in the Final Report or that Hort Innovation provides to you by any other means.

Funding statement:

This project has been funded by Hort Innovation, using the mushroom research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Publishing details:

Published and distributed by: Hort Innovation

Level 7
141 Walker Street
North Sydney NSW 2060

Telephone: (02) 8295 2300

www.horticulture.com.au

© Copyright 2026 Horticulture Innovation Australia Limited

Contents

Public summary	4
Keywords	4
Introduction	5
Methodology	5
Results and discussion	7
Outputs	8
Outcomes	9
Monitoring and evaluation	12
Recommendations	15
Refereed scientific publications	16
References	16
Intellectual property	16
Acknowledgements	16
Appendices	16

Public summary

Project aims

Unlike foods derived from plants and animals, *Agaricus bisporus* mushrooms are fungi with unique nutritional and culinary benefits. Evidence indicates that increasing domestic mushroom intake will have a positive impact on health outcomes. Previous work has also highlighted opportunities to leverage their umami taste, texture properties, and compatibility with different diets as pathways to inspire the inclusion of more mushrooms on menus.

The goals of the project were:

- 1) To increase the knowledge of food service and health care professionals about the nutritional and health benefits of mushrooms; and
- 2) To motivate food industry and health care professionals to improve the nutritional and flavour profiles of existing and new meals and menus by incorporating more Australian grown fresh mushrooms.

Method and outputs

The two-pronged project strategy was comprised of:

- 1) Top-down engagement with high quantum of influence food industry organisations. This involved:
 - Nutritional case study interventions at a hospital and an aged care facility; and
 - Curriculum revision at a culinary school.
- 2) Bottom-up engagement with food industry and healthcare professionals. This involved:
 - Development of educational resources including videos, fact sheets, a poster, and an e-book;
 - Oral presentations and outreach activities to promote educational resources and case study outcomes; and
 - Producing additional assets that can be used after the conclusion of the project to ensure a lasting legacy
 - Two Mushrooms on the Menu (MOM) videos with testimonials for each case study;
 - MOM aged care case study manuscript for publication in a peer-reviewed journal;
 - Lesson plans and recipes aligned to learning outcomes for the TAFE Certificate III in Commercial Cookery; and
 - A resource pack to enable mushroom growers to host farm tours for food industry stakeholders.

Key outcomes

The first nutritional case study intervention was conducted at Mater Health in Brisbane. A room service menu of vegetarian dishes was developed by Luke Mangan to provide a nutritional boost. Each meal provided 16-21% of the adult recommended dietary intake (RDI) for vitamin D, 18-25% of the adult RDI for copper and 18-30% for selenium. Dietitians and food service staff increased their nutritional knowledge and culinary skills, with 90% planning to include more mushrooms on menus.

The second case study was conducted at The Shoreline residential aged care facility in Coffs Harbour. Meals were prepared using UV-light exposed mushrooms which contain increased levels of vitamin D. The menu trial for residents in care resulted in a 3-fold increase in average vitamin D intake, with 75% of participants meeting the nutrient reference value (NRV). Food service staff reported that the meals were easy to prepare, with 100% support for including mushrooms on the menu.

Both case studies received high satisfaction ratings from participants who consumed the meals.

Recommendations

To build on the foundations of this project, the need for a central digital platform dedicated to the food service sector has been identified. Appointment of a Food Industry Education and Engagement Manager would enable the Australian mushroom industry to develop partnership opportunities and deliver education activities on an ongoing basis.

Keywords

Mushrooms; vitamin D; nutrition; dietary intervention; health care; culinary education; institutional catering; food service

Introduction

Background

Neither a plant nor an animal food, mushrooms have unique nutritional and culinary properties that make them valuable commodities in the food supply. *Agaricus bisporus* (*A. bisporus*) mushrooms (containing white button, Swiss brown, portobello, flat and cap mushrooms), are the primary mushrooms consumed by Australians. Mushrooms are a dietary source of key vitamins, minerals, prebiotic fibres, and antioxidants, with a range of health benefits achieved by consuming just 75 grams per day. Research findings from MU17002, published in the Journal of Nutritional Biochemistry, demonstrated that the science is clear: eating more mushrooms will lead to beneficial outcomes for human health (1).

Improving the nutritional profile of foods by adding fresh mushrooms and increasing mushroom consumption is not only beneficial for human health outcomes, but also for the Australian mushroom industry. The food industry is identified as a priority sector for growth, with FY 2022/23 production volumes directing 26% to food service and only 3% to processing (2).

To achieve higher consumption through the food industry channel, education and engagement activities are vital.

Project rationale

The food industry is complex and covers many sectors, including food producers, food processors, food manufacturing, retail, and food service - which includes commercial and institutional catering. As this project is focused on nutrition education, professionals from institutional catering (hospitals, residential aged care, correction centres) were identified as the primary target audience providing the opportunity for greatest impact, with those in commercial catering representing the secondary audience.

A 'top-down' and 'bottom-up' strategy was designed to broadly educate, engage, and influence the food industry.

Top down: Engage, educate, and inspire key decision makers in high quantum of influence top tier institutional catering organisations to implement mushrooms on their menu, via two case study mushroom interventions.

Bottom-up: Provide educational materials and engagement activities to culinary schools, mushroom growers, chefs, cooks, and food service dietitians, and leverage the case study interventions to educate and inspire others.

A previous levy funded project delivered by FOODiQ Global, *MU17002 - Educating health professionals about Australian mushrooms* delivered evidence-based research to form the foundations and key messages used within this project. With the addition of professional chef educators, the project delivered a suite of nutrition, health, and culinary educational resources suitable for food industry professionals, educators, and students.

Key outputs of the project were two 'Mushrooms on the Menu' case study interventions, which solved a nutrition problem within influential institutional organisations. These powerful case studies show how these organisations have successfully integrated mushrooms into their menus, offering practical insights and recommendations, and addressed the perceived objections and barriers of the use of mushrooms within institutional catering.

Using the case study findings and the suite of food industry educational resources, the project team deployed a multi-channel educational communications strategy to broadly educate health and food industry professionals, through digital marketing, high impact online learning events and conference events.

Project goals

1. Increase the knowledge of food service and health care professionals about the nutritional and health benefits of mushrooms, and;
2. Facilitate chefs and food service health professionals to improve the nutritional profile of existing and new foods, meals, and menus by incorporating more Australian grown fresh *A. bisporus* mushrooms.

This project is aligned with Outcome 1, Strategy 2 of the Mushroom Strategic Investment Plan 2022-26 to '*increase domestic consumer demand for fresh, quality Australian mushrooms through alternative menu uses in foodservice channels*'. It focuses on linked KPIs to deliver '*increased use of Australian mushrooms in menus*' and '*growth in production volume servicing foodservice*'.

Methodology

Develop a Food Industry Insights Report (Food Industry Blueprint): The first step was to generate insights into the food industry to create the engagement strategy and ensure that subsequent activities were aligned with the project aims. The approach was split into two phases:

1. Information gathering using desktop research approaches and initial stakeholder consultations provided insights into the food service industry, including key sectors and characterisation of high-profile organisations; and
2. One-on-one interviews with food industry key opinion leaders to gather insights and to identify who to engage for the top-down mushroom intervention case studies and bottom-up culinary school educational support.

Define the target audience: The Food Industry Blueprint identified that the project would have the greatest impact within the institutional catering sector, where nutrition is a key focus. The project delivered two strategies for engagement and education via the 'top down' and 'bottom up' approaches.

Development of Educational Materials: In MU17002, FOODiQ Global published a scientific review and translated it into educational materials and key messaging about the nutritional properties and health benefits of *A bisporus* mushrooms. This formed the foundation of the nutrition information for this project. Working with experienced chef and culinary educator, Chef Adam Moore, the nutrition information was merged with culinary information to produce of a suite of resources (educational videos, brochures, poster, e-book) specifically to educate food industry professionals.

Conduct mushroom interventions (case studies): The key deliverables for this project were the two 'Mushrooms on the Menu' interventions, which used mushrooms to solve a nutrition problem within influential institutional organisations. The two case study interventions were:

1. Mushrooms on the Menu at the Mater (Mater Health, South Brisbane campus)

Working with influential Dietitian and Director of Food Service at the Mater, Sally McCray, this study had three components:

- Mushroom-centric vegetarian meals on the specials menu, designed by Luke Mangan;
- Mushroom masterclass education programs for staff in foodservice and dietetics and nutrition; and
- Patient and community education.

2. Mushrooms on the Menu at The Shoreline – Vitamin D Feasibility Study (Residential Aged Care, Coffs Harbour).

This was the first study to evaluate the feasibility of administering a food service menu containing UV-exposed mushrooms to increase vitamin D intake in a Residential Aged Care facility. It was an ethics-approved study comprised of two participant groups: 60 participants from low and high residential care (RC); and 12 participants from independent living (IL). The primary objective was to compare dietary intake data during a baseline phase of 4 weeks, where participants consumed standard meals, to the following intervention phase of 4 weeks, where meals enhanced with UV-exposed mushrooms were consumed.

Both case studies were filmed to produce impactful educational video resources that showcase the findings.

Educate food industry professionals about the nutrition, health, and culinary benefits of mushrooms: The project team embarked on an educational outreach effort to broadly disseminate the case study findings and educational resources. A digital communications strategy was executed, with resources shared on LinkedIn and via email to the database of food industry professionals; in addition to distributing copies at in-person events.

The conference roadshow program provided the opportunity to engage directly with health and food industry professionals through three targeted events:

1. Dietitians Connection Foodservice Symposium: Strategies to Revolutionise Food and Nutrition in Care Settings (28 Aug 2024 - online) hosted three guest speakers including Dr. Flavia Fayet-Moore for a 2hr event;
2. World Mushroom Day Breakfast (15 Oct 2024 - Sydney) hosted food service and health care professionals for presentations from a mushroom grower, FOODiQ Global, Mater Hospital and The Shoreline Residential Aged Care; and
3. Institute of Hospitality in Healthcare (IHHC) Conference (4-6 Nov 2024 - Perth) invited Dr. Flavia Fayet-Moore to deliver a keynote presentation showcasing the two case studies and research findings.

Influencing the Australian Culinary Curriculum to include more Mushrooms: Leading foodservice consultancy Straight to the Source were engaged to assist the project team to influence the Australian culinary curriculum to include more mushrooms. Their scope of work was delivered in three stages:

1. The Australian culinary curriculum was updated in April 2022 (Version 9.0) with implementation beginning in 2023. Through one-on-one interviews with key culinary education professionals from different Vocational and Educational Training (VET) organisations, several opportunities for mushroom culinary education and resources were identified, particularly associated with two core units of the Certificate III in Commercial Cookery (SITHCCC030 and SITHCCC031);
2. A survey was launched to gather data from frontline culinary educators to inform the approach for curriculum aligned resource development. An opportunity for high quality curriculum aligned resources was identified, to assist teachers to engage and educate students, provided they are easy to locate and use; and
3. A detailed plan and assets to support the delivery of a professional development webinar TAFE NSW culinary educators was developed, in collaboration with an experienced culinary educator. The webinar will be delivered 10 April 2025 and will include dissemination of the educational resources.

Farm Tour & Farm Tour Information Pack: The project team hosted forty apprentices from The Star Culinary Institute for a tour of White Prince Mushrooms, including visits to Elf Farm Supplies (compost facility), Premier Mushrooms (farm) and the White Prince packing facility. The guided farm tour provided education on how mushrooms grow, and Chef Adam Moore hosted a culinary educational workshop, while guests enjoyed a mushroom lunch with various dishes prepared by a local caterer and received boxes of fresh mushrooms to take back to their kitchen classroom.

An *Australian Mushrooms Farm Tour Information Pack* has been developed to provide growers with inspiration, information, and confidence to deliver their own farm tours. The pack consists of a lesson plan (run sheet), links to industry educational resources produced for this project, and a tour evaluation form.

Data insights, Monitoring and Evaluation: Market research polls were conducted at the beginning to gain baseline insights to inform the project, and at the end of the project to measure the impact of the outputs of the project, and to demonstrate that food industry professionals have increased knowledge, recognition, understanding, confidence, and proficiency about the nutrition and health benefits of mushrooms.

Database of Health and Food Industry Professionals: The market research polls and other surveys provided the opportunity for respondents to sign up to receive educational resources and project updates.

Results and discussion

Mushrooms on the Menu at the Mater: key findings from case study (more details in report – Appendix 4)

- The initiative was extended from 3 months to 6 months (23 Aug 2023 – 31 March 2024) due to popularity of the menu with patients and heightened interest from staff following the educational workshops.
- Mushrooms added to vegetarian meal recipes provided 0.6-2.2µg/serve of vitamin D. This provided nearly a quarter of vitamin D daily intake for adults 51-70 years AND nearly half of daily intake for 19-50 years compared to zero delivery for non-mushroom meals.
- If UV exposed mushrooms had been used, vitamin D intake would have increased to 68%-247% for adults 51-70 yrs. This was outside the scope of this study and represents a future opportunity.
- Mushrooms added to vegan/vegetarian meals were important contributors to meeting patient micronutrient needs including up to 25% copper (8-25% DI males 51-70 years) and 30% selenium (18-30% DI male 51-70yrs).

Mushrooms on the Menu at The Shoreline: key findings from case study (more details in draft manuscript)

- Adapting food service recipes in residential aged care to include 75 g UV-exposed mushrooms (per serve) is well-accepted by residents and can increase vitamin D delivery without altering other nutritional properties of meals.
- The proportion of residential care participants meeting the Australian Nutrient Reference Value (NRV) for vitamin D intake (15ug/day) from lunch and dinner meals increased from 0% at baseline to 75% during the mushroom intervention phase.
- The proportion of independent living participants meeting vitamin D NRV increased from 18% to 100%.
- Residents rated the taste, presentation, and overall enjoyment of UV-exposed mushroom meals as excellent, while staff reported ease of implementation with both expressing desire for their continued provision at the RAC facility.

The two case studies represent high-impact demonstrations of the benefits that can be achieved through education and engagement of foodservice and health care professionals involved with institutional catering.

Influencing the Australian Culinary Curriculum to include more Mushrooms: key findings (more details in report – Appendix 5)

- 91% of survey respondents indicated they would benefit from access to resources to teach students about culinary techniques and the nutritional benefits of mushrooms.
- Resources should be accessible in a digital format.
- Resources should include downloadable fact sheets and recipes; videos; and livestreamed masterclasses.
- 55% of respondents indicated they would use resources about mushrooms aligned to core units SITHCCC030 and SITHCCC031 if they were available.

The audit of existing resources revealed that a range of high-quality assets already exist, but they're not easily accessible on a single digital platform. This means that relevant information may be difficult for culinary educators to find.

A detailed plan and assets to support the delivery of a professional development webinar for teachers has been developed in collaboration with TAFE NSW and an experienced culinary educator. This will be held on Thursday 10 April 2025, funded by the AMGA as the date that was suitable for TAFE NSW is outside of the timeframe for this project. A survey will be circulated to gather feedback from participants, which will be shared with Hort Innovation to inform the next steps.

Outputs

Table 1. Output summary

Output	Description	Detail
Library of educational resources from MU17002	Provides access to resources for healthcare professionals	Up-to-date information for mushroom health and nutrition science is available from Mushroom Health Science Australia (project MU22006, led by FOODiQ Global). The MHSA website incorporates relevant outputs from MU20003 (this project) and resources as appropriate from MU17002, in addition to new resources generated from MU22006 and other projects
Dedicated webpage for foodservice professionals	Provides access to resources specifically designed for the food industry	Publicly available resources for food industry professionals can be found on the Food Industry page of the AMGA website
Market research polls (baseline and end of project)	Online survey of food industry and healthcare professionals to measure project impact	Appendix 1
Food Industry Blueprint Report	Scoping activity to inform the strategic direction of the project. For use by project team and AMGA members	Appendix 2
Presentation at AMGA Conference (Oct 2022)	To provide an update to the mushroom industry on outcomes from the Food Industry Blueprint Report	Dr Flavia Fayet-Moore from FOODiQ Global delivered an in-person presentation at the AMGA Conference (Appendix 3). Dr Fayet-Moore was also interviewed at the conference, which was published on a MushroomLink podcast
Case study videos (x 2)	To share project findings with food industry and healthcare professionals	1. Mushrooms on the Menu at Mater Hospital: Video Link 2. Mushrooms on the Menu at The Shoreline: Video Link
Case study report	To summarise methods and results from studies at the Mater. For use by the project team and industry stakeholders	Appendix 4
Culinary school report and lesson plans	The report summarises findings from connecting with Australian culinary educators, for use by the project team. The lesson plans and recipes are for use by culinary educators and food industry professionals	Appendix 5: Culinary School Report Appendix 6: TAFE NSW Webinar template Publicly available resources for culinary educators can be found on the Culinary School page of the AMGA website: <ul style="list-style-type: none">• 3 lesson plans and recipes aligned with modules of Certificate III in Commercial Cookery (SIT30821)• 11 additional recipes aligned with SIT30821
Foodservice industry educational events (x 3)	To share project findings and resources with food industry and healthcare professionals	1. Dietitian Connection Food Service Symposium (28 Aug 2024): webinar presentation by Dr Flavia Fayet-Moore (Appendix 7) 2. World Mushroom Day Breakfast (15 Oct 2024 in Sydney): presentation by Dr Emma Beckett (FOODiQ Global) and panel discussion with Emma, Sally McCray (Mater Hospital), Andrew Wright (The Shoreline) and Chris Tolson (Premier Mushrooms), hosted by Tawnya Bahr (Straight to the Source) 3. Institute of Hospitality in HealthCare Conference (6 Nov 2024): 60 minute presentation by Dr Flavia Fayet-Moore (Appendix 8)
Ethics approved feasibility study protocol	To underpin the case study at The Shoreline	Confidential Appendix 2

Feasibility study manuscript (for publication)	Manuscript to be published in peer-reviewed scientific journal. For sharing results with health and nutrition academics and professionals	Confidential Appendices 3-5
Database of foodservice and healthcare professionals	Contact details stored by AMGA for project related communications	Confidential Appendix 6
Educational brochures (x 3)	Resources for food industry professionals (Appendix 9)	<ul style="list-style-type: none"> • Brochure 1: The X-factor Ingredient for Plant Based Eating • Brochure 2: Pro Culinary Nutrition Tips and Tricks • Brochure 3: Mighty Mushrooms – From Farm to You!
Printable poster	A resource for food industry professionals (Appendix 10)	Kitchen poster : Mushrooms = X-Factor Ingredient
e-book	A resource for food industry professionals (Appendix 11)	e-book : Mighty Mushrooms – the X-Factor Ingredient for Food Service
Educational videos on the nutrition, health, and culinary benefits of fresh <i>A. bisporus</i> mushrooms (x 3)	Resources for food industry professionals	<ul style="list-style-type: none"> • Video 1: Plant Based Diets (viewed 152 times) • Video 2: Nutrition and Culinary Tips (viewed 203 times) • Video 3: Farm to Plate (viewed 712 times) <p><i>Note – the number of views was determined on 4 Feb 2025</i></p>
Mushroom farm tour pack	To enable mushroom growing businesses to host farm tours for food industry and healthcare professionals (Appendix 12)	The pack consists of the curriculum, lesson plan (run sheet), written and video resources, and tour evaluation form. It is available to AMGA members via the AMGA website (login required)
Media releases (minimum of 5)	To drive dissemination of information about the project via independent media (Appendix 13)	<ol style="list-style-type: none"> 1. AMGA Media Release: 31 Jan 2022 2. AMGA Media Release: 27 Apr 2022 3. AMGA Media Release: 26 Apr 2023 4. AMGA Media Release: 18 Jan 2024 5. AMGA Media Release: 7 Feb 2024
Mushroom industry journal articles (minimum of 6)	To communicate about the project to mushroom industry stakeholders (Appendix 14)	<ol style="list-style-type: none"> 1. Australian Mushrooms Journal (2021): issue 3, pages 20-21 2. MushroomLink (2022): issue 2, pages 9-13 3. MushroomLink (2023): issue 5, pages 24-25 4. AMGA Journal (2023): issue 6, pages 12-13 5. AMGA Journal (2023): issue 7, pages 20-21 6. MushroomLink (2024): issue 8, pages 7-11 7. MushroomLink (2024): issue 10, page 28 8. MushroomLink (2025): issue 11, pages 8-13
Mushroom industry EDM updates (x 6)	To communicate about the project to mushroom industry stakeholders (Appendix 15)	<ol style="list-style-type: none"> 1. EDM from MushroomLink (2022): June e-bulletin 2. EDM from MushroomLink (2023): March e-bulletin 3. EDM from MushroomLink (2023): July e-bulletin 4. EDM from MushroomLink (2024): March e-bulletin 5. EDM from MushroomLink (2024): April e-bulletin 6. EDM from AMGA (October 2024): World Mushroom Day

Outcomes

Table 2. Outcome summary

Outcome	Alignment to fund outcome, strategy and KPI	Description	Evidence
Intermediate Outcomes			
Food industry professionals will have increased knowledge of the nutrition and health benefits of mushrooms	Outcome 1, Strategy 1 KPI: Use of nutritional information to support consumer demand	Overall, there was a trend of upward knowledge accuracy with 22-112% increase in respondents correctly identifying benefits	Survey results (Appendix 1)
Food industry professionals will more frequently use mushrooms to improve the nutritional profile of a meal	Outcome 1, Strategy 2 KPI: Increased use of Australian mushrooms in menus	87% of respondents indicated they are more motivated to include mushrooms in meals and menu development. Those who accessed resources are 2.7 times more likely to use mushrooms to improve the nutritional profile of meals	Survey results (Appendix 1)
Two large catering organisations will use mushrooms in meals or products to improve nutritional profile	Outcome 1, Strategy 2 KPI: Increased use of Australian mushrooms in menus	Two case study interventions were competed with influential institutional organisations. Both implemented a dedicated mushroom menu for the study and continue to use mushrooms on menus	Mater Health: <ul style="list-style-type: none">• Case Study Video• Case Study Report The Shoreline: <ul style="list-style-type: none">• Case Study Video• Ethics Approval• Feasibility Study Manuscript
At least one high influence culinary school will include mushroom nutrition, health, and culinary information in their curriculum	Outcome 1, Strategy 2 KPI: Increased use of Australian mushrooms in menus	Apprentices from The Star Culinary Institute visited White Prince Mushrooms for a tour and workshop by Chef Adam Moore	Photo Appendix 1
		Culinary Educator lesson plans and resources developed	Culinary School webpage containing curriculum aligned lesson recipes
		TAFE NSW Culinary Educators professional development webinar scheduled. This webinar will upskill the educators, with recording and resources uploaded to the internal TAFE Digital Campus platform.	Webinar template (Appendix 6) NB: webinar postponed by TAFE NSW from 28 November 2024 to 10 April 2025.
Food industry professionals will have an increase in their recognition of mushroom nutrition, health, and culinary uses	Outcome 1, Strategy 1 KPI: Use of nutritional information to support consumer demand	There was a 60% increase in the self-reported recognition of mushroom nutrition, health, and culinary benefits with 53% respondents reporting they are familiar and can specify, very familiar or have an academic knowledge at project end, versus only 34% at baseline.	Survey results (Appendix 1)
Mushroom Industry is well informed of the Food Industry landscape and the	Outcome 1, Strategy 2 KPI: Increased use of Australian mushrooms in	Provision of updates to the Australian mushroom industry through a range of channels	<ul style="list-style-type: none">• Food Industry Blueprint Report (Appendix 2)• Dr. Flavia Fayet-Moore presented at AMGA

product opportunities for Food Service	menus		<p>Conference 2022 (Appendix 3)</p> <ul style="list-style-type: none"> • Dr. Carlene Starck presented at the AU + NZ Mushroom Growers Conference 2024 • MushroomLink Articles and EDMs to industry (Appendices 14-15)
Growers are well equipped with resources and knowledge to run farm tours for nutrition education independently	Outcome 1, Strategy 2 KPI: Increased use of Australian mushrooms in menus	Growers have received project updates and access to the Australian Mushroom Farm Tour Information Pack	Australian Mushrooms Farm Tour Information Pack (Appendix 12)
Culinary educators and students will be more confident to use and recommend Australian mushrooms for their nutrition and health benefits	Outcome 1, Strategy 1 KPI: Use of nutritional information to support consumer demand	TAFE NSW Culinary Educators will be evaluated after the Professional Development webinar is delivered	Not yet delivered. The webinar was postponed by TAFE NSW. The webinar will be delivered on 10 April 2025
End of Project outcomes			
Improved nutrition knowledge about mushrooms through extension of credible science and research and development.	Outcome 1, Strategy 1 KPI: Use of nutritional information to support consumer demand	Awareness of vitamin D content (key project message) more than doubled from one-third (31%) respondents at baseline to over two-thirds (68%) at project end. Overall, all nutritional benefits also saw an upward trend in knowledge acquisition (22-60% increase in identification)	Survey results (Appendix 1)
Greater recognition of the nutrition and health benefits of mushrooms by food industry professionals.	Outcome 1, Strategy 1 KPI: Use of nutritional information to support consumer demand	There was a 60% increase in the self-reported recognition of mushroom nutrition, health, and culinary benefits with 53% respondents reporting they are familiar and can specify, very familiar or have an academic knowledge at project end, versus only 34% at baseline	Survey results (Appendix 1)
Identified stakeholders are confident and proficient in talking about the benefits of Australian mushroom.	Outcome 1, Strategy 1 KPI: Use of nutritional information to support consumer demand	Stakeholder confidence is increasing, with “ slightly confident ” rising from 17% to 23.7% and “ quite confident ” from 20.5% to 28.9%. Education drives motivation, with 9 in 10 reporting education makes them more likely to use mushrooms, and resource users 2.7 times more likely to be using them in the workplace	Survey results (Appendix 1)

Monitoring and evaluation

Table 3. Key Evaluation Questions

Key Evaluation Question	Project performance	Continuous improvement opportunities																																																
EFFECTIVENESS – To what extend has the project achieved its outcomes?																																																		
Did food industry professionals achieve a 50% increase in the scientific accuracy of their knowledge of nutrition and health benefits of mushrooms?	<p>YES: Overall there was an trend of upward knowledge accuracy with 22-112% increase in respondents correctly identifying benefits. Key focus of messaging was centred on vitamin D where there was highest (112%) increase in respondents identifying mushrooms to be source of vitamin D.</p> <table border="1"> <thead> <tr> <th></th><th>Baseline</th><th>Project end</th><th>% increase</th></tr> </thead> <tbody> <tr> <td>Vitamin D</td><td>32%</td><td>68%</td><td>112%</td></tr> <tr> <td>B Vitamins</td><td>29%</td><td>43%</td><td>48%</td></tr> <tr> <td>Copper</td><td>17%</td><td>13%</td><td>-23%</td></tr> <tr> <td>Selenium</td><td>18.5%</td><td>23%</td><td>24%</td></tr> <tr> <td>Low Calorie</td><td>50%</td><td>69%</td><td>38%</td></tr> <tr> <td>Antioxidant</td><td>36.5%</td><td>44%</td><td>22%</td></tr> <tr> <td>Chitin</td><td>5.%</td><td>8%</td><td>60%</td></tr> <tr> <td>Ergosterol</td><td>5.5%</td><td>9%</td><td>64%</td></tr> <tr> <td>Ergothioneine</td><td>7.5%</td><td>9%</td><td>45%</td></tr> <tr> <td>Increases vitamin D levels</td><td>40%</td><td>62.6%</td><td>57%</td></tr> <tr> <td>Umami flavour enhancer</td><td>61.5%</td><td>80%</td><td>30%</td></tr> </tbody> </table>		Baseline	Project end	% increase	Vitamin D	32%	68%	112%	B Vitamins	29%	43%	48%	Copper	17%	13%	-23%	Selenium	18.5%	23%	24%	Low Calorie	50%	69%	38%	Antioxidant	36.5%	44%	22%	Chitin	5.%	8%	60%	Ergosterol	5.5%	9%	64%	Ergothioneine	7.5%	9%	45%	Increases vitamin D levels	40%	62.6%	57%	Umami flavour enhancer	61.5%	80%	30%	<p>OPPORTUNITY: Education is key to motivation and momentum</p> <p>New knowledge about preparation, cooking practices and health benefits was the spark to get the institutional organisations involved and to engage their staff and the residents.</p> <p>As education was delivered via one-on-one workshops with supporting resources, the institutions experienced an ease of implementation and acceptability, which led to greater motivation for staff to want to continue including mushrooms on the menu post-trial.</p>
	Baseline	Project end	% increase																																															
Vitamin D	32%	68%	112%																																															
B Vitamins	29%	43%	48%																																															
Copper	17%	13%	-23%																																															
Selenium	18.5%	23%	24%																																															
Low Calorie	50%	69%	38%																																															
Antioxidant	36.5%	44%	22%																																															
Chitin	5.%	8%	60%																																															
Ergosterol	5.5%	9%	64%																																															
Ergothioneine	7.5%	9%	45%																																															
Increases vitamin D levels	40%	62.6%	57%																																															
Umami flavour enhancer	61.5%	80%	30%																																															
Are food industry professionals more frequently using mushrooms to improve the nutritional profile of a meal and/or to address a nutritional need or health issue?	<p>YES: Poll supports that education is and has been a key driver in motivating usage of mushrooms with 9 in 10 respondents agreeing to this. Those accessing resources were 2.7 times more likely to be using mushrooms to improve the nutritional profile of meals</p>	<p>OPPORTUNITY: Education and engagement are the key to food industry uptake of mushrooms on the menu</p>																																																
Do food industry professionals achieve a 50% increase in their recognition of mushroom nutrition, health benefits and culinary uses of mushrooms?	<p>YES: There was a 60% increase in the self-reported recognition of mushroom nutrition, health, and culinary benefits with 53% respondents reporting they are familiar and can specify, very familiar or have an academic knowledge at project end, versus only 34% at baseline</p>	<p>OPPORTUNITY: Education and engagement are the key to food industry recognition of mushroom nutrition, health benefits and culinary uses of mushrooms</p>																																																
Has one high influence culinary school changed their behaviour by including mushroom nutrition, health, and culinary uses in their curriculum?	<p>YES: On the 18 May 2023, forty apprentices from The Star Culinary Institute (studying at The Star Sydney), were hosted on a farm tour at White Prince. The Learning and Development Program Director was impressed with the event and has expressed interest in returning each year</p> <p>Straight to the Source have secured a webinar opportunity with TAFE NSW, to deliver a Culinary Educators Professional Development session about the culinary and nutritional benefits of mushrooms</p>	<p>OPPORTUNITY: Providing ongoing engagement and supporting resources is key for the uptake of mushroom education within culinary schools</p>																																																

Have two high quantum of influence organisations changed their behaviour to include mushrooms within their menus or food product, to improve the nutritional profile?	<p>YES: The project successfully influenced two key institutional catering organisations to include mushrooms to improve the nutritional profile of menus</p>	<p>OPPORTUNITY: The project has proven that engagement is key. Both organisations were excited to learn and implement mushrooms on the menu; and have continued to do so</p>
Are >70% of food industry professional students and educators from participating culinary schools more confident and proficient in correcting misinformation about mushrooms nutritional, health, and culinary benefits?	<p>NO, NOT ACHIEVED YET: The primary activity to engage with culinary educators has not yet been achieved. 90.9% of Culinary Educators indicated they could benefit from teaching resources. The team secured an opportunity to deliver a PD webinar for TAFE NSW. This was originally scheduled for 17 November 2024, and is ready to be delivered, however TAFE NSW postponed the event until 10 April 2025. This is outside the contract completion date. A survey will be conducted after the webinar, with findings shared with Hort Innovation</p>	<p>OPPORTUNITY: This output is an excellent example of what could be achieved with a longer-term strategy to continue to meet the needs of Culinary Educators, and to keep their students to be continuously informed, engaged & upskilled</p>
RELEVANCE – How relevant was the project to the needs of the beneficiaries?		
To what extent has the project educated the food industry of the nutritional and health benefits of mushrooms?	<p>The project has successfully raised awareness within the food industry regarding the nutrition and health benefits of mushrooms. This was achieved through the creation of food industry-specific resources. The three outreach activities delivered by the project were described by attendees as impactful, informative, and highly useful. Moreover, there was a notable increase in knowledge, confidence, motivation, and the use of mushrooms to address nutrition-related challenges</p>	<p>OPPORTUNITY: The project team were surprised at the lack of knowledge of the nutritional and health benefits of mushrooms, and highly recommend that one-on-one engagement programs like this continue</p>
To what extent was the interest from culinary organisations in the case study interventions?	<p>As the case study interventions have a detailed nutrition science focus, they have greater educational impact on health care professionals who influence institutional chefs to improve the nutritional value of menus. Culinary schools are focused on commercial cooking competency. Nutrition education is limited, as it's not a curriculum requirement. Educators have shown greater interest in practical resources to assist them in the classroom; fact sheets, educational videos (pro-tips, x-factor, farm to plate) with the biggest interest in curriculum aligned recipes.</p>	<p>OPPORTUNITY: The case study intervention findings and videos should be promoted to a health care professional audience. The case study intervention resources should be used as part of the Mushroom Health Science Australia (MU22006), communications and engagement plan</p>
How effective were the case study interventions for increasing mushrooms in meals?	<p>The case study interventions were highly effective in increasing the use of mushrooms in meals, with a lasting impact on the organisations' motivation to continue incorporating mushrooms into their menus. (Appendix X – Mater; Appendix X – The Shoreline)</p>	<p>OPPORTUNITY: These efforts can serve as a top-down model to inspire other organisations to recognise the potential benefits of including mushrooms in their offerings</p>
To what extent was the interest from culinary school educators on a revised curriculum?	<p>A revised culinary curriculum was launched in April 2022, therefore influencing a 'revised curriculum' was not possible within this project. Identifying modules and competency units within the new curriculum and delivering supporting educator resources was identified as the path for greatest impact</p>	<p>OPPORTUNITY: To employ a Food Industry Education and Engagement Manager to support increased inclusion of mushroom content in culinary school teaching</p>
To what extent was their interest from conference attendees in the conference workshops?	<p>Dietitian Connection Food Service Symposium</p> <ul style="list-style-type: none"> • 653 registered; 59 attended live • 481 views at 2 months post the event • 93% rated the webinar as excellent or very good 	<p>OPPORTUNITY: Continue to engage with health and food industry professionals via educational events</p>

	<p>World Mushroom Day Breakfast</p> <ul style="list-style-type: none"> • 57 attendees • 92% rated the event excellent (33.5%) or very good (58.5%) • 92% information provided as exceptional (42%) or above average (50%) • 100% found the information useful with 28.5% extremely useful and 46% very useful • 100% found resources useful with 58% very useful and 8% wanting more <p>IHHC Conference presentation</p> <ul style="list-style-type: none"> • 50 attendees • Positive feedback received (informative/inspiring) 	
PROJECT APPROPRIATENESS – How well have the intended beneficiaries been engaged in the project?		
To what extent has the food industry and health professionals' nutritional knowledge and usage intent for mushrooms increased?	<p>Self-reported familiarity about the nutrition and health benefits of mushrooms increased from 33% to 53%; with awareness of vitamin D content (key project message) increasing from 31% of respondents at baseline to more than two-thirds (68%) at project end. This was also supported by evidence of growing confidence with upward trends in mid confidence categories, with the data showing nuanced but positive shifts in participant confidence levels.</p> <p>Education has been key to driving motivation and usage with 9 in 10 reporting education has led to greater motivation to include mushrooms and those accessing resources were 2.7 times more likely to be using more mushrooms in the workplace to improve nutrition than if they had not accessed resources</p>	<p>OPPORTUNITY: The small drop in the "very confident" group (22.6% to 10.9%) reflects a more cautious and realistic understanding as participants learn more, which is common in educational projects. It suggests the messaging has encouraged critical thinking while still fostering an upward trend in confidence overall, as seen in the rises across the mid-confidence categories. This reflects a foundation for future growth and education</p>
To what extent have the educational resources been disseminated to the food industry and health care professionals?	<p>The resources delivered were well received with 100% viewing them useful, and nearly half (43%) rating them as very useful, and 1 in 10 wanting more. Evidence that resource usage is key driver to mushroom usage with respondents 2.7 times more likely to respond they are using mushrooms more in their workplace now to improve nutrition if they had accessed the resources, compared to those who had not</p>	<p>OPPORTUNITY: leverage MU22006 (led by FOODiQ Global) to further communicate project outcomes. After the article about The Shoreline study is published in a peer-reviewed journal, MU22006 will release an opinion piece to promote the video and study findings (from The Shoreline case study) to health professionals via Mushroom Health Science Australia</p>
Has the project team successfully engaged with the mushroom industry?	<p>YES: via the following activities</p> <ul style="list-style-type: none"> • PRG meetings x 7 • Presentations at two mushroom industry conferences: Adelaide 2022 & Auckland 2024 • Presentation by Dr Flavia Fayet-Moore at the mushrooms R&D ideation workshop, Sept 2024 	<p>OPPORTUNITY: leverage MU23004 (led by AMGA) for continuous improvement of mechanisms to communicate with industry stakeholders</p>
Have regular project updates been provided through linkage with the industry communication project?	<p>YES: via the following outputs</p> <ul style="list-style-type: none"> • MushroomLink Articles x 5 • AMGA Journal Articles x 3 • EDMs x 6 	<p>OPPORTUNITY: leverage MU23004 (led by AMGA) to work with MU21003 for continuous improvement of mechanisms to communicate with industry stakeholders</p>
Did the project identify nutrition problems in the food	<p>YES: The project effectively identified nutrition challenges in the food service industry and provided</p>	<p>OPPORTUNITY: To employ a Food Industry Education and</p>

service industry and provide practical ways to solve them, using mushrooms?	practical solutions using mushrooms. The Food Industry Blueprint Report identified two organisations—Mater Hospital and The Shoreline Aged Care—as ideal partners for case study interventions both addressing plant-forward opportunities and vitamin D deficiency.	Engagement Manager to liaise with institutional foodservice professionals to increase the use of mushrooms on menus
Did the project engage with the food service industry in their preferred learning style?	YES: The Food Industry Blueprint report highlighted that non-health-oriented food industry professionals, such as chefs, cooks, and catering staff, tend to prefer more hands-on, practical learning. In contrast, health professionals, including dietitians and nutritionists, favour evidence-based information from credible experts, supplemented by practical application. Through targeted approaches, the project catered to the preferred learning styles of both groups	OPPORTUNITY: use feedback from the TAFE NSW webinar to inform how to increase engagement with culinary educators and students
Did the project successfully engage with culinary students, and provide lessons using their preferred learning style?	YES: Surveys for the Food Industry Blueprint Report and the Culinary School Report informed the development of resources for students and culinary educators, aligned with their self-identified preferred learning styles	OPPORTUNITY: use feedback from the TAFE NSW webinar to inform how to develop additional resources for students and culinary educators
Did the project engage with mushroom growers, to provide educational resources for farm tours, that are useful to their needs?	YES: The Farm Tour pack was designed with input from the PRG, which included representation from mushroom growers. The pack consists of the curriculum, lesson plan (run sheet), written and video resources, and tour evaluation form	OPPORTUNITY: leverage MU23004 (led by AMGA) for continuous improvement of resources to assist growers with hosting farm tours for members of the food industry
EFFICIENCY – What efforts did the project make to improve efficiency?		
Did the project make efforts to improve efficiency?	YES: this was achieved through desktop research to identify existing knowledge and resources that could be leveraged by the project, including from MU17002; and by collaborating with concurrent projects including MU21003, MU22006, and MU22012	OPPORTUNITY: make non-confidential project outputs easily accessible for others to leverage. Use learnings for the development of new mushroom levy funded R&D projects

Recommendations

The overarching recommendation from this project is that a longer-term strategy is essential to continue to meet the needs of the foodservice industry. There is scope to build on the foundations that have been established by expanding efforts to engage with culinary educators, food service professionals, and health care professionals such as dietitians and nutritionists. The appointment of a dedicated Food Industry Education and Engagement Manager would enable the further development of key relationships and partnership opportunities to achieve impact at scale, ultimately contributing to the goal of increasing domestic consumer demand for Australian *Agaricus bisporus* mushrooms. This would deliver beneficial outcomes for public health and for the Australian mushroom industry. Areas of focus for a dedicated Food Industry Education and Engagement Manager could include:

- Leveraging the findings from the nutritional case study interventions to engage with senior managers of hospitals and residential aged care facilities to drive uptake of mushrooms on menus at a national level
- Connecting with chefs and dietitians in the aged care sector to ensure mushrooms are included in dietitian approved menus, which will be a nationally mandated requirement from 2026 onwards
- Collaborating with FOODiQ Global to increase the reach and impact of the Mushroom Health Science Australia initiative (funded by Hort Innovation project MU22006)
- Creation and promotion of a digital destination dedicated to the Australian food service industry, where tools and resources about mushrooms can be easily found and accessed
- Using the digital destination to provide mushroom resources aligned to core units of the Certificate III in Commercial Cookery
- Continued development of new tools and resources that accommodate different diets and food preferences
- Increased engagement with culinary educators to inspire them to educate the next generation of food service professionals about the culinary and nutritional benefits of mushrooms

References

1. Blumfield M, Abbott K, Duve E, Cassettari T, Marshall S, and Fayet-Moore F. Examining the health effects and bioactive components in *Agaricus bisporus* mushrooms: a scoping review. *Journal of Nutritional Biochemistry*: Volume 84 (2020) 108453. <https://doi.org/10.1016/j.jnutbio.2020.108453>
2. Australian Horticulture Statistics Handbook 2022/23. Copyright © Horticulture Innovation Australia Limited 2024. Accessible via [this link](#) on the Hort Innovation website

Intellectual property

No project IP or commercialisation to report

Acknowledgements

The Australian Mushroom Growers' Association sincerely acknowledges the invaluable contributions of FOODiQ Global, especially their project manager, Jutta Wright. Her expertise, dedication, and insights have been instrumental in shaping our findings and advancing our objectives. Thank you also to the members of the industry Project Reference Group for their voluntary contributions to help guide this project.

Appendices

- Appendix 1. Market Research Polls
- Appendix 2. Food Industry Blueprint Report
- Appendix 3. AMGA Conference 2022 - slides
- Appendix 4. Case Study Report - The Mater
- Appendix 5. Culinary School Report
- Appendix 6. TAFE NSW Webinar Template
- Appendix 7. Dietitian Connection Food Service Symposium – slides
- Appendix 8. IHHC Conference 2024 - slides
- Appendix 9. Educational Brochures
- Appendix 10. Kitchen Poster
- Appendix 11. E-book
- Appendix 12. AMGA Mushroom Farm Tour Pack
- Appendix 13. Media Releases and Linked Coverage
- Appendix 14. Mushroom Industry Journal Articles
- Appendix 15. Mushroom Industry EDM Updates

MU20003: Mushroom Industry **End of project Poll**

December 2024



Background

- **Project code:** MU20003
- **Project name: Project leader:** Jutta Wright
- **Delivery partner:** FOODiQ Global (formerly Nutrition Research Australia)
- **Report author:** FOODiQ Global
- **Contact:** Jutta Wright
- jutta@foodiq.global | 0402 315 969



Objective

Measure the impact of the project on changes in knowledge and recommendations in those who accessed the project resources, compared to those who did not, with reference to baseline data, where appropriate



This report describes the findings from the 2nd audience sentiment survey among food industry professionals on our database, following on from the baseline data report in June 2022.

Project outcomes

- Increase the knowledge of food industry professionals about the nutrition and health benefits of mushrooms
- Facilitate chefs and food service health professionals to improve the nutritional profile of existing and new foods, meals and menus by incorporating more Australian grown fresh *Agaricus bisporus* mushrooms.

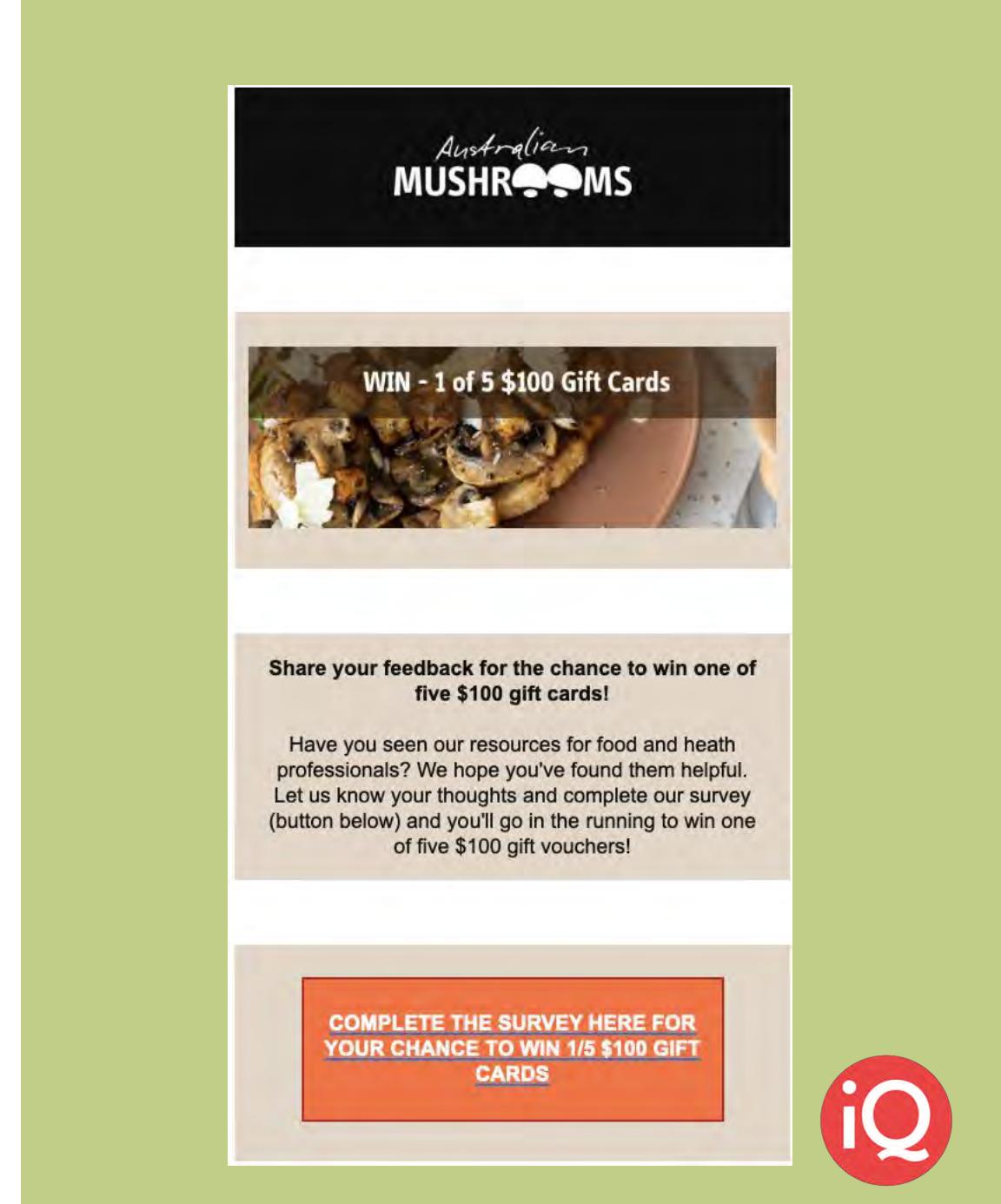


Method



Approach

- An eDM was sent to Mushroom Industry Database inviting subscribers to undertake a short 15 question survey.
- Participants were incentivised to take part in the survey with the chance to win 1 of 5 \$100 Visa Gift cards.



Australian MUSHROOMS

WIN - 1 of 5 \$100 Gift Cards

Share your feedback for the chance to win one of five \$100 gift cards!

Have you seen our resources for food and health professionals? We hope you've found them helpful. Let us know your thoughts and complete our survey (button below) and you'll go in the running to win one of five \$100 gift vouchers!

COMPLETE THE SURVEY HERE FOR YOUR CHANCE TO WIN 1/5 \$100 GIFT CARDS

iQ

Results



Survey statistics

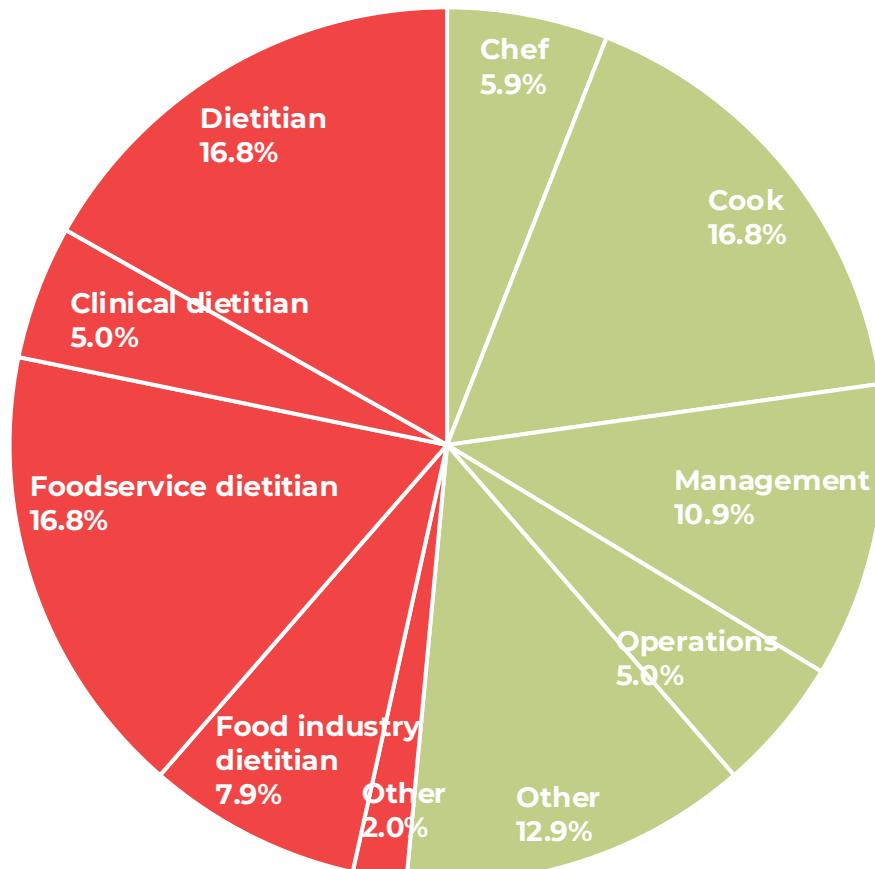
334 click throughs → 168 survey starts – 97 completed in full



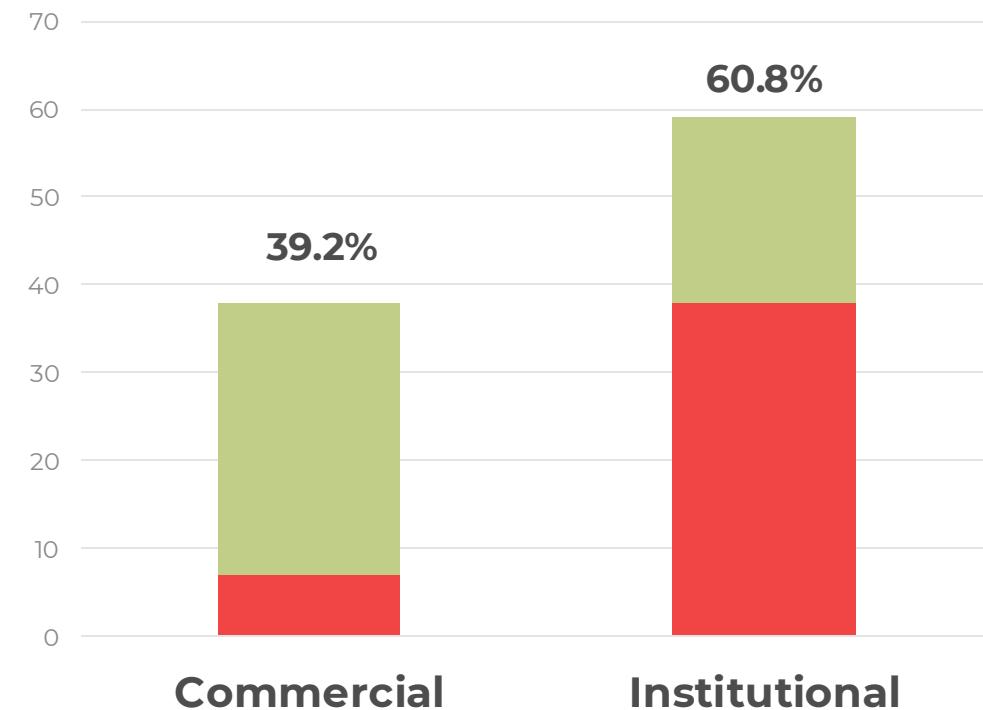
Health-oriented professionals: 43.4%



Non-health-oriented professionals: 56.6%



Sectors





Resource Access & usefulness

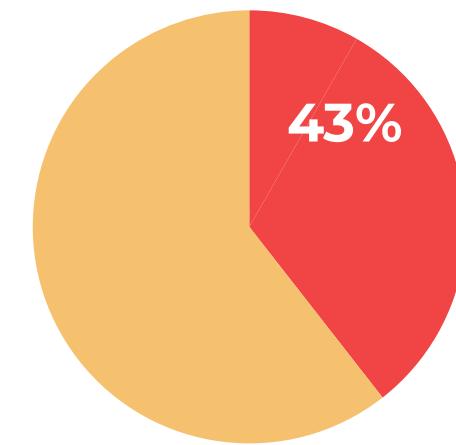


57.7% of participants had accessed the resources.



100% of participants that accessed the resources found them useful.

- 9.4% very useful and I would like more
- 34% very useful
- 41.5% useful
- 15.1% somewhat useful



of those who accessed resources found them **very useful**.



Mushrooms widely used: 85% use them, with nearly half regularly as main or side dishes

Q. Do you currently feature mushrooms on the menu where you work?

Yes, it's a main feature of some meal offerings year round



Yes, it's mainly used as a side dish year round



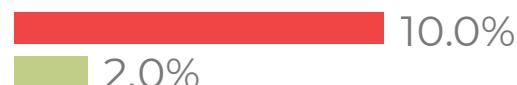
Occasionally, it may feature in our seasonal/limited time menus



No, we do not use mushrooms at all



I don't know



Project End

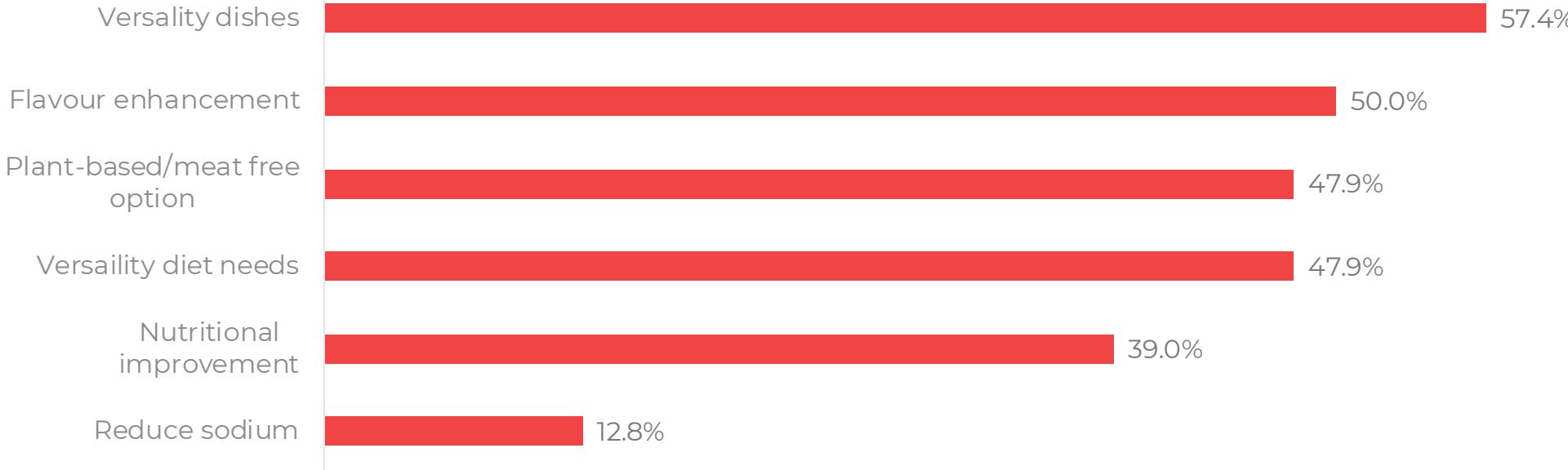
Baseline



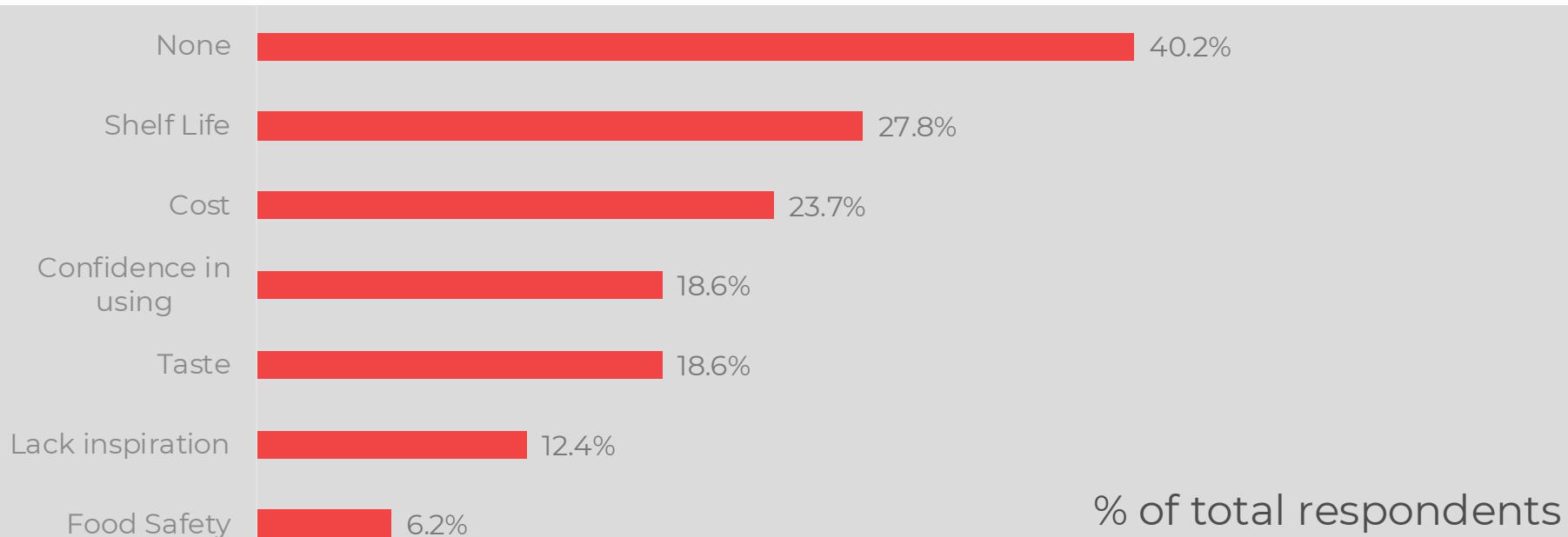
Versatility, flavour enhancement & Plant forward option are key usage drivers



DRIVERS FOR USING MUSHROOMS



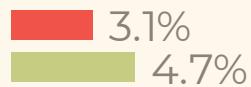
BARRIERS TO USING MUSHROOMS



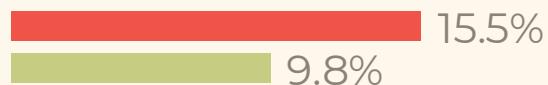
Knowledge nearly doubled: familiarity increased from 33% to 53%

Q. How familiar are you with the key nutritional properties and health benefits of consuming mushrooms?

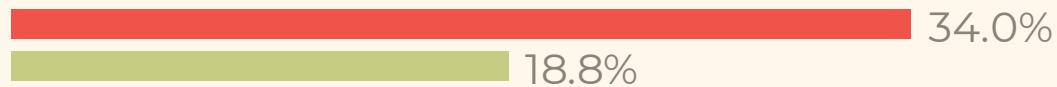
Academic knowledge



Very familiar as I have attended events/seminars/read resources



Familiar and can specify benefits



Familiar with some aspects but cannot specify them



Project End

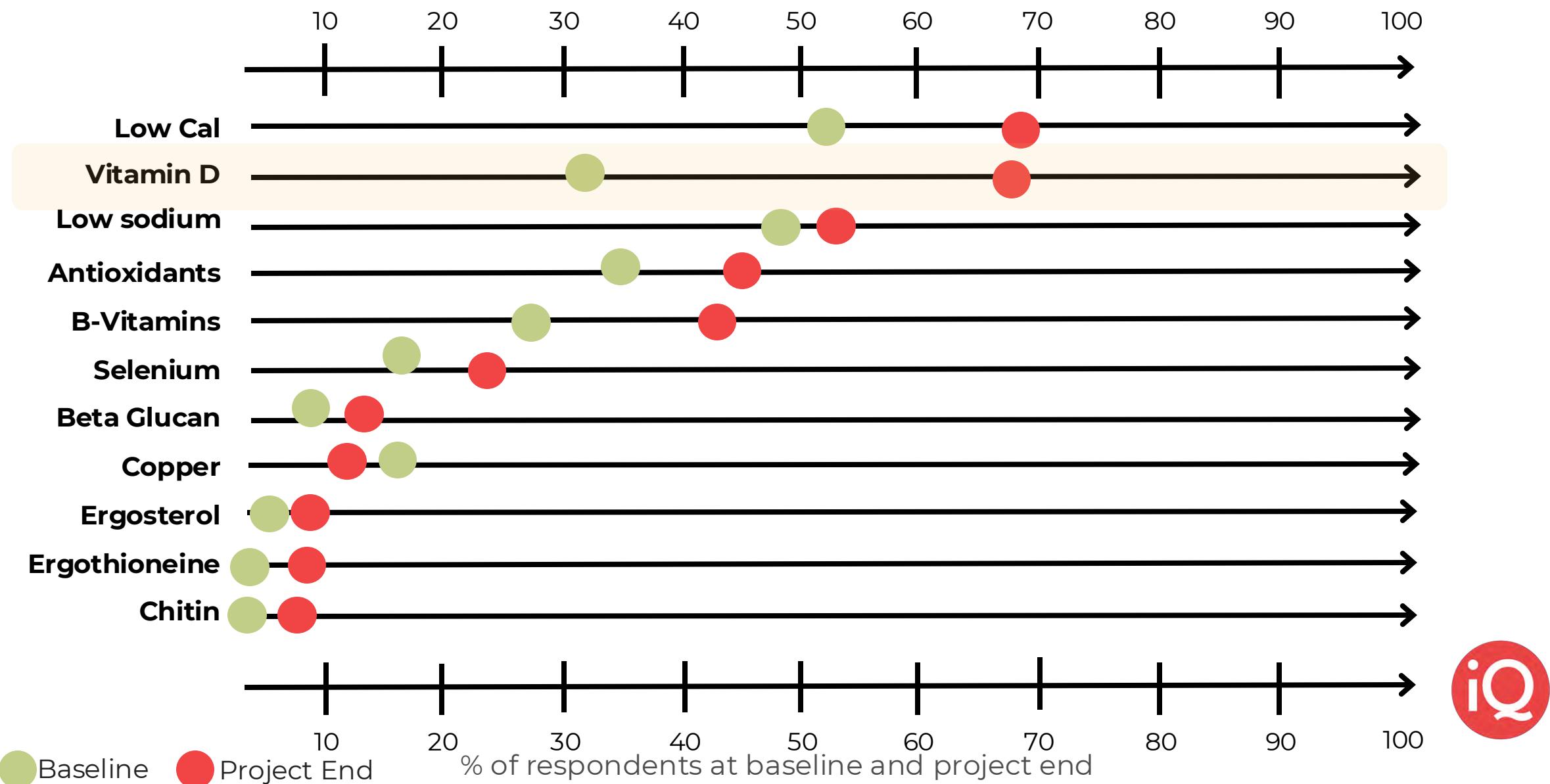


Baseline

Not familiar at all

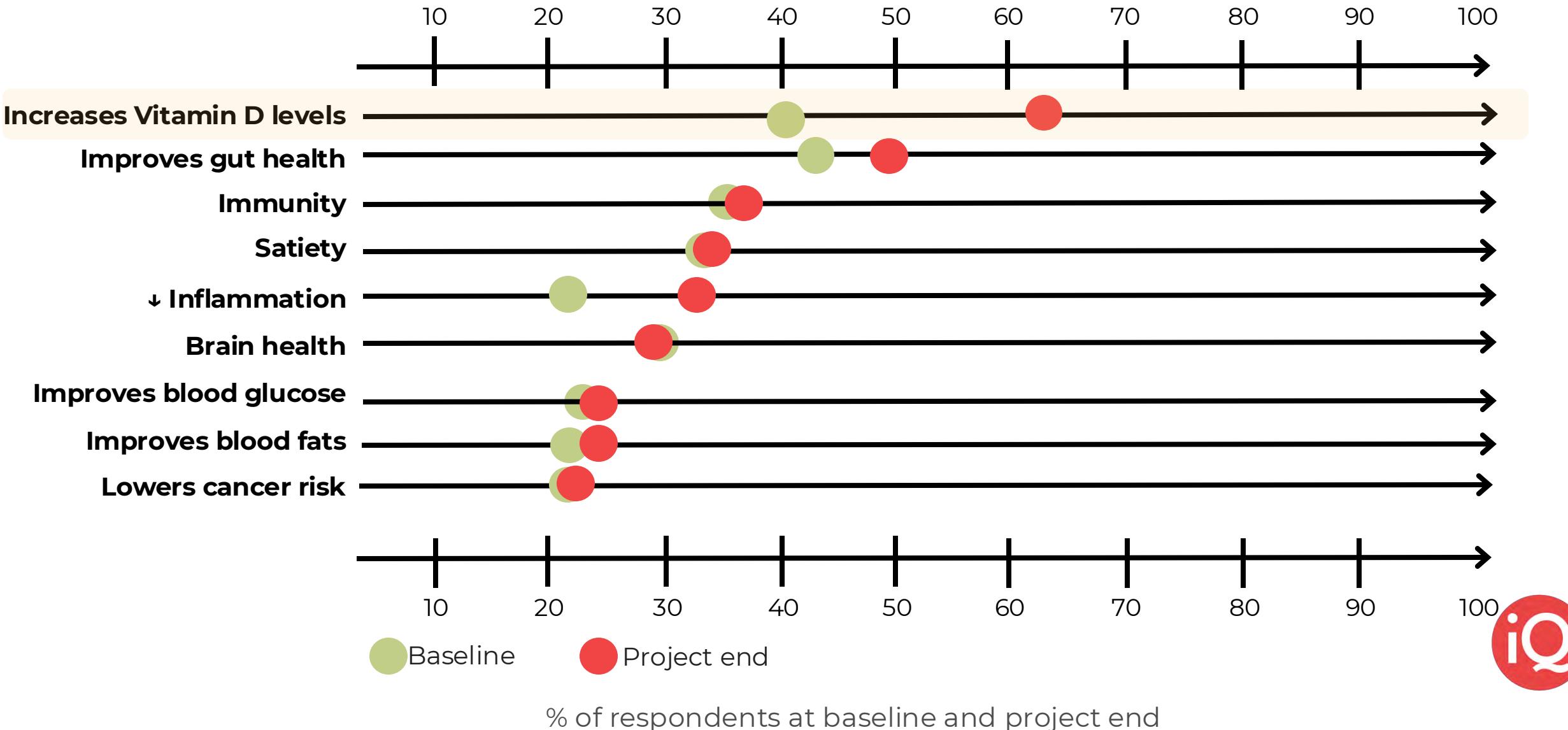


Knowledge of Mushrooms' Vitamin D Content More Than Doubled

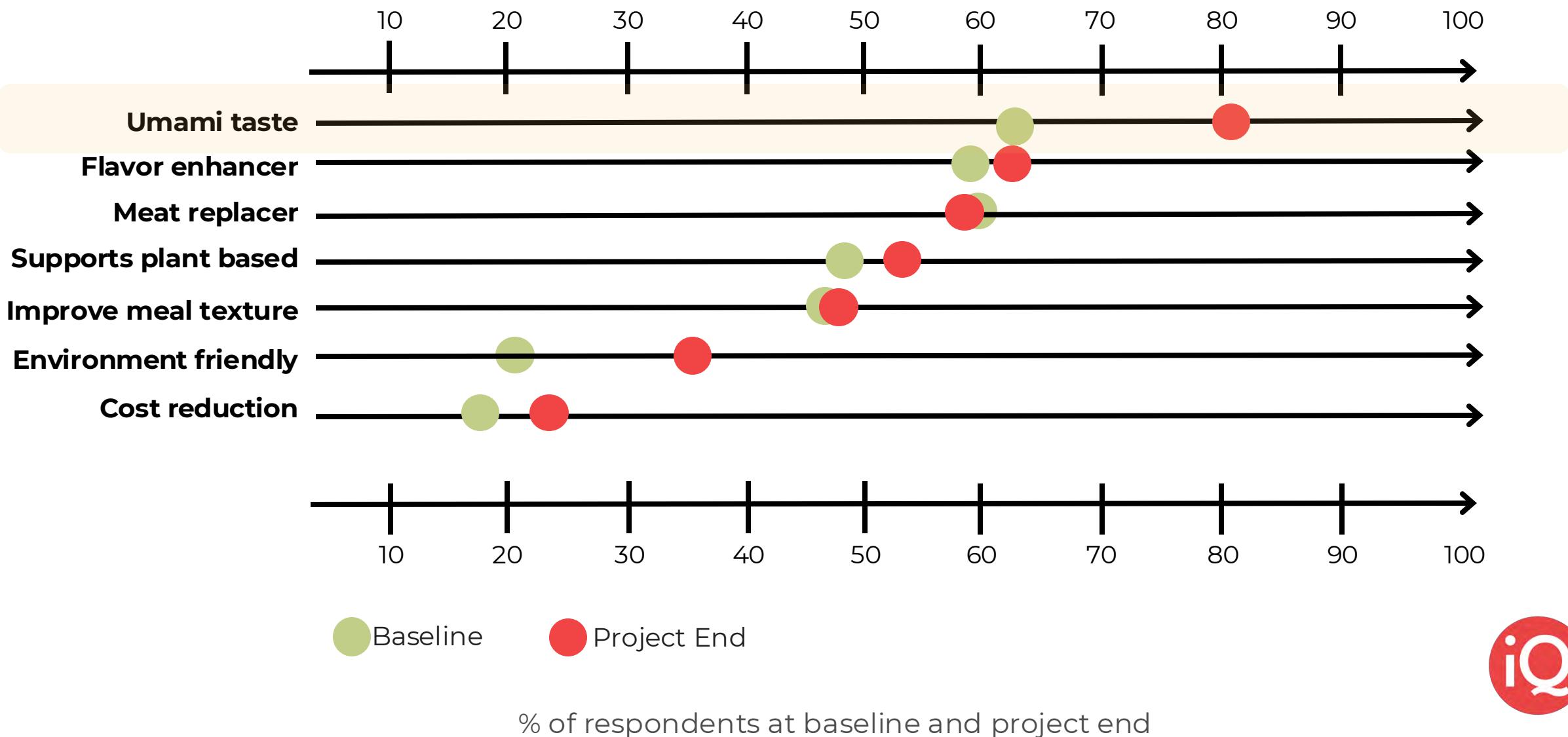


Awareness of Role in Boosting Vitamin D Levels

Increased by 58%



Awareness of Umami taste benefits Increased by over 30%



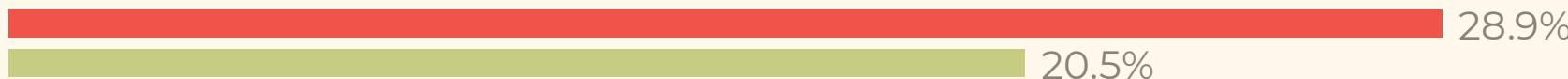
Growing confidence: More slightly to quite confident

Q. On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how confident do you feel in talking about the nutrition, health or culinary benefits of Australian mushrooms? (By industry)

Very Confident



Quite Confident



Somewhat Confident



Slightly Confident



Not confident at all



Project End

Baseline



Nearly 9 in 10 agree that education has made them more motivated to use mushrooms.

On a scale between 1 and 5, where 1 is 'strongly disagree', and 5 is 'strongly agree', thinking about your current workplace, how much do you agree with the following statement: **"Being educated about mushrooms has made me more motivated to include or encourage the inclusion of mushrooms in meals and menu development."**

Strongly agree

37.0%

Agree

50.0%

Unsure

7.4%

Disagree

0.0%

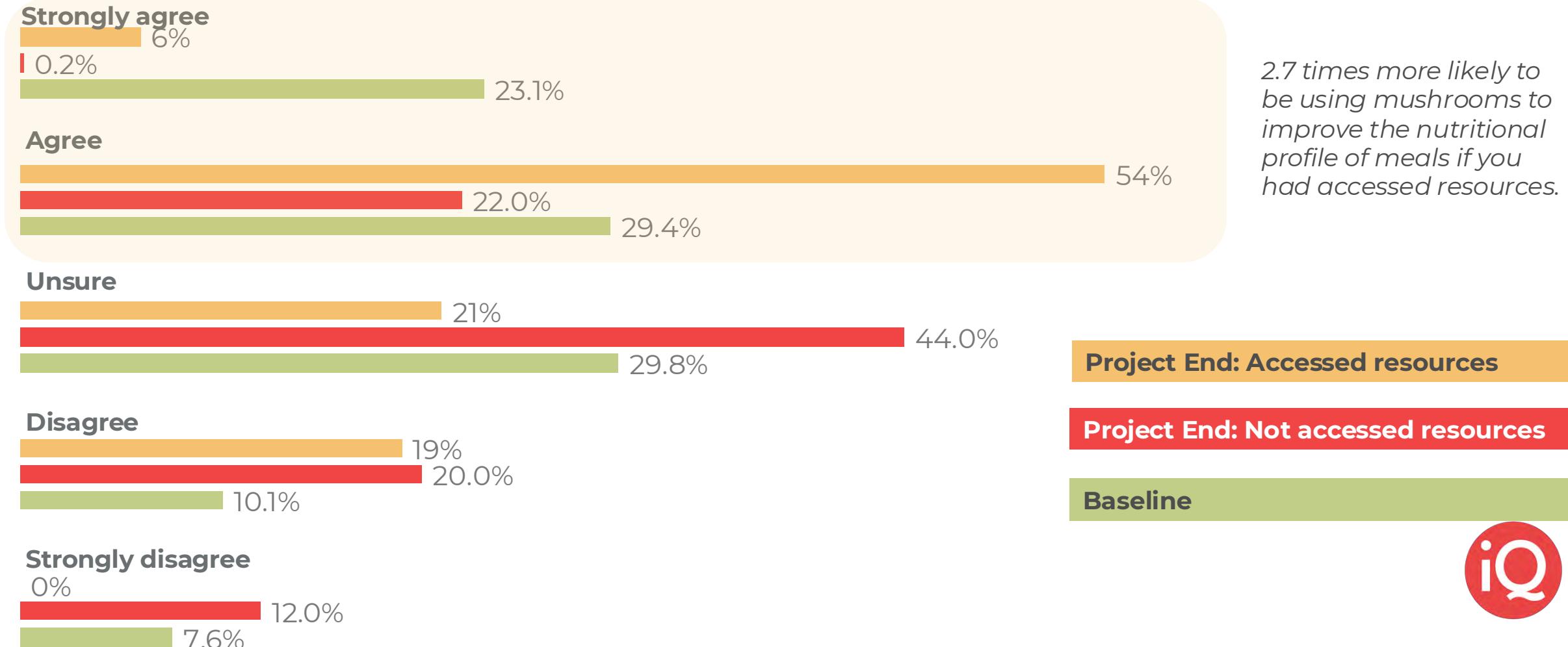
Strongly disagree

1.9%



Mushroom usage for nutrition increased for those accessing resources

On a scale between 1 and 5, where 1 is 'strongly disagree', and 5 is 'strongly agree', thinking about your current workplace, how much do you agree with the following statement: **"There has been an increase in the use of mushrooms in order to improve the nutritional profile of meals."**



Future Focus: Creative, Easy, and Safe Mushroom Recipes for All Ages and Needs

“

- More recipes
- More recipe inspo
- Easy recipes for younger students to follow
- More professional recipes on using mushrooms
- Food safety in mushroom handling and preparation
- I'd love to see kid friendly recipes
- Food safety in different varieties, storage and preparation
- Recipe ideas, mushrooms being used in different cultures
- Storage & reheating (my hospital uses cook-chill system) where foods are reheated which impacts texture & flavor
- Recipes for texture modified diets for IDDSI
- I would love to share some culturally diverse recipes using mushrooms
- Child friendly meals using mushrooms
- good quality mushroom powder to add in foods
- How to identify poisonous mushrooms.
- Food safety in mushroom handling and preparation



Learnings & Recommendations



Survey learnings and recommendations



Learning

- ✓ Resources were well received with nearly half rating them as very useful and 1 in 10 wanting more.
- ✓ Self-reported familiarity in nutrition and health benefits mushrooms increased 60% from 1 in 3 (33%) to over 1 in 2 (52.6%) with awareness of vitamin D content (key project message) more than doubled from one-third (31%) respondents at baseline to over two-thirds (68%) at project end.
- ✓ Evidence of growing confidence with upward trend in mid confidence categories.
- ✓ Education has been key to driving motivation and usage with 9 in 10 reporting education has led to greater motivation to include mushrooms and those accessing resources were 2.7 times more likely to be using more mushrooms in the workplace then if they had not accessed resources.



Recommendation

- ✓ Expand resources availability, particularly with practical information on usage and recipe inspiration.
- ✓ Continue to educate on nutrition, health and culinary benefits to further build awareness reach and solidify knowledge.
- ✓ Promote mushroom mastery with chefs: With education priming motivation, create more opportunities for workplace focussed initiatives or challenges to sustain and build on the momentum. Develop easy-to-use tools for chefs to keep top of mind to encourage consistent and widespread use of mushrooms in the workplace menus.

Thank
YOU!

 foodiqglobal

 @foodiqglobal

 foodiqglobal

 info@foodiq.global

 www.foodiq.global



A graphic element on the right side of the page. It consists of a stylized, thick red and grey curved line that forms a partial circle. Inside this curve, there is a white space containing a small white mushroom. To the right of the curve, there are three whole white mushrooms arranged in a cluster.

Food Industry Insights Final Report

Prepared for:

Australian Mushroom Grower's Association

August 2022

Prepared by:

Nutrition Research Australia Pty Ltd.

Table of contents

Table of contents	2
Executive Summary	3
MU20003 Project Background	8
The Mushroom Industry Insights Report	11
Phase 1: Industry Blueprint Identify 'who' to target	12
Methodology	13
Findings	19
Recommendations	29
Phase 2 Identify 'how' to best execute the project for maximum impact	42
Methodology	43
Finding	47
Recommendations	78
Other Opportunities	81
References	83
Appendix A	84
Appendix B	93

Executive Summary

Background

Hort Innovation project: **MU20003 Educating the Food Industry about Australian Mushrooms** aims to influence and facilitate the incorporation of mushrooms into the menus of the food service sector of the food industry through nutrition education

The overarching strategy is a two-pronged, top-down and bottom-up approach:

- **top-down** engagement with high quantum of influence food industry organisations to implement mushroom focused nutrition interventions, and
- **bottom-up** education and communication with industry professionals influencing the food service sector to educate on the culinary, nutrition, health benefits of Australian Mushrooms (*A. bisporus*).

Approach

To best deliver the project outcomes and planned activations, obtaining food industry insights to advise who in the industry we should be targeting within the key project pillars of the two strategic domains (top-down and bottom-up), and how best to engage and activate them, was deemed an important step to inform and direct the project strategic plan, along with serving to inform key industry stakeholders of opportunities, specifically mushroom growers. Hence an **Industry Insight project** was undertaken and divided into two phases. Phase 1 to identify 'Who' we should be targeting and Phase 2, how best to engage and activate and what opportunities exist.

In Phase 1, an industry blueprint comprised of desktop research was undertaken along with consultation with industry experts to scope and map out the role of the food service sector within the wider food industry. Findings from the information gathering were then reviewed in line with the project's aim, outcomes and strategy to inform the recommendations for:

- a. 'Who' the project should target and;
- b. Key individuals to interview in one-on-one interviews for Phase 2.

In phase 2, qualitative in-depth interviews were undertaken with twelve key opinion leaders and quantitative research conducted with broad range of food industry professionals which were together summarised to provide key insights into the food service industry falling under six key territories; Health centricity, Mushroom Knowledge (nutrition, health, culinary), Usage, Culinary Education, Opportunities and Communication. The qualitative interviews were also used to seek out interest in organisations taking part in planned case study interventions within the project.

Together the insights were used to inform recommendations for how best to execute the project and identify opportunities for the Australian mushroom industry.

Findings and Recommendations

Phase one

Food industry blueprint identified a dynamic and rapidly changing food service sector comprised of four major sectors; Institutional, Commercial, Quick Service Retail (QSR) and Industrial, each comprised of smaller sub-sectors. The industry at large is undergoing a period of rapid change driven by changing lifestyle demands and demographics. It is highly fragmented and largely comprised of independent and low quantum of influence outlets. Some sectors and sub-sectors comprise of chains of outlets managed by organisations that have the potential for higher quantum of influence, thus offering a greater opportunity and impact for the planned mushroom intervention. Food manufacturers were among other significant players identified that influence the foods, meals and menus of the sector.

Culinary training is undertaken by registered training organisations (RTO). While there are multiple smaller sized private organisations, the major trainer is the government funded Technical and Further Education (TAFE) organisations. The sector is comprised of multiple professions and there are several professional membership organisations that offer efficient channels for communication.

Utilising a prioritisation method using relatively objective and simplistic criteria across three domains, nutrition, ease of intervention and impact, five key recommendations were obtained to ensure opportunities with the greatest impact.

Five key recommendations from Phase 1 were:

Recommendation 1: The most relevant sectors/sub-sectors for the top-down mushroom case studies included: Institutional Aged Care and Hospitals, Industrial Caterers, Tier 2 QSR, Commercial Accommodation/Hotels and Food Manufacturing.

Recommendation 2: The following organisations within each sector should be prioritised for the mushroom case study interventions:

Aged Care: BUPA, Calvary, Unity, Regis, Allity

Hospitals: Ramsay Healthcare, NSW Health, VIC Health, Healthscope, St John of God

QSR Tier 2: Zambrero, The Coffee Club, Retail Zoo, Soul Origin, Guzman & Gomez

Industrial: Compass, Sodexo, Cater Care, Australian Turf Club, Trippis White

Accommodation/Hotels: Accor, ALH Hotels, Crown Group, Star Group, Hilton

Recommendation 3: The top five culinary schools for the curriculum revision include: NSW Ryde & Ultimo TAFE, QLD Southbank TAFE, VIC/NSW William Angliss Institute and The Learning Vault.

Recommendation 4: There are seventeen membership organisations that are relevant to target key industry professionals in education and communication activations. An influencer database by food service sector should be created. As individuals may change and new database contacts be

identified as the project progresses, the contact list should be expanded and maintained throughout the project.

Recommendation 5: Fifteen KOLS were identified for the Phase 2: Market Research. They comprised of nine individuals working at high quantum of influence organisations from the food service sectors; two from Aged Care, one from Private Hospitals, two from QSR Tier 2, two from Industrial Catering two from Accommodation/Hotel sectors, two individuals impacting culinary curriculum, four networked individuals and influencers of the broader food service industry; three dietitians and one commercial chef.

Phase two

The quantitative and qualitative research identified several insights of the food service industry across six territories.

Health centricity: It was clear that nutrition and health are not a focus in the nationally accredited commercial cookery curriculum and rarely a direct consideration of the commercial organisational sector. In contrast, nutrition and health are central to the institutional sector where dietitians often work in partnership with chefs. Irrespective of value on nutrition and health, taste is number one priority.

Knowledge: Mushrooms are best known by food industry professionals for culinary benefits with nutrition and health knowledge lacking, particularly for non-health industry professionals. A common misconception with non-health industry professionals is that mushrooms is a 'meat protein equivalent'. It was clear that education around nutrition and health benefits sparks motivation and greater interest in mushrooms. Mushrooms being a good source Vitamin D is the fact most are surprised and delighted by.

Usage: Mushrooms are considered a highly versatile ingredient and are used right across the menu. Their ability to add flavour to meals and be leveraged in plant-based meal offerings are key drivers of usage. Institutional organisations are more likely to value them for their nutritional benefits, compared with commercial organisations, where texture and flavour rate highest. Their ability to reduce sodium and saturated fat for the institutional sector and the misconception of being a protein replacement for meat for the commercial sector, are also important sector drivers.

There are no major barriers to usage for most, with shelf life, lack of top-of-mind awareness and inspiration the main limitations. Cost can be a barrier but can be positively viewed when mushrooms are used as substitute for meat. Nutrition solutions need to incorporate a cost benefit story for cut through, particularly in the institutional sector.

Culinary education: Within the nationally accredited commercial cookery curriculum, mushrooms are considered a vegetable and not specifically recognised. Registered training organisations (RTOs) are free to teach the curriculum as they like, and in practice mushrooms are an ingredient chosen to teach various units and preparation styles due to its versatility.

Opportunities: Many opportunities across the industry were identified. Overall, plant-based, flexitarian and vegetarian diets are key to tap into with opportunity to lead with inspiring mushroom recipes that achieve adequate protein. Related to this, the bigger flexitarian opportunity and dishes incorporating a blend of meat and mushrooms ('The blend') offer nutrition and cost saving potential benefits attractive to both commercial and institutional settings.

Overall, the opportunity to get mushrooms used more, centres around inspiring chefs' creativity to bring mushrooms top of mind. This is best achieved via engaging education on different mushroom types and how to use them (versatile applications), while supporting with underpinning fun nutrition and health facts. From a grassroots level, there is opportunity to provide materials that can be used to support the RTOs in delivery of the newly included unit SITHCCC031 - Prepare vegetarian and vegan dishes and longer term change the national curriculum to recognise mushrooms as a separate food grouping.

For the institutional sector, tapping into a 'Food as Medicine' approach instead of using supplements offers opportunity to educate and foster greater uptake of mushrooms. Taste benefits, vitamin D and other nutrients can offer potential of improved food intake and nutrition/health status, and subsequent less food waste and supplement usage, with consequent cost savings. Within the commercial sector, introducing a mushrooms provenance story has opportunity as a relevant avenue to connect with nutrition and drive interest.

Communication: From a communications perspective the key insight was to keep it simple, and to inspire rather than educate. Communication needs to be practical, visual, tactile and easy to understand. Whilst digital was seen as best, there is need and desire for something tangible that can be utilised in the kitchen to keep it top of mind. As a 'hands on' profession, training executive chefs to then train their staff ('train the trainer') appears a potential high quantum of influence strategy that is practical and puts knowledge into action.

In terms of messaging, leading with culinary benefits is key. Across the industry, the taste and texture benefits of mushrooms are seen to support greater food intake and consequent better nutrition and less food waste. It was clear that due to the different value placed on nutrition and health within the institutional and commercial industry sectors, that messaging needs to be different for each.

A practical usage and application provenance story (farm to fork) underpinned by nutrition fun facts and exploits plant-based food trends offers best opportunity for greater traction of mushrooms within the commercial sector. In the institutional sector however, leading with potential cost benefits underpinned by nutritional benefits, offers the best opportunity for success. Specifically positioning a 'Food as Medicine' approach, with mushrooms ability to provide flavour and texture and be a whole food 'nutrition supplement', supporting increased food and nutrient intake, improved nutritional status, and lower food wastage, were identified as key benefits to leverage.

Seven key recommendations from Phase 2 were:

Recommendation 1: Develop educational resources and an online dedicated food service 'Mushroom Academy' hub.

Recommendation 2: Undertake a mushroom case study intervention within two organisations to leverage in communication and gather support for further research.

Recommendation 3: Conduct a face-to-face pilot 'Masterclass' case study with commercial sector chefs to evaluate.

Recommendation 4: Communicate case studies to wider industry to educate and inspire.

Recommendation 5: Develop a farm tour framework, lesson plan and resource pack that facilitates grower and food industry professional connection and partnership.

Recommendation 6: Develop curriculum materials that can be leveraged as part of the Vegan & Vegetarian units.

Recommendation 7: Communicate key findings from this Mushroom Industry Insights report with industry to inspire and garner support to capitalise on future opportunities.

Future opportunities outside of the scope of the project were also provided. These include manufacturing opportunities, developing a provenance story strategic plan, developing an ongoing 'Train the trainer' strategic plan, investing in published research and advocating for update of the national accredited commercial cookery curriculum, for recognition of mushrooms as its own food grouping.

MU20003 Project Background

In August 2021, the Australian Mushroom Grower's Association (AMGA) in conjunction with Nutrition Research Australia (NRAUS) won a 3-year Hort Innovation project: **MU20003 Educating the Food Industry about Australian Mushrooms.**

Aim

This 3-year project aims to: (i) increase the knowledge of food industry professionals about the nutritional and health benefits of mushrooms; and (ii) facilitate food industry professionals to improve the nutritional profile of existing and new foods, meals, and menus available within the food service sector by incorporating more Australian grown fresh *A bisporus* mushrooms.

Outcomes

The key outcomes of the project include:

1. Food industry professionals will have increased knowledge of the nutrition and health benefits of mushrooms
2. Food industry professionals will more frequently use mushrooms to improve the nutritional profile of a meal
3. Two large catering organisations will use mushrooms in meals or products to improve nutritional profile
4. At least one high influence culinary school will include mushroom nutrition, health, and culinary uses, in their curriculum
5. Food industry professionals will have an increase in their recognition of mushroom nutrition, health, and culinary uses
6. Mushroom Industry is well informed of the Food Industry landscape and the opportunities within the food service industry
7. Growers are well equipped with resources and knowledge to run farm tours for nutrition education independently
8. Culinary educators and students will be more confident to use and recommend Australian mushrooms for their nutrition and health benefits

Strategy

To achieve the aim and outcomes of this project, a two-pronged top-down and bottom-up strategy was planned:

1. **Top-down:** Engagement with high quantum of influence food industry organisations to implement mushroom focused nutrition interventions. Specifically:
 - Mushroom case study interventions at two high impact catering organisations
 - Curriculum revision at one or more culinary schools

2. **Bottom-up:** Engagement with industry professionals influencing the food service sector to educate on the culinary, nutrition, health benefits of Australian Mushrooms (*A. bisporus*), with the following activations planned:

- Education and upskilling of growers via farm tour packs to run nutrition focused farm tours to key tier 1 food industry professionals who are influencers of the industry
- Conference sponsorship at high impact and relevant industry conference
- Oral presentation on nutrition, health and culinary science of mushrooms at a relevant industry conference
- Oral presentation at a relevant industry conference on nutrition interventions
- Educational materials (mushroom case study intervention and educational videos, educational brochures, posters, e-books) targeted and communicated to food service professionals via relevant channels

In addition, findings of the report were planned to be communicated with industry growers via presentation (webinar or conference) and updates via Australian Mushrooms Journal.

To meet the deliverables in both project domains (top-down interventions and bottom-up education and communication) there are 4 key strategic pillars:

1. **Food service sectors and organisations** relevant to undertake mushroom interventions.
2. **Culinary schools** relevant for implementation of mushroom relevant curriculum revision.
3. **Industry professional organisations** that can be leveraged to support targeted and efficient dissemination of information through established communication channels.
4. **Key industry influencers** who can be utilized in tandem to amplify messages and utilized as supporters and/or influencers of decision makers to help influence top-down interventions.

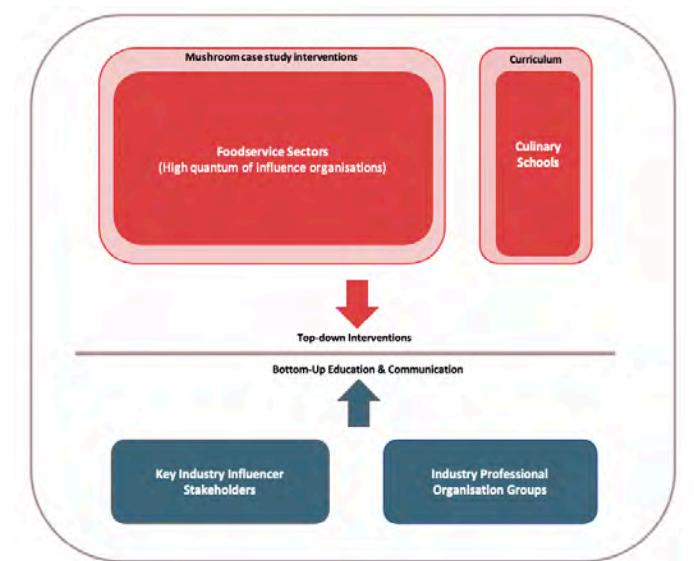


Figure 1. The four key strategic pillars for project MU2003; Food service Sectors, Culinary Schools, Industry Professional Membership Organisations and Key industry influencer stakeholders.

The first step of this project is to map out the opportunities within food service industry to deliver project outcomes and planned activations and is termed the Food Industry Insights Report. The report was divided into two phases:

- **Phase 1:** Identify 'Who' we should be targeting in the key strategic pillars within the two domains (top-down and bottom-up), and
- **Phase 2:** How best to engage and activate.

Phase 1 was completed 30th January 2022 and submitted to Hort Innovation as the 'Phase 1 interim Industry Insights' report. Phase 2 of the report, comprising qualitative and quantitative research was undertaken throughout February to June 2022. This final report incorporates the methodology, findings and recommendations of Phase 2 and comprises of the complete Mushroom Industry Insights report.

The Mushroom Industry Insights Report

Aim

To map out food industry insights that will inform and direct the project's strategic plan to best meet the project aim and outcomes.

Phase 1

Scope and map out the food industry including its key sectors, and identify the key pillars for 'who' the project will target within the two key domains (top-down and bottom-up):

- Provide a detailed overview of the food service sector of the food industry.
- Understand key sectors within this industry and their linkages.
- Understand organisations that operate within these key sectors.
- Identify 'who' to target for the project within each of the pillars within the two key domains (both top down and bottom up).
- Identify 15 key opinion leaders (and their organisations) to target in Phase 2.

Phase 2

Undertake market research with food industry professionals to understand their needs and barriers around using mushrooms, and to provide further insights to help inform 'how' the project will be best executed for maximum impact. Specifically, the research sought to uncover insights on the:

- Importance of nutrition/health (health centricity) within the industry
- Food service professionals' current mushroom nutrition and health knowledge
- Usage of mushrooms, including drivers and barriers within food service organisations
- Current focus of mushrooms within culinary education
- Opportunities and considerations within catering and culinary education organisations
- Effective ways to reach industry professionals to increase mushroom nutrition and health knowledge
- Key messages to target in communication and education of industry professionals

As part of the market research, the project team built rapport and links with key industry leaders and scoped interest in food service organisations and culinary schools' involvement in the project's future planned mushroom case study interventions.

Phase 1: Industry Blueprint

Identify 'who' to target

Methodology

Research Questions

Research questions were developed to help direct:

- a. Information gathering, and
- b. Recommendations on who to target.

Information Gathering

- 1. What is the structure, flow, and networks of the food industry in Australia?**
 - a. What are the key sectors that make up the industry and how do they inter-relate?
 - b. Who are the relevant key players?
 - c. What drives decision making on foods, meals and menu choices?
- 2. Who are the key organisations within these sectors?**
- 3. Who are the key industry professionals that this project should target?**
- 4. What are the culinary education pathways that exist?**

Industry insights were obtained via a combination of desktop research and consultation with food industry experts including Adam Moore (Culinary Revolution, Corporate executive chef), Karen Kingham (Nestlé Food services Brand Nutritionist) and Alan Barclay (Chef & PhD qualified Dietitian). This included:

- a. Reviewing previous reports (MU12006) and industry published reports
- b. Reviewing current market insights and trends on the current food environment – e.g., emergence of ghost kitchens; new meal delivery services, etc.

Based on the information gathered, the role of the food service sector within the wider food industry was mapped out to create an industry blueprint map.

The findings from the information gathering (questions 1-4) were then reviewed in line with the project's aim, outcomes and strategy to inform the recommendations (questions 5-9) for:

- a. 'Who' the project should target and;
- b. Final fifteen KOLs to use in Phase 2.

Recommendations

- 5. What are the relevant food service sectors to focus on for the top-down mushroom case study interventions?**

6. **What are the priority organisations (and associated individuals) within identified food service sectors for the top-down mushroom case study interventions?**
7. **What are the priority culinary schools for top-down curriculum revision intervention?**
8. **Who are the key food industry professional organisations that reach our target market and key individual industry influencers that can be used for bottom-UP nutrition education and communication to influence the use of mushrooms into the sector?**
9. **Who are the fifteen key opinion leaders (KOLS) to target for Phase 2?**

Priority sectors for mushroom case study interventions

To maximise project investment and produce the deliverables to timelines, the food service sectors and their sub-sectors relevant for the top-down mushroom intervention case studies were prioritised by two project team members (Jutta Wright, Project Manager and Adam Moore, Corporate Executive Chef), utilising a relatively objective and simplistic criteria across three domains:

- a. **Nutrition** i.e., how regularly and/or what proportion of days intake does a consumer rely on this sector for nutrition?
- b. **Ease of (mushroom) intervention** i.e., how likely will the project get traction within 6 months?
- c. **Impact** i.e., how much impact will it make? i.e., does it contribute significant volume to the food service sector; does it have high market profile?

This assessment was based on generalised considerations and broad assumptions by the team. From this assessment, nutritional need was weighted highest (50% of the total score) in view of this being primarily a nutrition education project. Ease of intervention was weighted at 30% of the total score in view of the project's limited timeline to delivery, and impact was weighted at 20% of the total score.

Each criterion was scored as 0, 1, or 2, where 0 was the least favourable response, and 2 the most favourable response (**Table 1**). To determine the weighted score, the total score for each criterion was then multiplied by the weight assigned to each, and the total was calculated by the sum of all. The three separate scores were totalled to provide a final total score out of 2 and rounded to one decimal place.

The sector was rated low if it scored ≤ 1 , moderate if it scores 1.1-1.4 and high if it scored ≥ 1.5 .

Table 1. Assessment criterion to prioritise food service sectors and sub-sectors

CRITERION	MEASURE	SCORE
Nutrition (50% weighting)	How regularly and/or what proportion of daily intake does a consumer rely on the sector for nutrition?	0 (Consumers rely on for meals sometimes i.e., monthly) 1 (Consumers rely on for some meals regularly i.e., a least one meal during the week) 2 (Rely on for all meals)
Ease intervention (30% weighting)	How likely will the project get traction within 6 months?	0 (Difficult, too many potential stakeholders) 1 (Not straightforward, 3-4 stakeholders) 2 (Relatively easy, 1-2 stakeholders)
Impact (20% weighting)	How much impact will targeting this sector make? Does it have high market profile? Does it contribute significant volume or growth to the sector?	0 (Little) 1 (Some) 2 (Significant)

Priority Organisations

Once the prioritised food service sectors and subsectors were identified, organisations within these sectors/subsectors were then scored and prioritised using a pre-determined set of criteria developed by the project team across the same three domains, but with a more detailed assessment (**Table 2**). In assessing organisations, ease of intervention was given a greater weighting based on the rationale that being able to execute an intervention within the project timeframe was considered the key priority.

Thus, each organisation was assessed for: ease of intervention (50% weighting); nutrition and health centricity (30% weighting); and impact and reach (20% weighting). Each category was broken into sub-questions, and a score of 0, 1, or 2 was given for each question, where 0 was the least favourable response, and 2 the most favourable response. To determine the weighted score, the total score for each category was summed and divided by the total number of questions for that sub-category to give a total score out of 2. This was then multiplied by the weighting assigned to

each category, and results summed and multiplied by 10 to give a total score out of 20. Scores are reported to 1 decimal point.

Table 2. Assessment criterion to prioritise organisations within priority food service sectors

CRITERION	MEASURE	SCORING
EASE OF INTERVENTION (50% weighting)	Are they (organisation/individual) known to our project team?	0 (Not at all) 1 (Indirect) 2 (Well known)
	How many levels of touchpoints to the decision maker?	0 (>5) 1 (3-4) 2 (1-2)
	What is their level of control over menu and meal preparation?	0 (Low, all food is brought into premise from elsewhere) 1 (Medium, made on site but prepared by cooks) 2 (High, chef designed/prepared menu/meals)
	How many times are they changing the menu?	0 (Set menu changed >1/yr) 1 (Set menu but regular rotation or promotions) 2 (Seasonal changes)
	What is the current level of mushroom usage?	0 (Featured/primary ingredient) 1 (inclusion/accompaniment ingredient) 2 (None)
		0 (None)

	Mushroom potential: How many menu items can we include with mushrooms?	1 (<3) 2 (≥ 3)
		0 (No/not possible)
	Do they conduct/have ability to conduct nutrition education for staff?	1 (Possible) 2 (Yes already part of organisation operation)
HEALTH (30% weighing)	Level of nutrition focus?	0 (Non-existent) 1 (Some: nutrition info provided/mentions nutrition in marketing materials) 2 (High: sets own or follows KPIs)
	Nutritionist working on team?	0 (No) 1 (Consultant used) 2 (Employee)
IMPACT (20% weighing)	Marketing reach: How many sites do they have?	0 (0-50) 1 (50-200) 2 (>200)
	Market influence: What is their level of influence on market trends/consumer awareness?	0 (Low) 1 (Medium) 2 (High)

The top five priority organisations for each previously prioritised sector/sub-sector were then identified and collated along with key contacts of individuals working within the organisations obtained via the intel from topic experts, company website and/or LinkedIn.

Priority culinary schools

Consultation was undertaken with food service industry expert Adam Moore to select based on his expertise and network, 3-5 priority culinary schools to target based on those likely to be most efficient for project resources while maximising reach and impact.

Key industry professional associations & Individual industry influencers

A workshop was undertaken with NRAUS, AMGA and Corporate Executive Chef, Adam Moore to identify influential industry professional association groups. A priority contact list of high influence food industry individuals was created. NRAUS and AMGA attendees included: Martine Poulain (Relationship and General Manager, AMGA), Leah Bramich (Marketing & Communications, AMGA), Flavia Fayet-Moore (CEO, NRAUS) and Jutta Wright (Project Manager, NRAUS).

KOLs for the Phase 2 market research

Based on the findings from all research questions (1-8), a workshop was held with AMGA and Corporate Executive Chef, Adam Moore to agree final recommendations for the KOLs to be interviewed 1:1. NRAUS and AMGA Attendees included: Leah Bramich (Marketing & Communications, AMGA), Flavia Fayet-Moore (Director, NRAUS) and Jutta Wright (Project Manager, NRAUS).

Findings

Food Industry Blueprint

Structure, flow and networks food service sector within food industry

The Australian Food industry represents around \$172 Billion AUD (1) and accounts for over one third of the country's total manufacturing sector (2). Traditionally, food has been prepared in the home into meals or snacks from ingredients bought from a structural retail outlet. Over the past two decades, with an increasingly time poor society, the drive for convenience has seen a transition toward eating ready prepared meals or snacks out of home, and a growing defined food service sector, representing ~35% of the industry representing \$57 Billion Australian Dollars (3).

'Food Service' has been defined as those organisations and companies who provide meals prepared outside the home. Traditionally, most of this food has been consumed by individuals away from home and hence the sector has been viewed as capturing the out of home eating occasion. Australian's propensity to eat out is reported to be one of the highest in the world. In 2018, nearly two thirds of the population over 14 years of age ate out at least once per month (3), and it was reported in 2019 that around 37% of consumer's food and beverage spend is spent in the food service sector (1).

With the advances in technology and ever-increasing consumer desire for convenience anywhere, anytime, there has been increasingly a move away from individuals preparing their own food towards utilising ready prepared meals, even within the home, predominantly in metropolitan areas and driven largely by millennials. These dynamics are reshaping the food industry and developing a modern food environment responding to the consumer demand for prepared meals or snacks eaten wherever they want, whenever they want. The food industry at large is undergoing a period of rapid change driven by these lifestyle demands and changing demographics. Furthermore, due to recent events of the global pandemic, COVID-19, there has been huge impacts on the entire food industry, including consumer behaviour, which will likely have a long-lasting effect on the industry.

As meal preparation is progressively outsourced, the boundaries of traditional retail and food service sectors are increasingly blurring. Over recent years the retail supermarkets have emerged as one-stop shops for fast affordable high quality convenient food, expanding their ranges of home-cooked meal replacements and heat-and-serve products such as pastas and pre-packaged mini meals, along with the emergence of their own brands. Traditional convenience stores have also attempted to access this market by expanding their fast-food options such as pre-made sandwiches and salads, and baked goods. While the retailers compete in the traditional 'out of home' eating occasion, commercial food service outlets are seeing the need to maintain relevancy along with potential opportunities for growth in the direct sell into home market, via the emerging online meal delivery channels.

Excitingly, new channels such as online delivery services and new concepts such as 'ghost kitchens' have been developed. The recent COVID-19 global pandemic over 2020-2022 has had a major

impact on the traditional food service channel and its need to adapt as consumers spend months locked down in homes and unable to visit outlets in person. This external event has been a major catalyst in driving growth in these newer online delivery channels and while they only represent 1.6% total share of commercial food service sector, current and predicted trends will see them likely to continue to grow (4). See **Figure 2** for visual overview of key food industry players and inter-relationships.

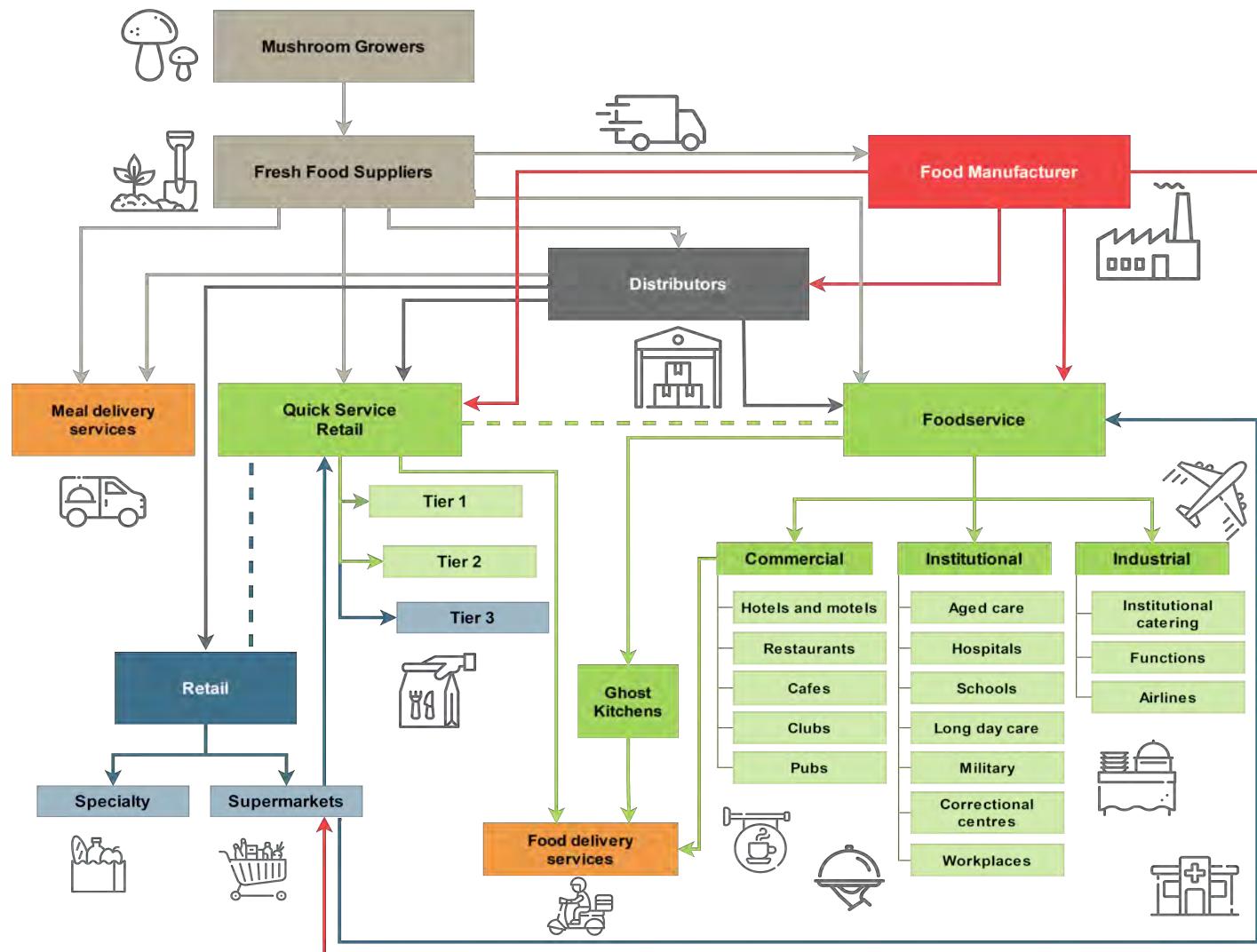


Figure 2. Food service industry blueprint map: key players and inter-relationships

Key Food service Sectors

The food service sector can be divided into four key sub-sectors comprising of commercial, institutional, industrial and Quick Service Retail (QSR) outlets, collectively representing around 90,000 outlets or establishments, with 80% of them positioned on the Australian Eastern states of New South Wales, Victoria and Queensland (5). In addition to these traditional sectors is the emergence of home meal delivery services, ghost kitchens and online meal delivery services. The key organisations within these sub-sectors are outlined in **Table 3**.

Commercial

The commercial sector is the biggest sector with around 65,000 outlets (5). It traditionally includes QSR, accommodation/hotels/motels, restaurants, cafes, clubs and pubs. This sector is highly fragmented and dominated by independent owners or operators comprising over 24,500 individual restaurant businesses and around 14,000 cafés and coffee shops. There are around 470 hotels and resorts in Australia (including luxury establishments), that derive a significant portion of revenue (20%) from the sale of meals and beverages prepared at onsite restaurants (2). The commercial sector is made up of around 30% chain and 70% independent single outlets, with the majority of chain outlets operating in the QSR sector (2). Casual dining (i.e., QSR, café) is the most popular style of dining with fine dining outlets accounting for only 2-3% of the industry total (2). The top volume drivers for the sector include restaurants followed by QSR chains, cafés and QSR independents (5).

QSR

QSR, traditionally viewed as a sub-sector within the commercial sector, is increasingly recognised as a significant inter-dependent player in the food industry. QSR represents the blurring of traditional retail and food service sectors and is fuelling the emergent online delivery service sector. There are around 25,000 fast food and takeaway businesses in Australia, with half of these being chains. QSR can be divided into three tiers; **Tier 1**- International chains such as McDonalds, **Tier 2**- franchises such as Soul Origin and Grill'd and independents, and **Tier 3**- retail connected food outlets including petrol and convenience stores such as 7/11 and Foodary. On average, Australians make 4.8 visits to QSR across a 4 week period, with 17.6% Australians eating from them 10 or more times (6). This is being fuelled by millennials who make up the biggest consumers of the top three outlets which are McDonalds, KFC and Hungry Jacks (see **Figure 3**). QSR acutely reflect consumer eating trends and is increasingly seen as a major influence on the entire food industry sector, influencing market strategy for retailers such as Woolworths and Coles, and in product development via food manufacturers such as Nestlé and Unilever.

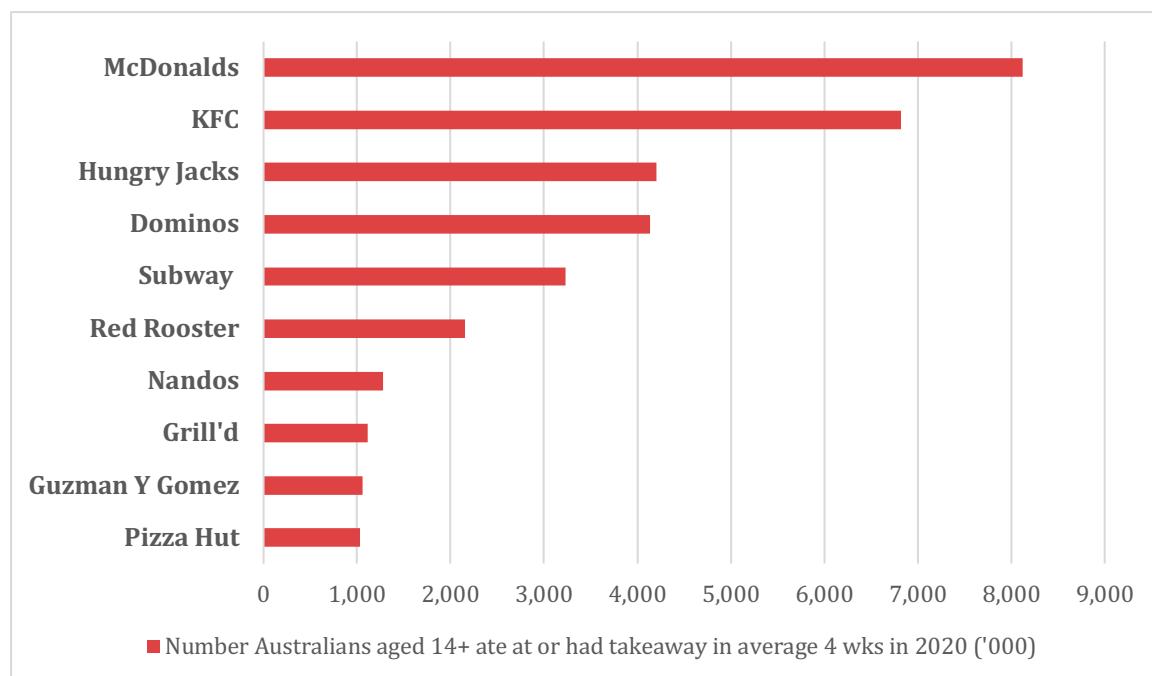


Figure 3. Adapted Roy Morgan poll of the top 10 QSR in 2020 (6)

Institutional

The institutional sector includes aged care, education (universities and schools), hospitals, early learning (long day care), military, correctional and workplaces, comprising approximately 20,000 outlets and around 15% of the food service sector volume (5). The institutional market is also growing in importance as a higher proportion of our population is ageing, fuelling faster growth in the sector (5%) compared to the growth in the commercial sector (3.5%). Aged care contributes the biggest volume to the sector and is predicted to surge as institutional care will be increasingly sought after. Furthermore, big changes in aged care catering are predicted over the next 5-10 years driven by differing tastes and requests for food of the baby boomers, compared to previous generations. In this sector, many organisations have outsourced their meal preparation to specialist catering organisations (i.e., Compass, Sodexo).

In Australia there are 690 public hospitals and 660 private hospitals (7) providing 62,000 beds and 11.3 million hospitalisations in 2018/19 (6.9 million public, 4.6 million private). The majority of these, located on the Eastern side of Australia, reflecting the total population spread in the country. Public hospitals are largely owned and managed by state and territory governments, and private hospitals are owned and managed by private for-profit or not-for-profit organisations.

Industrial

Industrial includes industry operators that provide a range of catering services to businesses, government, hospitals, aged care facilities, defence forces, correctional institutions and transport services including airlines. In 2019, there were over 1000 establishments reported. These services include catering for events such as sporting and one-off seminars, meetings and conferences. Some operators engage in full-service contracts, where they manage full company catering and canteens.

Despite currently being very small, the emerging ghost kitchens and online food delivery and meal delivery services are touted to be a significant future sector based on current and future predicted market dynamics and trends. Currently around 10% of Australians aged 14 years and older use meal delivery services (reported average during three month period) (3). QSR chains are also pushing this trend while responding to consumer trends towards 'eating out' in home, through marketing tactics such as providing exclusive promotional/limited edition offers via home delivery services (8). Online delivery services are allowing restaurants and QSR to expand their geographical distance and reach more people than ever before (3). In 2018, it was reported that a third of Australians living in capital cities order through online food delivery services (9).

Other relevant food service industry players

Food manufacturers are an important entity within the food service sector and food industry at large. Focused on the conversion of raw and semi-raw materials into food, products and meals primarily sold indirect to consumers via retail supermarkets such as Woolworths and Coles, they have over the past decades focused on the food service sector. They are providing unique offerings that best suit the food service market including bulk ingredients or finished/ready-to-use foods for use in meal preparation. Large players like Nestlé, Unilever and Simplot have dedicated food service businesses with sales teams that service both distributors and direct food service sectors and their outlets. The institutional and chain QSR sectors are key customers for food manufacturers due to their greater usage of pre-prepared items to satisfy their need for consistency and staying abreast of food trends.

The food service supply chain is complex (5). There are six channels including general distributors, speciality distributors, cash & carry, supermarkets, other retailers and direct from supplier/manufacturer. Distribution is centralised through distribution centres and wholesalers with the major players being Countrywide, PFD Food services (50% owned by Woolworths), Metcash and Bidfoods Australia.

Drivers of food service sector decision making

The broad commercial and institutional sectors have different drivers that influence decisions regarding food, meals and menu choices. While taste, texture and flavour will always be king for the commercial sector, storage and shelf life are also important determinants that drive decision making in food procurement where there is an acute focus on maintaining and increasing profit margin delivery. The sector is largely influenced by macro consumer eating trends and health is increasingly a need state that consumers are seeking as they increasingly outsource meal preparation to the everyday, rather than occasional.

In 2018 Deliveroo reported that Australians are fans of Asian noodle dishes, lovers of Mexican with the burrito the most ordered takeaway, and often aim for healthier options with healthier food orders tripling. Dishes like poke bowls, vegan meals, protein bowls, and sushi, are becoming more and more popular as food delivery orders (9).

While cost is a keen consideration for the institutional sector that is acutely budget conscious, nutrition takes a more prominent position in comparison to the commercial sector, particularly where catering supports a significant proportion of consumer daily food intake such as aged care, hospitals, defence and correctional centres. The importance and focus on food and nutrition in this sector was a major out-take of the highly publicised government Royal Commission into Aged Care in Australia (10). Engaging at least one dietitian at every aged care home, and an increase to the Basic Daily Fee to include support of nutritional intake, are just some of the recommendations provided in the Commission's Final Report in 2021. The time is ripe in the next few years to provide cost effective nutrition centred strategies to the institutional sector.

Key food industry organisations

The key relevant organisations identified that comprise the food industry are summarised in **Table 3**.

Table 3. Key Food Industry sectors and relevant organisations

INDUSTRY SECTOR	SUB-SECTOR	RELEVANT ORGANISATIONS
COMMERCIAL	ACCOMODATION/ HOTELS	Accor, ALH Hotels (Endeavour group), Catering HQ, Crown casino, Hilton Group, Marlo, Merlin entertainment, Merrivale, Quadrant Private Equity Group, Sam Prince Hospitality Group, Star casino, Urban rest
DISTRIBUTORS		Bidfood, Countrywide, Metcash, NAFDA, PFD Foods, Superior food services
INSTITUTIONAL	AGED CARE	ACH group, Allity, Anglican Care, Arcare, BlueCross, BUPA, Calvary healthcare, Catholic healthcare, McKenzie Aged care, NSW health, Primelife, Regis, Southern Cross Care, Uniting Care, Wesley Mission
	CORRECTIONAL	Correctional Service Industries (CSI)
	DEFENCE	AAFCANs, Australian Army Catering Corps
	HOSPITALS	Public: Health Share NSW (220 hospitals), Health Share Victoria (200 hospitals), Qld health Statewide Food Services (122 hospitals), SA (122 hospitals), WA Health 80 hospitals, SA Health 72 hospitals, NT health (5 hospitals), ACT Health (3 hospitals) Private [^] : Ramsay healthcare Australia (72 hospitals), Healthscope (42 hospitals), St John of God Healthcare (27 hospitals), Epworth Healthcare (9 hospitals),
	LONG DAY CARE	Affinity, C&K, G8 Education, Guardian Childcare, Kids gourmet food, KU, Lutheran playgroup, Montessori, The Orchard, YMCA

UNIVERSITIES	Australian Catholic University, Australian National University, Curtin University, Deakin University, Flinders University, La Trobe University, Monash University, Queensland University Technology, University of Adelaide, University of Melbourne, University of NSW, University of Queensland, University of Sydney, University of Technology, Western Sydney University	
FOOD DELIVERY SERVICES	Deliveroo, DoorDash, Menulog, UberEats	
FOOD MANUFACTURERS	Birch & Waite, Australian Whole Foods (Patties foods), Edyln, Farm foods Australia, Hub foods, JL King Co, Kids Gourmet Foods, Kraft, Krio Krush, Made with plants, Meal Me Professional, Nestlé Professional, Nutritious cuisine, Paramount foods, Prestige foods, Simplot Food service, Textured food concepts, theMeet Co, Unilever food solutions, V2 food, Vesco food	
INDUSTRIAL	INSTITUTION & FUNCTION CATERERS	Australian Turf Club Hospitality, Compass (Eurest, Medirest, Chartwells, ESS), Delware North, Epicure, Flemington racecourse, Peter Rolland, Restaurant associates (Compass), Rosehill racecourse. Sodexo, Trippis White (now owns Spotless sites)
	TRANSPORT CATERERS	Carnival cruises (P&O, carnival), Dnata (Snapfresh, Q Catering), Gate Gourmet, Plenty Food
MANUFACTURED MEAL DELIVERY SERVICES		Be fit food, Dietilicious, Dinner ladies, Gourmet Dinner Service, Hello Fresh, Lite n ' Easy, Marley Spoon, My muscle Chef, Thrive, YouFoodz
QUICK SERVICE RETAIL	TIER 1	Dominos, Hungry Jacks, KFC, McDonalds, Nandos, Oporto, Pizza Hut, Red Rooster, Subway, Taco Bell
	TIER 2	Ali Baba, Burger Urge, Burger Love, Crust, Grilled, Gloria Jeans, Guzman & Gomez, Hog's Breath Café, La Porchetta, Mad Mex, Milky Lane, Noodle Box, Seagrass Boutique Hospitality Group, Retail Zoo (Betty's Burgers, Salsa, Boost, CIBO), Soul Origin, The Coffee Club, Zambrero (Prince Group)
	TIER 3	Ampol, Bp roadhouse, Costco, Foodary, Ikea, Olivers, United petrol, 7/11
SUPERMARKETS		Aldi, Coles, IGA, Woolworths

[^]Private sector is highly fragmented. Only the top 5 private hospital groups listed.

Key industry professionals

The relevant food service industry professionals identified for the project are included in **Table 4**.

Table 4. Relevant food service industry professionals

KEY FOOD SERVICE INDUSTRY PROFESSIONALS
Aged and healthcare support service workers
Catering Managers/Production managers/Operational managers
Chefs
Cooks
Food Technologists
Food service & food industry dietitians
Procurement officers/Commercial managers
Restaurateurs/Institutional CEOs

Culinary training schools

In Australia, culinary training is undertaken by registered training organisations (RTO). While there are multiple smaller sized private organisations, the major trainer is the government funded Technical and Further Education (TAFE) organisations. The TAFEs on the Eastern coast of Australia are the biggest training organisations in Australia with the most recognised campuses within the industry located in Ryde and Ultimo in NSW, Southbank in Qld and William Angliss in Victoria. Le Cordon Bleu is considered one of the largest private RTOs in Australia. Many of the RTOs offer online learning. Learning vault (11) has emerged over recent years as an innovative educational company that supports RTOs with fully compliant, hand-crafted course content. An overview of culinary training organisations that exist in Australia (12) are listed in **Table 5**.

Table 5. Australian culinary training organisations

FUNDING	CULINARY SCHOOLS
GOVERNMENT	NSW TAFE (22 campuses) VIC TAFE (15 campuses) QLD TAFE (8 campuses) SA TAFE (3 campuses) TAS TAFE (2 campuses) WA TAFE (1 campus)
PRIVATE	Academia International (VIC, QLD) Academies Australia Polytechnic (NSW, VIC) Adelaide Hospitality and Training School (SA) AIC Australian International College (NSW) Australian Adelaide International College (SA)us Australian Catholic University (NSW, VIC) Australian Education Academy (VIC) Australian Institute of Business and Technology (QLD) Australian Professional Skills Institute (WA)

Box Hill Institute (VIC)
Cairns College English and Business (QLD)
Canberra Institute of Technology (ACT)
Canterbury Technical Institute (QLD)
Chefs Academy (NSW)
Chisholm Institute (VIC)
CQ University (QLD)
Empryean Education Institute (WA)
Evolution Hospitality Institute (NSW)
Front Cooking School (VIC, QLD)
Holmes Institute (NSW)
Holmesglen (VIC)
Imagine Education Australia (QLD)
Institute of Culinary Excellence (ICE)
Keystone College of Business and Technology (SA, WA)
Le Cordon Bleu (QLD, VIC)
Meriden International Hotel School (NSW)
New York College (QLD)
Quality College of Australia (NSW, SA)
Queensland Academy of Technology (QLD)
Reach Community College (TAS)
Salford College (SA)
Stanley College (WA)
Sydney Business and Travel Academy (NSW)
Sydney School of business and technology (NSW)
The Gordon (VIC)
Victorian Institute Technology (Vic)
Western Australian Institute of further studies (WA)
William Angliss Institute (NSW, VIC)
William Blue (NSW)
Windsor College (NSW)

Recommendations

Food service sectors for mushroom case study interventions

Recommendation 1: The food service sectors/subsectors to form part of the top-down mushroom case studies were identified as Institutional Aged Care and Hospitals, Industrial Caterers, Tier 2 QSR, Commercial Accommodation/Hotels and Food Manufacturing.

Based on the food industry blueprint, all four key food service sectors (Institutional, Commercial, Industrial and QSR) and their sub-sectors were considered relevant targets for top-down mushroom case study interventions. However, the food service sector is extremely diverse and highly fragmented with many independent operators, particularly within the commercial sector. Single outlet owner operators have a low quantum of influence as they make menu decisions that impact only one point of distribution. The project is limited in resources and time; hence prioritisation needs to be given to targeting sectors and sub-sectors that are going to best meet the project aims and outcomes within the timeframe, as assessing all organisations was not feasible.

Prioritisation of the sectors and sub-sectors of the top-down mushroom case study interventions was therefore actioned to help provide greater focus and chance of success. Based on this assessment, the commercial sector rated the lowest and the institutional sector the highest (See **Table 6**). A large reason for this is due to nutrition being a greater driver of food, meal and menu choices in institutional versus the commercial sectors. In addition, being an extremely diverse and largely fragmented sector, comprised largely of independent operators, ease of intervention was rated low and consequently, impact rated lower.

Within the Institutional sector, aged care, hospitals, correctional and defence rated moderate to high (1.3-1.7). Aged care represented a significant opportunity based on this sector being the leading volume driver for the institutional sector, projected to grow significantly and currently receiving a high profile in the national government policy and media for the need for nutritional transformation. While nutrition need is high for most institutional sub-sectors with consumers reliance on the sector for most meals, it is comparatively lower for universities and workplace sub-sectors where meals provide only part of the daily intake. While correctional and defence sectors align highly with nutrition, ease of intervention can be difficult and along with daycare, comprise only a small volume of the sector and hence impact lower. Correctional and defence however rated over moderate. Many organisations in these sectors outsource to industrial caterers, hence it was agreed that defence and correctional would be more efficiently targeted via focus on high quantum of influence institutional caterers.

While industrial and QSR sectors overall rated only 1, the sub-sectors institutional catering (1.5) and Tier 2 QSR (1.2) rated higher reflecting the greater nutritional need for institution catering compared to commercial and transport catering (airlines), and the high impact of QSR within the industry. Transport catering (airlines) rated low due to ease of intervention being low and requiring engagement and agreement with multiple decision makers. Within QSR, while nutrition overall has not been a key driver, the sector, particularly tier 1 and 2 QSR, have a significant impact on the food

service industry. Tier 2 QSR, offers a greater opportunity versus other QSR tiers due to its higher likelihood (and ease) of intervention.

Table 6. Priority assessment of food service sectors/sub-sectors against nutrition, ease of intervention and impact

SECTOR/SUB-SECTOR	SCORE	RATING
INSTITUTIONAL	1.1	
Aged care	1.7	HIGH
Hospital	1.5	HIGH
Defence	1.3	MODERATE
Correctional	1.3	MODERATE
Uni	0.7	LOW
Day care	0.8	LOW
Workplace	0.5	LOW
INDUSTRIAL	1.0	
Institutional Catering	1.5	HIGH
Commercial Catering	1.0	LOW
Airlines	0.7	LOW
QSR	1.0	
Tier 2	1.2	MODERATE
Tier 3	1	LOW
Tier 1	0.9	LOW
COMMERCIAL	1.1	1.1
Accommodation/Hotel	1	LOW
Restaurants	0.9	LOW
Cafes	0.9	LOW
Pubs/Clubs	0.7	LOW

In summary, using a more objective lens, the commercial sector including accommodation/ hotels, cafés, restaurants, pubs/clubs, along with QSR tier 1 and the institutional daycare, educational and workplace sectors, all rated less than or equal to 1 and were therefore not deemed sectors for primary target in this specific project.

While the highly fragmented nature of the commercial sector rules it out from consideration, an opportunity to investigate and have some influence in this sector can be gained from targeting the accommodation/hotels sub-sector which is comprised of higher quantum of influence chain groups (i.e., Accor, Hilton, ALH Hotels). The nutrition centricity and ease of intervention scores are lower than other sectors, but the higher quantum of influence makeup of this sub-sector offers potential opportunity to get engagement into the commercial sector.

The final recommendation for the food service sectors and subsectors to form part of the top-down mushroom case studies was therefore identified as institutional (aged care and hospital), industrial caterers, Tier 2 QSR and Commercial accommodation/Hotels.

Outside of the direct food service sectors, the food industry overview identified that other key players are worth considering and include the food manufacturers (i.e., Nestlé, Simplot) who provide pre-prepared foods, products and ingredients, that are increasingly being sought by the food service sector for convenience and consistency, particularly the institutional and the QSR sectors. While implementation within this sector will likely be difficult and unfeasible within the project timeframe, they are worthy of being explored in the initial phases and kept within consideration as the project progresses, as future product developments may have a large and substantial impact. Project MU20004, a tandem relevant project will be an important resource in this endeavour.

Project MU20004 A scoping study to review fungi-based innovations to inform product development opportunities, has developed a catalogue entitled the "Mushroom Product Compendium 2021", consisting of over 180 mushroom-containing, commercially available food products available globally, designed to inform Australian mushroom growers of novel value add food product possibilities. It includes product innovations catering to the food service sector for convenience and consistency (e.g., mushroom pouches, frozen mushrooms) as well as the health (e.g., vitamin D/Beta-glucan enriched mushroom powder supplements). These products will be instrumental in the long-term success of this project, and will assist to discover new markets for mushrooms (which is part of the Australian Mushrooms Strategic Investment Plan).

Figure 4 provides an overview of the final project target pillars, including food service sectors and sub-sectors recommended to meet project MU20003 aims and objectives.

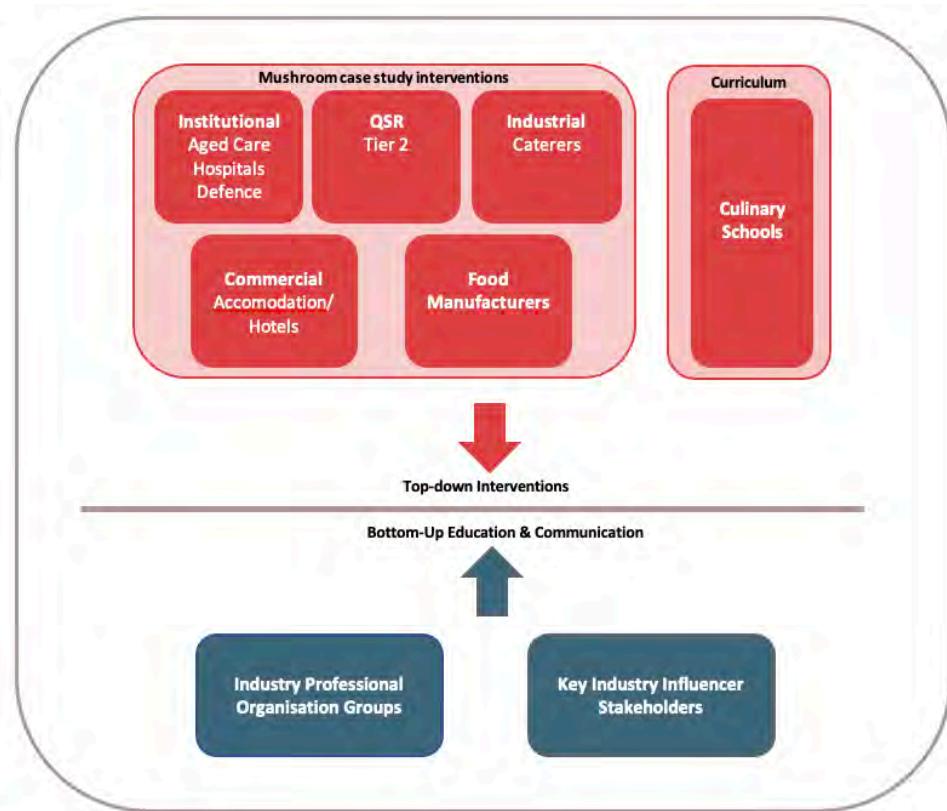


Figure 4. Recommended key target pillars for project MU20003

Priority organisations to target for top-down mushroom case study interventions

Recommendation 2: The top five organisations within each sector were:

Aged Care: BUPA, Calvary, Unity, Regis, Allity

Hospitals: Ramsay Healthcare, NSW Health, VIC Health, Healthscope, St John of God

QSR Tier 2: Zembrero, The Coffee Club, Retail Zoo, Soul Origin, Guzman & Gomez

Industrial: Compass, Sodexo, Cater Care, Australian Turf Club, Trippis White

Accommodation/Hotels: Accor, ALH Hotels, Crown Group, Star Group, Hilton

Organisations with potential for the mushroom case studies pillar were assessed within each prioritised food service sub-sector and ranked. The results of this are listed in **Table 7**.

Table 7. Score (X)[^] from assessment of top-down priority organisations

AGED CARE	HOSPITALS	QSR TIER 2	INDUSTRIAL	ACCOMMODATION/ HOTELS
BUPA (14.4)	NSW Health (14)	Zembrero (14.6)	Compass (15.1)	Accor (14.2)
Calvary (14.4)	Ramsay Healthcare (14)	The Coffee Club (14.1)	Sodexo (12.6)	ALH Hotels (11.2)
Uniting (14.4)	VIC Health (13)	Retail Zoo (13.9)	Cater Care (12.6)	Crown group (9.2)
Regis (14.4)	Healthscope (11.6)	Soul Origin (12.9)	Australian Turf	Star group (9.2)
Allity (14.1)	St John of God (11.6)	Guzman & Gomez (11.8)	Hospitality (8.4)	Hilton (8.5)
Catholic Healthcare (14.1)	QLD Health (10.9)	Mad Mex (11.1)	Trippis White (7.1)	Merrivale (7.5)
Anglicare (14.1)	WA Health (9.9)	Seagrass Hospitality	Peter Rolland (7.1)	Marlow (7.5)
BlueCross (14.1)	SA Health (9.9)	Group (9.4)	Restaurant Associates	Prince Group (7.2)
Wesley Mission (14.1)	Epworth Healthcare (9.6)	Grilled (8.8)	(7.1)	Urban rest (7.2)
Southern Cross Care (14.1)	NT Health (8.9)	Hog's Breath Café (8.6)	Epicure (7.1)	Rockpool Group (6.5)
ACH Group (14.1)	ACT Health (8.9)	Burger Urge (7.9)	Delware North (7.1)	Merlin Entertainment (6.5)
		Gloria Jeans (7)	Flemington Racecourse	
		Crust (6.8)	(7.1)	
		Noodle Box (8.1)		
		Milky Lane (6.4)		
		Burger Love (6.4)		
		La Porchetta (5.7)		

[^] (X): Score out of 20. Highest value scores best

The top five ranked organisations from each pillar were collated to create the final list of potential organisations for consideration by the project team in the delivery of the mushroom case study interventions. Individuals linked with these associations were identified and collated (see Table 8).

Table 8. Priority organisations and individual contacts for the mushroom case study interventions

ORGANISATION	WEBSITE	CONTACT
AGED CARE		
Calvary	https://www.calvarycare.org.au/retirement-communities/residential-aged-care/	Mark Hogben (Regional Hospitality Manager Aged Care) https://www.linkedin.com/in/mark-hogben-97a69b39/
BUPA	https://www.bupa.com.au/about-us/leadership-team	James Wix (National Food Services Manager) https://www.linkedin.com/in/jamesdwix/
Uniting	https://www.uniting.org/contact-us	Allen Robinson (Procurement Manager) https://www.linkedin.com/in/allen-robinson-1a74729b/
Regis	https://www.regis.com.au/leadership/	Melinda B (National Catering Manager) https://www.linkedin.com/in/melinda-b-26295813/
Allity	https://www.allity.com.au/leadership-team	Manish Arora (Corporate Executive Chef – Group Dining Services Manager) https://www.linkedin.com/in/manish-arora13/
HOSPITALS		
NSW Healthshare	https://www.healthshare.nsw.gov.au/services/food-patient	Carmen Rechbauer (Executive Director, Clinical support) https://www.linkedin.com/in/carmen-rechbauer-39651458/
Ramsay Healthcare	https://www.ramsayhealth.com.au/Australian-Leadership	Dr Bernadette Eather (Chief Nurse and Clinical Services Director) https://www.linkedin.com/in/dr-bernadette-eather/

VIC Healthshare	https://www.health.vic.gov.au/hospitals-and-health-services/public-hospitals-in-victoria	Angela Thompson (Food service dietitian NSW Healthshare) https://www.linkedin.com/in/angela-thompson-88608934/
QLD Health	https://www.qld.gov.au/health	Reuben Phillips (Procurement Liaison Officer) https://www.linkedin.com/in/reubenphillips/
Healthscope	https://healthscope.com.au/about/executive-leadership-team	Denise Cruickshank (Coordinator Statewide Food services Queensland Health) https://www.linkedin.com/in/denise-cruickshank-50953754/
		Mark Owens (National Support Services Manager) https://www.linkedin.com/in/mark-owens-15685b23/
QSR TIER 2		
Zambrero	https://www.zambrero.com.au/	Sam Prince (Medical doctor and founder The Prince Group) https://www.linkedin.com/in/dr-sam-prince-53228431/
		Sam Jarvis (Head of Supply Chain & Procurement) https://www.linkedin.com/in/sam-jarvis-5b2333b6/
The Coffee Club	https://www.coffeeclub.com.au/	Position not currently filled.
Retail Zoo	https://www.retailzoo.com.au/	Jack Brenan (Operations) https://www.linkedin.com/in/jack-brennan-6a12b430/
Soul Origin	https://www.soulorigin.com.au/	Paul McDonald (Executive Chef) https://www.linkedin.com/in/paul-mcdonald-29717825/
Guzman & Gomez	https://www.guzmanygomez.com/	Luiza Gomes (Co Head of Culinary) https://www.linkedin.com/in/luiza-gomes-9227898a/
INDUSTRIAL		
Compass	https://www.compass-group.com.au/	George Fouskarinis (National Culinary Director) https://www.linkedin.com/in/george-fouskarinis-a2604540/

Sodexo	https://au.sodexo.com/home.html	Michael Foenander (Segment Director Healthcare) https://www.linkedin.com/in/michael-foenander-gaicd-655b051b/
Cater Care	https://catercare.com.au/the-cater-care-way/	Sean Anderson (General Manager Food) https://www.linkedin.com/in/sean-anderson-361923ab/
Australian Turf Hospitality	https://www.australiaturfcub.com.au/our-hospitality/	Gerry Maher (Executive Chef) https://www.linkedin.com/in/gerry-maher-57b42147/
Trippis White	https://www.trippaswhitegroup.com.au/	George Diamond (Group Executive Chef) https://www.linkedin.com/in/george-diamond-5a1b13b/

ACCOMMODATION/ HOTELS

Accor	https://all.accor.com/australia/index.en.shtml	Anthony Flowers (Director Culinary Accor) https://www.linkedin.com/in/chefanthonyflowers/
ALH Hotels	https://www.alhgroup.com.au/venues	Gary Johnston (National executive Chef) https://www.linkedin.com/in/gary-johnson-chef/
Crown group	https://www.crowngroup.com.au/	Position not currently filled.
Star group	https://www.starentertainmentgroup.com.au/	Jason Alcock (Director Food & Beverage Operations) https://www.linkedin.com/in/jason-alcock-8a09791a/
Hilton	https://www.hotel.com.au/australia/hilton-hotels.htm	Position not currently filled.

Priority culinary schools to target for top-down curriculum revision

Recommendation 3: The top five culinary schools to prioritise for the curriculum revision included: NSW Ryde & Ultimo TAFE, QLD Southbank TAFE, VIC/NSW William Angliss Institute and The Learning Vault.

The priority list of culinary schools to target for the curriculum revision are highlighted in **Table 9**. In terms of reach and efficiency, TAFE organisations were deemed the priority. The priority TAFEs selected were the largest organisations within biggest states NSW, VIC and QLD. It was recommended that the most efficient way to target the private RTOs was via the innovative RTO organisation 'The Learning Vault'. As an RTO they produce their own material and learning programs, including those utilised by chefs to be certified under Australian Culinary Federation (ACF), along with also producing bespoke online materials that are utilized by every RTO and TAFE.

Table 9. Priority culinary schools

ORGANISATION	WEBSITE	CONTACT
NSW Ryde & Ultimo TAFE	https://www.tafensw.edu.au/courses/cookery-and-wine-courses	Ianthe Smith (Head teacher Commercial Cookery) https://www.linkedin.com/in/ianthesmith/
QLD Southbank TAFE	https://tafeqld.edu.au/courses/18228/certificate-iv-in-commercial-cookery-diploma-of-hospitality-management	Marlene Mifsud (Head teacher Hospitality Commercial Cookery) https://www.linkedin.com/in/marlene-mifsud-4132a541/
VIC William Angliss Institute TAFE	https://www.angliss.edu.au/courses/foods-cookery/certificate-iv-in-commercial-cookery/	Glen Zacher (Teacher) https://www.linkedin.com/in/glen-zacher-956a5391/
The Learning vault	https://www.learningvault.com.au/	Dale Lyman (Chef educator) https://www.linkedin.com/in/dale-lyman-0b4b4a22/
		Nicholas Robert (CEO) https://www.linkedin.com/in/nicholas-robert-62a00432/

Priority organisations and individuals to target for bottom-up education and communication

Recommendation 4: Seventeen membership organisations were identified that target relevant industry professionals and can be leveraged in education and communication activations. An influencer database by food service sector was created. It is noted individuals may change and new contacts identified as the project progresses. It is intended that the contact list be expanded and maintained as relevant throughout the project and ongoing.

The key member organisations that reach the relevant industry professionals and key individual influencers were identified and listed in **Table 9** and **Table 10** respectively.

Table 9. Key organisations that reach relevant food service industry professionals

MEMBERSHIP ORGANISATIONS

Australian Culinary Federation (ACF)
Australian Food service Advocacy Group
Australian Hotels Association (AHA)
Australian Institute Food Science
Australian Institute Food science & Technology (AIFST)
Clubs Australia
Culinary catering companies
Dietitian Australia (DA) Food service interest group
Dietitian Connection
Fine foods Australia
Food industry Australia (FIA)
Food technology Association Australia
Food service Australia
Food service Suppliers Association Australia (FSAA)
Institute of Hospitality in Healthcare (IHHC)
Nutrition Society of Australia
Restaurant catering Association (RCA)

Table 10. Key Food service industry influencer stakeholders by sector

SECTOR/SUBSECTOR	INDIVIDUAL	ORGANISATION
Aged Care	Cherie Hugo Maggie Beer Luke Mangan Louise Murray James Wix Mark Holgben Dr Sandra Iluliano Julie Dundon Anne Schnyder Gabrielle Thoreau Loretta Reikin Jacquie Krassie Julie Walton Olivia Farrer Carmel Curlewis Sharyn Broer	The Lantern Project Maggie Beer foundation Luke Mangan & Company Nosh to Nourish BUPA Calvary Healthcare Austin Health: Uni of Melbourne Nutritional Professionals Australia Nutritional Professionals Australia Food service consultant Aged care Dignity in Dining J. Krassie & Associates Wollongong Uni Flinders Uni Advantage Nutrition Meals on Wheels
Hospitals	Carmen Rechbauer Dr Karen Abbey Sally McCray Biance Guthrie Denise Cruishank Jorja Collins Dr. Kristen MacKenzie-Shalders Lillian Forrest Merrilyn Banks Angela Thompson Sophie Moulden Shannon Singh (Mickeljohn) Kathryn Jones	NSW Healthshare Nutrition and Catering consultancy Mater Hospital QLD Fiona Stanley Hospital Perth QLD Health Statewide Food Service Co-ordinator Melbourne Eastern Health & Monash Uni Bond Uni Healthshare NSW Director Royal Brisbane and Women's Hospital NSW Healthshare Austin Health Vic NSW Healthshare Ramsay Healthcare
Day care	Kay Gibbons	Early childhood management services, Chair

Caterers	George Fouskarinis	Compass Group
	Ryan Carmichael	Compass Group
	Jeannine Biviano	Compass Group
	Michael Foenander	Sodexo
	Ros Lenard	Sodexo
	Sean Anderson	Cater Care
	Renee Zu	Cater Care
	Nikita Deo	Cater Care
	George Diamond	Trippis White
QSR	Natalie Edwards	Olivers Real food (Tier 3)
	Sam Jarvis	Zambrero (Tier 2)
	Samantha Parker	Zambrero (Tier 2)
	Marianne Hudson	Zambrero (Tier 2)
	Paul McDonald	Soul Origin (Tier 2)
	Jack Brennan	Retail Zoo (Tier 2)
	Sam Prince	The Prince Group (Tier 2)
Commercial	Anthony Flowers	Accor
	Gary Johnson	ALH Hotels
	Jason Alcock	Star Group
Food Manufacturers	Natalie Figueira	Simplot Food service dietitian
	Karen Kingham	Nestle Food service dietitian
	Lucy Briscoe	Unilever Food service dietitian
	Ashleigh McIntosh	Patties Foods (Australian Wholefoods)
Culinary Education	Karen Doyle	ACF president, Le Cordon Bleu and TAFE Program manager
	Nicholas Roberts	The Learning Vault
	Dale Lyeman	William Angliss Institute
	Glen Zacher	Southbank TAFE
	Marlene Mifsud	Ultimo TAFE
	Ianthe Smith	Ryde TAFE
Other:	Rob Hunt	CEO Dietitians Australia
	Kathy Usic	GI Foundation
	Maree Ferguson	Dietitian Connection

Recommended KOLs for Phase 2 Market Research

Recommendation 5: Fifteen KOLS were identified to be taken through to Phase 2.

Four individuals were selected based on their network and influence within the food service sector. Nine individuals were selected across the five key food service sub-sectors; two each from Aged Care, QSR Tier 2, Industrial Catering and Accommodation/Hotels and only one from the hospital sector. For hospitals, only private hospitals were selected based on low likelihood of getting traction with government organisations within the project timeline and the insight that aged care organisations also have private hospitals, allowing these contacts (and organisations) to also be investigated across both sectors. Finally, two individuals influencing the culinary education space were selected.

Table 11 provides the summary of who the individuals are, respected organisation and rationale for selection and inclusion.

Table 11. Recommended KOLs

KEY OPINION LEADER	ORGANISATION, ROLE & Sector	RATIONALE
Dr Cherie Hugo	The Lantern Project Founder Aged Care	Networked Influencer: Dietitian founder of organisation The Lantern Project which driving nutrition transformation aged care
Sally McCray	Mater Group Qld Director Food services & Dietetics Hospital	Networked influencer: Innovation in food delivery in hospitals. Introduced room service into Mater showing impact on nutrition. Worked with Chef Luke Mangan on introducing plant-based menu into hospital.
Luke Mangan	Luke Mangan & Company Leading Chef & Restaurateur Commercial/Hospital	Networked influencer: Commercial focused Chef working to improve nutrition and quality of food in institutional setting.
Maree Ferguson	Dietitian Connection Founder Hospital/Aged Care	Networked influencer: Well-connected in all areas of nutrition and dietetics, including institutional setting (hospitals, aged care).
Sam Jarvis	Zambrero (Prince Group) Head of Supply Chain & Procurement QSR Tier 2	Rated highest QSR Tier 2: Organisation founded by medical doctor and entrepreneur Sam Prince.
Jack Brennan	Retail Zoo (Betty's burgers, Salsa, Boost, Mad Mex) QSR Tier 2	Key QSR: Entrepreneurial group under Janine Ellis with growing franchise brands – 500 stores. Betty's burgers up and coming.
James Wix	BUPA healthcare National Food service Manager Aged Care	Rated highest Aged care: one of largest aged care facilities with sites across NSW, VIC, QLD, SA.

Mark Hogben	Calvary healthcare Regional Hospitality Manager Aged Care	One of the largest aged care: Recently taken over Japara to now own most aged care sites in Australia. Facilities with sites across NSW, QLD, VIC, ACT, SA.
Dr Bernadette Eather	Ramsay Healthcare Chief nurse & Clinical Services Director Private Hospital	Largest Private hospital group:
George Fouskarinis	Compass National Culinary Director Industrial Catering	One of top 2 industrial catering organisations servicing institutional sector.
Michael Foenander	Sodexo Segment Director Healthcare Industrial Catering	One of top 2 industrial catering organisations servicing institutional sector.
Anthony Flowers	Accor Hotels Executive Chef Accommodation/Hotels	Key accommodation chain offering quantum of influence impact in commercial sector. Accor is a recognized leader in the hospitality wellness segment with nutrition key pillar.
Gary Johnson	ALH Hotels, National executive chef Accommodation/Hotels	Key hotel chain group in commercial sector. Very well known in industry.
Karen Doyle	Le Cordon Bleu Program Manager Culinary Education	AFC president, Le Cordon Bleu and TAFE Program manager. Insight into culinary schools.
Nicholas Robert	Learning Vault CEO Culinary Education	New innovative online learning platform being utilised across RTOs. Potentially effective way to target fragmented private RTO culinary organisations.

Phase 2

Identify 'how' to best execute the project for maximum impact

Methodology

Industry insights

Insights were obtained by quantitative market research that targeted a broad range of food industry professionals, and a deep dive qualitative 1:1 research with identified KOLs from Phase 1. The findings from both were then combined where relevant and summarised into six key territories; Health centricity, Knowledge, Usage, Culinary education, Opportunities & Communication.

Insights answered the following questions:

1. Health centricity

- What importance does nutrition/health have within the industry?
- What are the key nutrition issues and/or challenges for organisations?

2. Knowledge

- What is the current level of knowledge of food industry professionals regarding nutrition, health and culinary benefits of mushrooms?

3. Usage

- How are mushrooms being used within food service organisations?
- What are the drivers to usage?
- What are the barriers to usage?

4. Culinary education

- How do mushrooms feature within the curriculum?

5. Opportunities

- What considerations and/or opportunities are there around including mushrooms within the food service industry?
- What considerations and/or opportunities are there around including mushrooms within the culinary curriculum?

6. Communication

- What are most effective ways to reach organisations and industry professionals with mushroom centred nutrition, health and culinary education?
- What nutrition, health and culinary messages around mushrooms will best get attention of food service professionals?

These over-arching research questions informed the methodology and research questions of both the quantitative and qualitative research.

Qualitative research: 1:1 interview with KOLs

Qualitative research was undertaken with identified KOLs from phase 1, during February to June 2022. The fifteen identified KOLs from Phase 1, representing a broad range of sub-sectors within the industry, were each contacted to ascertain their interest in being interviewed for the project.

Contact details from the KOLs identified from Phase 1 were obtained through LinkedIn, organizational emails and/or networks. An email invite was developed describing the project and its outcomes. The interview spanned 30-60 minutes and was attended by 1-2 members of the research team. Interviews were conducted virtually using Zoom Inc., application. Participants were informed that all responses would be anonymous and confidential and verbally gave consent to the interview. As a thank you for their time, each interviewee received a \$150 gift card.

An interview guide was developed and tested internally by the research team and contained additional questions specific for those in culinary education. Questions were grouped into the following territories: nutrition centricity; key nutrition issues/challenges, mushroom usage, drivers, and barriers; mushroom focus in the curriculum; mushroom knowledge; and communication insights and opportunities. **Table 12** summarises the territories and types of questions explored.

Table 12. Key territories and questions explored in the qualitative research across organisations and culinary schools.

TERRITORY	DEFINITION	ORGANISATIONS	CULINARY SCHOOLS
Nutrition focus	Relevancy, importance and focus on health/nutrition.	<ul style="list-style-type: none">• How important is health and nutrition in the organization/sector?• What is the focus?• What key performance indicators or benchmarks around nutrition exist that the organization needs/seeks to follow?	<ul style="list-style-type: none">• How important is health and nutrition in the culinary curriculum?• Where does nutrition and health feature?
Key nutrition issues/challenges	Key nutrition issues the organisation must solve	<ul style="list-style-type: none">• What is the biggest nutrition/health issues the organization currently deals with?	<ul style="list-style-type: none">• NA
Mushroom Usage	Current mushroom usage within the organisation.	<ul style="list-style-type: none">• How are mushrooms currently used?• What preparation methods are used?	<ul style="list-style-type: none">• NA

			<ul style="list-style-type: none"> • What is the frequency and volume used? 	
- Drivers	Attributes that facilitate and/or encourage mushrooms use.		<ul style="list-style-type: none"> • What is the main purpose for using mushrooms on the menu? 	• NA
- Barriers	Attributes that impede and/or discourage use of mushrooms use/focus.		<ul style="list-style-type: none"> • Are there any barriers to using (or not adding more) mushrooms to the menu? 	• NA
Mushroom Focus	Current mushroom focus within the curriculum.		<ul style="list-style-type: none"> • NA 	<ul style="list-style-type: none"> • How do mushrooms feature within the curriculum?
Mushroom knowledge	Current knowledge and understanding of mushroom's key benefits.		<ul style="list-style-type: none"> • What do they know about the nutrition, health and culinary attributes of mushrooms? 	
Communication insights	Best way to engage and increase food industry professional's knowledge and understanding.		<ul style="list-style-type: none"> • What would be the best way/s to communicate with food industry professionals on nutrition education mushrooms? • What should be the key messages? 	
Opportunities/ Considerations	Key opportunities for mushrooms		<ul style="list-style-type: none"> • What opportunities and/or considerations do they see for using/including mushrooms on the menu? 	<ul style="list-style-type: none"> • What opportunities and/or considerations do they foresee to using/including mushrooms within the curriculum?

On agreement, a mutually convenient interview time was set up with the interviewee and researchers. Researchers included 1-2 of the following people: Chef Adam Moore, dietitian Dr Flavia Fayet- Moore and dietitian Jutta Wright. Where feasible, interviews included at least a dietitian and a chef.

At the start of the interview, researchers received permission from participants to record the interview for note taking purposes. The OTTER.AI, a voice meeting notes and real time transcription digital tool, was utilised for this purpose.

Post interview, researchers recorded and summarised insights according to key research questions developed. Findings were then synthesized with any relevant quantitative data (Knowledge, Usage, Drivers and Barriers only) to inform the over-arching key industry insights research questions.

Quantitative research: Food Industry Professional Online Survey

A short 5-minute market research survey, developed to be used as baseline data for project monitoring and evaluation was leveraged to gain additional insights.

As the survey was short and sweet to maximise reach and assess nutrition knowledge, questions were limited to knowledge and usage (including drivers and barriers) pillars. The survey questions were developed and set up on Typeform, an online survey tool (See **Appendix A**) and the survey ran from 26th April through to 15th June 2022.

A comprehensive communications plan was developed to drive awareness and recruitment to the survey. It included:

- A specific introductory electronic direct mail (EDM), sent out via third party Hospitality Magazine database as well as the AMGA database.
- Social media tiles developed for Facebook and LinkedIn, shared via NRAUS and AMGA social media channels.
- A media release from AMGA, titled 'Mushroom growers call on food industry professionals to share their nutrition knowledge' that was picked up by Bean Scene and Food Industry News.

Respondents were incentivised to undertake the survey for a chance to win one of five \$100 Visa gift cards. This was communicated at the beginning of the survey and in survey communications.

Post survey closure, results were tabulated, and findings summarised accordingly. Relevant data (Knowledge, Usage, Barriers and Drivers) were then synthesized to correspond with the qualitative research and help inform the over-arching key industry insights.

Mushroom Case Study Intervention Opportunities

Separately, the qualitative research was utilised to scope interest the mushroom case study interventions by asking the KOL at the end of the interview, if they or their organization, had any interest in being involved.

FINDINGS

Quantitative Research: Online Food Industry Professional Survey

The communication strategy was highly successful in recruiting individuals to undertake the survey. Despite a large proportion of respondents not being eligible to undertake the survey as they did not work in the industry, the survey achieved 654 valid survey completions from 1424 initial submissions. See **Appendix B** for full survey report.

Survey respondents represented the broad range of professions comprising the food service industry including chefs, cooks, catering managers, operational managers, food service dietitians, industry dietitians, and food technologists.

Qualitative Research: 1:1 KOL Interviews

The COVID-pandemic had significant impact on the food service sector with staff shortages and significant movements of staff, making it difficult for the project team to secure interviews. A few people who were originally identified, were either no longer working at the organisation and therefore no longer available, were not interested or were too busy to participate. In the end, twelve of fifteen interviews were undertaken and included a few KOLs that differed from the original recommendations.

The twelve interviewees comprised of one Food service Manager/Dietitian from institutional sector (major teaching hospital), five chefs from commercial sector (Hotels/Accommodation, QSR, Catering), one Chef and one Dietitian from institutional sector (aged care), one dietitian from manufacturing sector, two culinary educators and one culinary educator/industry association representative. Refer to **Table 13** for the interviewed KOLs.

Table 13. KOLs interviewed

KEY OPINION LEADER	ORGANISATION, ROLE & SECTOR
Amanda Fuller	Executive Chef Indu The Prince Group QSR Tier 2
Anthony Flowers	Accor Hotels Executive Chef Accommodation/Hotels
Ashleigh Jones	Senior Dietitian Lite N' Easy Manufacturing
Gary Johnson	ALH Hotels, National executive chef Accommodation/Hotels
Garry Stokes	Industry specialist consultant CasCat Consulting Culinary education/Industry Association Member

Karen Doyle	Le Cordon Bleu Program Manager Culinary Education
Louise Murray	Nosh Nutrition Accredited Practising Dietitian Aged Care
Manuel Malicdem	Executive Chef Catholic healthcare Aged Care
Michael Treacy	Corporate executive Dominos Australia & New Zealand QSR Tier 1
Nicholas Robert	Learning Vault CEO Culinary Education
Sally McCray	Mater Group Qld Director Food services & Dietetics Hospital
Toni Saba	Big Tony's Catering CEO Industrial Catering (corporate)

The key findings from both the quantitative and qualitative research for the six industry insight territories (Health centricity, Knowledge, Catering organisations, Culinary schools, Opportunities and Communication) were summarised.

Health Centricity

The focus and importance of nutrition, and nutrition issues and challenges, differed between the institutional and commercial sectors. See **Table 14** for summary.

Table 14. Nutrition focus and challenges by sector

TERRITORY	INSTITUTIONAL SECTOR	COMMERCIAL SECTOR
Nutrition focus	<ul style="list-style-type: none">• Key focus – Need to meet nutrition standards• Chef & dietitian working in partnership. Nutritional needs of menu based on clientele and guided by dietitian; Chef needs to make taste good at right cost• Ensure meets all food groups, balanced, and variety• Limit salt, added sugar, saturated fat• Ensure adequate energy, protein, healthy fats, healthy carbohydrates, vitamins, minerals	<ul style="list-style-type: none">• Not a direct focus - Primarily focused on customer experience/taste rather than nutrition• Dietitians rarely involved, other than organisations that differentiate and position on nutrition offerings• Indirect nutrition focus via consumer trends around nutrition, such as provenance, sustainability, real (quality) food, flexitarian/vegetarian eating patterns
Nutrition specific Issues/challenges	<ul style="list-style-type: none">• Achieving tasty nutritious food• Cost pressures• Inadequate national nutrition standards• Protein in vegetarian/ flexitarian menus• Protein in vegetarian, weight-controlled diets (nuts too high calories and tofu/legumes not liked)	<ul style="list-style-type: none">• Ensuring meet allergen needs and catering to increasing plant-rich dietary eating preferences such as vegan/vegetarian/flexitarian

Q: What importance does nutrition/health have within the industry?

Nutrition and health are not a focus in the culinary education curriculum

It was acknowledged by the industry KOLs that nutrition and health is not a significant part of the commercial cookery curriculum, with the anecdotal opinions that it has a flow on effect that results in low general nutrition and health knowledge level across the industry. There is only one unit that contains some basic principles of nutrition, with this unit primarily focused on catering to clientele with special dietary needs. This unit is SITHCCC042 - Prepare food to meet special dietary requirements (<https://training.gov.au/Training/Details/SITHCCC042>).

The culinary education KOLs acknowledged that they have limited nutrition/health knowledge. It was revealed in the interviews that there was a very common misconception by the industry that mushrooms were a good source of protein. It was noted that the institutional sector relies heavily on food service dietitians to ensure nutrition standards of meals/menus were met, and to upskill nutrition knowledge of catering staff.

Nutrition and health are central to the institutional sector

The qualitative research found institutional sector comprises mostly of organisations responsible for delivering their client's daily food intake and hence a need to ensure that their meals and menus meet appropriate nutritional standards. These organisations often employ a dietitian, who is an important stakeholder in partnership with the catering staff in the delivery of meals to the clientele. It was noted that this relationship could often be a tenuous one as they meet to ensure food is delicious (meeting the chef's needs) as well as nutritious (meeting the dietitians needs). The dietitian's desire for the limitation of nutrients of concern such as sugar and salt are often in opposition to the chef's desire to ensure the food deliver's appropriate taste.

The focus for dietitians within these settings was to cater to the individuals' nutritional needs. For example, in large teaching hospitals it covered a spectrum of dietary needs for life-stages from infancy through to aged care, and specific dietary needs to manage medical or chronic conditions. Managing heart health and diabetes were key conditions, hence ensuring lower salt, added sugar, saturated fat, and healthy carbohydrates (including amount) were a key focus. Whilst in aged care, the focus was on the specific nutritional needs of the life stage which was centred on higher energy, protein, and adequate vitamin D and calcium.

Nutrition and health are rarely considered in the commercial sector

The primary focus was largely on quality, performance and taste. It was noted by many that in the sector more generally, particularly accommodation/hotels/catering, clientele seek more of an experience, rather than 'fuel'. The sensory rather than nutrition attributes of food take priority. While many of the larger hotel chains offer 'healthy choice' offerings in response to feedback for choice on menus, most people still chose the 'less healthy' choices. The major nutrition and health-related consideration in the commercial sector was catering to plant-based/vegetarian/vegan requests.

Catering to dietary intolerances and trends was the focus in the commercial sector

KOLs voiced that while nutrition was not directly important, real 'quality' food delivery was, along with catering to consumer dietary needs, such as allergens and intolerances and dietary trends. The rise of plant-based dietary patterns as a consumer trend and hence catering to vegan, vegetarian or flexitarian was acknowledged to be an increasing focus and interest. This was reflected by the reported industry recommendation to the educational sector in the past few years to create a vegan/vegetarian course in the updated National Commercial Culinary Curriculum, which has recently been accepted.

Q: What are the key nutrition issues and/or challenges for catering organisations?

Taste number one priority across entire industry, irrespective of value placed on nutrition and health

A key insight that came through unanimously was that regardless of nutrition and health value, taste was still the number one priority across *all* sectors. While it is what ultimately makes customers come back again to a commercial organisation, as one institutional dietitian said, “*Food needs to be eaten to impact health, and it needs to taste good to be eaten.*” The institutional sector voiced that the common feedback from clientele is the poor taste of food. It is acknowledged that improved nutrition and health of a population ultimately leads to cost savings in the organization, and that improving the intake of nutritious food will positively impact savings. In addition, there are additional savings from reduced food waste when food is eaten.

Ensuring adequate protein is key challenge in vegetarian/vegan dishes in the institutional sector

A consistent message that came through in the interviews was the challenge of getting enough protein into meals/menus for vegetarian/vegan dishes. Unlike many non-nutrition industry professionals, who believed mushrooms to be a protein source, dietitians reported the difficulty of achieving adequate protein in non-animal-based meals/menus leaving nuts, legumes and dairy (for lacto-vegetarian diets) as the only feasible choices. They appreciated the texture and flavour that mushrooms can provide to a non-meat dish but needed inspiration of how adequate protein can also be delivered.

Current existing national nutrition standards are sub-standard in the institutional sector

It was evident from the KOLs that the nutrition standards that existed were too simplistic. Within one of the biggest sub-sectors, aged care, there are no specific nutrition standards, other than the organisation needing to ensure it is meeting the daily intake of the five food groups as stipulated in the Australian Dietary Guidelines. An aged care dietitian KOL noted that the Australian Dietary Guidelines are designed for the healthy population and are not specific to the nuanced nutrition challenges and issues of aged care. The organisation depended on the dietitians to ensure that individualised needs of clients were met. She advised that advocating for specific nutrition standards for aged care is currently a key priority for Dietitians Australia.

Inspiration for allergen free and plant-rich dietary patterns is a main need of the commercial sector

Where nutrition and health considerations existed, they centred on catering to the clientele’s dietary needs such as allergies and intolerances, and the rising trend of vegan, vegetarian and flexitarian eating patterns. KOLS within this sector voiced a strong desire for inspiration in these areas.

HEALTH CENTRICITY INSIGHTS SUMMARY

- Nutrition and health are not a focus in the National Commercial Cookery Curriculum.
- Central to institutional sector, nutrition and health are rarely a direct consideration in commercial sector.
- Nutrition focus for commercial sector indirectly centres on catering to dietary intolerances and trends, and they seek inspiration.
- Taste number one priority across entire industry, irrespective of value on nutrition and health.
- Ensuring adequate protein is key challenge in vegetarian/vegan dishes.
- Current existing national nutrition standards are sub-standard in institutional sector.

Knowledge

Q: What is the current level of knowledge of food industry professionals regarding nutrition, health and culinary benefits of mushrooms?

Best known for culinary benefits, nutrition and health knowledge is lacking particularly for non-health and non-institutional food industry professionals

Overall, aside from dietitian KOLs, nutrition and health knowledge were lacking. Culinary benefits were one of the most common unprompted attributes that interviewees stated when asked what benefits mushrooms provided. Specifically, mushroom's umami taste and ability to deliver flavour, texture and to lift a dish, were well-known and appreciated.

Supportive of the qualitative findings, in the quantitative research more respondents readily identified culinary benefits than nutrition and health benefits (see **Figures 6-8**). Nearly two thirds (>60%) identified mushrooms as a vegetarian option, to have an umami taste, and to improve taste, particularly by non-health industry professionals (i.e., chef, cooks, catering managers).

Overall, food industry professionals reported awareness of some aspects of the nutritional benefits of mushrooms, with only 7% claiming they are not at all familiar (**Figure 5**). The majority (59%) of food industry professionals say they are familiar with nutrition and health benefits of mushrooms but can't specify, and they were more likely to be non-health industry professionals. Only around one third (34%) claim to be very familiar or can specify a benefit or have an academic knowledge and these are more likely to be health industry professionals.

Overall, when asked about specific nutrition and health benefits, more non-health industry professionals were likely to report that they do not know. Around half of respondents correctly identified fibre, cholesterol free, low calorie, and ability to reduce sodium in a meal, but only around one third knew that mushrooms contain b-vitamins, antioxidants and vitamin D. Less than 1 in 10 knew about the unique components ergosterol, ergothioneine, beta glucan. However, health-oriented food industry professionals were much more likely to identify the key and specific nutritional components including ergothioneine, ergosterol, vitamin D, and beta-glucans.

Overall, less respondents were able to identify specific health benefits with gut health the most identified by less than half of respondents. Health industry professionals were much more likely to identify mushroom's ability to increase vitamin D status.

In terms of confidence, non-health food industry professionals did not have a high degree of confidence in talking about nutrition, health and culinary benefits of mushrooms (**Figure 9**). Overall, dietitians were the most confident in their ability with management professionals the least (**Figure 10**).

Figure 5. Food service industry professionals' awareness of nutrition and health benefits

Q. How familiar are you with the key nutritional properties and health benefits of consuming mushrooms?

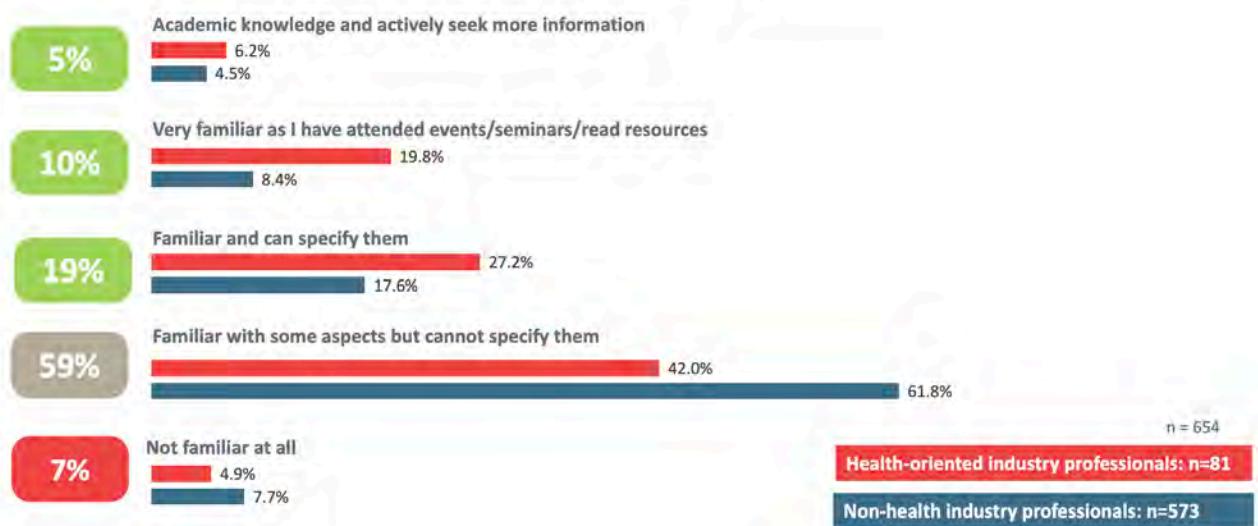


Figure 6. Food service industry professionals' knowledge key nutrition benefits mushrooms.

Q. In your opinion, what are the key nutritional properties of mushrooms?

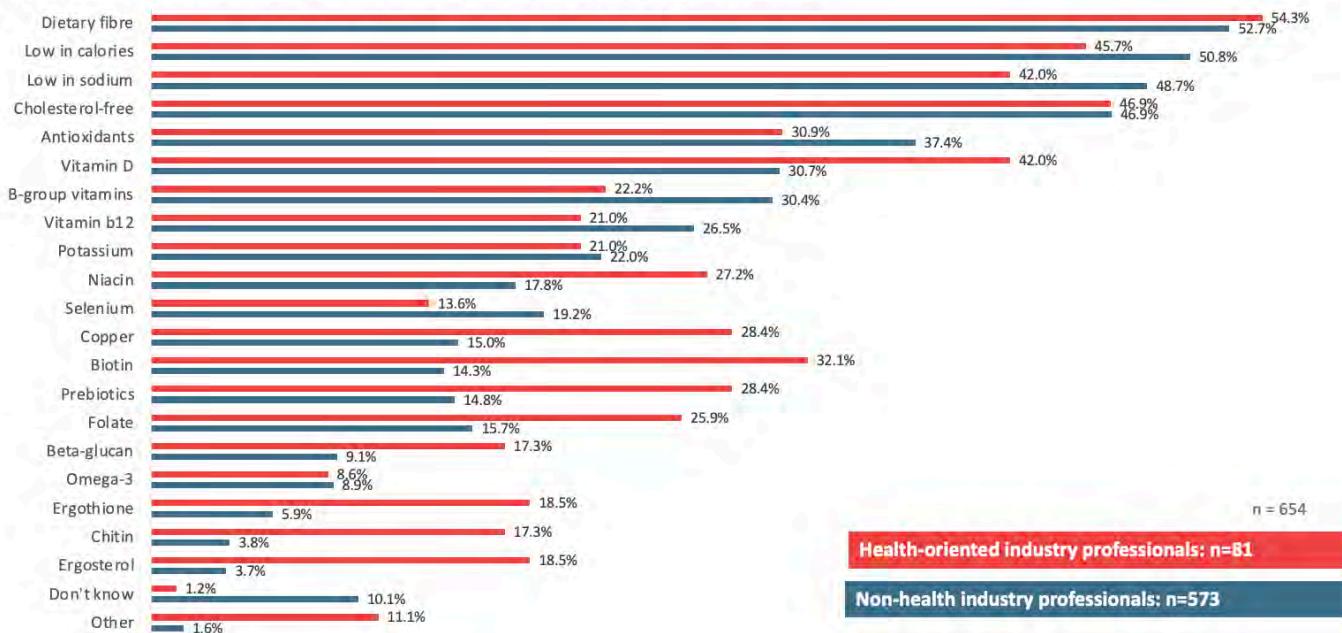


Figure 7. Food service industry professionals' knowledge key health benefits mushrooms.

Q. In your opinion, what are the key **health benefits** of mushrooms?

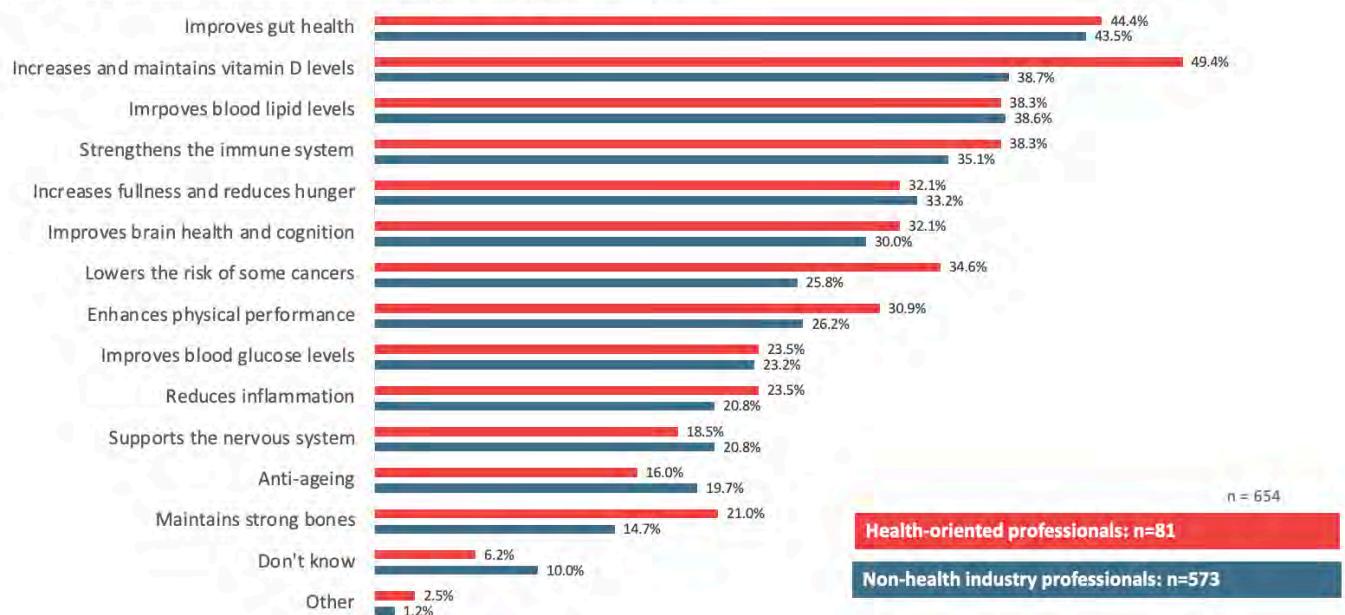


Figure 8. Food service industry professionals' knowledge key culinary benefits mushrooms.

Q. In your opinion, what are the key **culinary benefits** of mushrooms?

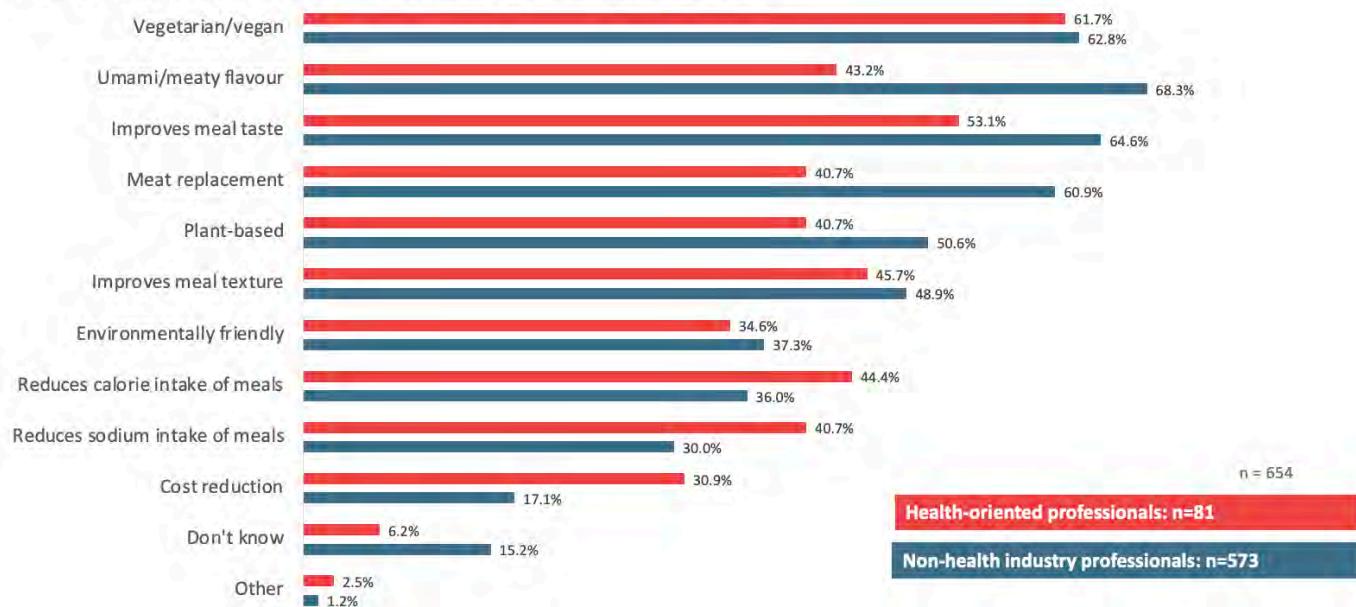


Figure 9. Food service industry professionals' confidence in talking about the benefits mushrooms.

Q. On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how confident do you feel in talking about the nutrition, health or culinary benefits of Australian mushrooms? (By industry)

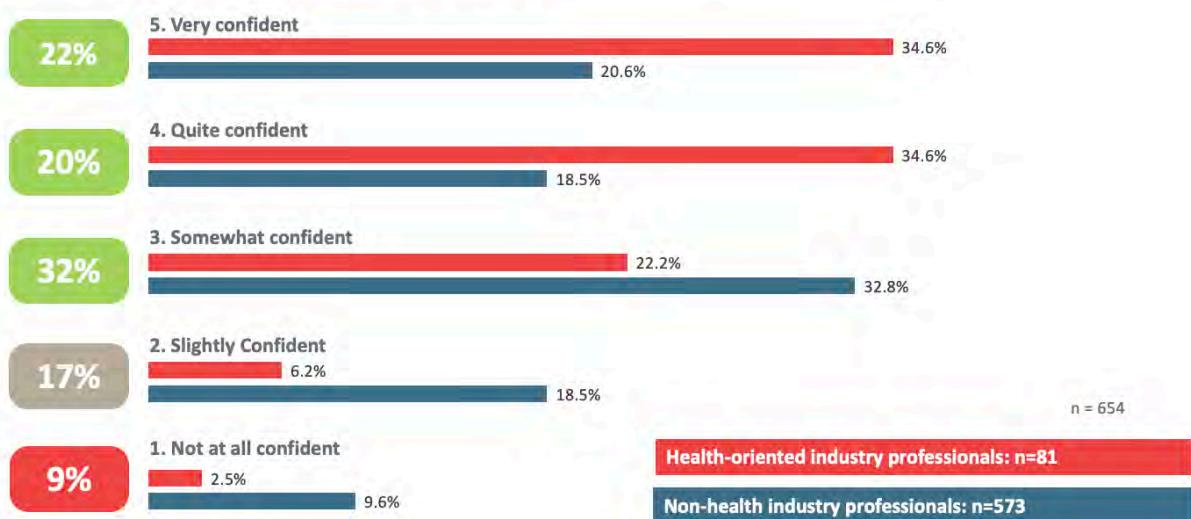
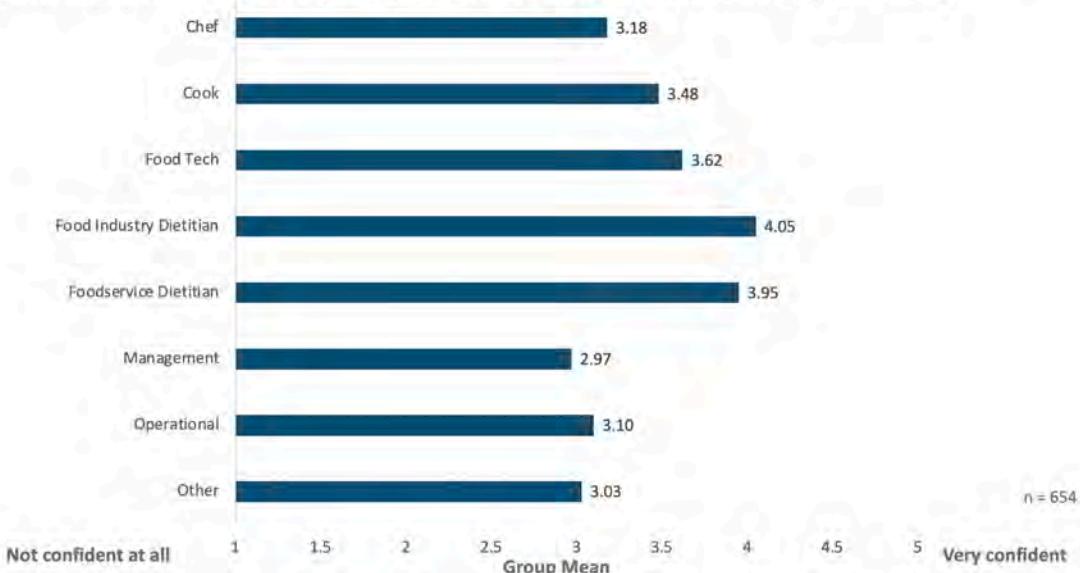


Figure 10. Confidence in talking about the benefits mushrooms by industry profession.

Q. On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how confident do you feel in talking about the nutrition, health or culinary benefits of Australian mushrooms? (by profession)



Common misconception that mushroom is a ‘meat protein equivalent’

In the qualitative research, all KOLs valued mushrooms to be a key ingredient in a vegetarian dish, with many seeing it as a meat replacer. While the ability to substitute for meat from a texture and taste viewpoint was acknowledged, a common misconception by all non-dietitian industry professionals was that mushrooms are a good source of protein and/or iron, and effectively be a ‘meat equivalent’ and an appropriate protein substitute in a dish. There is nothing specifically taught around mushrooms nutrition and health benefits in the culinary curriculum, and it was also evident that the educators had a low knowledge on the nutrition and health benefits themselves.

“I can tell you what mushrooms tastes great and what goes with what but as far as nutritional information, I probably am quite lacking in it you know, besides knowing that, you know, mushrooms, meat for vegetarians, and it’s something that’s, you know, high in iron, I probably don’t really know that much”

Mushrooms as a good source Vitamin D, surprised and delighted the most

In the qualitative research, ‘sun or UV exposed mushrooms being a good source of vitamin D’, was the fact that KOLs across the sectors were often both surprised by and excited to learn about. While dietitians and those working in the institutional sector were more likely to know the nutrition and health benefits of mushrooms, some of KOLs were still unaware that mushrooms are a natural, non-meat source of vitamin D. On learning about this benefit, they saw enormous benefit of leveraging this important nutrient, often a nutrient of concern in institutions (hospitals and aged care). The quantitative research showed 42% of health-oriented industry professionals identified vitamin D to be a key nutrient in mushrooms, compared to only 30% in non-health industry professionals. Regardless, the majority in both were not aware of this nutritional benefit.

Education around mushroom nutrition and health sparks motivation and interest

It was noteworthy that when educated during the qualitative interviews about mushrooms’ unique nutrition, health and culinary proposition, that interest increased dramatically. Simple top of mind awareness around mushrooms, particularly discussion around nutrition and health benefits sparked interest and motivation for more knowledge and desire for further menu inclusion (pending education and inspiration on what types and how to use). There was legitimate interest in knowing more about the nutrition and health benefits of mushrooms.

As one interviewee stated, *“Mushrooms are already popular, but you could double the popularity once we are made more aware of it.”*

“So, from a from a chef’s point of view. Getting the facts to the chef I think would be a lot better. Because obviously, we know from a culinary point of view, we go for appearance and taste. We don’t really look at the benefits for it. I mean, we still cook with lots of butter and fat and you name it, you know. So, I think informing the chefs and giving a rough guideline would be instrumental to be honest with you. Because what you’ve just said there, I knew probably 10-15% of what you’ve just said, which on the scale of things if you ask me after this interview, I would say, geez, I’m a genius now on mushrooms I think, (laugh)”

KNOWLEDGE INSIGHTS SUMMARY

- Best known for culinary benefits, nutrition and health knowledge lacking particularly for non-health industry professionals.
- Dietitians are the professional group most confident in their ability to talk about nutrition, health and culinary benefits of mushrooms with management the least.
- Common misconception with non-health professionals that mushrooms is 'meat protein equivalent'.
- Mushrooms being good source Vitamin D is the fact most surprised and delighted by.
- Education around nutrition and health benefits sparks motivation and interest.

Usage

Q: How are mushrooms being used within catering organisations?

Highly versatile ingredient, used right across the menu

Quantitative research showed mushrooms are commonly used in food service organisations with only 7% reporting that they do not include it on their menus. Over half (57%) of respondents featured mushrooms on menus all year around, as either a side dish (36%), or as a main meal (21%) feature. A further 33% used mushrooms occasionally. Commercial sectors were slightly more likely to use mushrooms year around, whereas institutional sectors were slightly more likely to use mushrooms on a seasonal basis. (See **Figure 11**).

From the qualitative interviews, mushrooms were seen to be a versatile ingredient that can be prepared in several ways and always guaranteed to provide an x-factor to a dish. Mushrooms were reported to be 'always on the menu' and used right across the menu as side dishes, as the hero or part of mains, share plates, soups, sauces, stocks and garnish; and prepared in many ways including sautéing, deep frying, pan frying, oven roasting, stir frying, pickling and garnish.

Figure 11. How mushrooms are predominantly used in food service organisations

Q. Do you currently feature mushrooms on the menu where you work?



Q: What are the drivers to usage?

Ability of mushrooms to add flavour to meals, and their versatility including use in plant-based options

The top three drivers for usage in the quantitative research were: i) to enhance flavour; ii) cater for vegetarian and plant-based options; and iii) improve nutrition. Their ability to reduce sodium rated the lowest with only 14% of respondents selecting this (See **Figure 12**). In line with the quantitative research, the main unprompted driver for mushroom usage from KOLs (qualitative research) was adding flavour. One KOL from the aged care institutional sector noted that mushroom extract is widely used by chefs in many of the meals to boost flavour. For some KOLs, also in line with the quantitative research, drivers to usage included mushroom's ability to add texture to a meal and being viewed as a key ingredient in plant-based, flexitarian or vegetarian meals and menus. A common advantage voiced by the KOLs' was its versatility.

Institutional organisations are more likely to value mushrooms for their nutritional benefits, compared with commercial organisations, which value texture and flavour

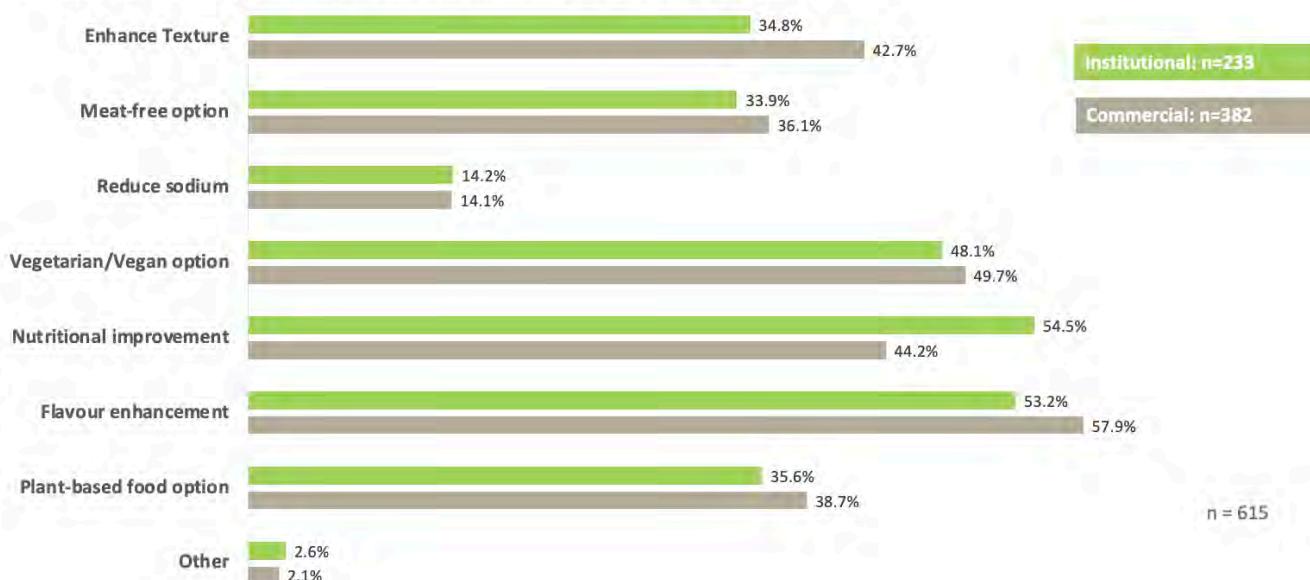
Both qualitative and quantitative research supported those institutional organisations value mushrooms equally for their nutritional and flavour benefits, compared with commercial organisations, which placed more value on texture and flavour (see **Figure 12**).

Ability to reduce sodium, saturated fat in institutional organisations and the misconception of being a protein replacement for meat-free options in commercial organisations

In the institutional sector, many dietitian KOLs were aware that mushrooms can be used to lower saturated fat and sodium of meals while delivering a good meal texture and flavour when used to replace meat. For many in the commercial sector, it was frequently used as a protein replacement for meat, based on the misconception that mushrooms contain equivalent protein to meat.

Figure 12. Quantitative research findings for drivers of mushroom usage in food service organisations.

Q. Why does your organisation include mushrooms on the menu and/or in meals?



Q: What are the barriers to usage?

No major barriers to usage, with lack of awareness and inspiration the main limitations

In the quantitative research, almost half of respondents (44.3%) did not report any barriers to using mushrooms (See **Figure 13**). There were little unprompted barriers to usage from the KOL interviews, noting that the one limitation out of their control is customers wants and needs. Mushrooms can be polarising and there was acknowledgment that there is a small sub-segment of consumers who dislike or have an intolerance.

It was conceded from qualitative research, that mushrooms simply are not top of mind, nor a food they feel very connected to, hence they get forgotten about. One of the barriers noted by the commercial sector KOLs was that it was already on the menu in many ways, and they are short of ideas on how mushrooms can be further utilised and leveraged. It was reported that catering staff are often not that creative and not equipped to incorporate mushrooms past the basic usage. There was a definite appetite for inspiration on how mushrooms can be further utilised, including knowledge on varieties and uses beyond the basics.

In the quantitative research, for around 1 in 4 respondents, shelf life, cost and seasonal availability were raised as barriers. From a sector perspective, commercial organisations were more likely to raise shelf life, seasonal availability, and supply issues as barriers to using mushrooms. Institutional organisations raised both cost and food safety as barriers. Shelf life was echoed in the qualitative research with KOLs noting 'it goes brown too quickly'. Other barriers offered by KOLs included it being viewed as a winter ingredient.

Cost can be a barrier but can be seen positively when compared as a substitute for meat

Another important driver of meal and menu development across the sector raised in the qualitative research, particularly in the institutional sector, is cost. This is reflected in the quantitative research with nearly 1 in 3 in the institutional sector and just over 1 in 4 in the commercial sector highlighting cost as a barrier to usage.

Budget responsibility is usually the domain of catering staff, and it was reported that in the institutional sector food choices and/or nutrition delivery would be often compromised due to cost pressures. While cost also came up as a barrier in the qualitative research, it also was considered a driver for some KOLs. For some it was positively viewed as being a cheaper alternative to meat, hence able to be used as an expander or meat replacer in some dishes. In contrast, others saw mushrooms to be more expensive than other vegetables and that cheaper options could be found than mushrooms to use as 'expanders' or fillers.

Nutrition solutions need to incorporate a cost benefit story for cut through, particularly in the institutional sector

A key insight was that to get any traction for change within the institutional sector with nutrition, cost benefits needed to be woven into the benefit story. While the commercial sector organisations focused on delivering a return on investment, the dynamics of a more competitive sector allows

food choices, customer experience and even nutrition offering an opportunity to provide value-adds that allows for differentiation.

Lack of protein and low-calorie content can be a limitation for the institutional sector

The institutional sector and meal delivery services need to achieve nutrition targets for their customers, and protein is often a nutrient that is a challenge to meet. Given mushrooms are not a source of protein and are low in calories, this becomes a barrier for this sector as there is often a need to provide high energy/high protein diets to their clientele. Lack of knowledge of catering staff around the nutrition credentials of mushrooms was seen by some institutional dietitian KOLs as a limitation to usage.

For specific sub-sectors food safety constraints and poor performance when thawed from frozen were raised

There were a couple of barriers voiced specific to sub-sectors. In the manufacturing sector (pre-prepared meal delivery service), one manufacturer selling chilled raw ingredients for clientele to prepare their own breakfast, raised a constraint of using (raw) mushrooms. In addition, many of their meals are frozen, and mushrooms do not perform very well with texture changes when thawed.

Figure 13. Quantitative research findings on barriers of mushroom usage in food service organisations.

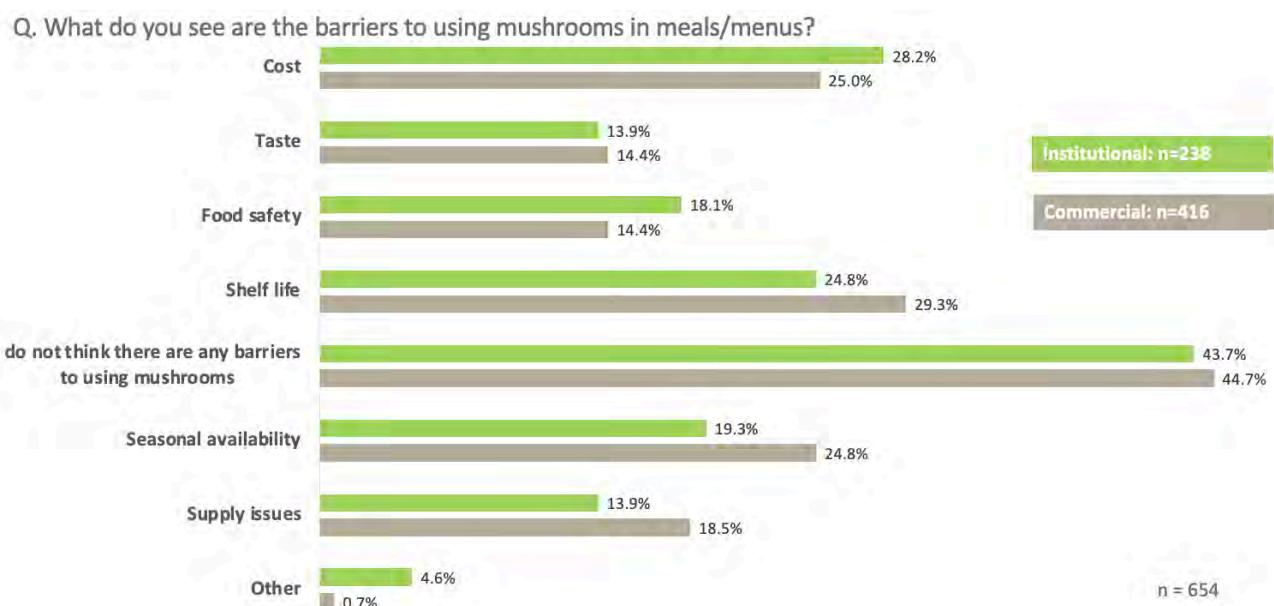


Table 15. Summary of usage drivers and barriers for organisations

TERRITORY	INSTITUTIONAL SECTOR	COMMERCIAL SECTOR
Drivers mushroom usage	<ul style="list-style-type: none"> • Flavour • Use flexitarian/vegetarian/plant-based diet • Versatility • Reduce saturated fat and sodium 	<ul style="list-style-type: none"> • Meat protein (& iron) replacer (misconception) • Texture
Barriers mushroom usage	<ul style="list-style-type: none"> • Nil • Not top of mind • Customer preference • Freshness/Shelf life • Food safety – can't use raw mushrooms. • Cost <ul style="list-style-type: none"> • Lack of knowledge on nutrition/health benefits by decision maker (chef) • Low in protein and calories when needing high protein and calories for aged care 	<ul style="list-style-type: none"> • Lack of connection with where it comes from • Lack ideas/inspiration • Winter food

USAGE INSIGHTS SUMMARY

- Considered a highly versatile ingredient and used right across the menu.
- Key drivers of usage are its ability to add flavour to meals and be leveraged in plant-based meal offerings.
- Institutional organisations are more likely to value mushrooms for their nutritional benefits, compared with commercial organisations, which value texture and flavour.
- Ability to reduce sodium, saturated fat for institutional and misconception to be protein replacement for meat for commercial are also important sector drivers.
- No major barriers to usage, with shelf life, lack of top-of-mind awareness and inspiration the main limitations.
- Cost can be a barrier but can be seen positively when mushrooms are used as a substitute for meat.
- Nutrition solutions need to incorporate a cost benefit story for cut through, particularly in institutional sector.
- Lack of protein and low-calorie content mushrooms can be a limitation for the institutional sector
- For specific sub-sectors, food safety constraints and poor performance when thawed from frozen were raised.

Culinary education

How do mushrooms feature within the curriculum?

Mushrooms are considered a vegetable and are currently not formally included within the national commercial cookery curriculum

Mushrooms are currently not explicitly included in the national commercial cookery curriculum. It was noted by the culinary education KOLs that there is no reference to mushrooms being in their own biological kingdom, Fungi. Like in the Australian Dietary Guidelines, mushrooms are currently viewed as a vegetable and one of the many vegetables that could be chosen by the educators in practical application.

One of the culinary educators advised that there are three key places where mushrooms could be included. This would be within the follow three units:

1. SITHCCC030 - *Prepare vegetable, fruit, eggs and farinaceous dishes*,
<https://training.gov.au/Training/Details/SITHCCC030>
2. SITHCCC031 - *Prepare vegetarian and vegan dishes*,
<https://training.gov.au/Training/Details/SITHCCC031> or
3. SITHCCC044 - *Prepare specialised food items*
<https://training.gov.au/Training/Details/SITHCCC044>

The educator noted that it was disappointing that while mushrooms maybe not specifically highlighted in the core vegetable and vegetarian/vegan units, it is not even a focus in SITHCCC044 *Specialised food items*, that has contemporary ingredients such as heirloom vegetables, native ingredients and artisan cheeses.

The national commercial cookery curriculum is developed and managed by a government -funded and outsourced agency, Skills Australia

The curriculum for commercial cookery is outsourced by the Australian government to a private education delivery partner, which is responsible for developing and managing the training packages for all the registered training organisations (RTOs), that includes of TAFE and private colleges. This current agency is Skills Australia.

RTOs have freedom to teach

The government appointed agency Skills Australia develops the course outline, including performance criteria and assessment requirements that the RTO needs to follow. Each RTO then has the freedom to deliver the course how they like. Each RTO can develop their own materials and/or utilise third party content. The LEARNING VAULT digital education company was often mentioned by KOLs due to the high quality and ease of use of their materials. The RTOs are required to show evidence on auditing that they comply with the national curriculum performance criteria and assessment criteria. They are allowed to teach something additional outside of the curriculum if they can show there is an industry need.

Mushrooms are part of the curriculum

The culinary educator KOLs noted that in practice, mushrooms used throughout the course as an ingredient in the preparation of a range of dishes from classical dishes to desserts, due to their versatility, whilst not specifically directed to be taught in the national curriculum as a food group on their own, one of the culinary educators KOL working at a TAFE, has students go out on mushroom foraging twice/year.

CULINARY EDUCATION INSIGHTS SUMMARY

- Mushrooms are considered a vegetable and are not part of the national culinary education curriculum, that is developed and managed by government outsourced agency, currently Skills Australia.
- While registered training organisations (RTOs) for commercial cookery need to show evidence of achieving performance criteria and assessment guidelines, they are free to teach the curriculum how they wish.
- RTOs often develop their own education materials and many value and utilise the materials produced by leading digital education training company, The Learning Vault.
- In practice, while not formally specified in curriculum, mushrooms are an ingredient often chosen to teach various units and different preparation styles due to its versatility.

Opportunities

Q: What opportunities and/or considerations are there around including mushrooms within food service sector?

Overall, plant-based, vegetarian and flexitarian diets are key opportunities for mushrooms

Across the industry it was acknowledged that mushrooms are a go to ingredient in its ability to cater to flexitarian/vegetarian diets that becoming popular. It was acknowledged that a greater opportunity exists in the commercial sector for flexitarian food offerings, which are marked by the need for more vegetables, rather than just the exclusion of meat. Practical inspiration on mushroom varieties and their uses, recipes for incorporating mushrooms in meals already on the menu to boost flavour and nutrition and using them as the hero or part of vegetarian meal offering were seen as key.

Opportunity to lead with inspiring mushroom recipes to achieve adequate protein, particularly in plant-based diets

Offers real opportunity to help solve an issue recognised and reported by the institutional sector. It was noted by aged care interviewee that combining mushrooms with nuts may offer opportunity to provide adequate protein while leveraging mushroom's benefits (nutritional, flavour and texture) in plant-based meals, noting that the biggest allergy seen is seafood/shellfish rather than nuts. An important consideration with leveraging mushrooms in the plant-based dietary pattern trend is also correcting the misconception that it is a protein source and using the opportunity to educate on the many unique value proposition it offers.

'The Blend' offers potential nutrition and cost saving benefits

Meals that blended mushrooms with minced meat such as mushroom bolognese, sparked interest for additional cost savings. An important consideration here was about leveraging the taste and textural advantages of mushrooms over other vegetables as some chefs saw this as an 'expander' opportunity for a meal, and in this context, other vegetables could be considered cheaper.

For the institutional sector where nutrition is important, reducing meat intake and replacing with mushrooms offer additional benefits of reducing sodium content and saturated fat without loss of taste.

Pre-prepped options were attractive to catering organisations

Several interviewees acknowledged that they utilise pre- or semi-prepared ingredients. One manufacturer who produced ready to eat nutritious meals, including for a residential aged care home delivery service, highlighted that there was an opportunity for pre-prepared (Chopped, chilled) mushrooms that overcome food safety issues of using them raw. They noted it would need to be cost effective including availability in smaller minimum order quantities.

Nutrition, health and cost benefits hold high appeal for the institutional sector, and tapping into 'Food as Medicine' offers potential for education and greater menu inclusion mushrooms

For the institutional sector, particularly aged care, where nutrition and health are a high priority, and there is a need to meet certain nutrition KPIs, the nutrition and health benefits of mushrooms hold

high appeal. The vitamin D content was seen as important and relevant since the institutionalised clientele is at higher risk of vitamin D deficiency and need further foods to support the immune system.

To achieve greater cut through and uptake, linking with cost benefits will be vital. There is an opportunity around a ‘Food as medicine’ story for mushrooms in aged care, where supplement usage and pressures on food costs are significant. One dietitian KOL in aged care saw a huge ‘Food as medicine’ opportunity. She noted that supplement usage in the institutional setting is not only high but costly. Food is often forgotten as a strategy to improve health and mushrooms offers a range of tangible and measurable benefits. She saw the opportunity to position mushrooms as a food on the menu that would have multiple benefits including improving total intake through boosting taste of meals, increasing vitamin D status of the patient, leading to better nutrition and health status and cost savings for the organisation via decreased food wastage (as more food is eaten via improved taste and texture), less need to use expensive supplements, and potentially less illness via improved health.

Tap into mushrooms’ provenance story as a relevant avenue to connect with nutrition & health in the commercial sector

While nutrition and health intrinsically were not seen to be a primary opportunity, a few chef KOLs saw high appeal in information on provenance; connecting the journey of the food to the chef/consumer, where it comes from, and the ‘farm to fork’ story. This story telling is often used as part of their ‘value-add’ and experience they deliver to clientele with other ingredients (such as meat, fish, etc.). They voiced that there was a sense of lack of connection to mushrooms, unlike what has been created for other produce like meat, seafood, grapes and so on.

“If, for example, you were to do from a culinary point of view, do a vegetarian degustation and it's around the mushrooms and you can incorporate a bit of a spiel on the mushrooms. And for example, you could I mean I wouldn't have a clue; I'm not being disrespectful, I actually wouldn't have a clue where my mushrooms are come from. But with the focus on beef for example. We say this beef is from Riverina, it's grain fed, and you can trace each animal, you know what I mean? And for the seafood, this is from the Hawkesbury, this is from Dow. And my mushrooms come in I would not have a clue about them.”

Provenance, reflecting the sentiment that people want “something from ‘somewhere’, more than they want something from ‘anywhere’” is a key nutrition, health and wellness trend that Mellentin (13) reports from the pandemic and supply issues that continues to strengthen. It is also a concept that ladders to nutrition/health. The Mellentin (13) reports that provenance is closely linked with sustainability in consumers’ minds, and with “real food”. The link to where the food comes from and growing conditions makes people feel like what they are eating is better for them and has an element of ‘quality’, an important driver for the commercial sector. Having a provenance story makes it easy to connect with people, and creates an opportunity to educate the foodservice industry about the nutrition and health benefits of mushrooms.

Provide commercial sector and chefs specifically, with mushroom inspiration

The commercial sector KOLs overwhelmingly stated that creativity and inspiration were key to influencing and educating the sector. The chef KOLs had a genuine love for mushrooms but conceded that they did not have the knowledge, motivation nor inspiration. They greatly desired to know more about the different types of mushrooms and be inspired with ideas on how to use them and understand their versatility and applications. Simply, what mushroom use and how to use it.

“I feel that mushrooms are underrated and often overlooked due to uncertainty around the correct preparation and handling: perhaps a ‘quick’ simple campaign similar to the banana ones may help more people incorporate mushrooms into more meals.”

For the institutional setting, inspiration was wanted on how to boost flavour and nutrition. A specific opportunity provided through the qualitative research, included recipe inspiration for mushroom based nutritious soups. The aged care demographic often seeks a lighter meal at night and soup is a popular choice. A key issue is that offerings are nutritionally replete and they complain about their diminishing taste that negatively impacts their food intake. There is an opportunity to add mushrooms to base recipes along with suitable higher-protein-based ingredients like nuts, to deliver good nutrition as well as the flavour and taste that aged care residents desperately desire.

An important consideration will be ensuring that the information is delivered for all mushroom varieties and species, with a focus on *Agaricus bisporous* to ensure project needs are met.

Spark interest and motivation and educate the commercial sector via nutrition fun facts

For the commercial sector, nutrition and health messages alone hold no direct appeal to increasing usage, but it was evident that providing education around fun facts on nutrition and health rouses interest and engagement, making it more top of mind, and more likely to educate, and ultimately drive motivation to incorporate more mushrooms on the menus.

Table 16. Opportunities and considerations for catering organisations

	INSTITUTIONAL SECTOR	COMMERCIAL SECTOR
Opportunities	<ul style="list-style-type: none"> • Recipe inspiration: 'The blend' – Tapping into plant-based trends, blending mushrooms with minced meat to improve nutrition and save money. • Product innovation: Getting suppliers to make ready-made options – a lot of food is bought pre-prepped e.g., rissoles, meatballs - mushrooms can be incorporated into these to offer time savings and boost nutritional content of dishes. • Inspiring education: Inspire chefs' creativity and bring mushrooms top of mind by using engaging education on what are different mushroom varieties are and how to use them (versatile applications), while supporting with engaging nutrition and health facts. <ul style="list-style-type: none"> • Provide a cost-benefit analysis of using mushrooms as 'food as medicine' instead of supplements. Improved nutritional status and potential improvement in health outcomes; improved vitamin D status, improved immunity, less sickness. • Recipe inspiration using mushrooms to: <ul style="list-style-type: none"> ○ achieve adequate protein in plant-based diets. ○ improve taste of meals and therefore increase nutrition intake. ○ boost nutritional content of meals; greater vitamin D, lower sodium and saturated fat ○ develop 'aged care' nutrition soups 	<ul style="list-style-type: none"> • Tap into the local provenance story for mushrooms as avenue to ladder to nutrition/health.
Considerations	<ul style="list-style-type: none"> • Provide solutions in relevant settings to achieving high energy/protein diets while still incorporating mushrooms. 	<ul style="list-style-type: none"> • Correct misconception that mushrooms are a protein source, while maintaining its use within vegetarian/flexitarian meal/menu offerings. • Need to cover exotic mushrooms as this is what the industry also wants to know, while keeping focus on Australian mushrooms.

Q: What opportunities and/or considerations are there around including mushrooms within the culinary curriculum?

The culinary educators interviewed all saw merit in including mushrooms within the culinary curriculum in a more focused and grassroots way, and reported that there are several ways to get greater traction of this well-regarded ingredient within culinary education:

1. Request an update/change to the current national curriculum to have mushrooms acknowledged as a separate food group to vegetables.

One of the educators believed that a more direct way to get mushrooms a greater focus in the curriculum would be to advocate for a review to the national curriculum to have mushrooms separated out from vegetables and have it as its own food grouping in the two relevant modules: SITHCCC030 - Prepare vegetable, fruit, eggs and farinaceous dishes; and SITHCCC031 - Prepare vegetarian and vegan dishes. It was acknowledged that this would be a longer route but had good chance success.

The process would involve contacting the appointed agency and providing a rationale for the change (currently by Skills Australia but noted that a new tender period submission process is underway to take effect from January 2023, with the successful delivery provider to be announced in July/August 2022.)

2. Contact individual TAFE or RTO and work to develop materials that can be used to support the newly included unit SITHCCC031 - Prepare vegetarian and vegan dishes

The commercial cookery curriculum gets reviewed every five years, with the latest review recently completed at the end of 2021. In the review process, industry consultation is undertaken for nomination for any updates/changes. In the last review, industry advocated for compulsory inclusion of a Vegan/Vegetarian module into the curriculum. This was endorsed and signed off in 2021 and will come into effect in the second half 2022. RTOs can use any material they want to teach this course and many welcome supports in developing dynamic course content. Mushrooms were seen to fit well within this unit and a TAFE educator KOL was keen to partner with the project to utilise mushroom materials in their practical teaching of the course.

3. Incorporate mushrooms into modules on 'The Learning Vault'

The Learning Vault is a digital education company that is currently used by TAFE and private RTOs to support students' culinary education. It was suggested that working to develop modules on mushrooms to support stand-alone courses and/or content that could support RTOs in the current delivery of Vegetarian/Vegan unit would be welcomed and timely. Learning Vault is developing content for its course and mushrooms could be leveraged as key hero ingredient.

FOOD SERVICE INDUSTRY OPPORTUNITIES INSIGHTS SUMMARY

Catering organisations

- Overall, plant-based, flexitarian and vegetarian diets are key to tap into with opportunity to lead with inspiring mushroom recipes that achieve adequate protein in plant-based diets.
- 'The blend' offers nutrition and cost saving potential benefits attractive to both commercial and institutional settings.
- Tapping into 'Food as Medicine' approach instead of using supplements offers opportunity in institutional sector to educate and foster greater uptake of mushrooms. Taste benefits, vitamin D and other nutrients can offer potential of improved food intake and nutrition/health status, and subsequently less food waste, less supplements and therefore cost savings.
- Tapping into mushrooms provenance story has opportunity as a relevant avenue to connect with nutrition in commercial sector.
- Inspiring chefs' creativity to bring mushrooms top of mind and use mushrooms more by engaging education on what are different mushroom types and how to use them (versatile applications), while supporting with fun nutrition and health facts.

Culinary education

- Develop proposal and request update/change of the current national curriculum to have mushrooms acknowledged as a separate food group to vegetables.
- Individual TAFE or RTO can be contacted to develop materials that can be used to support the newly included unit SITHCCC031 - Prepare vegetarian and vegan dishes.
- 'The Learning Vault' is currently developing materials to support SITHCCC031 and offers a way to also reach RTOs with content.

Communication

Q: What are most effective ways to reach organisations and industry professionals with mushroom centred nutrition & health education?

Table 17 summarises the ideas from KOLs in the qualitative research. Key insights are discussed below.

Keep it simple and inspire on the job rather than 'educate'

The consistent insight that came through from all KOLs is that education and communication of industry professionals needs to be easy to understand and quick. It needs to be practical, visual, tactile, and simple. It is best received if it is undertaken within the work environment, 'on the job' and meeting them where they are, such as through their digital media channels, rather than trying to push them to attend an external workshop or seminar. Food industry professionals are time poor, hence undertaking any offsite training programs or certification programs were seen as lower priority.

"It needs to be done in such a way that individuals can feel and do it."

With respect to getting uptake of messages a KOL working within the culinary education field highlighted that for food industry professionals, the key is not making people feel like they are being educated or taught. They respond best when the communication is inspiring and shows them how they can do something, rather than just providing information. Tapping into creativity and inspiration is key for this group.

"We never call it training or professional development as people do not like being told what to do or be 'taught'."

Digital works best, but in-kitchen posters are valuable

While there was a distinct preference for digital informational, something tangible they could refer to in the kitchen was also seen to be valuable. A smart approach by several interviewees was to provide information on posters that can be placed on walls within working kitchens and used as a reference guide/educational poster. The Meat and Livestock Association posters for beef that educates on different meat cuts were often described as examples. A few KOLs suggested the incorporation of QR codes on the poster that allows for further access to engaging digital educational resources such as video, infographics and fun facts. This was seen as a more effective way to gain the attention and engagement of the increasingly digital savvy food industry workforce for mushroom messages and to allow for 'on the job' training and education. Along these lines, targeting dissemination of communication messages via social media was also seen as important. Leveraging a mushroom ambassador and influencer via social media was also suggested.

Table 17. KOL's suggestions to best reach food industry professionals with communication.

Communication channels to reach food industry professionals

Posters with QR codes directing to dedicated digital web information
QR code on mushroom boxes
Leaflet that comes with mushroom delivery
Digital web information – engaging messaging and visuals, downloadable short videos, infographics, recipes that are 'Instagramable', screen saver for the computer
'Train the trainer' - Educational session with visual takeaways for Executive chefs to take back to organisations to train their team tapping into: <ul style="list-style-type: none"> - Executive Chef Club (https://executivechefsclub.com) - Internal organisational chef meetings in larger organisations with multiple sites - Food Frontiers - Accredited course by the Australian Culinary Federation
Or via: <ul style="list-style-type: none"> - Conducting dedicated mushroom masterclasses - Creating specific mushroom events e.g., mushroom festival or mushroom themed degustation menu - Suppliers
Social media targeted advertising with incentives to share
National conferences e.g., Fine Food Australia, Institute for Hospitality in Healthcare (IHHC)
Utilise a Mushroom Ambassador (Chef)
Magazines e.g., Hospitality Magazine, Dietitians Connection newsletter

'Train the trainer' as a high quantum of influence strategy

Another common suggestion given by most of the chef KOLs was around on-site training and leveraging 'train the trainer' approaches e.g., training the Executive Chef who would then take the messages and visual takeaways back to their organisation and train their wider team 'on the job'. While leaflets and videos and other resources have merit, the experience by KOL's is that being hands on with staff, getting in and doing it with them is where there is greater traction of messages and education. While training all staff is not feasible, targeting the on-the-job training that organically happens in the kitchen, from Executive Chef to junior staff has a huge potential. This idea was echoed by many of the KOLs and positive feedback given by others who were asked their opinion on the idea if not suggested by them. Training Executive Chefs to train the team was seen as an effective way to target the junior staff and get important 'buy in', while also providing Executive Chefs with the knowledge and inspiration they desire to fulfil their teaching role in the kitchen. As primarily the decision makers in the kitchen, if you can inspire them, it will flow onto the organisation.

Suggestions of how Executive Chefs could be targeted included: conducting dedicated masterclasses, creating specific mushroom themed events such as a mushroom festival or mushroom themed

degustation menu, tapping into internal Executive Chef organisational meetings for catering organisations with multiple sites, or externally via the Executive Chefs Club. The Executive Chefs Club (<https://executivechefsclub.com>) is an informal association of Executive Chefs designed for interactive meetings with purveyors and producers, or through suppliers. Most catering organisations are visited by suppliers who regularly hold educational sessions on their products with the Executive Chefs passing this information onto their junior team members. Educating suppliers to take the message out to the individual organisations was also identified by a number of KOLs as a potentially efficient and effective way of educating catering organisations more broadly.

As one executive chef said, *“I think that training is invaluable. I love that. So I love to learn stuff, you know, and I love to pass that knowledge on to my team, whether it be just me standing next to them saying Oh, listen, this is really good, has got this, it's that... I do think you need to focus on the people that purchase the mushrooms and write the menus like me... I would probably sit down and learn from you guys and be educated by you guys. And then the fact sheets that you give me I can then pass on and be the tutor and educate my team rather than have this forum where you've got executive chefs and apprentices, armies and you go there. And I do think is important that they know. But I think it's important that the people at the top that make the decisions that design the menus, do the costings, accept the product, that we know first what's going on. And then we can pass that information down the line.”*

Consider the target audience

An insight from one dietitian KOL working in the institutional sector noted that it is key to communicate and educate chefs and catering staff more than dietitians, as they are the ones who ultimately have the cut through and will get changes taken up. Dietitians are the supporters but not often the decision makers in the organisation. Existing suppliers and supply chain are also important to influence as they educate the decision makers and purchasers of products and ingredients in organisations.

Q: What nutrition & health messages around mushrooms will best get attention of food service professionals?

Leading with culinary benefits is key

For the institutional sector, nutrition is intimately linked to cost. Cost is the number one key driver of decision making. The institutional sector needs to meet certain nutrition standards, but cost will often prevail. In the commercial sector, while cost is a definite driver, delivery of quality and taste and support for inspiration are important considerations. Ultimately, chefs are interested in the practical aspects of food, how to get it to the customer, with flavour and performance their key aim and focus. Overall, the clear insight within the food service industry was that the key to education on nutrition and health is to lead with the culinary benefits and how wonderful mushrooms are for texture and flavour enhancement.

Communication messaging should be targeted to the intended audience and based on their needs and drivers

Aligning with the different value placed on nutrition and health within the institutional and commercial industry sectors, KOLs identified opportunities for key messaging for mushrooms that would gain traction. It was clear that in the commercial sector nutrition and health fun facts that centred on inspiration for usage and application, and that tapped into the provenance story (farm to fork) offers the best opportunity to gain greater traction in this sector.

Whilst in the institutional sector, leading with potential cost benefits with underpinning nutritional benefits offered the greatest opportunity. Specifically positioning a ‘Food as Medicine’ approach – mushrooms providing flavour and texture and providing a whole food supplement approach to increase food intake, nutrition and status with lower food wastage was key.

Table 18. Key messages per sector.

MESSAGE	INSTITUTIONAL	COMMERCIAL
Common	Taste/flavour/texture enhancer = greater food intake (hence better nutrition with less food waste) Plant-base food trends – vegetarian/vegan, flexitarian – meat and mince mushroom blends	
Specific Lead Story	Food as medicine: Flavour enhancing whole food fortification Synergy of nutrients and bioactives; less cost to supplements, enhances food intake and nutrition & health benefit/s.	Versatile flavour enhancer that is good for you - What mushroom to use, how to use them, underpinned by nutrition and health fun facts. - Tied to a provenance story.
Support	- Vitamin D intake/status - Immunity - Gut health - Blood glucose control - Improve recipes: lower sodium and saturated fat, added nutrients	- Different varieties - Inspiring application and versatility - Details on where the mushrooms were grown, soil conditions - Sustainability

COMMUNICATION INSIGHTS SUMMARY

How

- Keep it simple, inspire rather than educate. It needs to be practical, visual, tactile and easy to understand.
- Provide something tangible that can be utilised in the kitchen. Posters in the kitchen with QR code taps into achieving the need to be top of mind in a practical way but also tap into an increasingly digitally savvy workforce.
- A digital go to hub for information and resources is ideal.
- 'Train the trainer' has potential as high quantum of influence strategy that taps into the underlying driving need of this industry to be practical and put knowledge into action.
 - Masterclasses and educational events for executive chefs to take back to the kitchen.
 - Opportunity to educate suppliers who are already in the supply chain to go on to educate the organisations.

What

- Communication messaging should be targeted to the intended audience and their needs/drivers thus should be different for institutional versus commercial audiences.
- Irrespective of sector, leading with culinary benefits is key.
- Taste/flavour/texture enhancer = greater food intake (hence better nutrition less food waste) is the common ground for both sectors, along with connecting with plant-based food trends.
- The lead story for institutional sector = Flavour enhancing whole food fortification that can save money – improved nutrient intake, higher vitamin D status and immune support benefits. Potential benefits less food waste, less need supplements.
- The lead story for commercial sector = Local versatile flavour enhancer that is good for you and your customers – what mushrooms to use, how to use, underpinned by fun nutrition facts.

Mushroom case study interventions

The KOLs in the qualitative research were passionate industry professionals and were extremely interested and excited to learn about mushrooms' nutrition, culinary and health benefits. Moreover, they were all keen to be involved in potential case study interventions as part of the project.

Recommendations

Recommended next steps have been provided, based on the research findings:

Develop educational resources and an online dedicated food service 'Mushroom Academy' hub

Central to the project is developing a digital hub that serves to inspire and educate, providing easy and ready digital access to educational information and resources. This website should be the main call to action to any communication activity. It should aim to include sections on a 'farm-to-fork' connection, masterclass educational videos and brochures, and mushroom inspiration.

It was evident that printed brochures and resources are of limited value, except for posters which could be hung in food service kitchens and leaflets that are provided with mushroom boxes. Digital resources such as fact sheets and masterclass videos could be housed on the site. The key messages for these resources should centre around mushroom 'what and how' with engaging nutrition and health facts, and recipe inspiration all interwoven.

Based on the research the below resources are recommended:

- 1 x Poster outlining different types/varieties of mushrooms and nutrition facts with QR code (that sends to 'Mushrooms Academy').
- 3 x fact sheets (digital); Different varieties & growing, Culinary benefits & how to prepare – tips and tricks, Plant based diet inspiration
- 3 x 2-3 min masterclass videos; Different varieties & growing, Culinary benefits & how to prepare – tips and tricks, Plant based diet inspiration
- E-Book of poster and factsheets that can be used to recruit to database sign-up.

Undertake a mushroom case study intervention within two organisations to leverage in communication and gather support for further research

Undertake a mushroom case study intervention with two organisations. It is recommended that one of these be an aged care organisation. The intervention involves education and incorporation of mushrooms into the menu to achieve an intake of at least 3 Cup mushrooms per person each day for a set number of weeks compared with another residential site used as a comparator.

The aim is to obtain resident's nutritional intake pre- and post- the mushroom intervention. Document the journey of the mushrooms intervention via film. This pilot intervention could be used to undertake a larger scale clinical trial that aims to evaluate the cost benefit to incorporating more mushrooms into the sector (see future opportunities).

Conduct a face-to-face pilot 'Masterclass' with commercial sector chefs and evaluate

The research supports that practical and, on the job, learning is the best way to encourage behaviour change in the overall sector. The institutional and commercial sectors are distinctly different and a direct nutrition and health intervention in the commercial sector is not motivating and educating enough.

It is recommended to undertake a pilot face-to-face Masterclass where a select number of commercial Executive Chefs are invited to a masterclass to be educated and inspired on nutrition, health and culinary benefits of mushrooms. The impact of this would then be measured via evaluating mushroom knowledge and usage of these organisations in the 3-month period after the Masterclass. This evaluation could then be utilised to consider whether this strategy offers an opportunity longer-term for the industry to invest in. The masterclass series could evolve to being conducted longer term as an online live class. The face-to-face pilot as part of this project, offers an opportunity for further insights and learnings to be gathered to understand true feasibility longer term.

Communicate case studies to wider industry to educated and inspire

Present at two key conferences; Institute Hospitality in Healthcare and Food Service Australia to educate and inspire food industry professionals with an engaging presentation on the nutrition, health and culinary benefits mushrooms and case study interventions, showing how mushrooms can drive benefits to the sector.

Develop a farm tour framework, lesson plan and resource pack that facilitates grower and food industry professional connection and partnership

A key insight from the research was the opportunity to develop a greater connection between the food and food industry professionals with growers and the mushroom provenance story. It was clear from the research that food industry professionals prefer experiential learning. Farm tours are an ideal way to build this connection and educate with experience. This interaction also facilitates key invited influencers to expand the reach of the key messages more broadly by via sharing their experiences via their own social networks.

This project can develop a framework for growers to undertake farm tours with food industry professionals and start to weave education to the industry on nutrition, health and culinary benefits of mushrooms.

It is recommended that a tour framework and a curriculum-linked learning opportunity/lesson plan be combined with relevant resources (previously developed above). These resources could be printed by the individual farm growers to distribute to tour participants.

Develop curriculum materials that can be leveraged as part of the Vegan & Vegetarian units

Influencing from the grassroots via culinary curriculum is fundamental to the ongoing impact of increasing the incorporation of mushrooms into the food service sector. There is no opportunity at present to influence the new national Vegan/Vegetarian unit as part of culinary curriculum that has been already developed by the government appointed training agency. However, there is an opportunity to develop materials that can be utilised by the RTOs in the teaching of the content and working with both TAFE NSW and the Learning Vault to create these materials.

Communicate key findings from this Mushroom Industry Insights report with industry to inspire and garner support to capitalise on future opportunities

The research uncovered several opportunities for the mushroom industry that are outside of the scope of this project. To capitalise on these opportunities and provide the industry with rich insights to inspire them, it is recommended this report be presented to the industry at the high-profile AMGA conference 26-28 October 2022.

Other Opportunities

Manufacturing opportunities

While outside of current project scope, there was a lot of feedback from KOLs within the qualitative interviews for product mushroom innovation opportunities. Listed are some of the ideas the industry should consider:

- Product innovation that overcomes issues of shelf life.
- Mushroom powder used as a booster in nutrition and flavour that can be added to dishes.
- Pre-prepped and ready-to use blend of mushroom and meat mince.
- Mushroom based soups in aged care.

Develop a provenance story strategic plan

The provenance story is a big opportunity for the industry to consider more holistically. While this will be executed in this project as part of developing farm tour materials and information on the 'Mushroom Academy' website, there is greater opportunity to consider this more strategically. Opportunities to consider include utilising a QR code for information on mushroom boxes with information (about the farm, where mushrooms come from), printed information on the box or included brochure/flyer that educates and inspires. There could be a distinct strategy of getting the growing area/farm of where the mushroom came incorporated into organisational menus. Mushrooms from 'x' area can be communicated by Chefs when describing the meal in the commercial sector. The 'Mushroom Academy' website could also host an online video series of high-profile chefs visiting farms and bring the 'paddock-to-plate' story alive.

Develop an ongoing 'train the trainer' strategic plan

On review of the pilot masterclass intervention, develop a strategic plan that looks to incorporate potential third party like Executive Chef Club, live online classes and/or suppliers as ways to educate and inspire across the industry in a high quantum of influence way.

Invest in published research that supports health and cost benefits for mushroom usage in aged care/institutional sector and advocacy.

Undertake clinical research that provides evidence for the benefits (i.e., reduced cost, improved nutritional intake, and health outcomes) of including mushrooms into the menus of an aged care facility with anticipation of less waste and supplement usage. Published research can be used in advocacy with the sector and to support in other projects like providing evidence for mushrooms to be a separate food group in the Australian Dietary Guidelines and the proposal to update the National commercial cookery curriculum to consider mushrooms a separate food grouping.

Develop submission and advocate to the National curriculum to include mushrooms as a separate food group.

To influence the sector from a grassroots level, having mushrooms identified as a separate food group and given distinct focus within the National Commercial Cookery Curriculum will be key. This would require developing an appropriate submission requesting an update.

References

1. Foresight Fi. The nature of the food service market. 2020.
2. USDA. Australia Food service Report 2018.
3. Flanders. Food & Beverage Industry Market Overview Australia. 2019.
4. Foresight Fi. Food service Bulletin. 2021;No.2.
5. Foresight Fi. The Australian Food service Market. 2020.
6. Morgan R. Australian eating habits eating in out December 20202021. Available from: <http://www.roymorgan.com/findings/8712-australian-eating-habits-eating-in-out-december-2020-202105240437>.
7. AIHW. 2020 [Available from: <https://www.aihw.gov.au/reports/australias-health/hospital-care>.
8. Honey N. McDonald's launches Tim Tam McFlurry — here's how to be among the first to taste it. Available from: <https://kitchen.nine.com.au/latest/mcdonalds-uber-eats-launches-tim-tam-mcflurry/53898be4-2d4d-492e-9638-30cca8b2ad81>.
9. Banney A. Australians spend \$1,590 each year on delivered food2018. Available from: <https://www.finder.com.au/australians-spend-1590-each-year-on-delivered-food>.
10. Australia Co. Royal Commision into Aged Care Quality and Safety Final report: Care, Dignity and Respect. 2021.
11. Robert N. Learning Vault 2022 [Available from: <https://www.learningvault.com.au/>].
12. IDP. Hot courses abroad 2022 [Available from: <https://www.hotcoursesabroad.com/study/training-degrees/australia/cookery-courses/loc/9/cgory/nf.-4/sin/ct/programs.html#search&catCode=NF.-4&countryId=9&nationCode=9&nationCntryCode=9&studyAbroad=N&studyOnline=N&studyCross=N&studyDomestic=N&studyPartTime=N&startOnlineCampusLater=N&manStdyAbroadFlag=N&parentCatEngName=Travel,%20Tourism%20and%20Hospitality&childCatEngName=Food%20and%20Drink%20Production&ldcsCatEngName=Cookery&restRefineFlag=Y&pageNo=5>.
13. Mellentin, J. 10 Key trends in food, nutrition and health 2022, New nutrition business, The Centre for Food & Health Studies Limited 2021.

Appendix A



The image shows a survey landing page with a light beige background featuring a faint illustration of a person's head and shoulders. The text is centered and reads:

Australian
MUSHROOMS

ARE YOU A FOOD INDUSTRY PROFESSIONAL
LIVING IN AUSTRALIA?

Australian Mushrooms Growers Association (AMGA) are working on some research to understand what people working in the food industry know about mushrooms, including their unique nutritional and health properties and ways to consume them.

Please spare only a **few minutes** to complete this short survey, for a chance to win one of five \$100 VISA gift cards!

This project has been funded by Hort Innovation using the mushrooms research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

Start press Enter ↵

⌚ Takes 4 minutes

1→ Before we begin, tell us a little bit about the kind of work you do in the food industry. What type of food industry professional are you? *

Choose which best represents your main role. If your role is not included here, please select "other" and let us know what it is.

- A Foodservice dietitian
- B Food Technologist
- C Operational
- D Cook
- E Chef
- F Food industry dietitian
- G I do not work within the food industry
- H Management
- I Other (please specify)

2→ Which of the two food industry sectors do you mainly work? *

- A **Institutional sector** (i.e. hospitals, aged care, defence, education, day-care, correctional centres)
- B **Commercial sector** (i.e. cafes, hotels/accommodation, restaurants, pubs, clubs, quick service retail, food manufacturing, grocery)

OK ✓

3→ Do you currently feature mushrooms on the menu where you work?

*

Choose which best applies to your main place of work.

- A Yes, it's a main feature of some meal offerings year round
- B Yes, it's mainly used as a side dish year round
- C Occasionally, it may feature in our seasonal/limited time menus
- D No, we do not use mushrooms at all
- E Don't know

4→ Why do you use mushrooms on your menu? *

Choose as many as you like

- A To help improve the nutritional delivery of the meal/menu
- B To help enhance the flavour of the meal
- C To help enhance the texture of the meal
- D Plant-based food option
- E To help reduce the sodium content of the meal
- F Meat free food option
- G Vegetarian/Vegan food option
- H Other (please specify)

OK ✓

5 → What do you see are the barriers to using mushrooms in meals/menus? *

Choose as many as you like

- A Cost
- B Taste
- C Food safety
- D Shelf-life
- E I do not think there are any barriers to using mushrooms
- F Seasonal availability
- G Supply issues
- H Other (please specify)

OK ✓

6 → How familiar are you with the key nutritional properties and health benefits of consuming mushrooms? *

Please select the statement that best applies to you.

- A Not familiar at all
- B Familiar with some nutritional properties or health benefits but cannot specify them
- C Familiar and can specify them
- D Very familiar as I have attended events / seminars / read resources
- E Academic knowledge and actively seek more information

OK ✓

7+ In your opinion, what are the key nutritional properties of mushrooms? *

Choose as many as you like (scroll to see all options)

- A Selenium
- B Dietary fibre
- C Prebiotics
- D Cholesterol free
- E Copper
- F Biotin
- G Niacin
- H Low in sodium
- I Low in calories
- J Antioxidants
- K Beta-glucan
- L Ergosterol
- M Chitin
- N Vitamin D
- O Omega-3
- P Folate
- Q Potassium
- R Ergothioneine
- S Folate
- T B-group vitamins
- U Vitamin B12
- V Don't know
- W Other (please specify)

OK ✓

8 → In your opinion, what are the key health benefits of mushrooms? *

Choose as many as you like (scroll to see all options)

- A Anti-ageing
- B Enhances physical performance (e.g. energy, muscle mass)
- C Improves gut health
- D Improves blood fat levels (e.g. cholesterol, triglycerides)
- E Improves blood glucose levels
- F Improves brain health and cognition
- G Increases and maintains vitamin D levels
- H Increases fullness and reduces hunger
- I Lowers the risk of some cancers
- J Maintains strong bones
- K Reduces inflammation
- L Strengthens the immune system
- M Supports the nervous system
- N Don't know
- O Other (please specify)

OK ✓

9 ➔ In your opinion, what are the key culinary benefits of mushrooms? *

Choose as many as you like (scroll to see all options)

A Umami/meaty flavour

B Reduces sodium intake of meals

C Reduces calorie intake of meals

D Meat replacement

E Cost reduction

F Improves meal texture

G Improves meal taste

H Vegetarian/Vegan

I Environmentally friendly

J Plant-based

K Don't know

L Other (please specify)

OK ✓

10 ➔ On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how confident do you feel in talking about the nutrition, health or culinary benefits of Australian mushrooms? *

1

2

3

4

5

Not confident at all

Somewhat confident

Very confident

OK ✓

11 → On a scale between 1 and 5, where 1 is 'strongly disagree', and 5 is 'strongly agree', thinking about your current workplace, how much do you agree with the following statement:

"There has been an increase in the use of mushrooms in order to improve the nutritional profile of meals." *

1

2

3

4

5

Strongly disagree

Unsure

Strongly agree

OK ✓

12 → As a food industry professional, have you ever seen educational resources about the health benefits of mushrooms? *

A I don't know of any resources

B I have seen resources but am not really interested in them

C I have resources and they are not very useful

D I have resources and they are useful

E I have resources and would like more

OK ✓

13 → Please provide any additional questions or thoughts on the type of information that you would like to see provided about the nutritional, health, or culinary properties of mushrooms.

Type your answer here...

Shift ⌘ + Enter ↵ to make a line break

OK ✓

press Enter ↵

14 → To be in the running for one of five VISA \$100 gift vouchers, please **submit your email below.**

The winners will be drawn and contacted by email on **June 30th, 2022.**

If you do not wish to enter the draw, simply leave the email blank and click "Submit" (hit 'enter' if the button is not immediately visible).

** By entering the draw, you are subscribing to the Australian Mushrooms food industry professional database and will receive information, resources and updates about the unique nutrition, health, and culinary properties of mushrooms. You can unsubscribe at any time.*

What is your email address? e.g. john.smith@example.com

name@example.com

Appendix B



Australian Mushrooms: the X-factor ingredient

Dr Flavia Fayet-Moore
CEO Nutrition Research Australia (NRAUS)



Mushroom Hub

28 October 2022



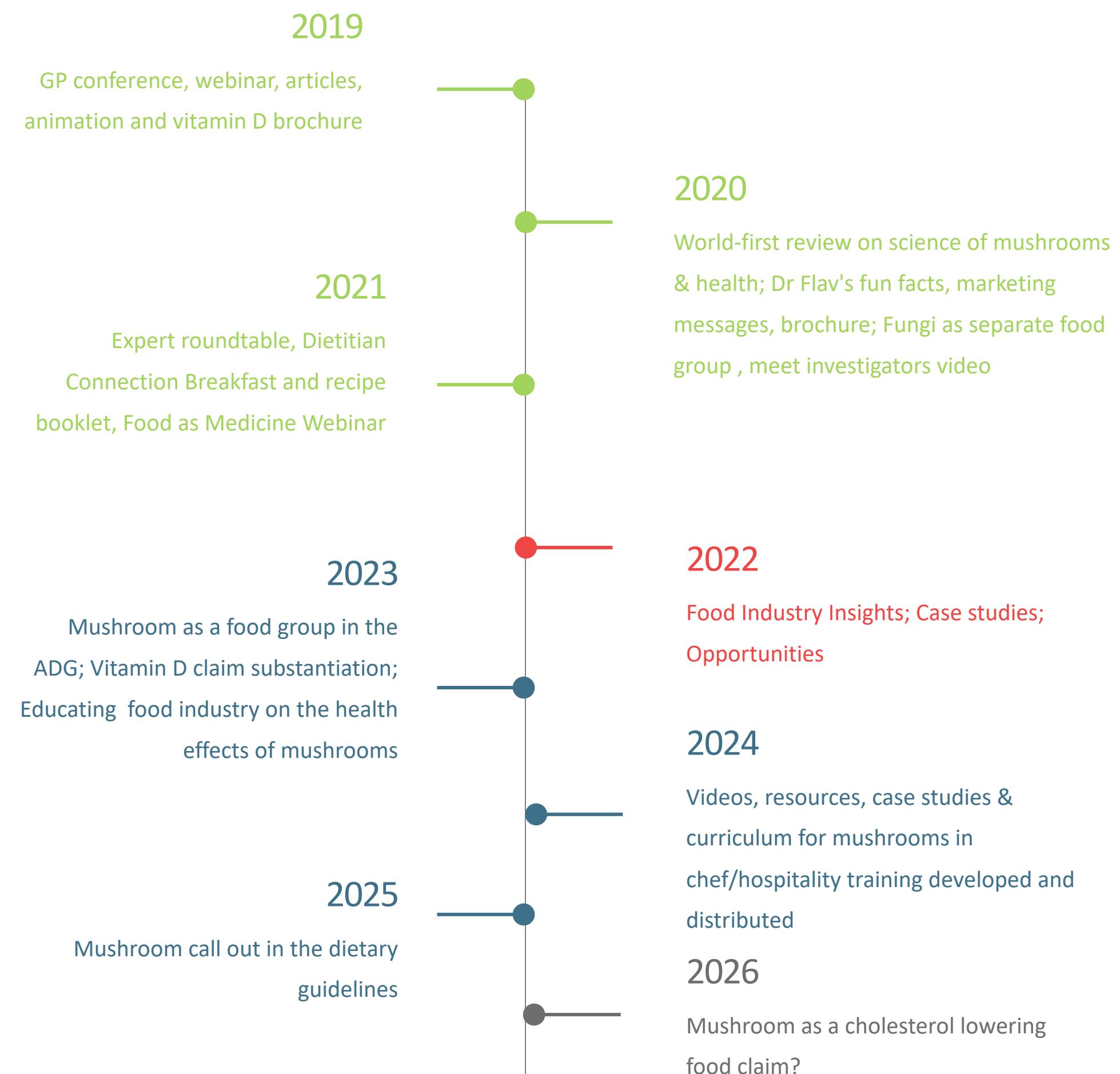


Changemakers in global
human health and nutrition,
back by science



MU17002- educating HCP
MU20003- educating food
industry MU20001 -Beta-
glucan
MU22001 - Dietary
guidelines
MU22004 -Vitamin D
claim

Our mushroom journey





Examining the health effects and bioactive components in *Agaricus bisporus* mushrooms: a scoping review[☆]

Michelle Blumfield^a, Kylie Abbott^{a,b}, Emily Duve^c, Tim Cassettari^d, Skye Marshall^{a,e}, Flavia Fayet-Moore^{f,*}

^aBNutrDiet (Hons), PhD, Nutrition Research Australia, Sydney, New South Wales, Australia

^bNutraceuticals Research Group, School of Biomedical Sciences and Pharmacy, University of Newcastle, Callaghan, Australia

^cBPESS, MPH, Nutrition Research Australia, Sydney, New South Wales, Australia

^dBSc(Hons), BAppSc, Nutrition Research Australia, Sydney, New South Wales, Australia

^eBond University, Nutrition and Dietetics Research Group, Faculty of Health Sciences and Medicine, Bond University, Gold Coast, Queensland, Australia

^fBSc(Hons), MNutrDiet, PhD, Nutrition Research Australia, Sydney, New South Wales, Australia

Received 8 March 2020; received in revised form 19 May 2020; accepted 8 June 2020

Abstract

There is evidence from both *in vitro* and animal models that the consumption of edible mushrooms has beneficial effects on health. It is unclear whether similar effects exist in humans and which bioactive compounds are present. This review synthesises the evidence on the world's most commonly consumed mushroom, *Agaricus bisporus* to (i) examine its effect on human health outcomes; and (ii) determine the nutrient density of its bioactive compounds, which may explain their health effects. A systematic literature search was conducted on the consumption of *A. bisporus*, without date and study design limits. Bioactive compounds included ergosterol, ergothioneine, flavonoids, glucans and chitin. Two authors independently identified studies for inclusion and assessed methodological quality. Beneficial effects of *A. bisporus* on metabolic syndrome, immune function, gastrointestinal health and cancer, with the strongest evidence for the improvement in Vitamin D status in humans, were found. Ultraviolet B (UVB) exposed mushrooms may increase and maintain serum 25(OH)D levels to a similar degree as vitamin D supplements. *A. bisporus* contain beta-glucans, ergosterol, ergothioneine, vitamin D and an antioxidant compound usually reported as flavonoids; with varying concentrations depending on the type of mushroom, cooking method and duration, and UVB exposure. Further research is required to fully elucidate the bioactive compounds in mushrooms using vigorous analytical methods and expand the immunological markers being tested. To enable findings to be adopted into clinical practice and public health initiatives, replication of existing studies in different population groups is required to confirm the impact of *A. bisporus* on human health.

Keywords: Systematic review; *Agaricus bisporus*; Mushroom; Health; Human; Bioactive

Contents

1. Introduction	2
2. Methods	2
2.1. Eligibility criteria	2
2.2. Search strategy	3

Abbreviations: 25(OH)D₂, 25-Hydroxyvitamin D₂; 25(OH)D, 25-Hydroxyvitamin D; BBM, brown button mushrooms; CE, catechin equivalents; CG, comparator group; CGEs, cyanidin-3-glucoside equivalents; d, days; f, female; GAE, gallic acid equivalents; g, grams; Hb, haemoglobin; HDL, high density lipoprotein cholesterol; HMW, high molecular weight; H₂, hydrogen; IgA, immunoglobulin A; IgG, immunoglobulin G; IL, interleukin; IU, international units; IG, intervention group; kcal, kilocalorie; LDL, low density lipoprotein cholesterol; LMW, low molecular weight; MetS, metabolic syndrome; NA, not applicable; OR, odds ratio; ORAC, oxygen radical absorbance capacity; PCV, packed cell volume; iPTH, parathyroid hormone; PSA, prostate specific antigen; QE, quercetin equivalents; Qct, quercetin; RCT, randomised controlled trial; RBC, red blood cells; RE, rutin equivalents; sIgA, secretory immunoglobulin A; sCML, serum carboxymethyl-lysine; sMG, serum methylglyoxal; TNF, tumour necrosis factor; UV, ultraviolet; UVB, ultraviolet B; WBC, white blood cells; w/w, weight per weight; WBM, white button mushrooms

[☆] **Prospero:** This study was prospectively registered (still awaiting processing). **Disclaimer:** Horticulture Innovation provided topline suggestions on the proposed review methodology; but had no contribution to the draft analysis, interpretation of results or drafting of the manuscript. **Funding:** This project has been funded by Hort Innovation, using the Mushroom Fund research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

* Corresponding author at: Level 10, 20 Martin Place, Sydney, New South Wales, Australia.

World first research

Being fungi
makes them
unique in
3 ways:

01

Nutrition

02

Health

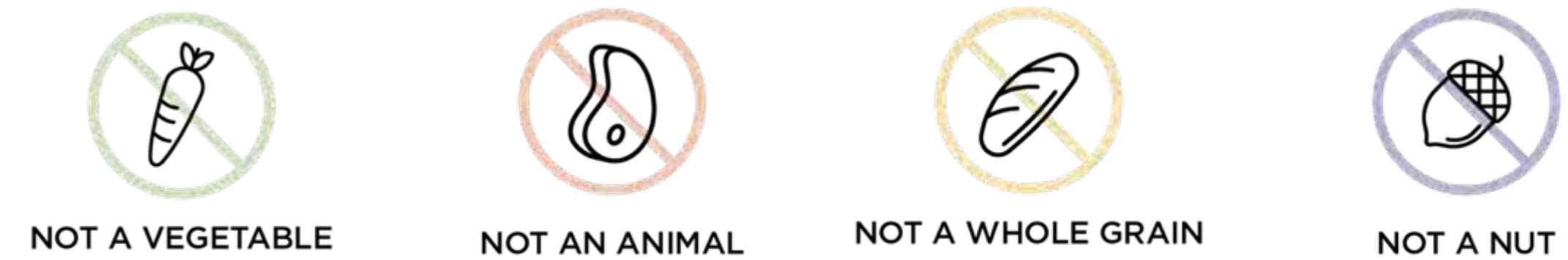
03

Culinary



01 Nutritious in every way

- Vitamins
- Minerals
- Bioactives



Offers what is unique to other food groups

& it's a standout for 3 key components:
ergothioneine, chitin, vitamin D

3 key components



ERGOTHIONEINE

powerful amino acid



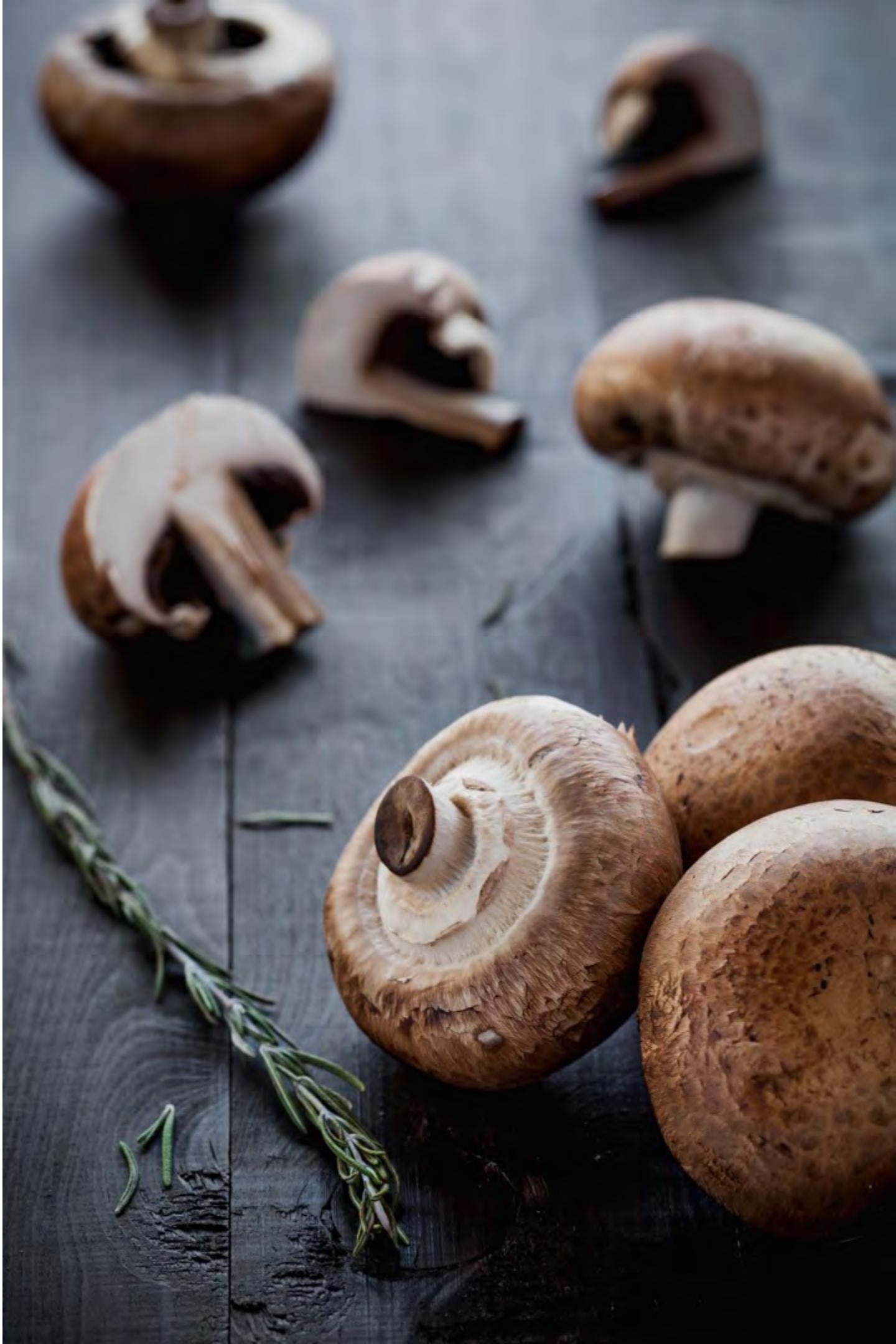
CHITIN

unique prebiotic



ERGOSTEROL

non-animal & natural source of vitamin D



Star source of D

100% of daily requirements



UV
→

15 minutes

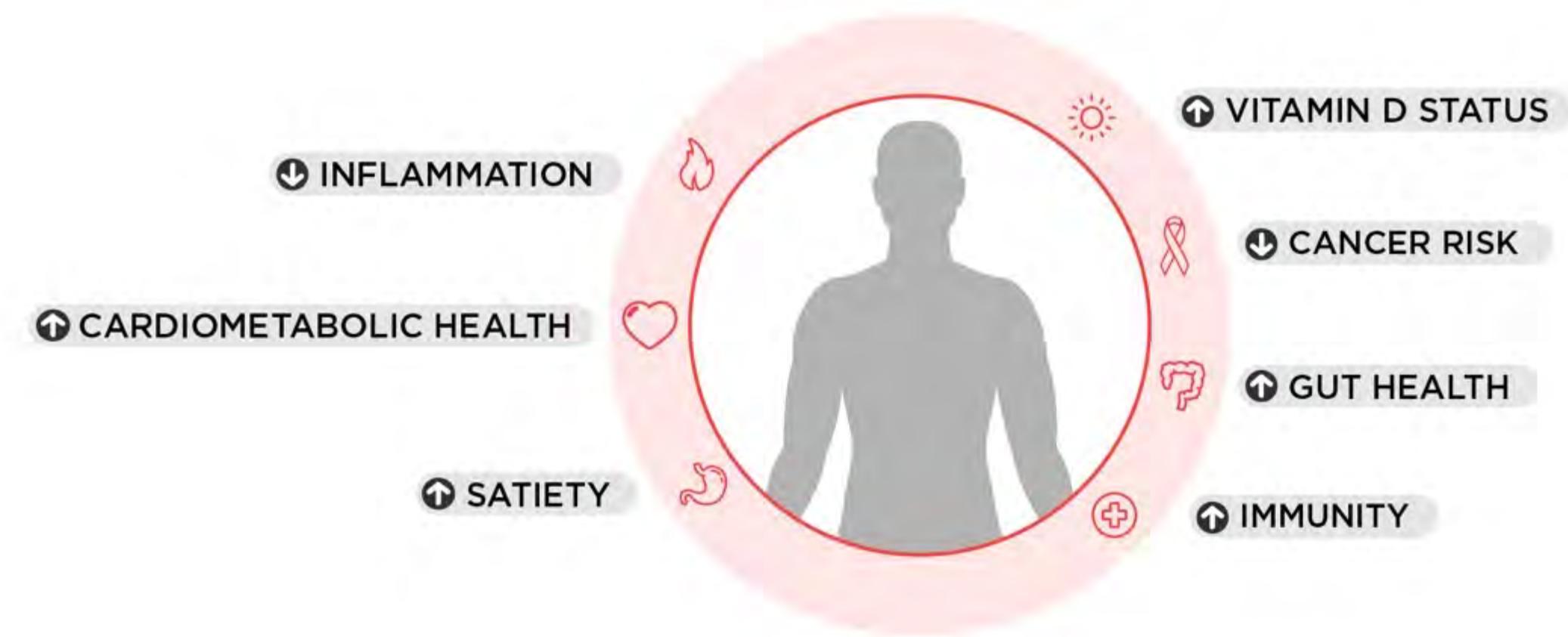


2-3 ug

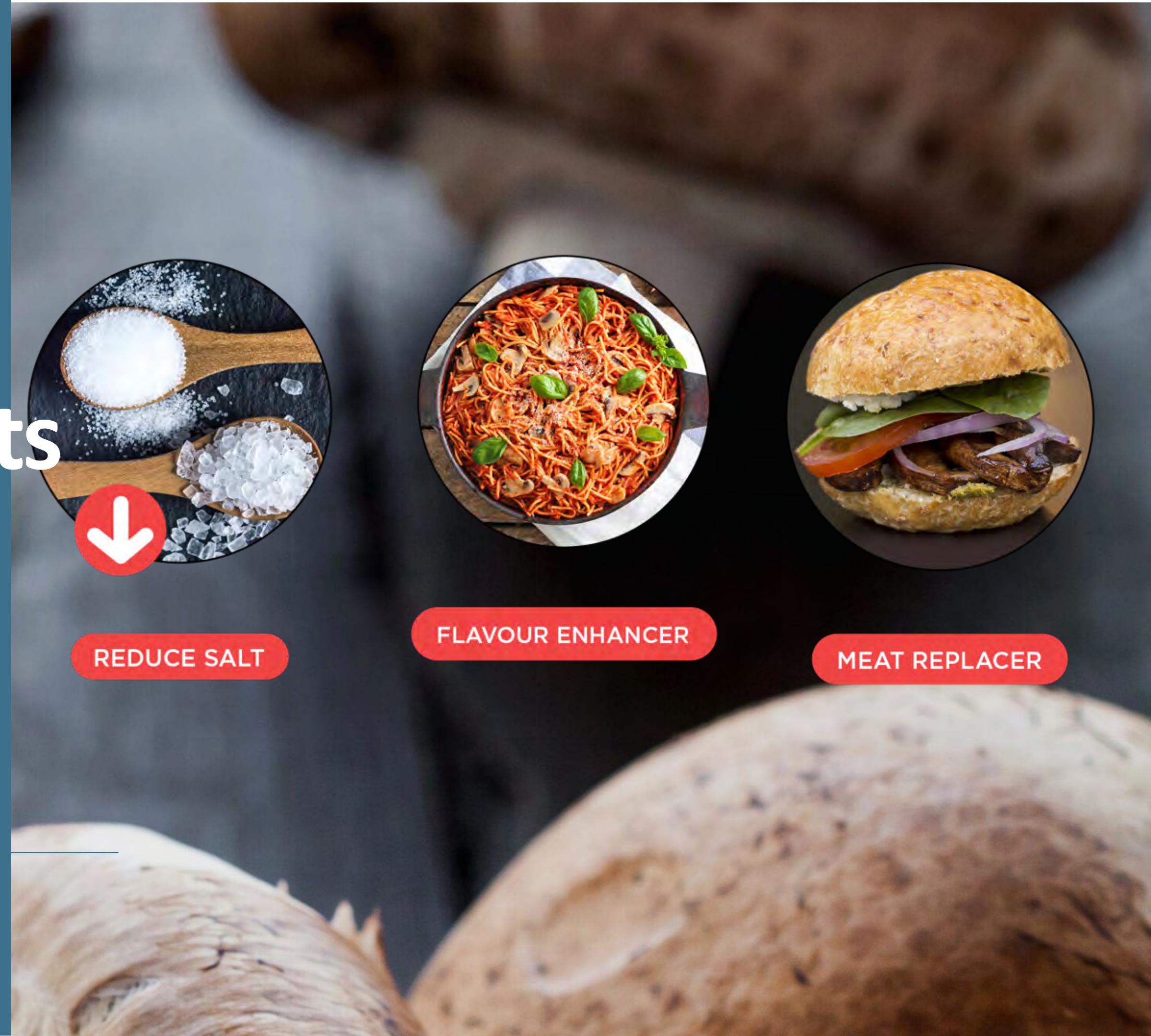
24 ug

02

Multiple health benefits



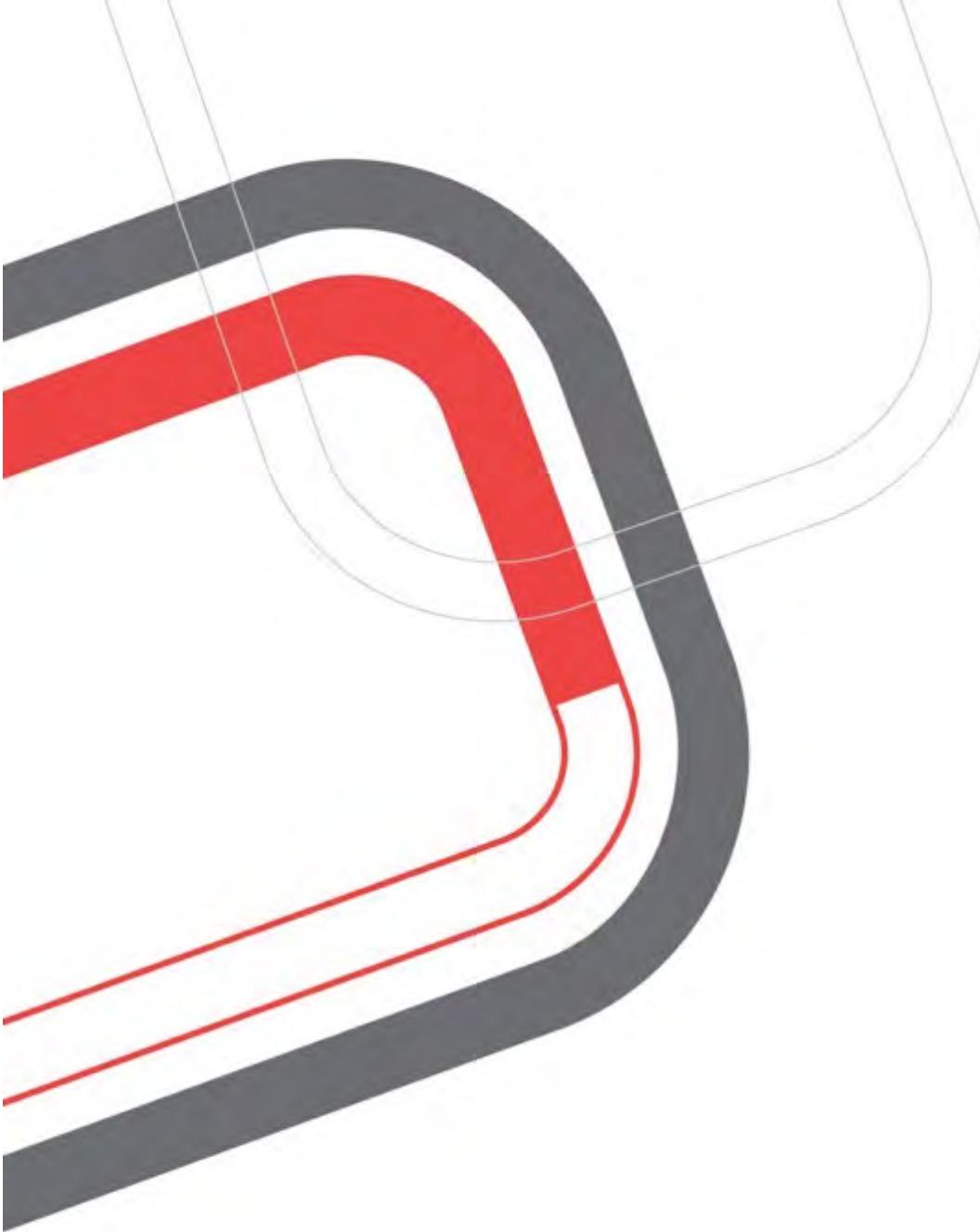
03 Multiple culinary benefits



REDUCE SALT

FLAVOUR ENHANCER

MEAT REPLACER



The sleeping giant for
the food service
industry





WHY?

Versatile,
nutritious & flavour
enhancer





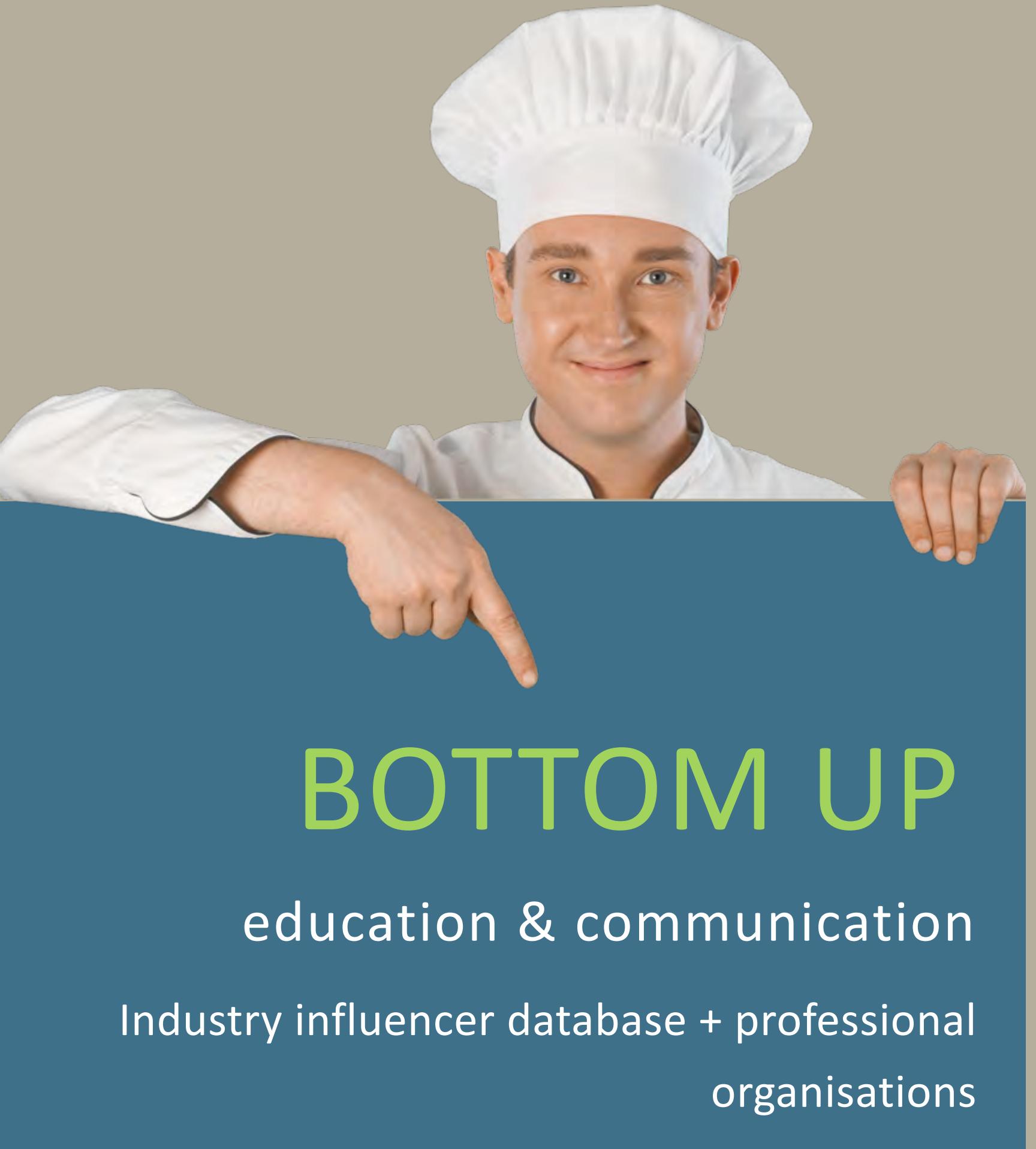
OUR 2 MAJOR GOALS: MU20003

Nutrition & health
benefits

Facilitate

Increase
knowledge
Greater
incorporation





TOP DOWN

High quantum of influence

Mushroom case study interventions &
Culinary school curriculum influence





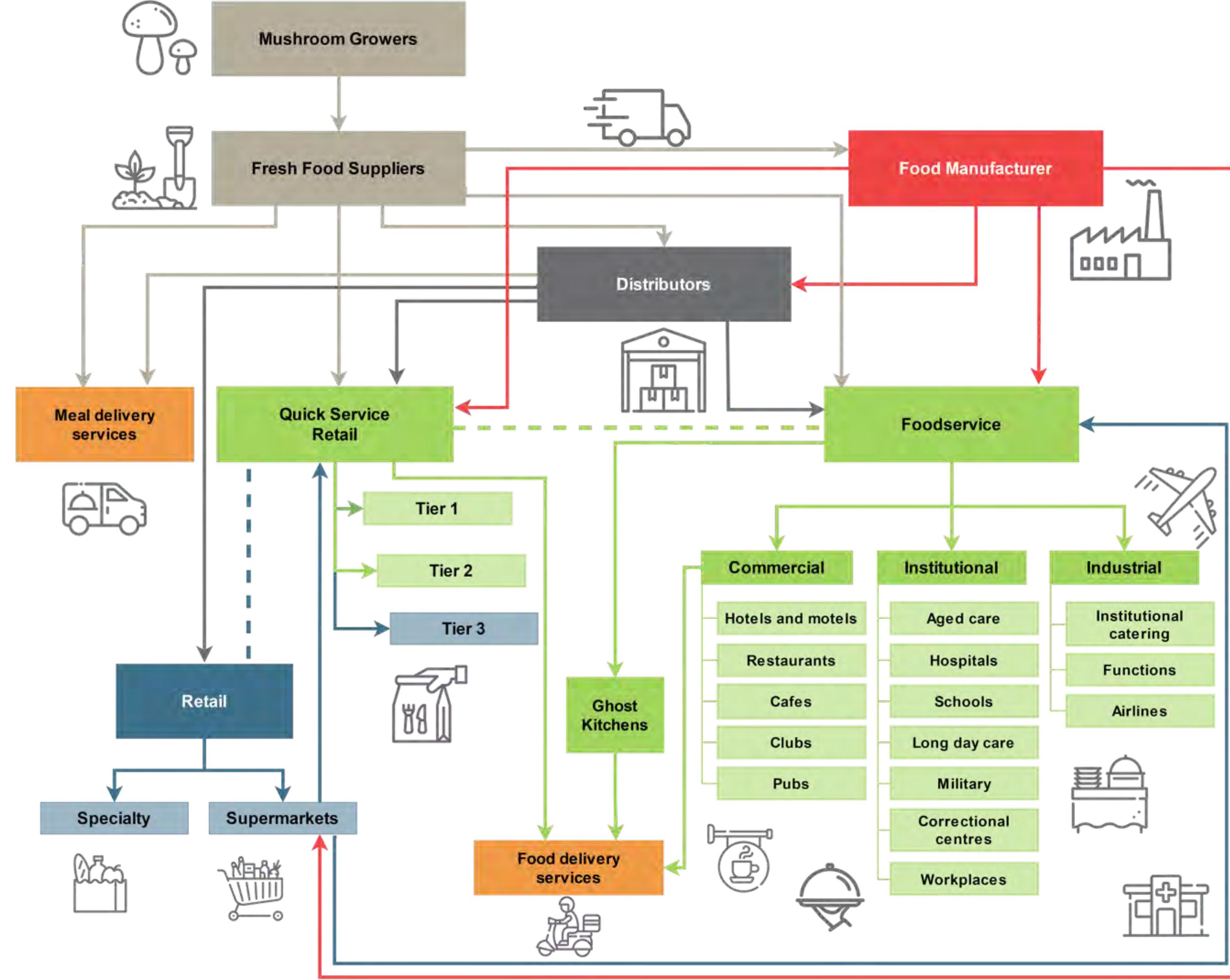
The WHO
Blueprint

INDUSTRY INSIGHTS

The HOW
KOL interviews + industry survey



Industry Blueprint



6 industry insights

12 KOL interviews

600+ survey respondents



01 HEALTH

Nutrition most relevant for institutional sector, taste & catering to diets priority for all



02 KNOWLEDGE

Little known but well received, lack confidence & nutrition excites



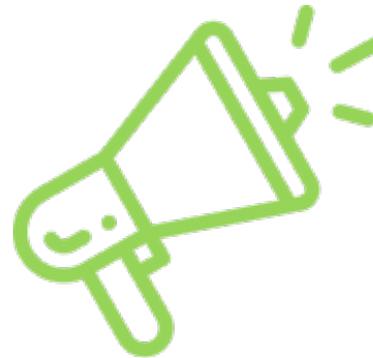
03 USAGE

Versatile flavour addition, plant-based diets, not top of mind, consider cost/benefit

6 industry insights

12 KOL interviews

600+ survey respondents



04 COMMUNICATION

On the job, keep it simple,
inspiration not educate with QR
codes & train the trainer via
masterclass



05 CURRICULUM

Featured everywhere but not
taught, & there's 3 places it can,
develop own materials



06 OPPORTUNITIES

Provenance, food as medicine, cost-
saving benefits, & pre-made options

“I’m not being disrespectful, I actually wouldn’t have a clue where my mushrooms come from. But with the focus on beef for example. We say this beef is from Riverina, it’s grain fed, and you can trace each animal, you know what I mean? And for the seafood, this is from the Hawkesbury... And my mushrooms come in, I would not have a clue about them.”

“It needs to be done in such a way that individuals can feel and do it.”

“We never call it training or professional development as people do not like being told what to do or be ‘taught’.”

What we heard

“ I love to learn stuff, you know, and I love to pass that knowledge on to my team, whether it be just me standing next to them saying Oh, listen, this is really good, has got this, it’s that... I do think you need to focus on the people that purchase the mushrooms and write the menus like me...”

“Mushrooms are already popular, but you could double the popularity once we are made more aware of it (nutrition).”

Disappointing that mushrooms are not specifically highlighted in the core vegetable and vegetarian/vegan units, not even a focus in *SITHCCCO44-Specialised food items, that has contemporary ingredients such as heirloom vegetables, native ingredients and artisan cheeses.*



A person is stirring a steaming pot with a spoon, with text overlay.

Where to next for
this project?

7 PROJECT RECOMMENDATIONS

FOODSERVICE MUSHROOM HUB



EDUCATION VIA INSPIRATION



CURRICULUM MATERIALS



CASE STUDY



FACE TO FACE MASTERCLASS



SHARE INSIGHTS WITH INDUSTRY



FARM TOUR FRAMEWORK



What else was
uncovered for the
mushroom
industry?



Future Opportunities

Provenance Story

Develop a strategic plan for the industry

Manufacturing

Fresher for longer, powder, pre-prepped, soup bases.

Research

Clinical/qualitative research on benefits of mushrooms on menus (cost, improved vitamin D status, food wastage); link to other projects

Train the trainer

Development of ongoing masterclass strategy including Executive Chef Club, online classes/suppliers

Curriculum Advocacy

Advocate mushrooms as fungi not plant (vegetables) at grassroots level in national commercial cookery curriculum



What you can do now

Ideas from the foodservice industry professionals



Talk about where mushrooms come from



QR code or leaflet with delivery to chefs



Address shelf-life barriers



Innovate with added protein



Promote its use year-round



Work with manufacturers to develop pre-prepared products



Take home message



Maximise nutrition communication opportunities with chefs



Menu planning and grower partnerships



Are you a change maker too?

Let's connect:



[@nutritionresearchaus](https://www.facebook.com/nutritionresearchaus)



[@nr_aus](https://www.instagram.com/nr_aus)



[nutrition-research-australia](https://www.linkedin.com/company/nutrition-research-australia)



info@nraus.com



www.nraus.com



Mushroom Hub



MU20003:

Mushroom Industry

Mater Case Study

Prepared for:
Hort Innovation
June 2024

Prepared by:
FOODiQ Global



Contents

Summary	3
Background	4
Aim	6
Approach	6
Findings	13
Conclusion	26
Going Forward	26
Appendix 1	28
Appendix 2	29
Appendix 3	38
Appendix 4	39
Appendix 5	41
Appendix 6	44

Summary

Mater Health, South Brisbane campus, embarked on a comprehensive mushroom-focussed initiative from 21 August through to 31st March 2024. The initiative arose from Mater Health's recognition of mushrooms as a unique, versatile, and vegan source of vitamin D, aligning seamlessly with their growing demand for plant-forward diets and their commitment to prioritising food-first dietary solutions for health. With up to 31% of Australians vitamin D deficient, and recognition that vegetarians and vegans are at higher risk, they sought to increase the delivery of vitamin D in vegetarian meals through incorporation of Australian mushrooms (*Agaricus bisporus*).

The initiative included multifaceted efforts including the introduction of a mushroom-focused chef's specials menu within the private hospital campus, complemented by tailored education of staff, patients and community. The menu offering featured a dedicated mushroom meal option integrated into the existing four-week rotating Luke Mangan weekly specials menu.

The initiative successfully increased the vitamin D content in the vegetarian meal offerings and ensured patient meal acceptability. Specifically, the incorporation of mushrooms led to a significant contribution to the provision of vitamin D in vegetarian meals; providing up to nearly half of DI (5ug/day) for adults 19-50 years and up to nearly a quarter DI (10ug/day) for adults 51-70 years, compared to zero delivery for non-mushroom vegetarian meals. In addition, the education of staff on the nutrition, health and culinary benefits of mushrooms led to greater knowledge, confidence and, ultimately, motivation to include mushrooms in menu development going forward.

The Mater mushroom initiative provides some proof points that education is key to increasing awareness, knowledge, and confidence that is paramount to motivate key decision-makers to proactively look to incorporate mushrooms into their menu development. It helped to solve through a food-first approach a key nutritional issue, specifically low provision of vitamin D in vegetarian menus, whilst also being recognised as extremely advantageous as a very versatile and easy-to-use ingredient.

Background

Context

Vitamin D is crucial for immunity and bone health, yet 31% Australian adults have vitamin D deficiency (1, 2). Current vitamin D intakes (1.84- 3.25 µg/day) are well below Adequate Intake levels (5-15 µg/day) across all population groups, and Australian vitamin D intakes are among the lowest reported globally (3). While low vitamin D intakes are common across all adult age groups, the elderly, pregnant women, and people from low to middle socioeconomic areas have been highlighted as particularly vulnerable, often with increased vitamin D needs (1, 4, 5). Vegetarians and vegans may also have increased difficulty obtaining sufficient vitamin D due to their restricted intake of animal foods (6).

Mushrooms are part of the fungi biological kingdom, boasting a unique set of nutritional properties found across different food groups, including vegetables, grains, nuts and meats, as well as three unique bioactive compounds (ergothioneine, chitin and ergosterol), not commonly found in animals or plants (7-11). Mushrooms provide essential vitamins and minerals such as B vitamins, copper and selenium, and are also the only natural and non-animal food source of vitamin (8). Raw white button mushrooms naturally contain 2.14µg vitamin D₃ equivalents per 100 g, equivalent to 21% of the daily intake (8). If mushrooms are exposed to the sun for around 15 minutes before being consumed, they provide over 100% of daily vitamin D needs(6). Research supports that mushroom consumption has the potential to not only support improvement in vitamin D status, but also immune function, metabolic health, and gastrointestinal health (12).

Mushrooms also contain a unique umami taste profile supporting flavour enhancement of meals, and an extremely versatile food ingredient for menu development (7, 13, 14). They can be utilised across different meal occasions as entrée, main or side accompaniment, and dietary needs including gluten-free, dairy-free, nut-free, heart healthy, diabetes, no added salt, vegan and vegetarian patients' needs, making them a highly valuable ingredient in food service.

Opportunity

Mater Health is focussed on delivery of fresh and high-quality produce and strives to achieve a food-first solution to nutrition and health. They also aim seek to include food ingredients that can cater to the diverse dietary needs of patients, and specifically plant-based meal options having seen an increase in demand for these over the past five years.

The Mater saw an opportunity to incorporate mushrooms into their vegetarian/vegan meal offerings to enhance the vitamin D content and maintain acceptability. In addition, they sought to raise awareness and increase knowledge about the nutrition, health and culinary benefits of mushrooms to elevate their status as a valuable dietary component and inspire their usage by staff, patients and the community.

Setting

Mater Health, situated in the heart of South Brisbane, stands as a beacon of healthcare excellence, boasting a network of five hospitals catering to the needs of both publicly and privately funded patients. The Mater provides a wide range of adult surgical, medical and cancer services, including intensive and coronary care, day surgery, day oncology and day respite, as well as busy medical, cancer and surgical units. Age demographic varies from 18-70 years. With a combined capacity of approximately 860 beds, of which 55% are reserved for privately funded individuals, Mater South Brisbane is pivotal in serving the diverse healthcare needs of Queensland's bustling population of 2.3 million.

Mater Health is an innovative leader in hospital catering. It was the first hospital in Australia to implement 'room service' for meals. Setting a new standard in patient care, every patient is provided with room service-style meal selection. Embracing flexibility and freshness, patients can choose from an array of dishes from an a la carte menu, prepared and delivered within 45 minutes.

For those under private funding, Mater offers an additional weekly Chef's Special menu. Over the past 4 years Mater has partnered with renowned Australian celebrity chef Luke Mangan to develop the Chef's special menu and support the provision of a restaurant quality menu. The Chef's Special menus, rotates weekly on a four-week cycle, and these cycles change 3 times a year, with each cycle featuring a unique theme. Previous examples have included showcasing the vibrancy of local, seasonal produce, championing plant-based dishes and spotlighting the richness of Australian native ingredients, such as plants and seeds. Mater looks to focus on themes that align to offer high-quality and fresh produce, provide nutritious meals and promote health, and support a local and/or sustainable food supply.

Aim

The aim of the mushroom initiative was to increase the delivery of vitamin D and maintain acceptability of vegetarian meals via the inclusion of Australian mushrooms (*Agaricus bisporus*) and educate staff patients and wider community on their nutrition, health and culinary benefits) to inspire their usage.

Approach

The initiative involved a multi-disciplinary team incorporating FOODiQ Global and Australian Mushroom Growers Australia together with the Mater Health, Brisbane's dietetics and foodservice team (dietitians, chefs and customer service staff) and leveraging the Mater's existing partnership with celebrity chef Luke Mangan. Specifically, the initiative encompassed:

1. Luke Mangan Mushroom focused specials menu within the private hospital campus.

Four separate weekly Chef's Special menus (4-week cycle) were crafted to feature Australian mushrooms in two entrées and two main meals (see Figure 1,2 and 3). The mushroom menu was designed by Chef Luke Mangan in conjunction with Mater's nutrition and food services team to optimise nutritional delivery and the culinary experience for patients choosing vegetarian meals at Mater Private Hospital Brisbane and Mater Mothers' Private Brisbane. The menu development aimed to provide ~75g (raw weight) of mushrooms per meal.



Figure 1. Image of Luke Mangan Mushroom Menu.

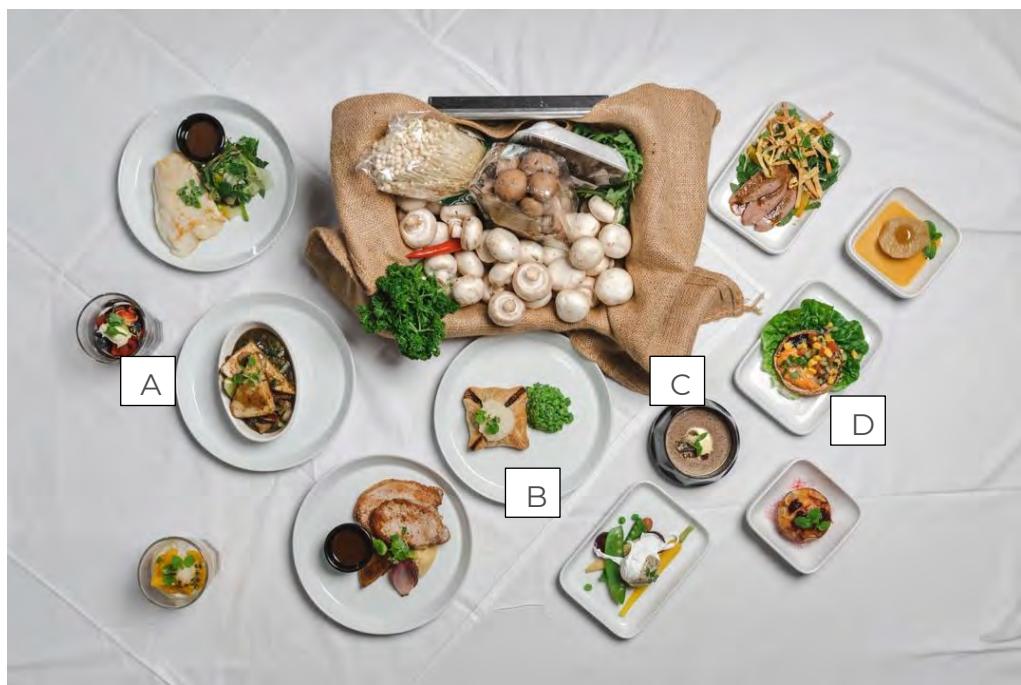


Figure 2. Photo of the mushroom focused specials menu.

A = Tofu and Mushroom meal, B= Mushroom Wellington, C = Creamy Mushroom Soup, D = Grilled Portobello and roasted vegetables.



Figure 3. Image of the collaborative mushroom initiative team members L→R Dr Flávia Fayet-Moore (FOODiQ Global), Luke Mangan (Chef), Sally McCray (Director of Dietetics and Foodservices at Mater Group, Brisbane)

2. Staff education

Three tailored culinary nutrition workshops led by external nutrition and culinary mushroom experts, Dr. Flávia Fayet-Moore (FOODiQ Global), Chef Adam Moore (Culinary Revolutions), and Leah Bramich (Australian Mushroom Grower's Association) were conducted for the food production team, customer service team, and dietitians. Attendees were provided an educational toolkit comprising printed resources and complimentary punnets of mushrooms (provided by local Brisbane based grower, Marland Mushrooms). See Figure 4 for the mushroom poster provided and Appendix 1 for full resources.

The workshops were tailored to the specific needs of the audience groups both in terms of content and delivery:

- The food service staff education took place in their kitchen setting and was led by Chef Adam Moore (see figure 5). While underpinned with a nutrition education, focus was on practical elements including education on different mushroom types, usages and how best to prepare to inspire their usage in menu development and support their skills in preparing and cooking.
- Nutrition and dietetic education took place in a meeting room with education assisted with power point presentation and was delivered by mushroom and nutrition scientist Dr Flávia Fayet-Moore. Education was focused primarily on a deep dive around the nutrition and health benefits, along with practical culinary application to support their skills in delivering ongoing education of other health professionals and clients around value and usage of mushrooms.
- Customer service staff education took place in their call centre location. Education was more consumer focused to inspire and assist them in answering questions they may get from clients around mushrooms when taking their food order. Information centred on 'fun facts' on the how mushrooms grow, different types of mushrooms and providing a top line education around nutrition benefits. It was delivered via a question-and-answer style education format.

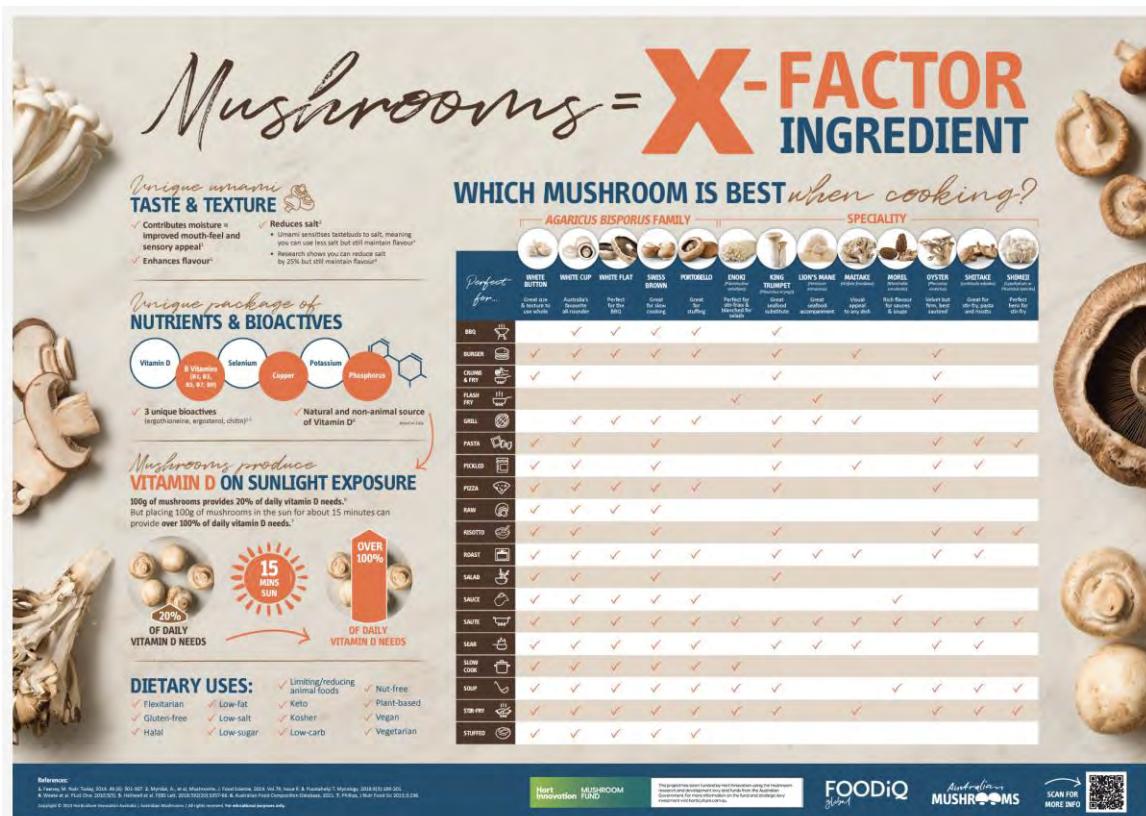


Figure 4. Food service Mushroom Kitchen poster provided to staff.

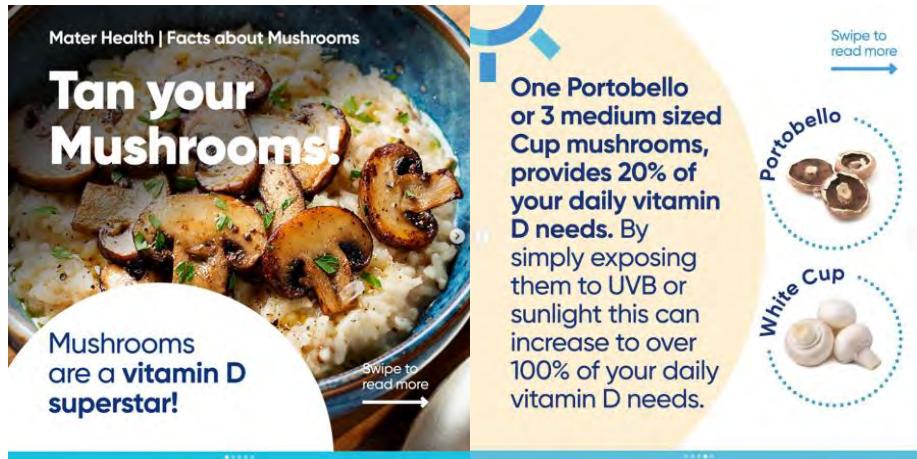


Figure 5. Image of Chef Adam Moore providing mushroom masterclass education centre to Mater Health food production team.

3. Patient and community education

An educational brochure for patients and a social media outreach campaign was developed by Mater dietetic staff in conjunction with their marketing team (See Figures 6, 7 and 8). The educational brochure provided information on different mushroom varieties with usage tips and an inspiring recipe to try at home with nutritional education focus on the vitamin D content. The social media outreach campaign comprised of two activations, one a carousel of static tiles focused on educating the mushrooms and vitamin D story, and the second a short video featuring Luke Mangan, Sally McCray and Dr Flávia Fayet-Moore highlighting the mushroom special focused menu available to order and educating on key nutritional benefits. See Social Media Reel Creative

Figure 6. Image of mushroom educational patient brochure



materqld Did you know? ☀️ 😊

By placing your mushrooms in the sun for 15 minutes before cooking, you can increase your daily vitamin D needs by more than 100%.

Mushrooms produce more Vitamin D when exposed to sunlight. Their unique compound called ergosterol converts sunlight into Vitamin D that our bodies absorb naturally!

Until April, Mater Private Hospital Brisbane is offering a mushroom-packed menu designed by restaurateur and partner, Luke Mangan.

Want to learn more? Visit the link in our bio ➡️

Figure 7. Image of Mater Social media tiles



Figure 8. Image of Mater and Luke Mangan Social Media Tile

Assessment

To assess the impact of the initiative the following assessments were undertaken:

1. **Meal nutrient delivery and acceptability:** Nutritional analysis of the recipes was undertaken via latest FoodWorks online version using Australian Food Composition Database (AFCD) 2016, and AUSFOOD 2020 and AUSBRAND 2020 databases. A record was kept of the popularity (how often meals were chosen) and consumption of the mushroom meals via CBORD™. CBORD™ is a sophisticated nutrition and menu management system that monitors meal order patterns and intake by meal, by patient, by day.
2. **Staff Knowledge and understanding:** Staff were invited to fill out a survey on their knowledge and understanding pre- and post- workshops in either a paper or online format (Typeform). See Appendix 2 for surveys utilised.
3. **Insights:** In the post-workshop survey given to staff, questions were included to garner perceptions relating to mushrooms and the initiative. In addition, a qualitative interview was conducted following the initiative with Director of Dietetics and Foodservices at Mater Group, Brisbane, Sally McCray to provide richer insights along with any learnings and recommendations that stemmed from the initiative. See Appendix 3 for the question guide utilised.

Note that this case assessment was unable to make any direct assessment on direct patient or community sentiment as it fell out of scope, due to the complexity and difficulty in obtaining ethic approvals which was required to do so.

Findings

The initiative was initially slated to be executed for 3 months from 23 August to 6 December 2023, but due to heightened interest post the staff educational workshops in October, it was extended a further 3 months to 31 March 2024.

Meal nutrient delivery and acceptability

Only three out of four mushroom meals included the target of at least 75g raw mushrooms/serve. Both the Grilled Portobello and Roasted Vegetables and Mushroom Wellington contained 75g, and the Creamy Mushroom Soup 100g. The Tofu and Vegetables only contained 28g due to need to manage and balance a protein target and sensory delivery in the recipe.

Mushrooms added to vegetarian meal recipes provided up to nearly half of daily needs for 19-50 years and up to nearly a quarter of vitamin D daily intake for adults 51-70 years compared to zero delivery for non-mushroom meals.

The four mushroom-focused meals offered on the menu delivered 0.6-2.2ug vitamin D per serve representing 12-41.8% daily intake (DI) for 19-50 years and 6-21.9% DI for 51-70 years compared to standard non-mushroom vegan/vegetarian meals which contain no vitamin D. Modelling analysis shows that if the mushrooms used were UV exposed, the meals would deliver 67.7%-246.7% of daily intake for 51-70 years. See Figure 9.

Mushrooms added to vegan/vegetarian meals were important contributors to meeting important patient micronutrient needs including copper and selenium.

In addition to providing vitamin D, mushrooms delivered a wide range of micronutrients with significant contributions of copper (8-25% DI males 51-70 years) and selenium (18-30% DI male 51-70yrs). See Figure 10. See Appendix 4 for full menu nutritional analysis.

Mushrooms are well accepted by patients, with Creamy Mushroom Soup the most popular and consumed.

All meals were popular and well accepted (Figures 11 and 12). The Creamy Mushroom Soup entrée was the most popular followed by the Portobello Mushroom entrée with the Tofu and Mushroom main the least. It is noted that the Tofu and Mushroom meal contained the least quantity of mushroom (28g) and staff note that tofu-based dishes can be polarising, which is reflected in the very wide standard deviation (SD) in consumption score. The Creamy Mushroom Soup and the Mushroom Wellington were the most consumed of the mushroom meals. The average consumption for each of the two entrees, was 91.7% (SD 2.1) for Grilled Portobello and Roasted Vegetables and 94.6% (SD 2.2) for the Creamy Mushroom Soup, which compared well with the average consumption for the 'best of Luke Mangan meals' entrée's being 94.6%. The average consumption for the two mains, was and 89.1% (SD 5.1) for the Tofu and Mushrooms and 92.9% (SD

1.9) for the Mushroom Wellington for the two mains, also comparing well with the average main meal consumption for the 'best of Luke Mangan meals' 93.2%. See Figure 10.

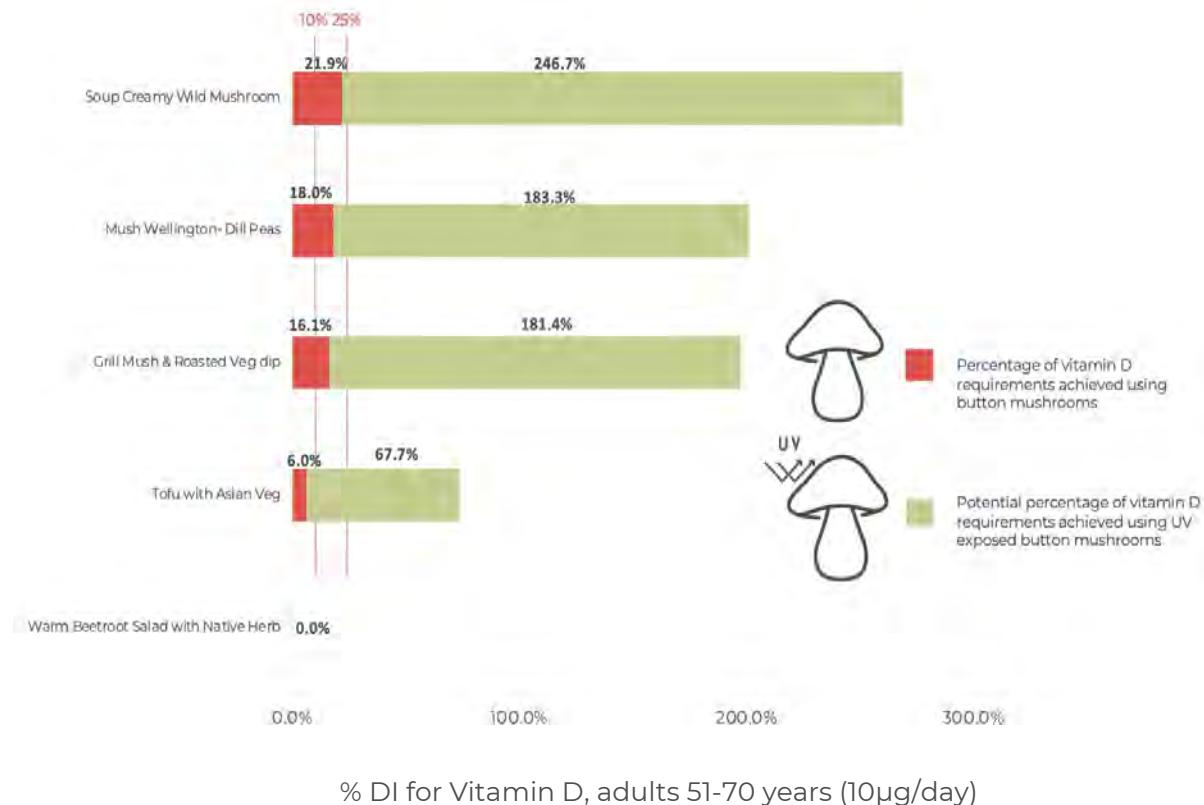


Figure 9. Per serve % Daily intake vitamin D 51-70 years for mushroom meals compared to a standard vegan/vegetarian meal offering and projected % daily intake if mushrooms were UV exposed.

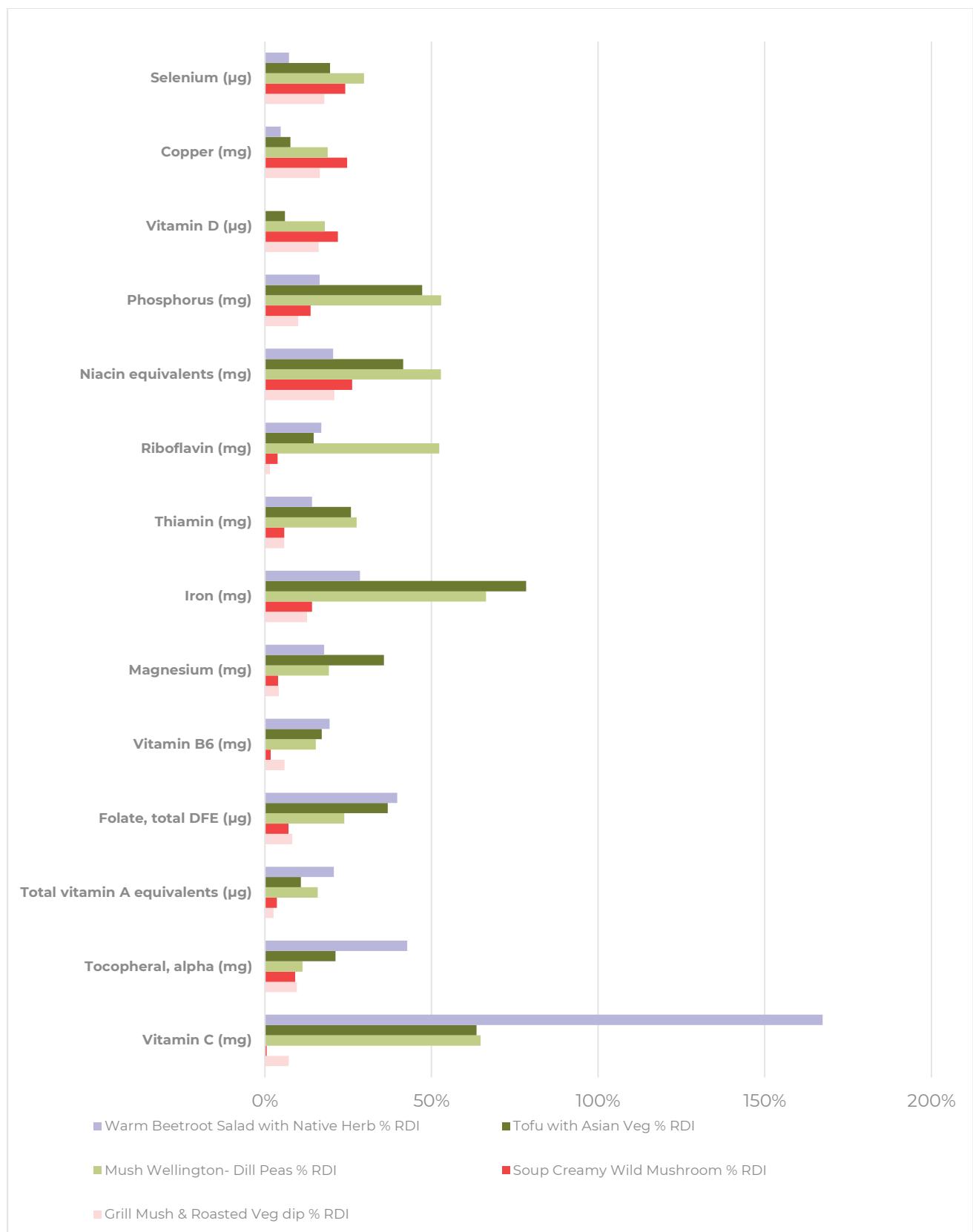


Figure 10. Per serve micronutrient % RDI (51-70 years, male) of mushroom meals compared to a standard 'Luke Mangan Best of' vegetarian meal offering.

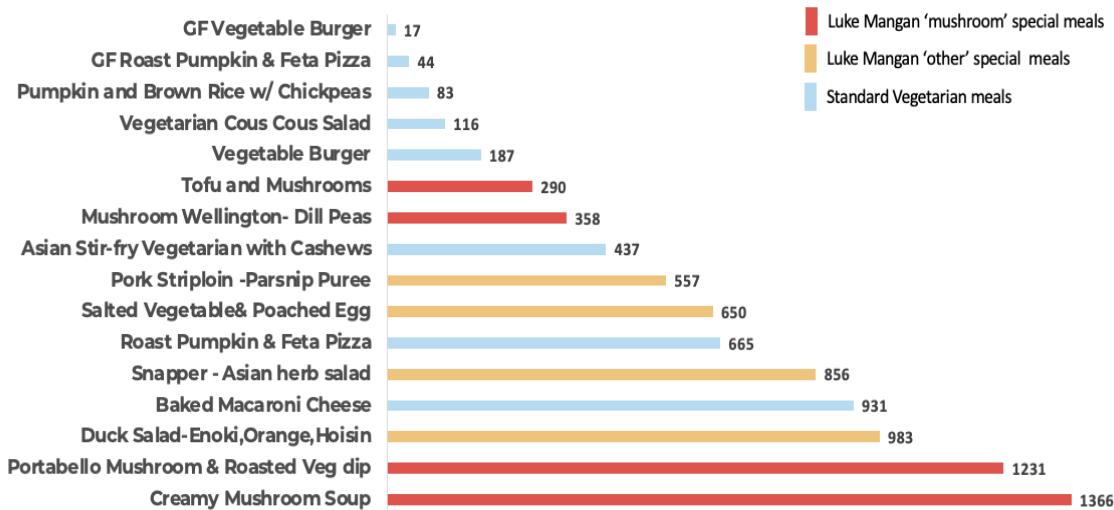


Figure 11. Meal popularity: Number of meals ordered over 1 month period.

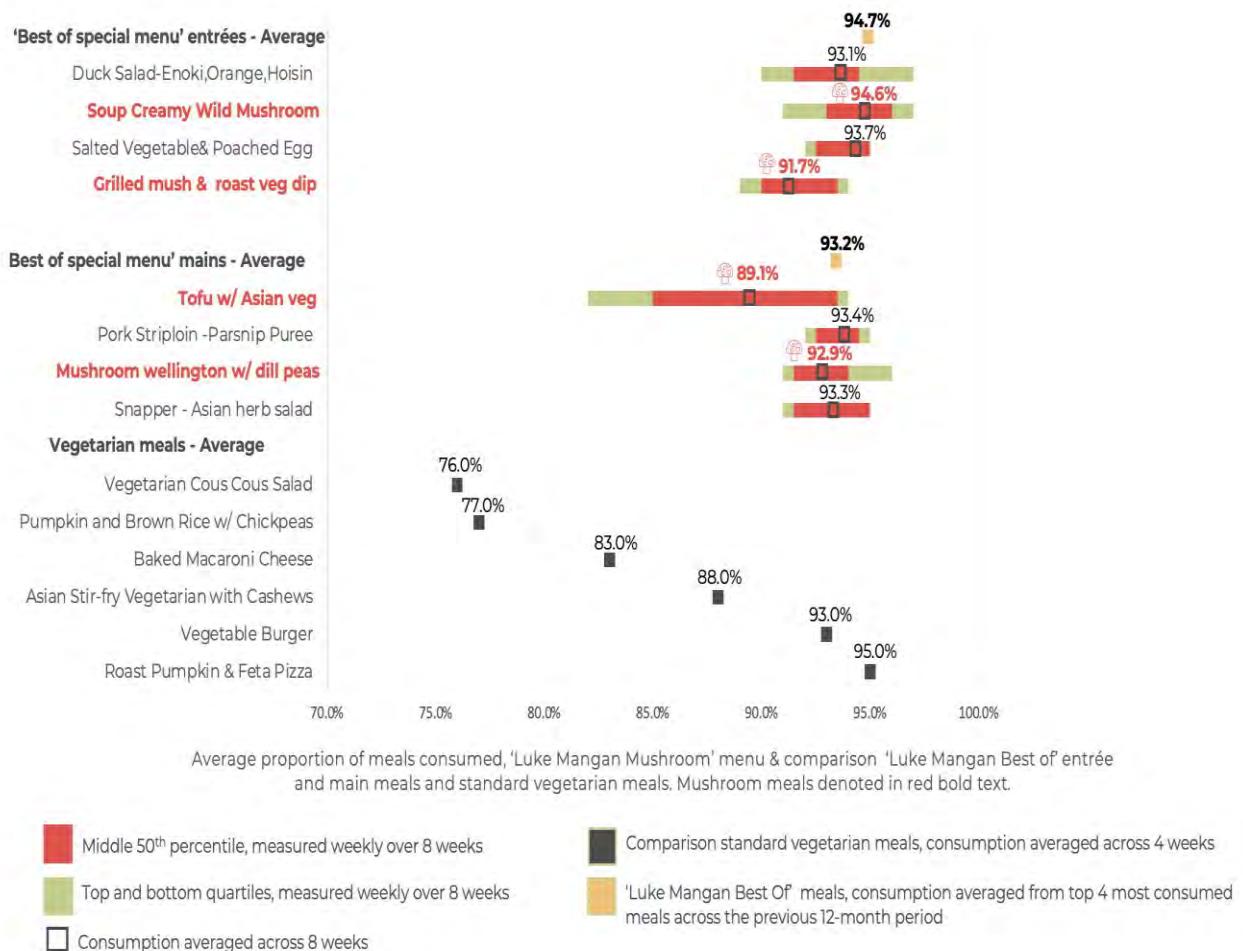


Figure 12. Meal acceptability: % Luke Mangan Mushroom focused Special Menu meals consumed

Staff knowledge and understanding

A total of 26 participants attended the masterclasses. Eleven from dietetics, eleven from production (catering staff) and four from the call centre. Participants positively rated the masterclass with 80% reporting the information delivered to be 'excellent or very good' and 92% useful (68% extremely or very useful).

Education had significant impact on confidence, with a nearly doubling in self-reported confidence levels in discussing nutrition and health benefits of mushrooms.

The dietetic staff and call centre staff were the only groups to complete the survey before and after the workshop (See Appendix 5). There was a significant increase in the overall confidence levels in discussing the nutrition and health benefits of mushrooms, with respondents' average confidence 3.9 out of 5 (SD 0.7) post the mushroom masterclass education versus 2.7 out of 5 (SD 1.2) prior to the education. Confidence levels nearly doubled with 70% post education reporting they felt 'quite or very confident' compared to 37% at baseline. See Figure 13.



Figure 13. Confidence level in discussing nutrition and health benefits of mushrooms.

Education significantly increased familiarity with nutrition and health benefits and ability to correctly identify nutrition and health benefits.

Perceived familiarity with nutrition and health properties increased significantly. Post education, for nutrition benefits, around two-thirds of respondents and for health benefits, three quarters reported being 'very familiar and or familiar and can specify', versus only one quarter at baseline for nutrition benefits and only one third for health benefits. See Figures 14 and 15.

Overall, most participants correctly identified the key nutritional properties of mushrooms with vitamin D identified by most (96% participants). Also identified by over half of participants were gluten free (89.9%), low sodium (81.5%), low fat (77.8%), low calorie (74.1), B-vitamins (51.9%). Results show positive movements in understanding with significant increase in participants correctly identifying selenium, and bioactive constituents' chitin, ergothioneine, beta glucan, and ergosterol, in addition to reductions in participants identifying protein, iron, and magnesium pre versus post masterclass. See Figure 16.

The most common health benefit that was correctly identified by 96% of respondents was improvement of vitamin D levels, followed by decreased risk of cancer and improved heart and metabolic health (57.7% respondents). See Figure 17.



Figure 14. Familiarity with nutrition and bioactive benefits of mushrooms.

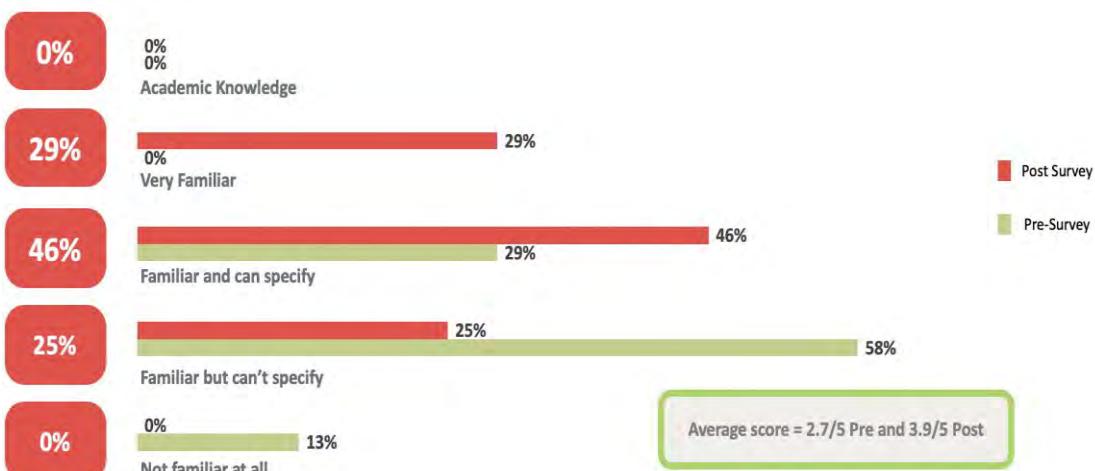


Figure 15. Familiarity with health benefits of mushrooms.

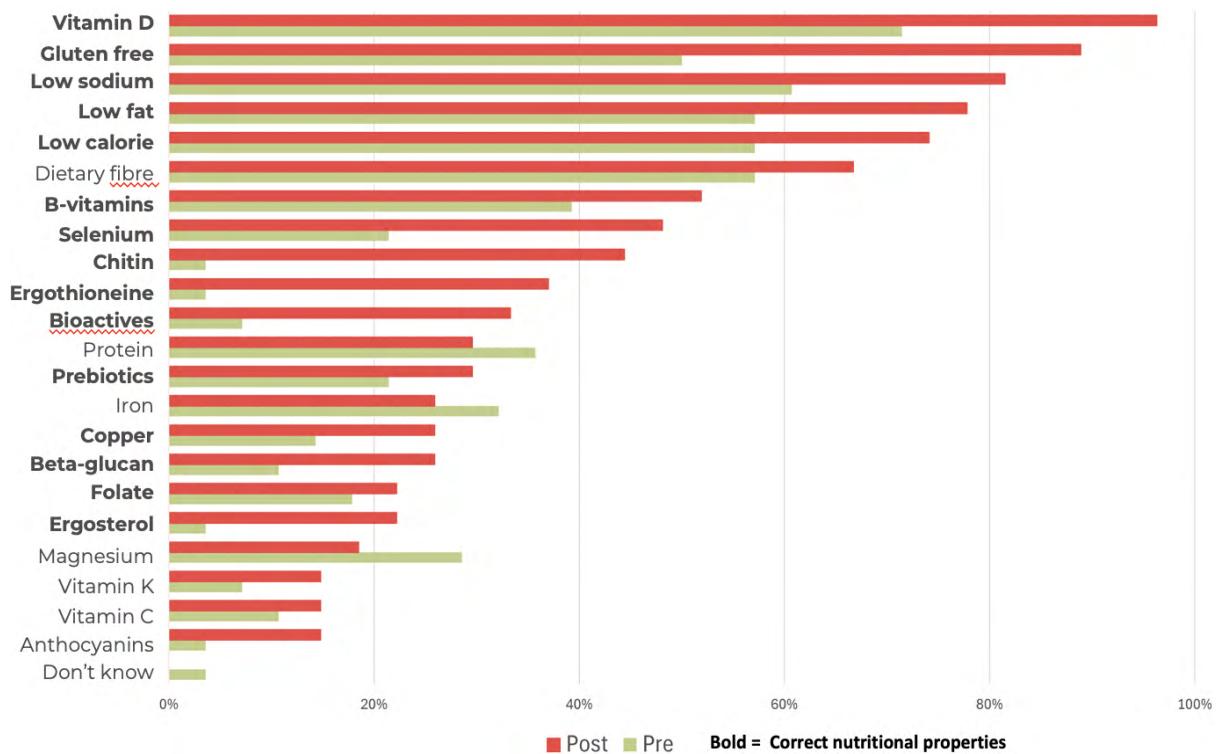


Figure 16. Nutritional properties of mushrooms identified by respondents

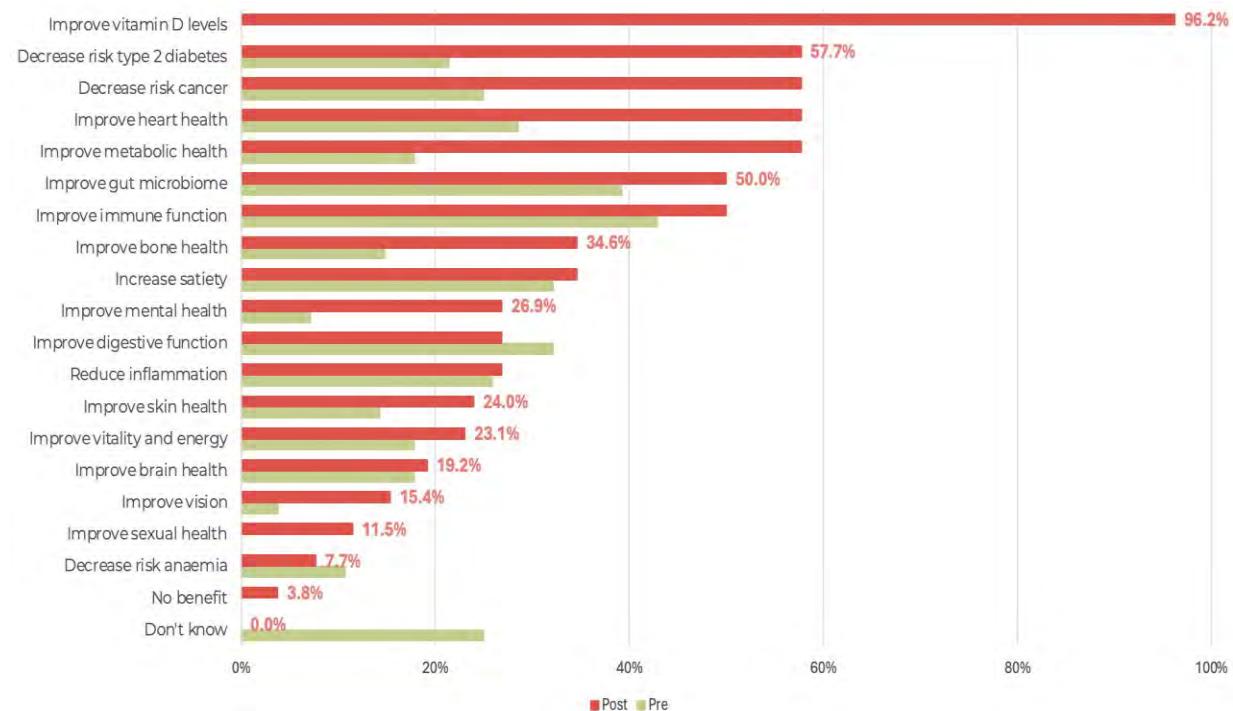


Figure 17. Health benefits of mushrooms identified by respondents.

Insights

Findings from the quantitative assessment with staff via the survey post education were combined with the qualitative deeper dive 1:1 interview with Sally McCray, Nutrition and Foodservice Director Mater Health (Appendix 6). Key insights from both are summarised below.

Nutritional benefits and being utilised in plant forward menus are key opportunities for mushrooms in hospital healthcare menus.

Most staff indicated that while mouthfeel (61.5%) and flavour (61.5%) were key, a range of nutrition benefits were the key benefit for mushroom usage in healthcare food service, with 50% or greater indicating their value for improving nutrition delivery (60%), decreasing saturated fat (61.5%) and sodium (66.7%). At the top of the list however was to support vegan/vegetarian/plant forward menus (84.6%) and using them as a meat replacer (76.9%). See Figure 18.

From the Nutrition and Foodservice director, Sally McCray's viewpoint, a key outcome from the initiative there is more inspiration to include mushrooms on the menu more. This was primarily based on the learning and understanding the nutritional benefits and the positive experience in using and patient acceptability of *Agaricus bisporous* in meals. Sally reported the intention moving forward to being more proactive including in including mushrooms in menu development. The next big focus will be on blending mushrooms with meat dishes to offer more 'flexitarian' meal choices, which she sees as the emerging opportunity. Similarly, she sees further opportunity leveraging mushrooms in meals to support decreasing the sodium and saturated fat content, particularly their heart friendly choices.

Improving confidence in usage is key opportunity to drive uptake.

In relation to barriers, while 1 in 5 reported none, nearly half reported confidence in knowing how to use(46%). Around 1 in 3 reported cost (35%) and shelf life (27%), and nearly 1 in 4 (27%) saying taste (Figure 19).

Chefs and dietitians have different perspectives that need to be considered.

When asked about the key benefits and barriers to using mushrooms in healthcare foodservice, while both professional groups agreed that mushrooms were key for supporting vegan/vegetarian/plant-forward menus, dietitians were more likely to rate nutrition delivery and taste whereas chefs as a meat replacer and meal texture. See Figure 20. Compared with chefs, dietitians placed higher value on mushrooms for their benefits on taste and nutrition delivery – likely as a recognition of taste and flavour being a facilitator of dietary intake, particularly in vulnerable populations. In terms of barriers, dietitians were more likely to perceive confidence as a barrier and for chef's cost. See Figure 21.

Education (underpinned by nutrition) is key to motivation to use mushrooms in menu development

From the deep dive interview with Nutrition and Foodservice Director Sally McCray one of the greatest outcomes of the mushroom initiative, which was underpinned by the strong educational component, was that it has inspired the department to want to use mushrooms more in their menus going forward.

100% respondents to the staff survey 'strongly agree or agree' that 'Being educated about mushrooms made me more motivated to include mushrooms in meals and menu development', and 89.5% 'strongly agree or agree' that 'Going forward I will actively look to include mushrooms more in meals and on the menu'.

In an open-ended question, 'how do you intend to use the learnings at the Mater', one of the common answers, included considering in future menu design (Table 1). When the answers were reviewed by work area, different relevant themes were evident. Dietitian responses highlighted benefits for particular patient groups including vegetarian/vegan, pregnant women and to improve vitamin D levels, plus incorporation into their education with patients and friends. Production staff responses included the ambition of utilising the techniques they learnt to maintain flavour and texture on cooking while call centre staff saw the personal benefits to their own behaviour. A major theme to come from learnings they have 'for driving more mushrooms into the industry' is via communicating their nutritional value (Table 2).

Education and practical usage of everyday Australian mushrooms (*Agaricus bisporus*) resulted in a newfound appreciation of this variety due to versatility, ease of use over exotic mushroom varieties

Sally McCray's reported that one of surprising insights from the initiative was a greater appreciation for the common mushroom, *Agaricus bisporus*. She reported that many staff prior to the initiative had not really considered the *Agaricus bisporus* variety, placing a higher value on the exotic mushrooms, driven by their perceived nutrition and health benefits. They were surprised to learn not only of the nutrition, health and culinary benefits of *Agaricus bisporus* but to also find in practice that this variety, which includes button, cup, and portobello, were much more versatile, easier to use and cost effective.

Leveraging institutional foodservice dietitians as ambassadors for mushrooms offers a potential opportunity to drive their uptake into the sector.

Dietitians and chefs have a shared role in menu development. Dietitians are influencing menu development with nutrition KPIs in mind, Chefs primarily sensory delivery and cost. As key custodian of ensuring adequate nutrient delivery, they have a significant influencer on menu inclusions. Dietitians are potentially easier to target in institutional healthcare and can be potential ambassadors of the uptake of mushrooms into the sector if upskilled in sharing knowledge of the benefits (nutrition, health, taste, ease of use, versatility) and overcoming any barriers (confidence in usage and cost).

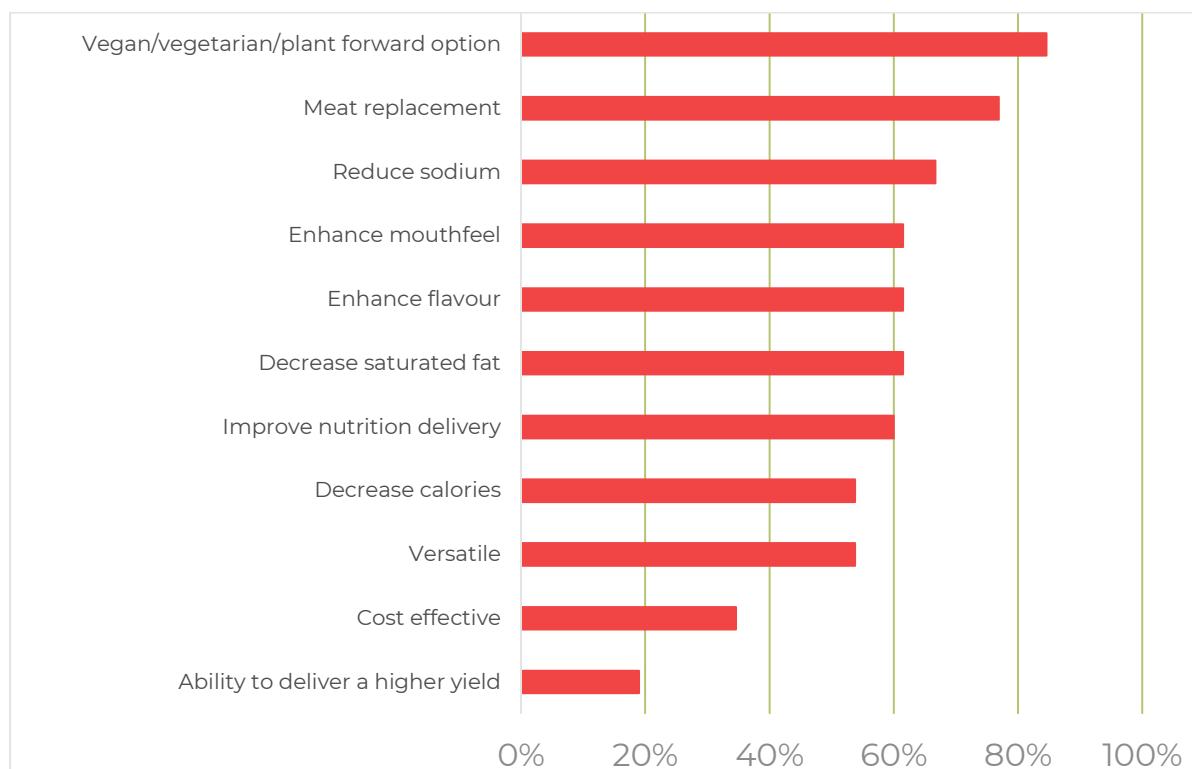


Figure 18. Perceived benefits of using mushrooms with hospital food service.

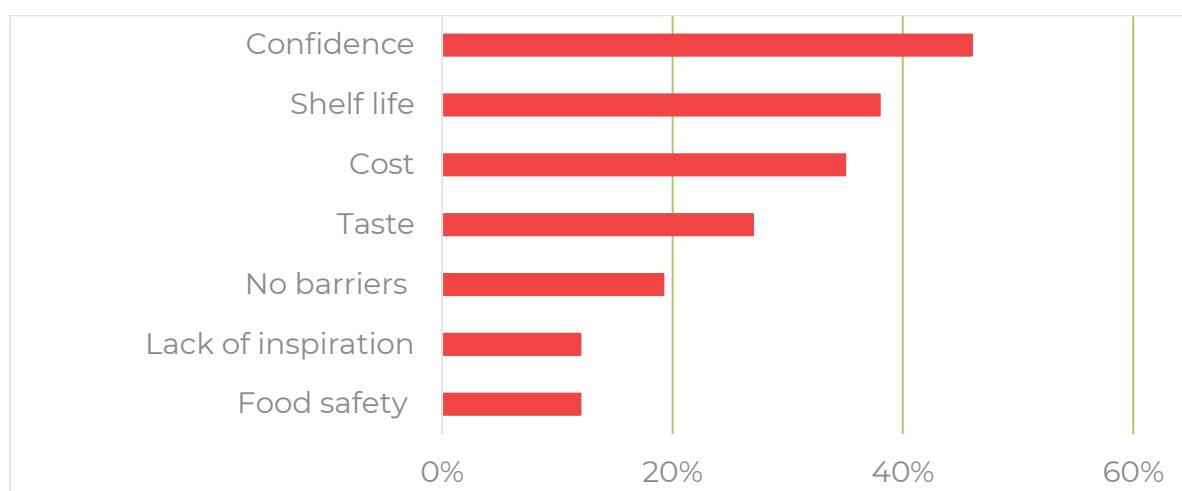


Figure 19. Perceived barriers of using mushroom within hospital food service.

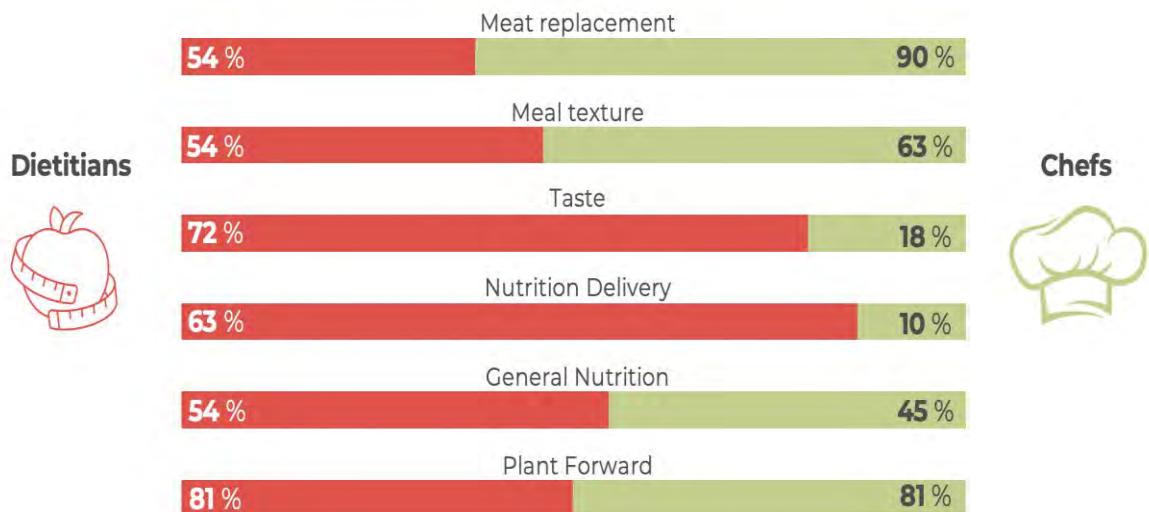


Figure 20. Dietitians Vs Chefs perceived drivers of mushrooms



Figure 21. Dietitians Vs Chefs perceived barriers of mushrooms

Table 1. Open responses to question: How do you intend to use the learnings in the future at the Mater?

Dietitians	Catering Staff	Call Centre Staff
<ul style="list-style-type: none"> To increase use of mushrooms in meals and as a meat/sodium replacement Promote as vegetarian/vegan option to my patients on the wards and in clinic. Useful for pregnant patients on low protein diets requiring more vitamin D Will consider in future menu design. Promoted as a bulking agent for meals such as lasagne and spaghetti, tacos. reduced sodium content but also adding unique umami flavours. Consider in menu design. Consider as an additional way to improve vitamin D levels, consider suggesting for patients requiring a low salt diet as a flavour enhancer. Discuss with patients, friends and colleagues. Improving education provided to patients 	<ul style="list-style-type: none"> Will encourage to use more mushrooms now I am aware of the health benefits. Try to focus in using more mushrooms in our future menus. Using the technique provided during education to cook my mushrooms. Try to cook more mushroom dishes discuss the benefits with patient. Encourage to use more mushroom in menu. Share the benefits with staff and patients. Use the information provided in daily cooking at home. More mushroom dishes Cooking method, recipe Poster provided presented information has been posted in the office and has been a talk point in staff huddles 	<ul style="list-style-type: none"> I have already started putting my own mushrooms, gills facing sunlight for 15 minutes. I am confident to introduce mushrooms to patients & my family too. By putting mushrooms in the sun to absorb vitamin D

Table 2. Open ended responses to initiative learnings.

What learnings do you have to share in getting more mushrooms utilised in healthcare foodservice?
<ul style="list-style-type: none">• Encourage use of mushrooms as a meat replacement for vegetarian/vegan meals• As it is a great substitute to meat nutritionally very beneficial will try to utilise more mushrooms• Nutritional value• Nutritional benefits of mushrooms.• Proper technique to cook them.• Excellent nutritional value• Exceptional nutritional value.• Great versatility• Keep using mushroom 'because its important to our health'.• Nutritional value.• Versatile• A great flexible and sustainable ingredient that can be incorporated into a range of dishes to provide good range of health benefits.• Suggest mushrooms more as a side on breakfast, lunch, or dinner orders

Conclusion

In summary, the Mater hospital mushroom initiative was successful in its ambition to increase the vitamin D content via incorporation of Australian mushrooms (*Agaricus bisporus*) in the vegetarian meal offerings as part of Luke Mangan specials menu and ensure patient meal acceptability. Specifically, the incorporation of mushrooms led to a significant contribution to the provision of vitamin D, a key nutrient at risk in the Australian diet, with meals providing up to nearly half of DI for adults 19-50 years and up to nearly a quarter DI for adults 51-70 years, compared to zero delivery for non-mushroom vegetarian meals. In addition, the education of staff on the nutrition, health and culinary benefits of mushrooms led to greater knowledge, confidence and ultimately motivation to include mushrooms in menu development going forward.

The Mater mushroom initiative provides some proof points that education is key to increasing awareness, knowledge, and confidence that is paramount to motivate key decision makers to proactively look to incorporate mushrooms into their menu development. It helped to solve through a food first approach a key nutritional issue, specifically high risk of vitamin D deficiency in Australia and low provision of vitamin D in vegetarian menus whilst also being advantageous as a very versatile and easy to use ingredient.

Going Forward

This case study gave the Mater Nutrition and Food service team confidence and inspiration to include mushrooms more in their mushroom development. Going forward they see an opportunity to extend the usage of mushrooms into 'standard' meals by combining and substituting mushrooms in recipes for some of the meat component to support the emerging and growing 'flexitarian' style eating pattern, that is part of the over-arching plant forward movement. As part of the plant forward movement, plants are pivotal to the dietary pattern either exclusively (Vegan) or predominantly, with meat when included forming a relatively smaller proportion of the diet (Flexitarian). In flexitarian dietary patterns, individuals are not wanting to avoid meat per se, but looking to reduce it and in place include more health promoting foods, such as plant and fungi foods. They also see benefits further in supporting heart healthy diets to support reduction in sodium and saturated fat. Research supports acceptable sensory appeal with up to 80% substitution, and evidence for increased flavour when fresh mushrooms were substituted for red meat, even when salt levels were reduced (15-17).

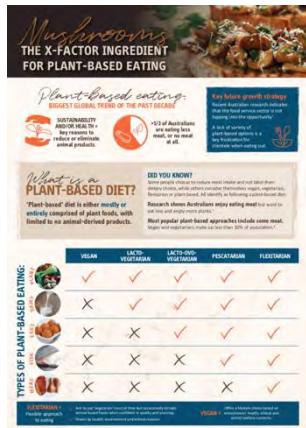
From the mushroom industry perspective this case study highlighted that there is potential opportunity for driving uptake of mushrooms into the institutional foodservice sector via focusing on foodservice dietitians to be ambassadors of the mushroom message. It is recommended that in doing so, there is opportunity to develop tailored toolkits to provide them with the right tools to influence successfully.

References

1. Cui A ZT, Xiao P, Fan Z, Wang H, Zhuang Y. Global and regional prevalence of vitamin D deficiency in population-based studies from 2000 to 2022: A pooled analysis of 7.9 million participants. *Front Nutr.* 2023;10:1070808.
2. NHMRC. Nutrient Reference Values. 2006.
3. Dunlop E BJ, Hambridge TL, McNeill J, James AP, Kiely M, et al. Evidence of low vitamin D intakes in the Australian population points to a need for data-driven nutrition policy for improving population vitamin D status. *J. Hum Nutr Diet* 2023;36(1):203-15.
4. Feehan O, et al. Vitamin D deficiency in nursing home residents: a systematic review. *Nutr Rev.* 2022.
5. Da Silveira EA, et al. Prevalence of Vitamin D and Calcium Deficiency and Insufficiency in Women of Childbearing Age and Associated Risk Factors: A Systematic Review and Meta-Analysis. *Nutrients.* 2022;14(20).
6. Cardwell G, et al., . A Review of Mushrooms as a Potential Source of Dietary Vitamin D. *Nutrients.* 2018; ;10(10).
7. Feeney MJ, Miller AM, Roupas P. Mushrooms—Biologically distinct and nutritionally unique: Exploring a “third food kingdom”. *Nutrition today.* 2014; 49(6):301.
8. FSANZ. Australian Food Composition Database - release 2.0. 2019. <https://www.foodstandards.gov.au/science/monitoringnutrients/afcd/Pages/foodssearch.asp> FSANZAFCD-RAF.
9. USDoA. FoodData Central Available from: <https://fdc.nal.usda.gov/>.
10. Manzi P, A. Aguzzi, and L. Pizzoferrato. Nutritional value of mushrooms widely consumed in Italy. *Food Chemistry.* 2001;73(3): p. 321-325.
11. Gallotti FaVL, T. he Effect of UV Irradiation on Vitamin D(2) Content and Antioxidant and Antiglycation Activities of Mushrooms. *Foods.* 2020;9(8).
12. Blumfield M, Abbott K, Duve E, Cassettari T, Marshall S, Fayet-Moore F. Examining the health effects and bioactive components in *Agaricus bisporus* mushrooms: A scoping review. *The Journal of Nutritional Biochemistry.* 2020;84:108453.
13. Sun L-b, et al., . Advances in umami taste and aroma of edible mushrooms. *Trends in Food Science & Technology.* 2020;96: p. 176-187.
14. Crowe-White KM, et al. Application of Umami Tastants for Sodium Reduction in Food: An Evidence Analysis Center Scoping Review. *Journal of the Academy of Nutrition and Dietetics.* 2022.
15. Miller A, et al. Flavor-enhancing properties of mushrooms in meat-based dishes in which sodium has been reduced and meat has been partially substituted with mushrooms. *J Food Sci.* 2014;79(9): p. S1795-804.
16. Wong KM, et al. Utilizing Mushrooms to Reduce Overall Sodium in Taco Filling Using Physical and Sensory Evaluation. *J Food Sci.* 2017;82(10): p. 2379-2386.
17. Wong KM, et al., . Sodium reduction strategies through use of meat extenders (white button mushrooms vs. textured soy) in beef patties . *Food Sci Nutr.* 2019; ;7(2): p. 506-518.

Appendix 1

Masterclass resources



This comprehensive resource is a whitepaper from the Australian Mushroom Council. It covers the following topics:

- Unique mushroom TASTE & TEXTURE:** Discusses how mushrooms contribute moisture, reduce salt, and enhance flavor.
- Unique package of NUTRIENTS & BIOACTIVES:** Lists Vitamins B, D, E, Selenium, Copper, Potassium, and Phytosterols.
- Mushrooms produce VITAMIN D ON SUNLIGHT EXPOSURE:** States that 100g of mushrooms provides 20% of daily Vitamin D needs.
- DIETARY USES:** Lists various dietary uses including Flexitarian, Gluten-free, Kosher, Halal, Low-fat, Low-salt, Low-carb, Low-sugar, Animal-free, Plant-based, Vegan, and Vegetarian.
- WHICH MUSHROOM IS BEST when cooking?** A comparison chart for the Agaricus bisporus family, including Porcini, Cremini, White button, Baby bella, Shimeji, Porcini, Enoki, King trumpet, Lion's mane, Maitake, Angel, Oyster, Shitake, and Enoki.
- OVER 100% OF DAILY VITAMIN D NEEDS** (with a sun icon).

At the bottom, there is a QR code for more info, and logos for Hart Innovation, INGREDIUM, NRAUS, and Australian MUSHROOMS.

Appendix 2

Staff Survey Pre-intervention

Please spare a few minutes to complete this short survey as part of the **Mater Mushroom Project** to help us understand your knowledge, perceptions and recommendations around mushrooms.

Completing this survey is anonymous. Your responses will be used to help inform the Mater Mushroom Project, as well as measure its impact and success.

Q1 What area within the Mater do you work? Please circle

1. Nutrition and Dietetics team
2. Production/ Chefs Team
3. RS Call Centre team

Position: _____

Q2 On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how **confident** do you feel in discussing the nutrition and health benefits of Australian mushrooms? Please circle

1. Not confident at all
2. Slightly confident
3. Somewhat confident
4. Quite Confident
5. Very confident
6. Don't know

Q3 How familiar do you think you are with the different **nutritional properties** (nutrient content and bioactive components) of Australian mushrooms?

Scale from 1 to 5: Please circle

1. Not familiar at all
2. Familiar with some nutritional properties but cannot specify them
3. Familiar and can specify them
4. Very familiar as I have attended events / seminars / read resources
5. Academic knowledge and actively seek more information

Q4 How familiar do you think you are with the different **health benefits** of Australian mushrooms? Please select the statement that best applies to you

Scale from 1 to 5: Please circle

1. Not familiar at all
2. Familiar with some nutritional properties but cannot specify them
3. Familiar and can specify them
4. Very familiar as I have attended events / seminars / read resources
5. Academic knowledge and actively seek more information

Q5 In your opinion, what are the key **nutritional properties** of Australian mushrooms? Choose as many as you like

- Anthocyanins
- Beta-glucan
- Bioactives
- B-Vitamins
- Chitin
- Copper
- Dietary fibre
- Ergosterol
- Ergothioneine
- Folate
- Gluten free
- Iron
- Low calorie
- Low Fat
- Low sodium
- Magnesium
- Prebiotics
- Protein
- Selenium
- Vitamin C
- Vitamin D
- Vitamin K
- Don't know
- Other _____

Q6 Which statement best describes how often you specifically **discuss** mushrooms or mushroom dishes to patients?

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never, but I do see clients
6. Never, as I don't see patients (skip to Q11)

Q7 Which statement best describes how often you specifically **recommend** mushrooms or mushroom dishes to patients?

7. Always (skip to Q10)
8. Often (skip Q10)
9. Sometimes
10. Rarely
11. Never, but I do see patients
12. Never, as I don't see patients (skip to Q11)

Q8 If you **don't recommend** them often, help us to understand why you do not regularly recommend mushrooms or mushroom dishes to patients?

Choose all that apply and then go to **Q11**.

- I do not think about mushrooms specifically
- I'm not familiar with their health benefits
- I do not have time to discuss mushrooms specifically
- I'm not familiar with their nutritional properties
- They cost too much
- I do not believe mushrooms are important to recommend
- Patients do not like mushrooms
- Not my role to
- Other (Please specify)_____

Q9 If you **do recommend** them, help us to understand why you regularly recommend mushrooms to your patients.

Choose all that apply

- For their nutritional properties
- For their health benefits
- Vegetarian/Vegan food option
- They are delicious
- They are easy and convenient
- They are versatile
- They make meals healthier
- Not applicable
- Other (Please specify)_____

Q10 In your opinion, in what ways can Australian mushrooms **influence health**?

Choose as many as you like

- Improve metabolic health
- Improve heart health
- Improve vision
- Improve skin health
- Improve immune function
- Reduce inflammation
- Decrease risk of cancer
- Decrease risk of type 2 diabetes
- Decrease risk of anaemia
- Increase satiety
- Improve bone health
- Improve brain health and cognitive function
- Improve vitality and energy
- Improve sexual health
- Improve digestive function
- Improve gut microbiome
- Improve mental health
- There are no specific health benefits of mushrooms
- Don't know

- Other (Please specify): _____

Q11 In your opinion what do you see as the benefits to including mushrooms on the menu and/or in meals at the Mater?

Select as many as you like:

- Meat replacement
- Improves meal texture
- To help enhance the taste/flavour of the meal
- To help enhance the mouthfeel and sensory appeal
- Vegetarian/Vegan/Supports plant forward menus
- Environmentally friendly
- Versatility
- Cost effective
- Higher yield
- Specific nutrition and health benefits. Please list _____
- To help improve the general nutritional delivery of the meal/menu
- To help reduce the sodium content of the meal
- To help reduce the calorie content of the meal
- To help reduce the saturated fat content of the meal
- Other (please specify) _____
- Don't know

Q12 In your opinion, what do you see are the barriers to using mushrooms in meals/menus?

Select as many as you like:

- Cost
- Taste
- Confidence in knowing how to use
- Lack of inspiration
- Food safety
- Shelf-life
- Other (please specify) _____
- I do not think there are any barriers to using mushrooms

Staff Survey Post-Intervention

Please spare a few minutes to complete this short survey as part of the **Mater Mushroom Project** to help us understand your knowledge, perceptions and recommendations around mushrooms post the masterclasses.

Completing this survey is anonymous. Your responses will be used to help inform the Mater Mushroom Project, as well as measure its impact and success.

Q1 What area within Mater do you work? Please circle

1. Nutrition and Dietetics team
2. Production/ Chefs Team
3. RS Call Centre team
- 4.

Position:_____

Q2. On a scale between 1 and 5, where 1 is 'Excellent', and 5 is 'Poor', How informative did you find the masterclass held in October?

1. Excellent
2. Very good
3. Good
4. OK
5. Poor

Q3. Why/Why not?

Q4. On a scale between 1 and 5, where 1 is 'Extremely useful', and 5 is 'Useless' How useful do you feel the information presented was to you?

1. Extremely useful
2. Very useful
3. Useful
4. Somewhat useful
5. Useless

Q5. On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how **confident** do you currently feel in discussing the nutrition and health benefits of Australian mushrooms? Please circle

1. Not confident at all
2. Slightly confident
3. Somewhat confident
4. Quite Confident
5. Very confident
6. Don't know

Q6. How familiar do you think you are with the different **nutritional properties** (nutrient content and bioactive components) of Australian mushrooms?

Scale from 1 to 5: Please circle

1. Not familiar at all
2. Familiar with some nutritional properties but cannot specify them
3. Familiar and can specify them
4. Very familiar as I have attended events / seminars / read resources
5. Academic knowledge and actively seek more information

Q7. How familiar do you think you are with the different **health benefits** of Australian mushrooms? Please select the statement that best applies to you.

1. Not familiar at all
2. Familiar with some nutritional properties but cannot specify them
3. Familiar and can specify them
4. Very familiar as I have attended events / seminars / read resources
5. Academic knowledge and actively seek more information

Q8. In your opinion, what are the key **nutritional properties** of Australian mushrooms? Choose as many as you like

- Anthocyanins
- Beta-glucan
- Bioactives
- B-Vitamins
- Chitin
- Copper
- Dietary fibre
- Ergosterol
- Ergothioneine
- Folate

- Gluten free
- Iron
- Low calorie
- Low Fat
- Low sodium
- Magnesium
- Prebiotics
- Protein
- Selenium
- Vitamin C
- Vitamin D
- Vitamin K
- Don't know
- Other _____

Q9. In your opinion, in what ways can Australian mushrooms **influence health?**

Choose as many as you like

- Improve metabolic health
- Improve heart health
- Improve vision
- Improve skin health
- Improve immune function
- Reduce inflammation
- Decrease risk of cancer
- Decrease risk of type 2 diabetes
- Decrease risk of anaemia
- Increase satiety
- Improve bone health
- Improve brain health and cognitive function
- Improve vitality and energy
- Improve sexual health
- Improve digestive function
- Improve gut microbiome
- Improve mental health
- Improve vitamin D levels
- There are no specific health benefits of mushrooms
- Don't know
- Other (Please specify): _____

Q10. In your opinion what do you see as the benefits to including mushrooms on the menu and/or in meals at the Mater?

Select as many as you like:

- Meat replacement
- Improves meal texture
- Vegetarian/Vegan/Supports plant forward menus

- Environmentally friendly
- Versatility
- Ease of use as an ingredient
- Specific nutrition and health benefits. Please list _____
- To help enhance the taste/flavour of the meal
- To help enhance the mouthfeel and sensory appeal
- To help improve the general nutritional delivery of the meal/menu
- To help reduce the sodium content of the meal
- To help reduce the calorie content of the meal
- To help reduce the saturated fat content of the meal
- Cost effective
- Ability to deliver higher yield
- Other (please specify)_____
- Don't know

Q11. In your opinion, what do you see are the barriers to using mushrooms in meals/menus?

Select as many as you like:

- Cost
- Taste
- Confidence in knowing how to use
- Lack of inspiration
- Food safety
- Shelf-life
- Other (please specify)_____
- I do not think there are any barriers to using mushrooms

Q12. On a scale between 1 and 5, where 1 is 'strongly disagree', and 5 is 'strongly agree', thinking about your current workplace, how much do you agree with the following statement:

"Patients are ordering more mushrooms since we have provided them with patient leaflet and/or I have been talking about them more."

Scale from 1 to 5:

1. Strongly disagree
2. Disagree
3. Unsure
4. Agree
5. Strongly agree
6. Don't know

Q13. On a scale between 1 and 5, where 1 is 'strongly disagree', and 5 is 'strongly agree', thinking about your current workplace, how much do you agree with the following statement:

"Being educated about mushrooms makes me more motivated to include mushrooms in meals and menu development."

Scale from 1 to 5:

1. Strongly disagree
2. Disagree
3. Unsure
4. Agree
5. Strongly agree
6. Don't know

Q14. On a scale between 1 and 5, where 1 is 'strongly disagree', and 5 is 'strongly agree', thinking about your current workplace, how much do you agree with the following statement:

"Going forward I will be actively looking to how I can include mushrooms more in meals and on the menu."

Scale from 1 to 5:

1. Strongly disagree
2. Disagree
3. Unsure
4. Agree
5. Strongly agree
6. Don't know

Q15. Tell us a little more about how you intend to use the learnings from the masterclass at the Mater:

Q16. What learning do you have to share for how to generate more mushrooms being utilised on the menu in healthcare foodservice?

Appendix 3

Deep Dive Discussion Guide

Purpose

- The purpose of the discussion is to understand more about your experiences over the six months of the mushroom intervention.
- The results will be used to evaluate the implementation of this initiative to gather insights, learnings and future recommendations for other healthcare organisations.

Guidelines

- No right or wrong answers, only differing points of view. Please feel free to share your point of view even if it differs from what others have said. Keep in mind that we're just as interested in negative comments as positive comments, and at times the negative comments are the most helpful.

Open-ended questions

- Why was this initiative important for you to undertake? What benefits did you see in undertaking this project?
- What did you see as the most valuable outcomes?
- I'd like to hear about your experience of implementing the mushroom initiative.
 - What worked well from all that was done,
 - what didn't work so well,
 - what could have been better?
- Tell me about what you heard from the staff around the initiative?
- Going forward, what role do you see for mushrooms at Mater? in institutional healthcare foodservice?
- Opportunities for industry? In what ways could mushroom industry influence greater uptake of mushrooms into institutional healthcare?
- That brings us to the end. Before we wrap up was there anything else that anyone wanted to share? Any final thoughts, reflections, learnings, or comments?

Appendix 4

Nutritional Analysis Mushroom Meals

Nutrient	Grill Mush & Roasted Veg dip	Per 100g	Per serve	Soup Creamy Wild Mushroom	Per 100g	Per serve	Mush Wellington-Dill Peas	Per 100g	Per serve	Tofu with Asian Veg	Per 100g	Per serve	Warm Beetroot Salad with Native Herb
Source: Foodworks Online 2024													
Weight (g)	100	110	100	180	100	100	185	100	302.9	100	210		
Energy (kJ)	281	309	227	408	899	1664	519	1571	814	1709			
Energy (Cal)	67	74	54	98	215	398	124	375	194	408			
Protein (g)	2.29	2.52	1.89	3.4	10.98	20.31	7.54	22.83	3.62	7.6			
Total fat (g)	3.33	3.67	3.82	6.88	7.61	14.08	7.56	22.92	14.47	30.38			
Saturated fat (g)	0.49	0.54	0.8	1.44	3.9	7.21	0.83	2.51	2.38	4.99			
Carbohydrate-available (g)	4.69	5.16	2	3.6	22.05	40.79	4.34	13.14	10.56	22.18			
Sugars (g)	2.85	3.14	0.62	1.12	12.07	22.33	2.35	7.11	9.21	19.35			
Dietary fibre (g)	2.18	2.4	0.92	1.66	3.87	7.16	2.9	8.77	4.07	8.55			
Thiamin (mg)	0.06	0.07	0.04	0.07	0.18	0.33	0.1	0.31	0.08	0.17			
Riboflavin (mg)	0.01	0.02	0.03	0.05	0.37	0.68	0.06	0.19	0.1	0.22			
Niacin (mg)	2.44	2.69	1.87	3.37	2.24	4.15	0.74	2.23	0.85	1.79			
Niacin equivalents (mg)	3.03	3.33	2.33	4.19	4.57	8.45	2.19	6.64	1.56	3.28			
Vitamin C (mg)	2.92	3.22	0.14	0.25	15.73	29.11	9.43	28.57	35.86	75.31			
Vitamin D (µg)	1.46	1.61	1.22	2.19	0.97	1.8	0.2	0.6	0	0			
Ergocalciferol (Vitamin D2) (µg)	1.36	1.5	1.13	2.04	0.81	1.5	0.18	0.56	0	0			
Cholecalciferol (Vitamin D3) (µg)	0	0	0	0	0.11	0.2	0	0	0	0			
Vitamin E (mg)	1.02	1.12	0.71	1.27	0.71	1.32	0.98	2.96	2.35	4.94			
Tocopherol, alpha (mg)	0.88	0.96	0.51	0.91	0.61	1.13	0.7	2.12	2.04	4.27			

Vitamin B6 (mg)	0.09	0.1	0.02	0.03	0.14	0.26	0.1	0.29	0.16	0.33
Vitamin B12 (µg)	0	0	0.07	0.13	0.3	0.56	0	0	0.03	0.07
Total folate (µg)	27.84	30.63	15.68	28.22	51.47	95.22	48.69	147.49	72.24	151.69
Folate, total DFE (µg)	29.8	32.78	15.68	28.22	51.47	95.22	48.69	147.49	75.67	158.9
Folate acid (µg)	2.93	3.22	0	0	0	0	0	0	5.14	10.79
Food Folate (µg)	24.91	27.4	15.68	28.22	51.47	95.22	48.69	147.49	67.1	140.9
Total vitamin A equivalents (µg)	21.42	23.57	17.87	32.17	76.98	142.41	32.06	97.13	88.56	185.98
Retinol (µg)	0	0	15.6	28.09	37.37	69.13	0	0	3.86	8.1
Beta carotene equivalents (µg)	128.42	141.26	14.33	25.8	237.48	439.33	192.07	581.81	507.81	1066.4
Beta carotene (µg)	125.72	138.29	14.33	25.8	228.62	422.95	184.33	558.37	332.98	699.26
Sodium (mg)	78.67	86.54	70.38	126.69	138.84	256.85	286.01	866.38	139.85	293.68
					604.9					
Potassium (mg)	330.63	363.7	225.99	406.79	8	1119.22	170.9	517.69	334.6	702.66
Magnesium (mg)	15.8	17.38	9.16	16.5	43.61	80.68	49.49	149.91	35.53	74.61
Calcium (mg)	26.41	29.05	23.27	41.89	250.93	464.22	193.01	584.67	61.74	129.65
Phosphorus (mg)	91.21	100.33	76.07	136.93	285.69	528.52	155.72	471.69	78.19	164.2
Iron (mg)	0.92	1.01	0.63	1.13	2.87	5.31	2.07	6.27	1.09	2.28
Zinc (mg)	0.16	0.18	0.1	0.19	1.16	2.15	1.04	3.16	0.79	1.65
Zinc Copper (mg)	0.25	0.28	0.23	0.42	0.17	0.32	0.04	0.13	0.04	0.08
Selenium (µg)	11.33	12.47	9.37	16.87	11.25	20.81	4.53	13.71	2.4	5.04
Iodine (µg)	1.41	1.55	3.39	6.11	36.98	68.41	2.52	7.63	4.85	10.19
Substituting with vitamin D enhanced mushrooms										
Vitamin D (by summation) (µg)	16.49	18.14	13.71	24.67	9.91	18.33	2.24	6.77	0	0
Ergocalciferol (Vitamin D2) (µg)	16.36	18	13.6	24.48	9.73	18	2.22	6.72	0	0
Cholecalciferol (Vitamin D3) (µg)	0	0	0	0	0.11	0.2	0	0	0	0

Appendix 5

Mater Health Staff Survey Results

Table 1. What area within the Mater do you work?

	Pre survey	Post survey
Nutrition & Dietetics Team	19	11
RS Call Centre Team	9	4
Production/Chefs team	0	11
Unknown	0	1
Total	28	26

Table 2. How informative and useful was the masterclass?

	n (%)
How informative was the masterclass?*	
Excellent	7 (26.9)
Very Good	13 (50.0)
Good	5 (19.2)
OK	1 (3.8)
Poor	0 (0.0)
Total	26 (100)
How useful do you feel the information presented was to you?	
Extremely useful	4 (15.4)
Very useful	11 (42.3)
Useful	8 (30.8)
Somewhat useful	3 (11.5)
Not at all useful	0 (0.0)
Total	26 (100)

Table 3. On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how confident do you feel in discussing the nutrition and health benefits of Australian mushrooms?

	Pre Mean (SD)	Post Mean (SD)	p
Total Group	2.7 (1.3)	3.9 (0.7)	<0.001
- Dietitians	2.8 (1.2)	3.8 (0.8)	0.021
- RS Call Team			
- Production/Chef team			

Groups compared using unpaired two-tailed t test

Table 4. On a scale between 1 and 5, where 1 is 'not confident at all', and 5 is 'very confident', how confident do you feel in discussing the nutrition and health benefits of Australian mushrooms?

Rating	Pre Survey	Post Survey
Not Confident at all	22%	0%
Slightly confident	22%	0%
Somewhat confident	19%	30%
Quite confident	26%	51%
Very confident	11%	19%

Table 5. How familiar are you with the different nutrition and bioactive properties of Australian Mushrooms?

	Pre n (%)	Post n (%)
Academic knowledge and actively seek more information	0 (0.0%)	0 (0.0%)
Very familiar as I have attended events / seminars / read resources	1 (3.6%)	8 (29.6%)
Familiar and can specify them	6 (21.4%)	10 (37.0%)
Familiar with some nutritional properties but cannot specify them	16 (57.1%)	9 (33.3%)
Not familiar at all	5 (17.9%)	0 (0.0%)
TOTAL	28	27

Table 6. How familiar are you with the different **health effects** of Australian Mushrooms?

	Pre n (%)	Post n (%)
Academic knowledge and actively seek more information	0 (0.0%)	0 (0.0%)
Very familiar as I have attended events / seminars / read resources	0 (0.0%)	7 (29.2%)
Familiar and can specify them	7 (29.2%)	11 (45.8%)
Familiar with some nutritional properties but cannot specify them	14 (58.3%)	6 (25.0%)
Not familiar at all	3 (12.5%)	0 (0.0%)
TOTAL	24*	24**

* n=4 participants did not respond. **n=3 participants did not respond.

Appendix 6

Deep Dive Interview: Sally McCray - Director of Dietetics and Foodservices at Mater Group, Brisbane

Why was this initiative important for you to undertake? What benefits did you see in undertaking this project?

- Mater and particularly Sally's ethos is seeing themselves as educators primarily and not just service providers.
- She looks to every opportunity to educate – the menu particularly is an opportunity to educate people of food and nutrition. While they are about delivering good quality food – it is more than just nice food on the plate. It is about educational health message behind it. 'Every single menu we have done has had an educational message behind it.' Feels it is important to advocate internally that food offered is part of clinical care and treatment and not just a nice to have that can be open to budgetary cuts if needed. Food is medicine and the food service department is critical to patient care.
- In a broader context, their focus is on a food-first approach to health, centred on fresh, high-quality produce and aligned with plant-forward diets that reflect current nutritional science. They aim to incorporate this focus into both their Luke Mangan menu and educational initiatives.
- As part of their mission, they been looking at innovative ways to drive this bigger picture of fresh, high quality, plant forward food/menus, education which has been part of their partnership with Luke Mangan and having 3-4 monthly themed menus and education.
- They include mushrooms in meals but it has never been key focus in their menu development - admittedly seen like many as just 'another vegetable'. It wasn't until we educated Sally in the interviews on the unique benefits of mushrooms that interest was piqued to look to include it as a key focus on their themed menu and education drive.
- Mushroom delivered unique nutrition, health and culinary benefits. The ability to deliver vitamin D, particularly on their vegan/vegetarian menus was motivating. But equally, needing to meet diverse dietary needs, ingredients that are easy to use, versatile highly appeal.
- Having a focused initiative on mushrooms was seen as beneficial as
 - It aligns with the undertone of the themes they do with Luke Mangan which across the board are plant focused – it was another angle to the plant forward menu which was growing in popularity.
 - Learning how good they were - They are a unique food – nutrition and culinary benefits (vitamin D key) and an ingredient that would be easy to use and work with on menu development.
 - Working collaboratively with other partners is important to Mater as they see value in partnerships to drive supports and innovative and thought leadership mindset and believe they get more successful outcomes that often can't do on own.

What did you see as the most valuable outcomes?

- The inspiration to want to use mushrooms more in the menu now going forward. Learning about it and then actually using it piqued everyone interest and opened their eyes to their ease of use, making them now really think about ways of using them more in menu development going forward.
- Awareness/Education at ALL levels got people interested and inspired to use/include mushrooms: The awareness of the nutrition and health and culinary benefits mushrooms across all key stakeholders in the chain was seen as extremely worthwhile by the staff. They do not get much professional development. The upside is that the education boosted their interest and motivation, from the chefs and production staff preparing the food and developing recipes to the customer service staff 'selling' the menu and then the dietitians counselling patients on nutritional benefits. It also had knock effects on a personal level to the staff and herself. Learning about it herself she told her mum to consume them.

What was your experience of implementing the mushroom initiative?

What worked well?

- Using the Australian mushroom – easy to use – sometimes we go to exotic as they have this perception, particularly by chefs that they are better. Did not know previously appreciate that common Australian mushroom had nutrition/health benefits. The key messages and educational materials (poster) had cut through and made people think differently about mushrooms.
- But the ease of use and versatility (versus exotics) in practice sold the deal. On paper the nutrition creds look good, but the practice shows us it is so easy. It offers a viable natural food solution to improving nutrient and taste delivery and can be cost effective.

What was not so great?

- Mushroom poisoning timing – delayed promotion and distracted people including doctors who were worried where the hospital was getting their mushrooms from. Even educated doctors were ringing to ask to make sure the mushrooms were not coming from Victoria!

What could have been improved?

- Too many good things to say about mushrooms – a little bit over-whelming. Need bite size messages for education. Could have pushed our messages out sequentially over the 6 months with a different focus/fact.

Tell me about what you heard from the staff around the initiative.

- Staff loved the education – they do not get things like that very often and lap it up.
- Education sessions for staff was extremely valued by staff as they do not get a lot of it. They learnt things they did not know and found it useful.
- And in effect it had the knock-on effect of driving a motivation around mushrooms.
- Feels staff education is under appreciated – from the chefs designing it and customer service staff selling the menu to patients and dietitians counselling on nutrition, the education had an impact to make it top of mind, increase confidence and drive greater motivation and reason to include it in menu development and educate about it more widely. Not only helps them with their job but anecdotal reports they impact their own health.

Going forward, what role do you see for mushrooms at Mater? in institutional healthcare foodservice?

- Look to include mushrooms more in the flexitarian meals to support the breadth of plant forward diets we are encouraging. Flexitarian opportunity (people who enjoy meat but looking to reduce and eat more plants) – using mushrooms to substitute for meat more cost effective and nutrition advantages – this is also a bigger market than just the vegans/vegetarians. We are all about driving plant forward and can see now the next opportunity for Mater to extend into leveraging mushrooms as they have great benefit in extending and substituting into meat-based dishes. Our intent is always to use more natural and food first solutions and mushrooms also ticks those boxes.
- Seeing the opportunity to use in other menu development – heart healthy menu - Big things we try and do is bring sodium down and mushrooms great for that due to the umami profile.

Opportunities for industry? In what ways could mushroom industry influence greater uptake of mushrooms into institutional healthcare?

- Be visible and in their face on the key messages.
- Attending the different conferences.
- Look to solve their problem – educate what their problem is and show them how mushrooms can solve the problem – cheap, easy, versatile way.
- Need to solve nutrition problem (vit D) and talk to versatility and cost.
- Consider the different needs of different stakeholders/decision makers – some places dietitian in charge of both nutrition and foodservice like Mater, others it is chefs. Chefs not always thinking the nutrition considerations or opportunities. Both come from different perspectives. Dietitians are influencing menu development with nutrition KPIs in mind, Chefs primarily sensory delivery and cost. Dietitians are easier to target and can be potential ambassadors of the nutrition and cost message into institutional food service if upskilled – opportunity to provide them with appropriate skill set that addresses opportunity and nutrition and cost benefits.



AMGA
Australian Mushroom Growers' Assoc.

MU20003: Educating the Food Industry about the Nutritional Benefits of Australian Mushrooms

**Culinary Educators Project
Final Report by Straight To The Source
6th January 2025**

PROJECT TEAM July–December 2024



Tawnya Bahr
Straight To The Source



Lucy Allon
Straight To The Source

STRAIGHT TO THE SOURCE



Straight To The Source is a leading foodservice consultancy dedicated to driving excellence, professional development, and meaningful connections in the hospitality industry. We champion the people, products, and regions behind Australia's finest food and drinks, serving as strategic partners for producers, chefs, and the hospitality and agricultural sectors.

Founded by industry leaders Tawnya Bahr and Lucy Allon, our passionate team combines award-winning experience as chefs, restaurateurs, educators, and project managers. Specialising in a tailored approach to training programs and immersive experiences, we connect foodservice professionals with premium Australian producers to foster a deep understanding of local, seasonal, and sustainably sourced ingredients.

With unparalleled knowledge of the Australian and New Zealand gastronomic landscape, we deliver practical solutions across all stages of the supply chain—strategy, education, procurement, preparation, and service—empowering businesses to enhance operations, champion sustainability, and elevate industry standards. By leveraging our expertise and far-reaching networks, we drive business growth and nurture meaningful relationships across the industry.

PROJECT GOAL



Influence the Australian culinary curriculum to include more mushrooms.

The specific culinary qualification we focused on is **SIT30821 Certificate III in Commercial Cookery** as this is the entry level certification required to be employed as a Qualified Chef.

Within this qualification, we focused on two specific core units as they presented the strongest opportunity for mushrooms. The two modules are:

- SITHCCC030: Prepare vegetable, fruit, egg and farinaceous dishes
- SITHCCC031: Prepare vegetarian and vegan dishes

Other Core Units in this qualification curriculum that offer opportunities for future focus are:

- Prepare Meat Dishes; Prepare Poultry Dishes; Prepare Seafood Dishes; Stocks, Sauces & Soups; and, Appetisers & Salads

APPROACH



Stage 1. Connect with key culinary educator influencers and decision-makers for buy-in and their high level insights

Stage 2. Gain broader engagement and feedback from frontline culinary educators

Stage 3. Develop key resources and find opportunities to educate the educators

The approach was a relationship-driven one. In Stage 1 we connected with key influencers in our network and once we gained their attention and positive engagement we requested that they connect us with their broader culinary education networks. It was a prolonged but effective approach.

STAGE 1: Connecting with key educators and influencers

Our objectives in Stage One were to determine the answers to two key questions:

- ? Is there an opportunity to influence the Australian Culinary Curriculum to include more mushrooms?
- ? If so, where do the opportunities lie and how can we access them?

To achieve this, we sought out and connected directly where possible with key Australian culinary educators and influencers to ascertain their interest and feedback.

STAGE 1: National Culinary Organisation Database



Additionally we compiled a list of national culinary organisations offering SIT30821 Certificate III in Commercial Cookery to Domestic Students.

The list of national culinary organisations can be found [HERE](#).

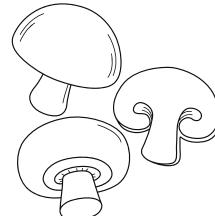
We contacted these organisations to invite them to share their insights into what they want and need to support their culinary education outcomes.

A Culinary Educators survey was determined as the best way to gather feedback. This is outlined further below.

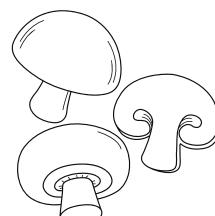
STAGE 1: Educating and Influencing Culinary Educators



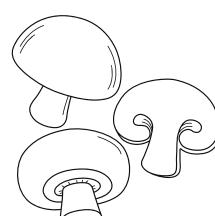
Through this consultative approach with Culinary Educators from the most senior levels down we established a clear message from culinary educators that supporting them in skills and resources is the most effective way to influence the Australian culinary curriculum to include more mushrooms.



Upskill & enhance the knowledge of the culinary teachers



Provide easy access to tools and resources



So they can educate the next generation of food service professionals about the nutritional and health benefits of mushrooms.

STAGE 1: Outcomes

Can we influence curriculum inclusions?



- Resoundingly YES! Especially now that Prepare Vegetarian & Vegan Dishes is a Core Unit of the Cert III curriculum.
- High quality content and resources that assist teachers to engage, inspire and educate students would be welcomed.
- Culinary educators are time and resource poor; we need to make it as easy as possible for them to find and use resources.

Future Opportunities



- Service and Creative Skills Australia (SaCSA) is currently undertaking a major design and delivery reform of the VET Qualification for the hospitality curriculum. Their proposal is for a more streamlined approach to training and qualifications including a Specialised Skills level where upskilling micro-credentials will be available for students and professionals to undertake at any point in their career. There is the potential for mushrooms to feature throughout the new proposed model including a specialty micro-credential at the Specialised Skills level.

Key Considerations



- Decision makers and influencers at this level are very busy and finding time in their schedules to discuss and engage with them is a key challenge.
- With the above point in mind, need to consider how to get the resources into the right hands, incentives to use them, and ongoing awareness & engagement to keep mushrooms front-of-mind.

STAGE 2: Broader engagement with culinary teachers nationally

A **SURVEY** was identified as the best way to gather broad insights and feedback from hard-to-reach, time-poor culinary educators while also encouraging ongoing engagement and opt-ins for future updates on plans and resources. The survey results can be accessed [**HERE**](#).

KEY RESULTS

- %** **90.9%** said they would benefit from access to resources to teach their students about culinary techniques and the nutritional benefits of mushrooms.
-  **Digital** access was the preferred way to access resources.
-  **Top 3** types of preferred resources were: (1) downloadable fact sheets & recipes; (2) video resources; and, (3) live stream masterclasses.
- %** **54.5%** of respondents would use these resources in Certificate III in Commercial Cookery modules SITHCCC030 and SITHCCC031 if they were available.

STAGE 2: Audit of Existing Resources

There are a range of high-quality resources available but they aren't easily accessible via a single digital platform known by the industry, making it harder for them to be found. We have outlined a full list of resources [HERE](#).



RECOMMENDATION: Create an Australian Mushrooms Food Service digital destination where tools and resources for Food Service broadly, including Culinary Educators, can be easily found and accessed. Implement a strategy to build awareness and recognition of the Australian Mushrooms Food Service to teachers and students.

STAGE 2: Review of MU22102 Foodservice Strategy 2024-2027



Influencing the Culinary Curriculum is a critical step towards achieving the report's key Strategic Priorities & Enablers and our recommendations are aligned with the report's key Strategic Enabler:

ALIGNMENT WITH KEY PRIORITIES

- Drive mushrooms as the fresh natural ingredient with unique flavour.
- Reestablish mushrooms as the fresh, natural ingredient that packs a flavour punch.
- Reignite mushrooms as the hero vegetarian ingredient across all meal occasions.

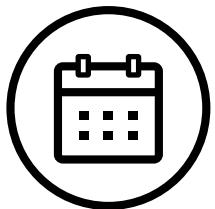
ALIGNMENT WITH KEY ENABLER

- The foodservice home of Australian Mushrooms

STAGE 2: A Big Win!

Opportunity to Educate the Educators at TAFE NSW

- Through continuous engagement with our network and our networks' networks we secured the approval of the TAFE NSW Culinary Director to deliver a 1-hour Professional Development (PD) Webinar for TAFE NSW Culinary Educators.
- This webinar, which will contribute to the teachers' annual proficiency, was reviewed and approved for delivery by TAFE NSW's Director of Culinary.



Proposed delivery timing for the webinar: Thursday 10 April 2025

- *The ongoing development of the TAFE relationship could lead to micro-credential development opportunities.*
- *This webinar session can be offered to other culinary organisations.*
- *This webinar format provides a template for future webinar opportunities.*

(NB: the webinar date may be subject to change once the TAFE teaching schedule is finalised in the new year)

STAGE 3: Setting the Stage to Educate the Educators



This stage focused on creating and developing the assets for an engaging, educational and **actionable** 1-hour Professional Development (PD) Webinar on Australian mushrooms (*Agaricus Bisporus*) for TAFE NSW Culinary Educators.

- This included:
 - Collaborating with TAFE Innovation Team to flesh out opportunity, execution and outcomes.
 - Secured presenters for the webinar including Tawnya Bahr from STTS as facilitator, Chris Tolson, White Prince, and renowned chef, Jacqui Challinor (*subject to availability*).
 - Developed the webinar content ready for execution.
 - Scripted webinar key messaging.
 - Liaising with AMGA to ensure relevant Culinary Educator resources are in a single digital destination to be shared at the conclusion of the webinar.
 - Gaining permission from TAFE to circulate a feedback questionnaire.
 - TAFE NSW Demo Kitchen recce and coordination of ingredients, equipment
 - Coordination of TAFE NSW livestream filming (camera, audio, recording)

STAGE 3



Developed Webinar Template and Actionable Resources for Culinary Educators

- This also included:
 - Working with an experienced Culinary Educator to review the Assessment Criteria for SITH000CCC30 and 31 (clustered) units to inform recipe selection and required adaptions suited to Core Units SITHCCC030 & SITHCCC031.
 - Reviewing AMGA & Australian Mushrooms recipe bank content keeping in mind key considerations of: exclusively showcasing Agaricus Bisporus; range of sizes & specifications; meal occasion; assessment criteria; Vegetarian or Vegan; Industry Currency) to select suitable recipes to adapt for lesson plans in order to provide Culinary Educators with actionable resources that are fit for purpose and ready to use within their lesson plans.
 - This resulted in the delivery of 14 mushroom recipes with detailed edits and enhancements noted to enable adaptation to meet Culinary Educators and Foodservice requirements and needs.

STAGE 3: Outcomes



- An engaging, educational and actionable 1-hour Professional Development (PD) Webinar on Australian mushrooms (*Agaricus Bisporus*) for TAFE NSW Culinary Educators, along with key presenters, is ready for delivery on Thursday, 10 April 2025 including a recipe bank of 14 recipes aligned to meet SIT30821 Certificate III in Commercial Cookery assessment requirements.
- This includes 3 fit-for-purpose recipes for lesson plan resources and a link for where Culinary Educators to access the resources.
- The webinar template can be used for other TAFEs and culinary organisations nationally.
- The webinar template can be adapted for future additional upskill sessions for TAFEs and culinary organisations.
- This includes 9 additional fit-for-purpose recipes for lesson plan resources.

PROJECT LEARNINGS

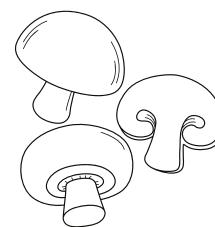


- Can we influence Culinary Curriculum inclusions?
 - **Yes!**
- Where is there an opportunity for mushrooms in the culinary curriculum?
 - ***There is a HUGE opportunity for educational resources on Australian mushrooms to be further developed and made accessible to Culinary Educators, who will use them to upskill themselves and to educate and empower the next generation of culinary professionals to meet current and emerging industry demands.***
- What type of content do culinary educators/students want/need?
 - ***High quality industry relevant resources including downloadable fact sheets & recipes; video resources; and live stream masterclasses.***
- How is the content best delivered/accessible?
 - ***Through an easy to find and access digital platform.***
- How do we keep culinary educators informed, engaged & upskilled?
 - ***Continuous liaison and ongoing engagement to identify and act on the multitude of opportunities.***

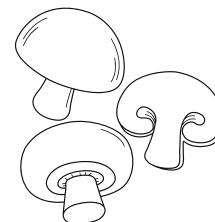
RECOMMENDATIONS

Australian Mushrooms can progress towards its strategic goals by educating and empowering our next generation of culinary professionals to meet current and emerging industry demands.

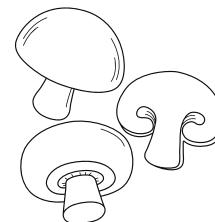
To do so requires:



A longer-term strategy is essential to continue to meet the needs of Culinary Educators, build on the foundations established through this project and keep Culinary Educators continuously informed, engaged & upskilled.



Investment in building a central digital platform dedicated to the foodservice industry.



The appointment of a dedicated Industry Education & Engagement Manager role to be able to build these important industry relationships and for the continuous activation of key activities and partnership opportunities.

Thank you



straight to the SOURCE



AMGA
Australian Mushroom Growers' Assoc.



Culinary Educators Survey - Insights

MU20003: Educating the Food Industry
about the Nutritional Benefits of Australian Mushrooms



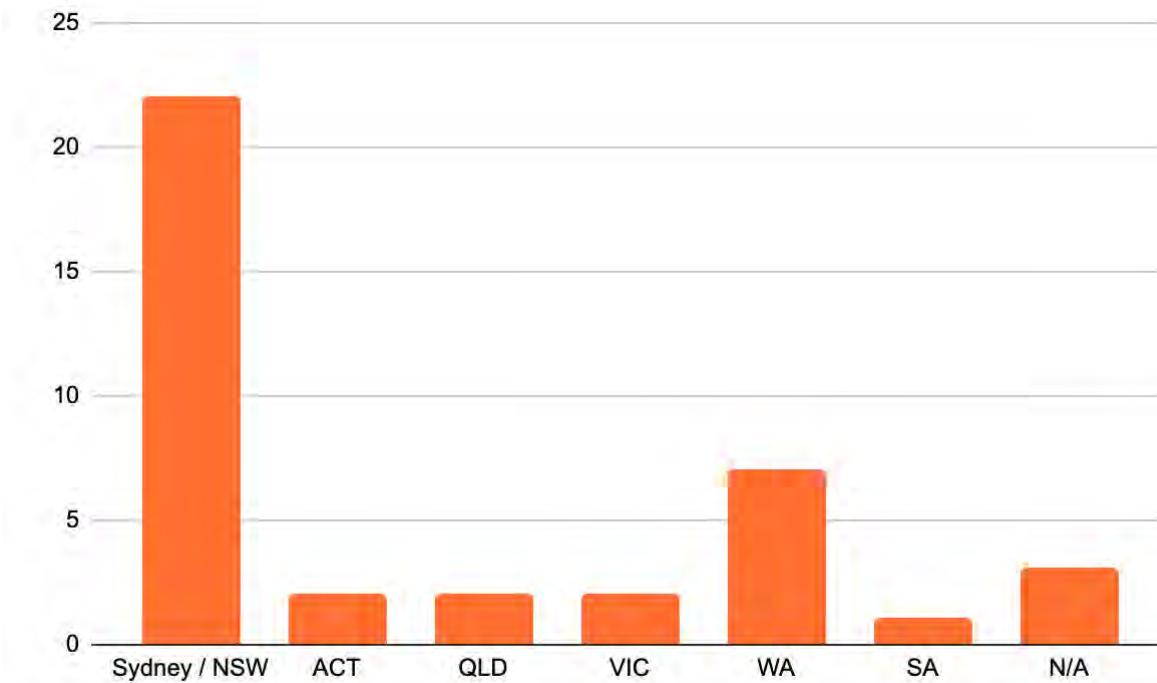
Purpose of Survey

Following consultation with key culinary educators on their thoughts and recommendations around the opportunity for mushrooms within Cert 3 culinary education, we then wanted to establish whether these insights from these key influencers were supported by feedback from a broader range of educators within public and private educational organizations.

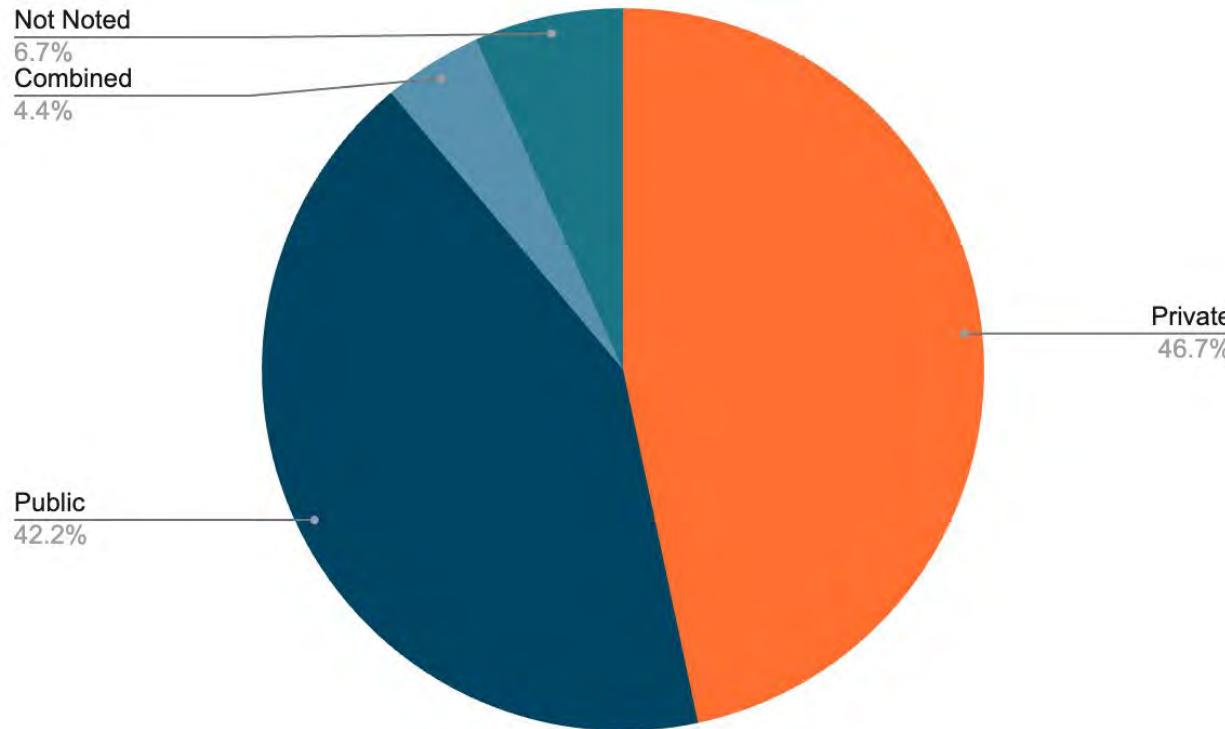
It was determined that a survey would be the most effective way to gain a broader range of insights and feedback from culinary educators who are difficult to access and time poor, as well as a way to continue to build engagement from this target audience to opt-in to being kept up-to-date with plans and resources when ready.

A survey was created and STTS has been sending the survey to as many culinary educators as possible, and asking these contacts to share it with their networks.

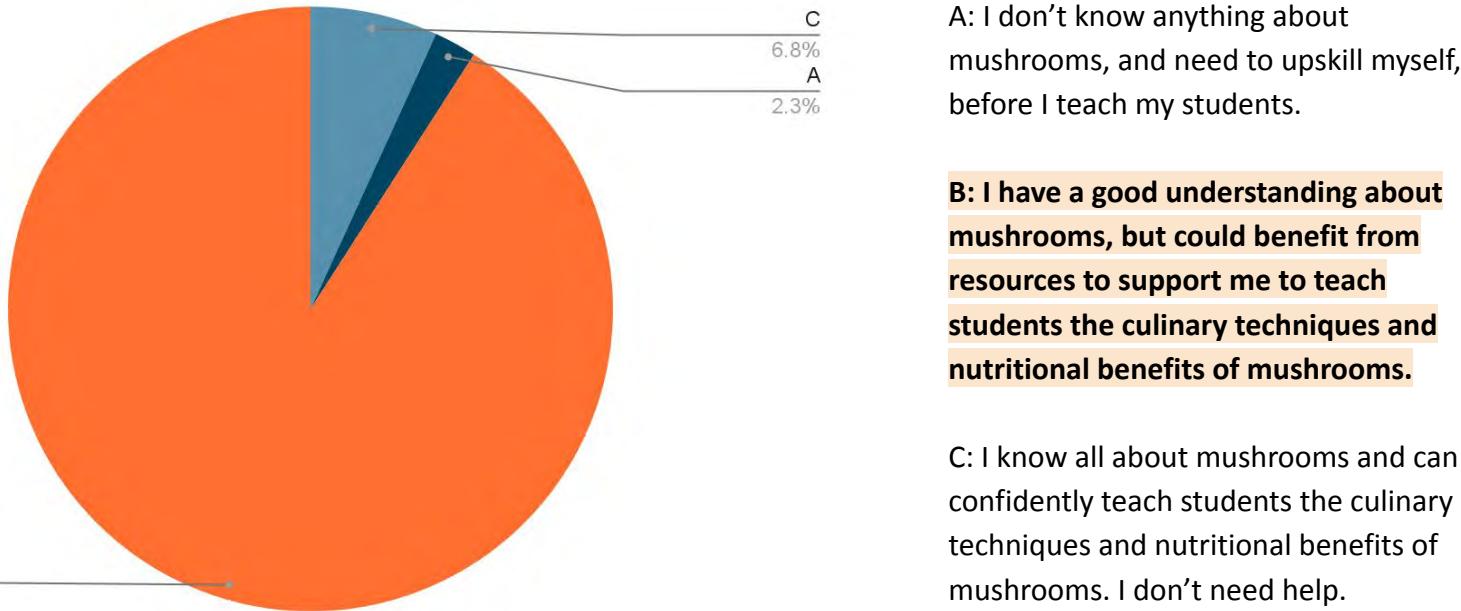
Location of Respondents



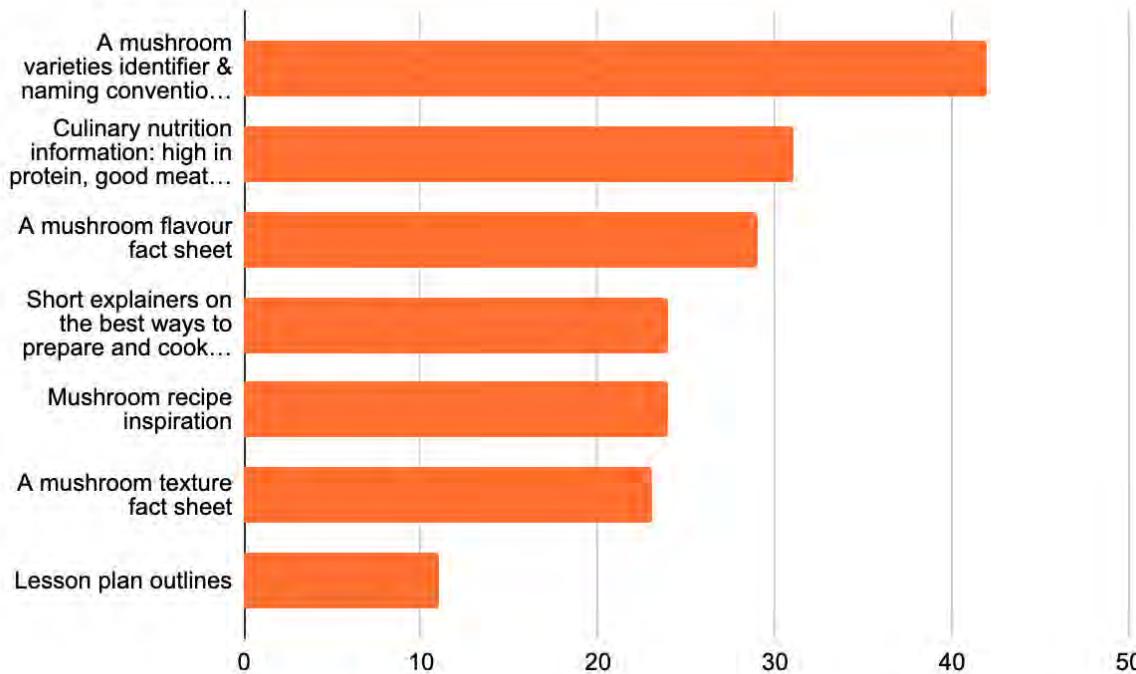
Type of Organisation - Private vs Public



Q1. Which statement best describes your knowledge of the culinary and nutritional benefits



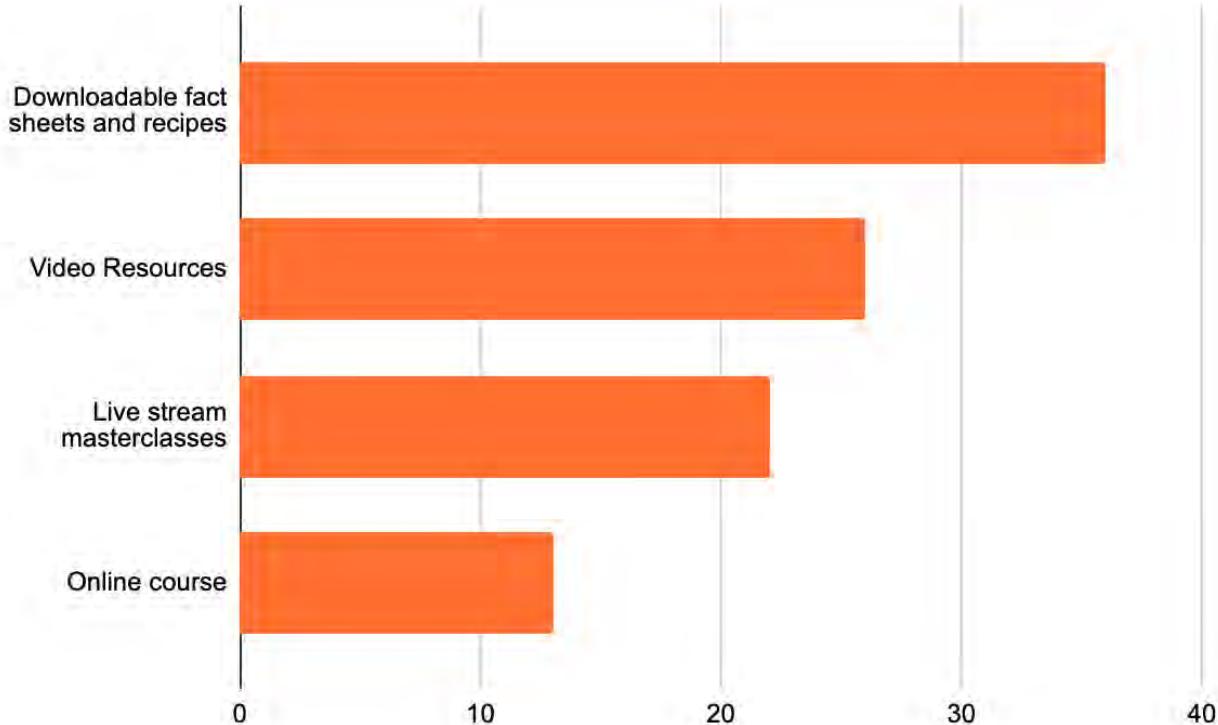
Q2. Which of the following resources would you find helpful and be likely to use (select all that apply):



Other:

- *Images and names to easily identify different mushroom varieties
- *Live cooking demos and videos preparing dishes with mushrooms
- *Adelaide based suppliers for the products / mushroom suppliers or companies
- *Information about wild mushrooms and safety
- *Recipe information/ inspiration that uses lesser known varieties and highlights their unique flavours/textures.

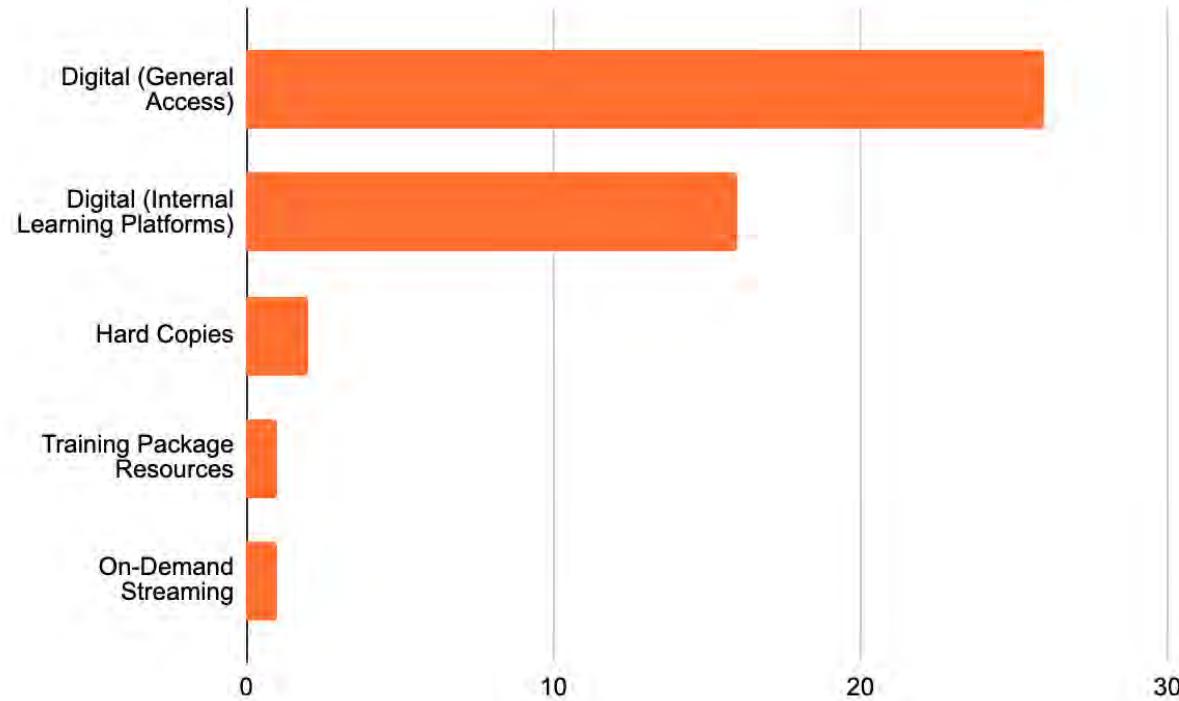
Q3. How would you like to see these resources delivered (select all that apply):



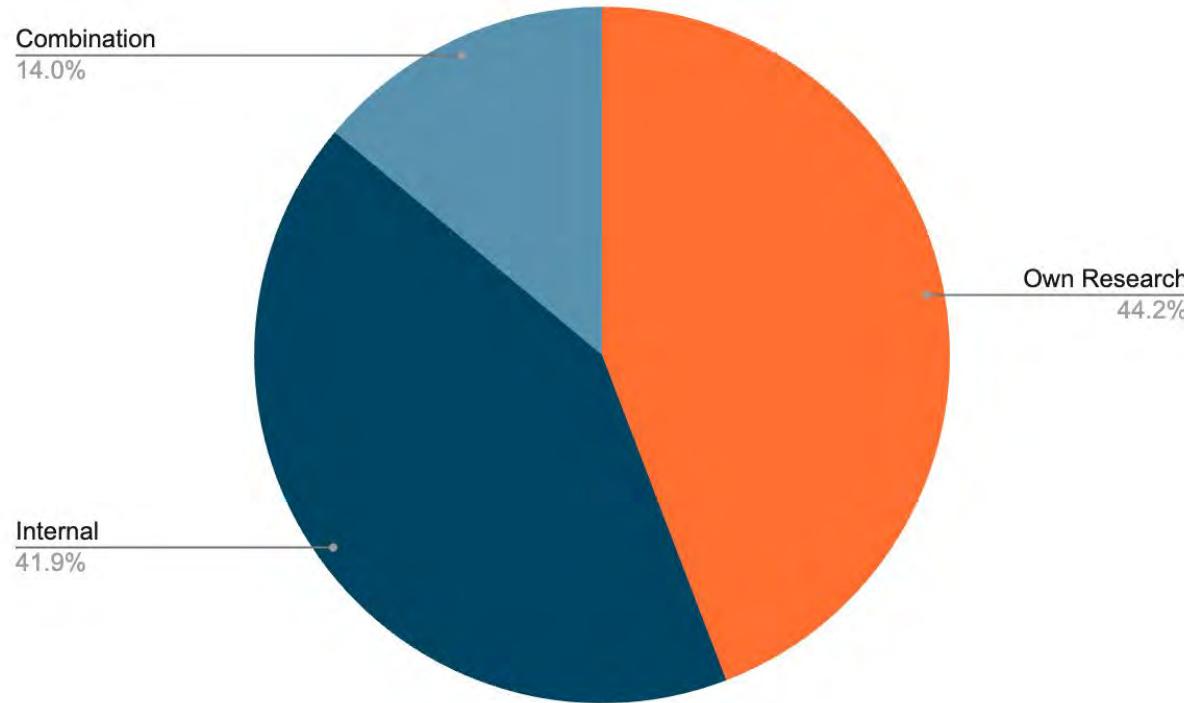
Other:

- *Cooking competition guidelines for culinary schools to use mushrooms as a main ingredient
- *Mushroom farm visit for classes
- *Hands-on taste smell touch feel absolute awesome cook up the beauties in real to get the aroma and the best sensory experience

Q4. For your ease of access, where could these resources be housed? *Open-Ended Response*



Q5. What resources do you currently use for culinary education inspiration? *Open-Ended Response*



Q5. What resources do you currently use for culinary education inspiration? *Open-Ended Response* + Q6. Where do you access these resources? *Open-Ended Response*

Own personal research 44.2%

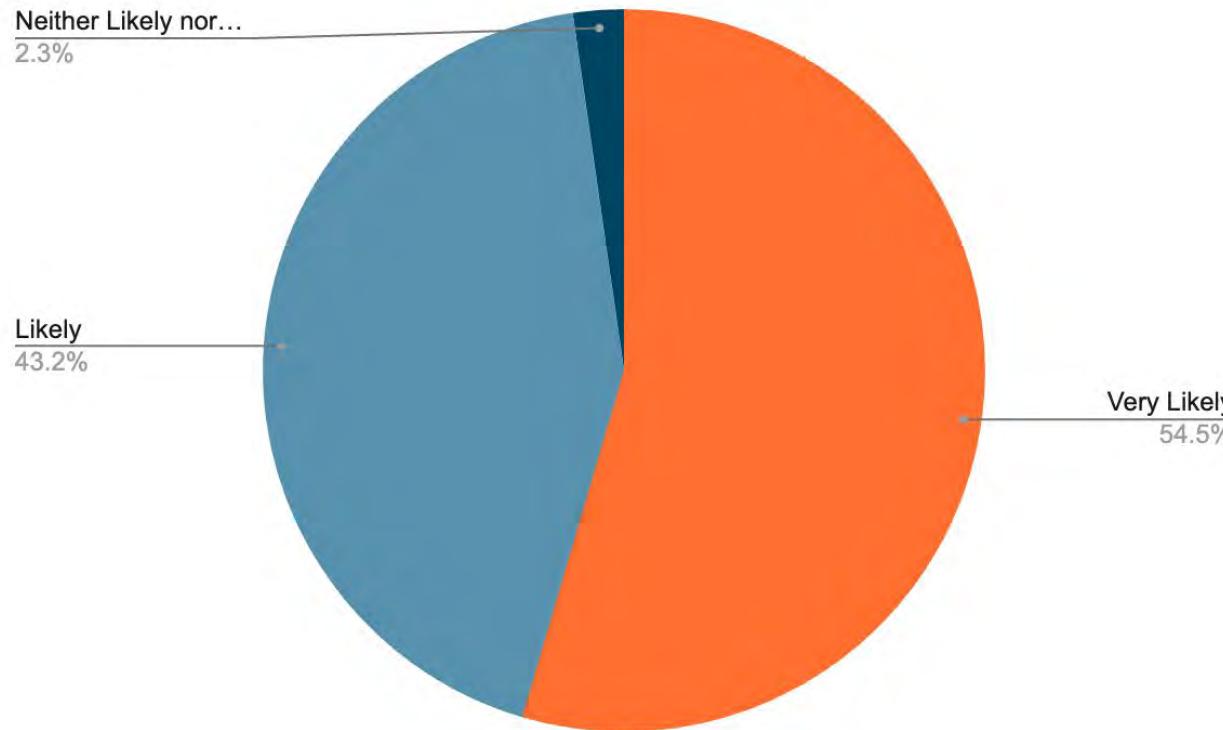
- Online - Google, Wikipedia, YouTube
- Social Media
- Own resources from private research & culinary repertoire
- Chef Platforms
- Recipe books
- Alerts on trends
- Online Webinars
- In person workshops, demonstrations
- Food media

VET approved & Internal Training Resources 41.9%

- Training.Gov.Au
- Tafe Digital Campus (TDC)
- Blackboard
- Moodle
- Didasko
- Learning Vault
- Futura
- Precision

Combination of the above 14%

Q7. If these resources were available would you be likely to use them to deliver SIT 30821 Certificate III in Commercial Cookery modules SITHCCC030 and SITHCCC031?



Summary

- 90.9% of culinary educators said they would benefit from access to resources to teach their students about culinary techniques and the nutritional benefits of mushrooms.
- Top 3 ways educators would like resources delivered were: (1) Downloadable fact sheets & recipes; (2) video resources; and, (3) live stream masterclasses. Some would like online courses. Other ideas included: farm tours, cooking competition formats and hands-on workshops.
- Digital access was the preferred way to access resources.
- The majority of respondents (58.2%) use online research and resources to form and inform their culinary educational resources.
- 54.5% of respondents would use these resources to deliver SIT30821 Certificate III in Commercial Cookery modules SITHCCC030 and SITHCCC031 if they were available.

Comments & Recommendations

- Survey has been the most effective way to engage with a diverse group of culinary educators (location/type of organisation) to gather their feedback and gain their opt-in to be kept up-to-date.
- Delivery of selected resources through a dedicated online platform would be the most effective way to provide access to a broad range of culinary teachers nationally with relevant and easily accessible educational resources.



**Australian Mushroom Growers Association
Culinary Educators Project
Outline for AMGA Australian Mushrooms Professional Development session for TAFE
NSW**

Live stream webinar + on-demand access via TAFE Digital Campus (TDC)

Location: Demo kitchen at TAFE Ultimo or TAFE Ryde (*to be confirmed*)

Session Date: Thursday, 10 April, 2025

Session Time: TBC

- 1-hour session:
 - 5 min intro by TAFE NSW host including Acknowledgement of Country
 - 45-50 min content delivery by STTS
 - 5-10 min Q&A and wrap-up/thank you's by TAFE NSW host
- 45-50 min content facilitated by Chef Tawnya Bahr:
 - **(1) Introduction by Tawnya Bahr (1 min)**
 - **(2) Farm to Table & sustainability - Tawnya Bahr & Chris Tolson, White Prince Mushrooms (9 mins incl video)**
 - How mushrooms grow, supply chain, storage, sustainability
 - *Reference video*
 Farm to Plate: Educating Food Industry Professionals about Australian Mu...
 - **(3) Intro to culinary educational resource bank on Australian Mushrooms (10 mins)**
 - Unique ingredient, fungi not a vegetable, varieties, flavour profiles, textures (*reference online resources*) - Tawnya Bahr
 - Demonstration on the 'no fail' method to prepare & cook mushrooms - Guest Chef
 - **(4) Culinary Nutrition (7 mins) - Tawnya Bahr**
 - Culinary nutrition information: vegan, high in protein, good meat replacement, VIT D
 - *Reference video*
 Nutrition and Culinary Tips: Educating Food Industry Professionals about ...

- The Blenditarian - discuss
- **(5) Culinary Trends and Recipe Inspiration demonstration (15 mins)**
 - 1 x recipe demonstrating replacing a % of meat with mushrooms from The Blenditarian (preferably a lunch or dinner recipe)
 - 1 x recipe suited to SITHCCC030: Prepare vegetable, fruit, egg and farinaceous dishes from the AMGA recipe bank (preferably a lunch or dinner recipe)
 - 1 recipe suited to SITHCCC031: Prepare vegetarian and vegan dishes from the AMGA recipe bank (preferably a lunch or dinner recipe*)
- **(6) References to culinary resources and where to find them (3 mins)**
 - QR code to link to sign-up to receive email with links to all resources.
 - Share the website link on the screen as well.
- 5-10 mins: Q&A and wrap-up/thank you's by TAFE NSW host
- Session Content Presenters:
 - Tawnya Bahr, Straight To The Source (facilitator)
 - Chris Tolson, White Prince Mushrooms
 - Jacqui Challinor, Guest Chef

**The above is subject to change based on upcoming further discussions with TAFE NSW team and TAFE NSW demo kitchen site visit*



Transforming food service with Australian mushrooms: **Nature's vitamin D powerhouse**

Flávia Fayet-Moore, PhD, MNutDiet, FASLM

August 2024



There's a need for Diet as a source of vitamin D



Sun exposure

Insufficient sunlight exposure due to indoor lifestyle, skin colour and concerns of skin cancer



Supplements

Low adherence to supplementation by both consumers and within institutional care



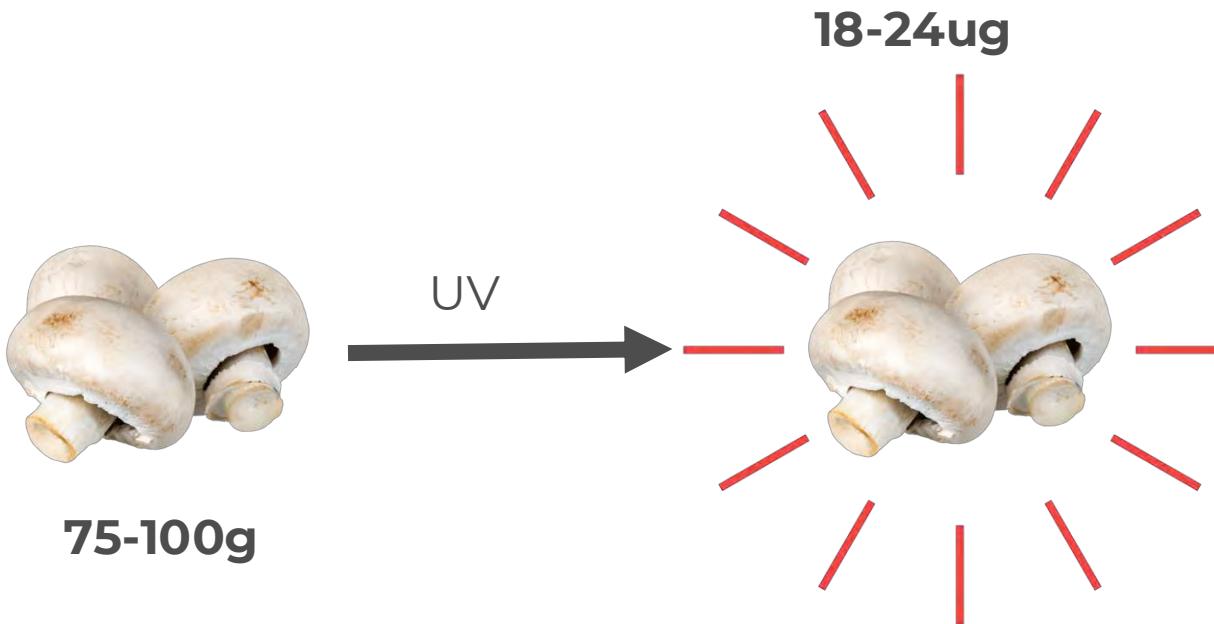
Diet

More than 95% of Australians having an inadequate dietary intake of vitamin D (<10ug/day).¹

Fayet-Moore et al., J Steroid Biochem Mol Bio 2019; Feehan et al., Nutrients 2018; Pilz et al., Front Endocrinol 2018; Walker et al., BMC Geriatrics 2020; Buttriss et al., Nutr Bull 2020. Cui et al., Front Nutr. 2023; Malacova et al., Br J Nutr. 2019; Nowson et al., Med J Aust 2005; Mozaffarian, IntechOpen; 2021.

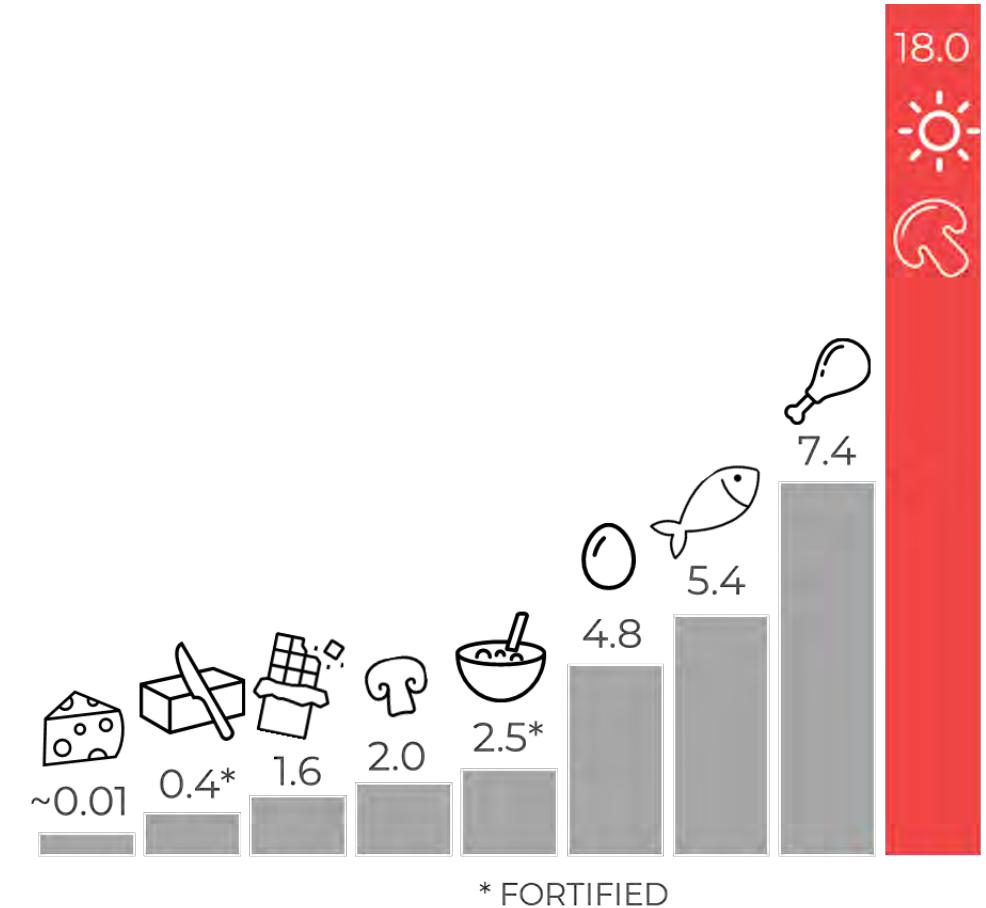


Mushrooms: an overlooked D superstar

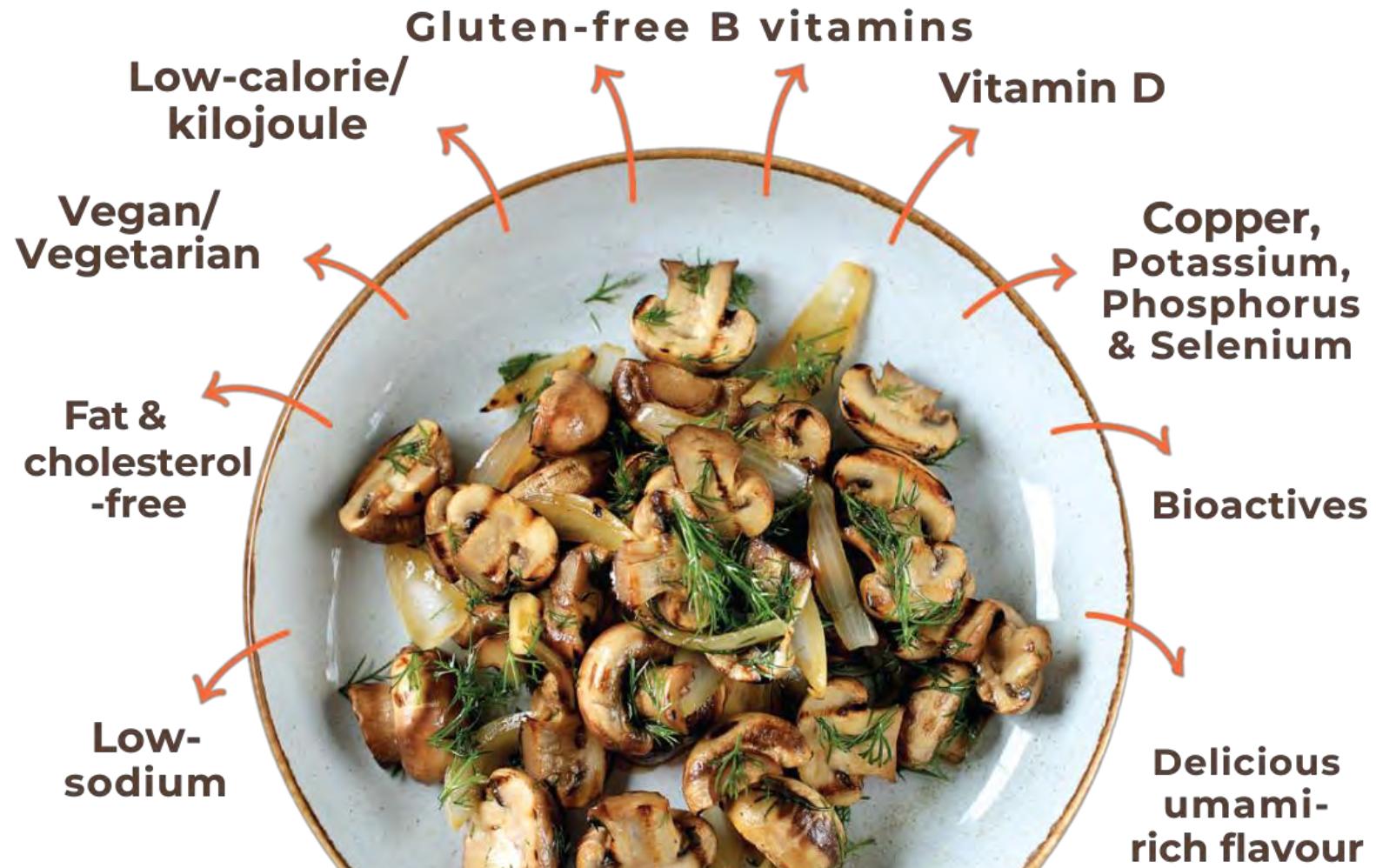


As effective as supplementation at increasing
vitamin D levels

Comparison of sources per serve



Mushrooms are **more** than vitamin D





Mater Hospital

Innovator in institutional
food service



The opportunity

Increased demand for **plant-based meals**, recognised to be **low in vitamin D**



- ✓ **Mushrooms as nutritional boost in plant-based meals**

Increase vitamin D delivery and maintain acceptability of vegetarian meals.



- ✓ **Staff & community Education**

Educate to raise awareness & knowledge on nutrition, health, culinary benefits Australian Mushrooms (*Agaricus bisporus*) to inspire usage.



The mushroom-focused initiative



Luke Mangan Menu



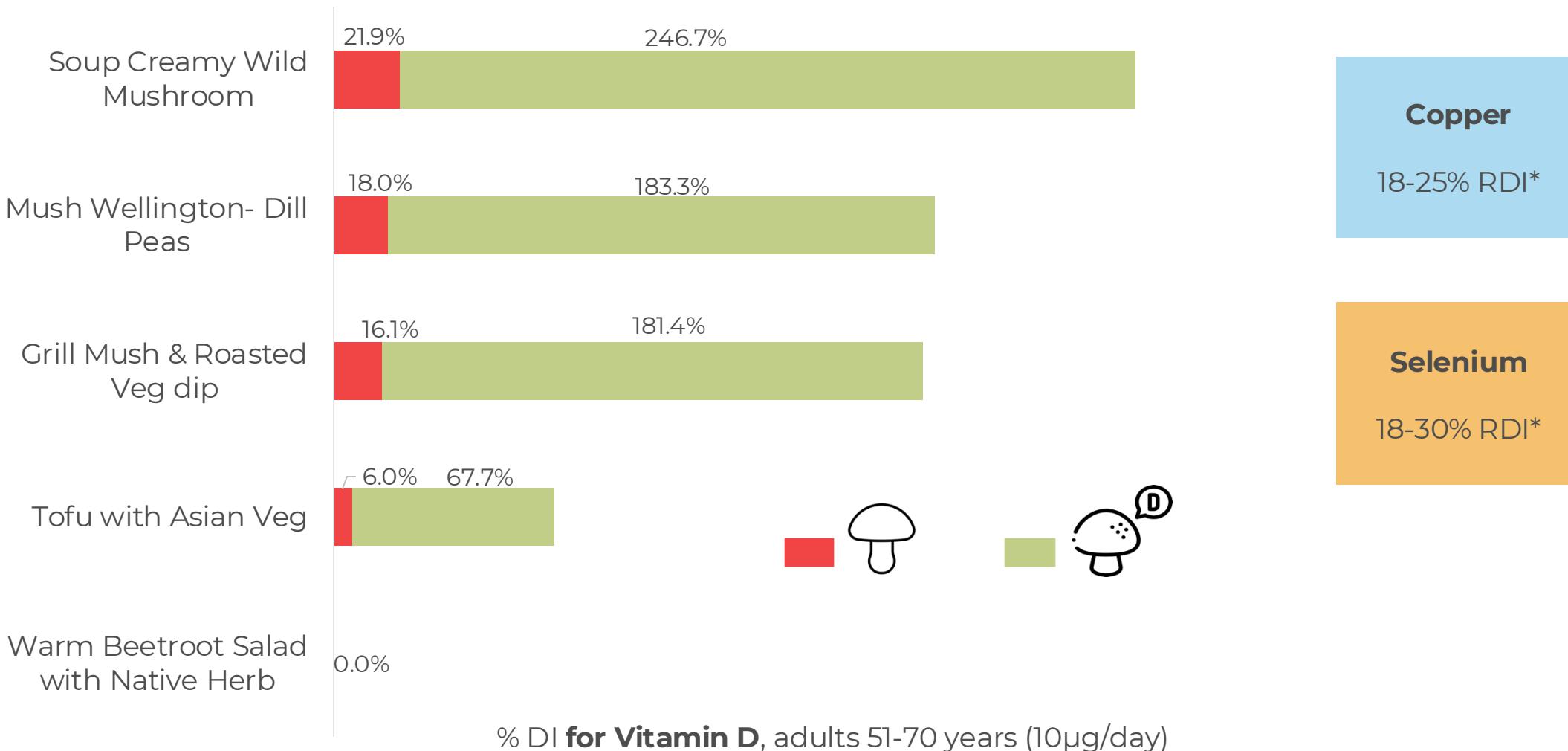
Staff Masterclass



Patient & Community Education

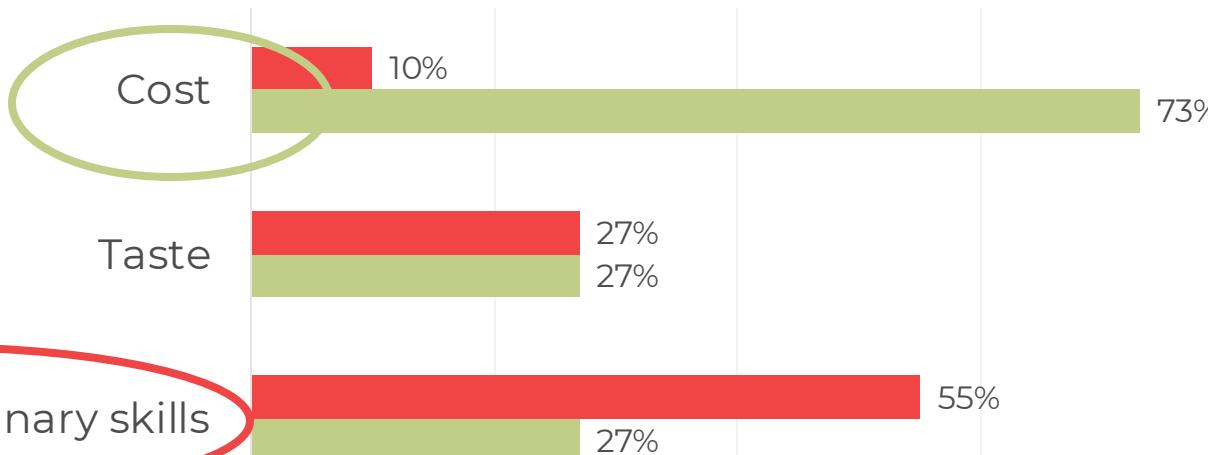
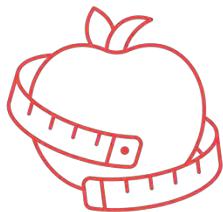


Nutrition meal provision quarter of vitamin D needs

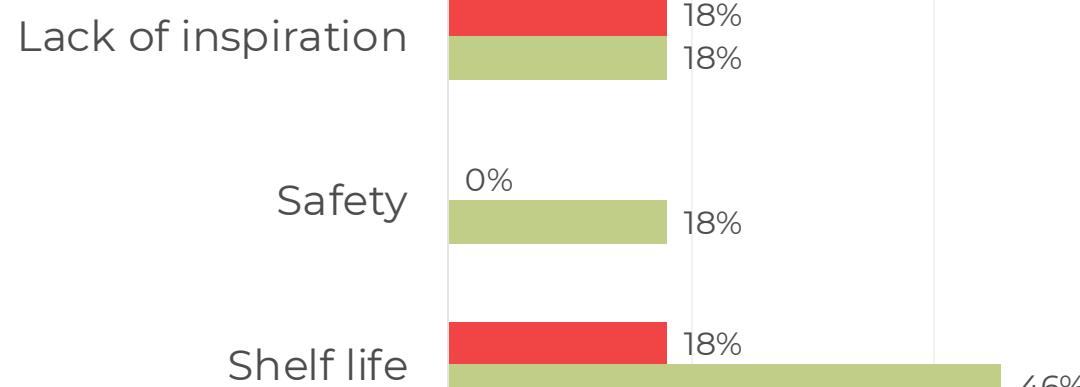


Perceived barriers to mushroom use

Dietitians



Chefs



% respondents from each professional group



66

“One of the greatest outcomes of the initiative is that it has inspired increased usage of mushrooms in menu development”

- Sally McCray

Education is key

- ✓ **Confidence** in discussing mushroom nutrition and health nearly doubled after masterclass; 70% vs 37% “Quite or very confident”
- ✓ **Motivation** 100% agreed that ‘Being educated about mushrooms made me more motivated to include mushrooms in meals and menu development’.
- ✓ **Usage**
 - Ease of usage and versatility most surprising
 - 89.5% were planning to actively include more mushrooms on the menu
 - Flexitarian meal offerings biggest opportunity





The Shoreline Residential Care Facility

Prioritise food-first
approach to health



SH
A

The Opportunity

Malnutrition prevalent in residential aged care- particularly vitamin D- **up to 80%**



✓ Staff Education

Education of chef to raise awareness & knowledge on nutrition, health, culinary benefits to inspire usage resulted in funding of a study!



✓ Use of vitamin D mushrooms (commercial UV-exposed)

Motivation so high to incorporate vitamin D provision-led to **the MOM Study**; mushrooms already prevalent on menu

Mushrooms On The Menu: MOM Study



Residential Care



Menu modified to include **28 mushroom meals** at lunch & dinner



75g = 18ug
vitamin D per serve



Order a minimum of one mushroom meal each day



60 residents | 87.2 y | BMI 26.4 |
72% female

Independent Living



Education session with nurse, dietitian, chef



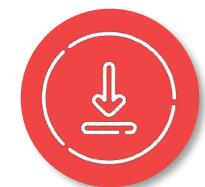
Provided with vitamin D mushrooms + recipe book



Prepare at least one meal each day containing 75g

12 residents | 71.6 y | BMI 29.5 |
75% female

Vitamin D* of meals & intake increased



Standard
Menu

Residential Care (lunch + dinner)

Vitamin D
of meals

3.7ug
per meal

Vitamin D
intake

6ug from
lunch/dinner

Meeting
NRV (15ug)

0%

Independent Living (all meals-daily)

Vitamin D
intake

8.7ug
per day

Meeting
NRV (15ug)

18%



MOM

22ug
per meal

18.7ug from
lunch/dinner

75%

73.1 ug
per day

100%

6 times
more vitamin D
provided

vitamin D intake
tripled

3 in 4
meeting targets

8.4
times higher
intake

1 in 5 to
ALL
meeting targets

*Mean

Ingredients for success



Vary the Menu

Variety of inclusions (spag bol, quiche, sauce, soup)

Select a proportion of meals with added mushrooms; leverage plant-rich offerings

Combination of feature and blended



Make it easy

No need for new recipes

Adapt existing

Higher than expected popularity of meals- phased approach needed



Education is Motivation

Staff and residents

Cooking, preparation and health benefits

Inspiration via recipe book

Community synergy



66

“Weeks past the study we have monthly breakfast for the independent living residents and I have people coming up and making sure I have mushrooms on the menu “

- Andy Wright ,
Food Service Manager

Key takeaways



Vitamin D mushrooms are a feasible way to increase vitamin D provision & intake and meet targets



Versatile ingredient across recipes & diets



Starts with education and **you have an important role to play**

Thank YOU!

-  [foodiqglobal](https://www.linkedin.com/company/foodiq-global/)
-  [@foodiqglobal](https://www.instagram.com/foodiqglobal/)
-  [foodiqglobal](https://www.linkedin.com/company/foodiq-global/)
-  info@foodiq.global
-  www.foodiq.global

Jutta Wright
Michelle Blumfield
Lucy Downey
Emily Duve
Celeste Ferraris
Emma Beckett
Kylie Abbott
Saamia Khan





Transforming food service Australian mushrooms: **Nature's vitamin D powerhouse**

Flávia Fayet-Moore, PhD, MNutDiet, FASLM

August 2024

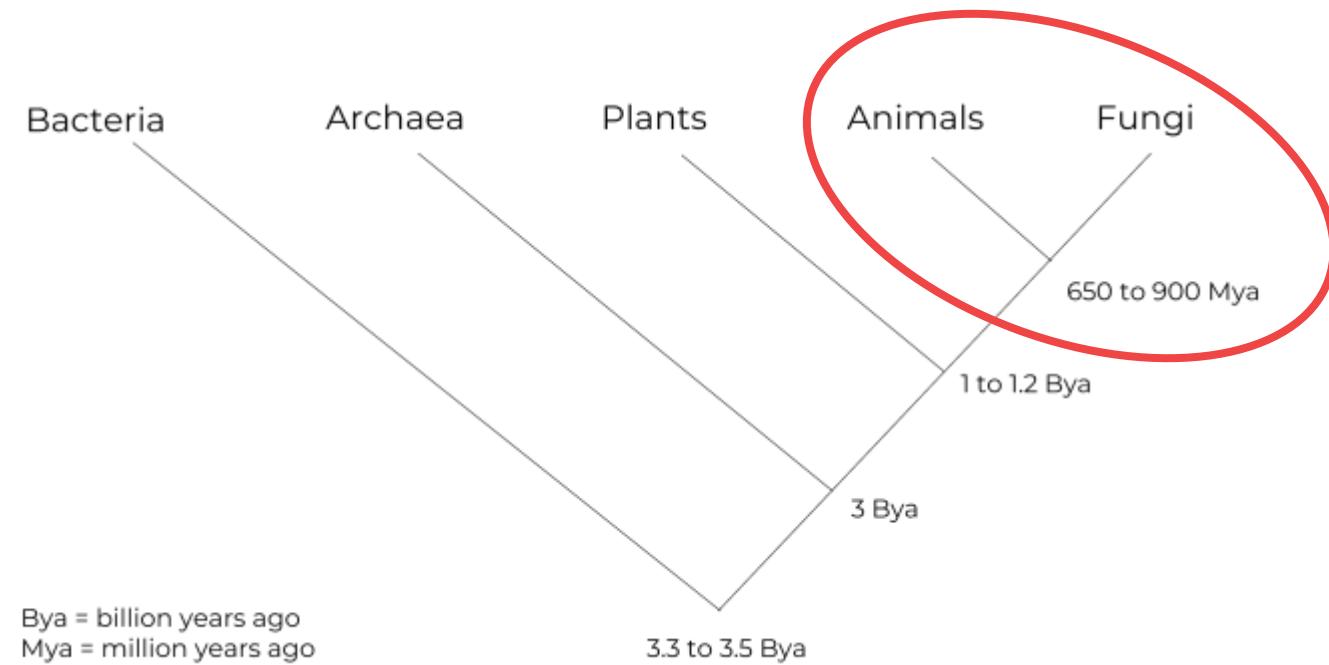


Hort
Innovation MUSHROOM FUND

This project has been funded by Hort Innovation using the mushroom research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

Mushrooms are unique

More closely related to animals than plants¹.



¹ Baldauf et al., *PNAS*, 1993, 90(24)

Because of their **unique** biology



Nutrients



Bioactives



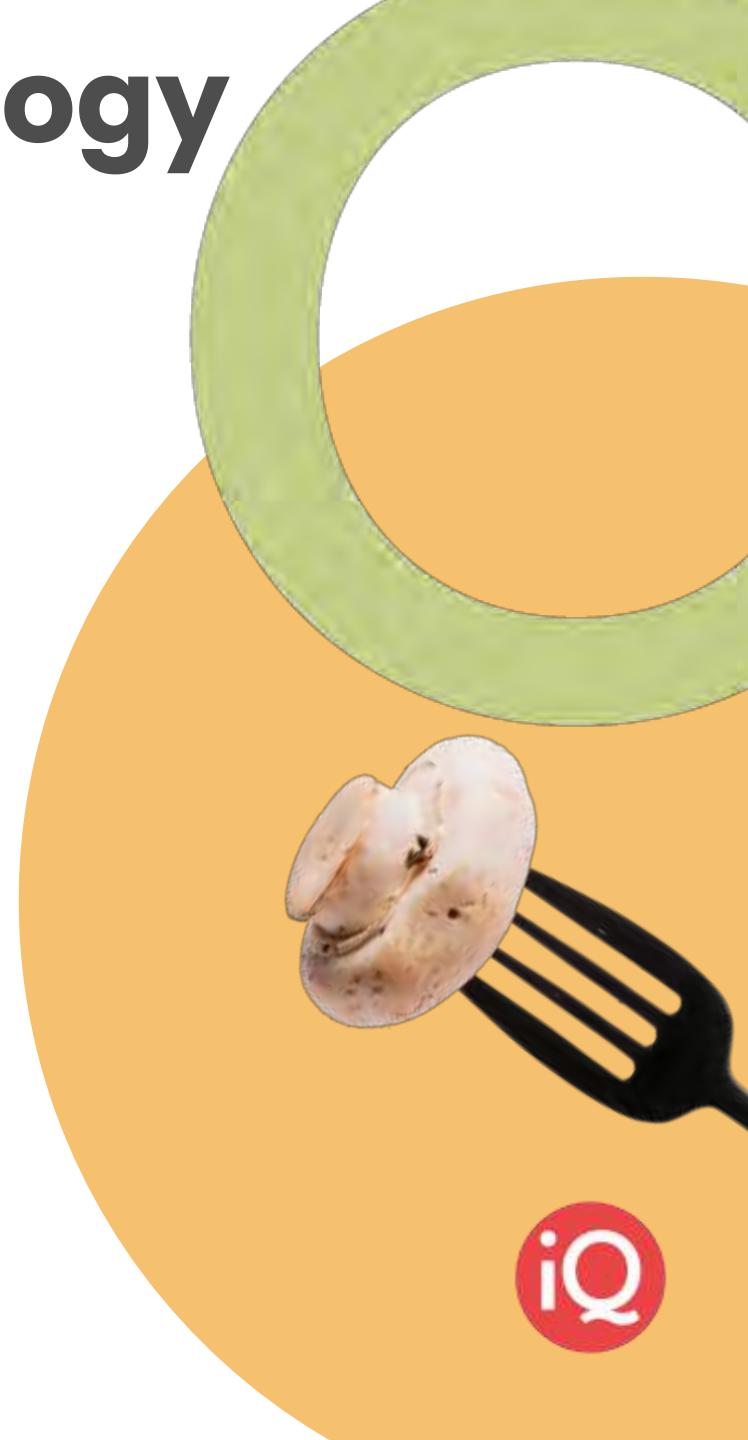
Growing systems



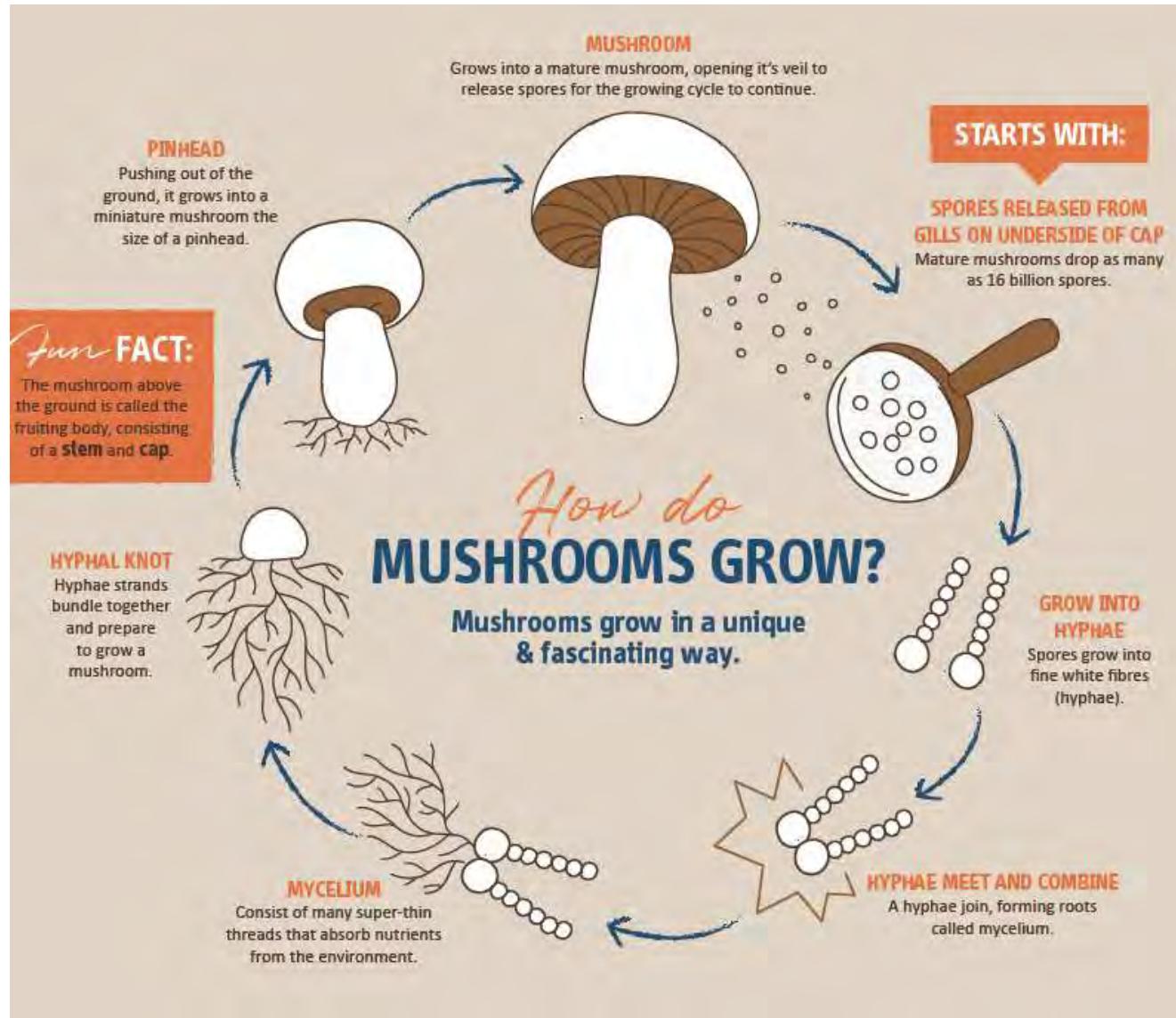
Taste



Versatility



The fruiting body of the mycelium



- Does not need sunlight to grow
- Vertical farms
- Circular farming
- Always in season

Agaricus bisporus



Not quite just a 'vegetable'



	Vegetables	Fruit	Grains	Milk and alternatives	Meat and alternatives		
					Meat	Legumes	Nuts and seeds
Key distinguishing nutrients*	Carotenoids (vitamin A) Vitamin C Folate Fibre Potassium Carbohydrate	Vitamin C Fibre Folate Vitamin B6	Iron Fibre Vitamin B1 Folate Magnesium Vitamin B3	Calcium Vitamin B2 Vitamin B12 Zinc Potassium Vitamin A	Iron Zinc Vitamin B12 (animal) Omega-3		Magnesium Potassium Omega-6 Vitamin E
Other significant nutrients**	Magnesium Iron	Carbohydrate Beta-carotene Potassium	Protein Energy Carbohydrate Zinc Vitamin B2 Vitamin E Iodine	Energy Fat Carbohydrate Magnesium Protein		Protein Energy Fibre (plant) Vitamin B3	

+ Copper, Phosphorus, Selenium, Vitamins B5, B7



+ Bioactives



ERGOTHIONEINE
GLUTATHIONE



CHITIN



BETA-GLUCAN



A unique contribution to health



The Journal of Nutritional Biochemistry

Volume 84, October 2020, 108453

Reviews: Current Topic

Examining the health effects and bioactive components in *Agaricus bisporus* mushrooms: a scoping review ☆

Michelle Blumfield ^a, Kylie Abbott ^{a, b}, Emily Duve ^c, Tim Cassettari ^d, Skye Marshall ^{a, e}, Flavia Fayet-Moore ^f

Health benefits:¹

- Vitamin D levels
- Immune function
- Inflammation
- Satiety
- Cancer
- Gut health
- Heart health
- Lifespan²

¹Blumfield *J Nutr Biochem* 2020 Oct;84:108453

²Ba et al., *Nutr J* 2021;20(1):38; Uffelman et al., *Nutrients* 2023;15(5).

Mushrooms are for **everyone**



- ‘Plant-based’
- DASH diet
- Mediterranean diet
- Low sodium
- Fat-free
- Gluten free
- Vegetarian
- Vegan

Multiple culinary benefits



Feature food



Hidden ingredient



Salt reducer: 30-40%



Flavour enhancer: umami



Blended with meat



¹ Miller et al., (2014) *J Food Sci*, 79(9):S1795-804; Wong et al., (2017) *J Food Sci*, 82(10):2379-86.

² Hess et al., (2017) *Appetite*, 117: 179-185; Hess et al., (2018) *Nutrients*, 10 (10); Poddar et al., (2013) *Appetite*, 71: 379-387

What about vitamin D?



true or false about vitamin D:

- A. You can get it from vegetables
- B. 1 in 5 Aussies are deficient
- C. The ability to absorb it decreases with age



ARE YOU DEFICIENT IN VITAMIN D?

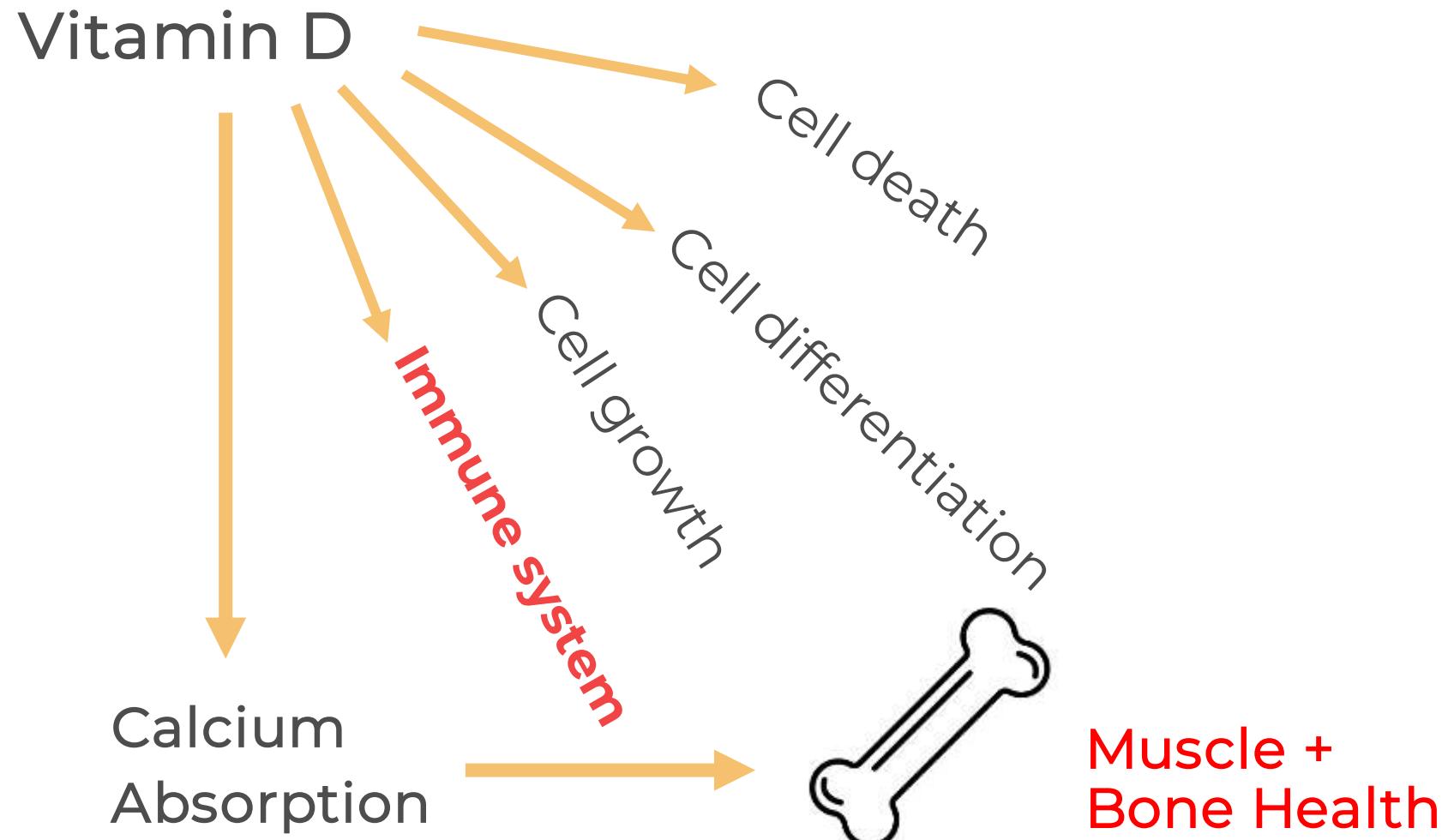
Almost 1 in 3 Aussies are



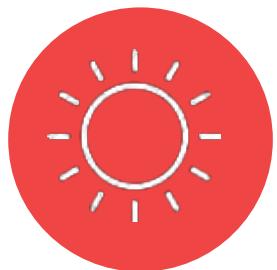
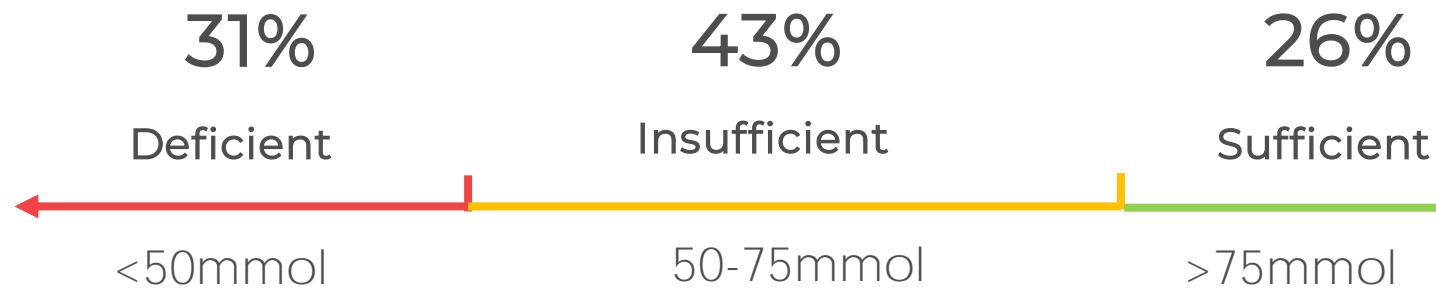
Cui, A, et al. *Front Nutr.* (2023) 10:1070808
Malacova et al. *Br J Nutr.* (2019) 121:894–904.



Virtually every human cell has a vitamin D receptor



3 in 4 Australians are not getting enough **vitamin D**



More **dietary** vitamin D is needed



Sun exposure

Insufficient sunlight exposure due to indoor lifestyle, skin colour and concerns of skin cancer



Supplements

Low adherence to supplementation by both consumers and within institutional care



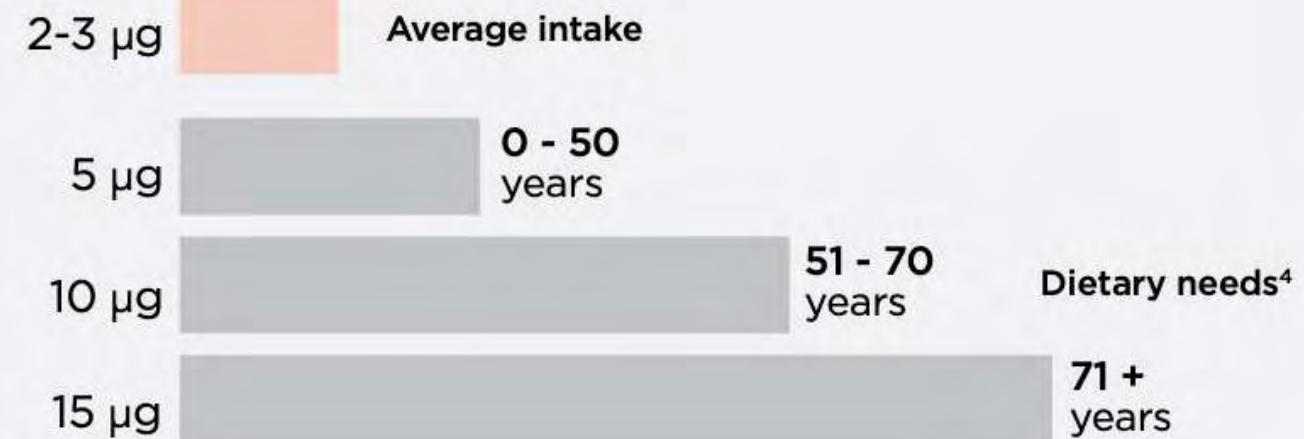
Diet

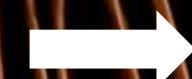
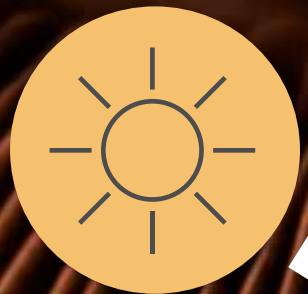
More than 95% of Australians having an inadequate *dietary* intake of vitamin D (<10ug/day).

Dietary vitamin D is very low



Australians are getting less than they need from food³



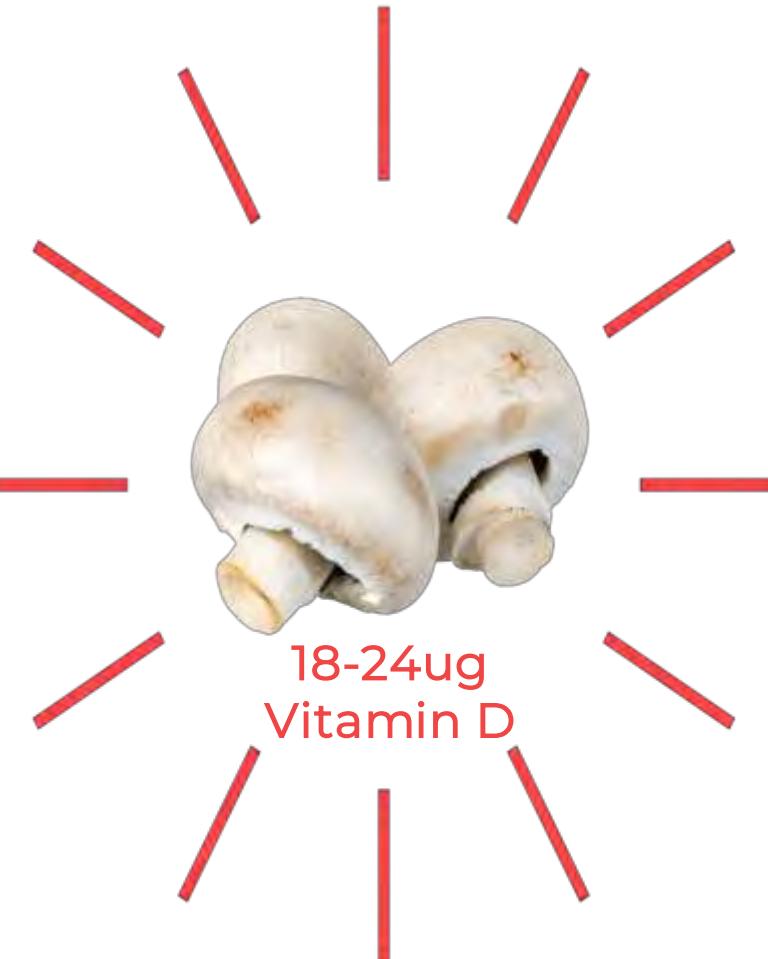


Mushrooms: an overlooked D superstar



0-2ug
Vitamin D

15 minutes in
sunlight

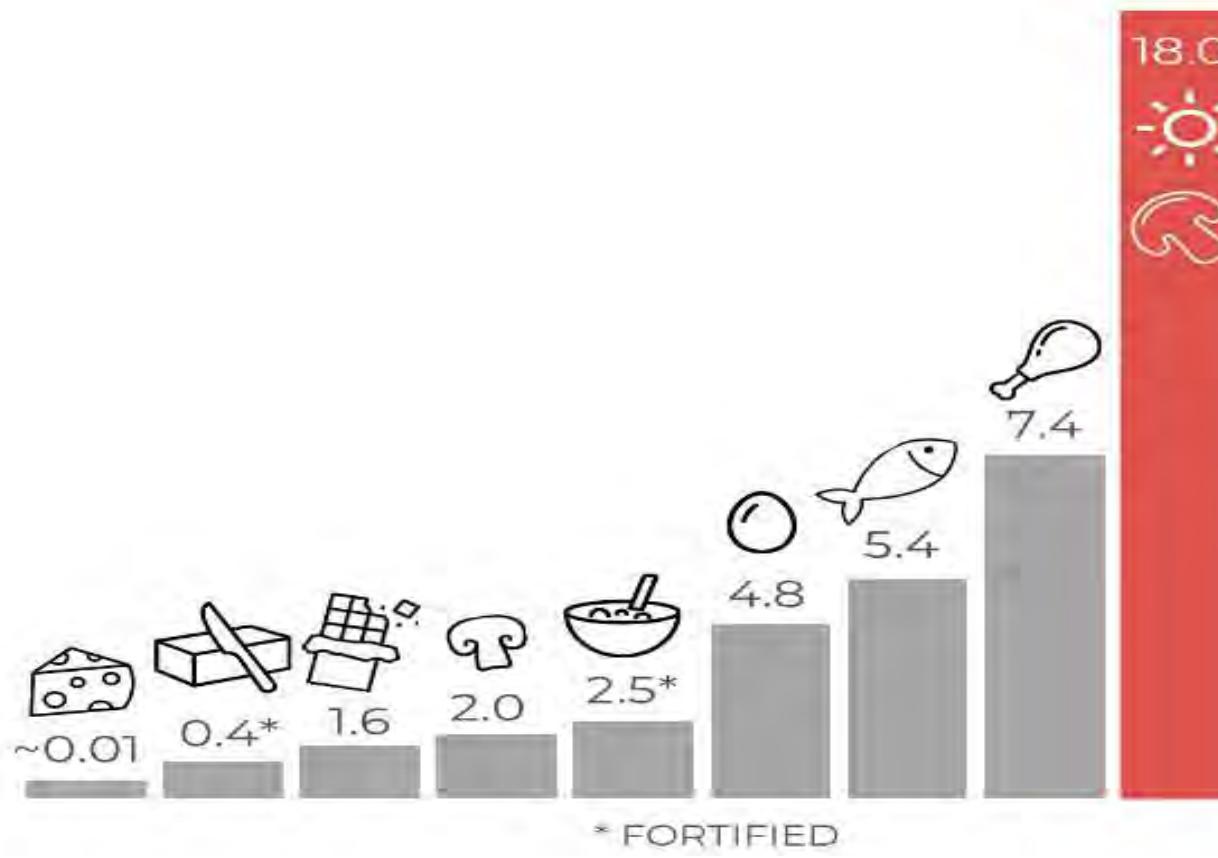


Daily
requirements:
5-15ug/day

As effective as supplementation at increasing vitamin D levels



Only food to meet 100% needs in one serve **D superstar**



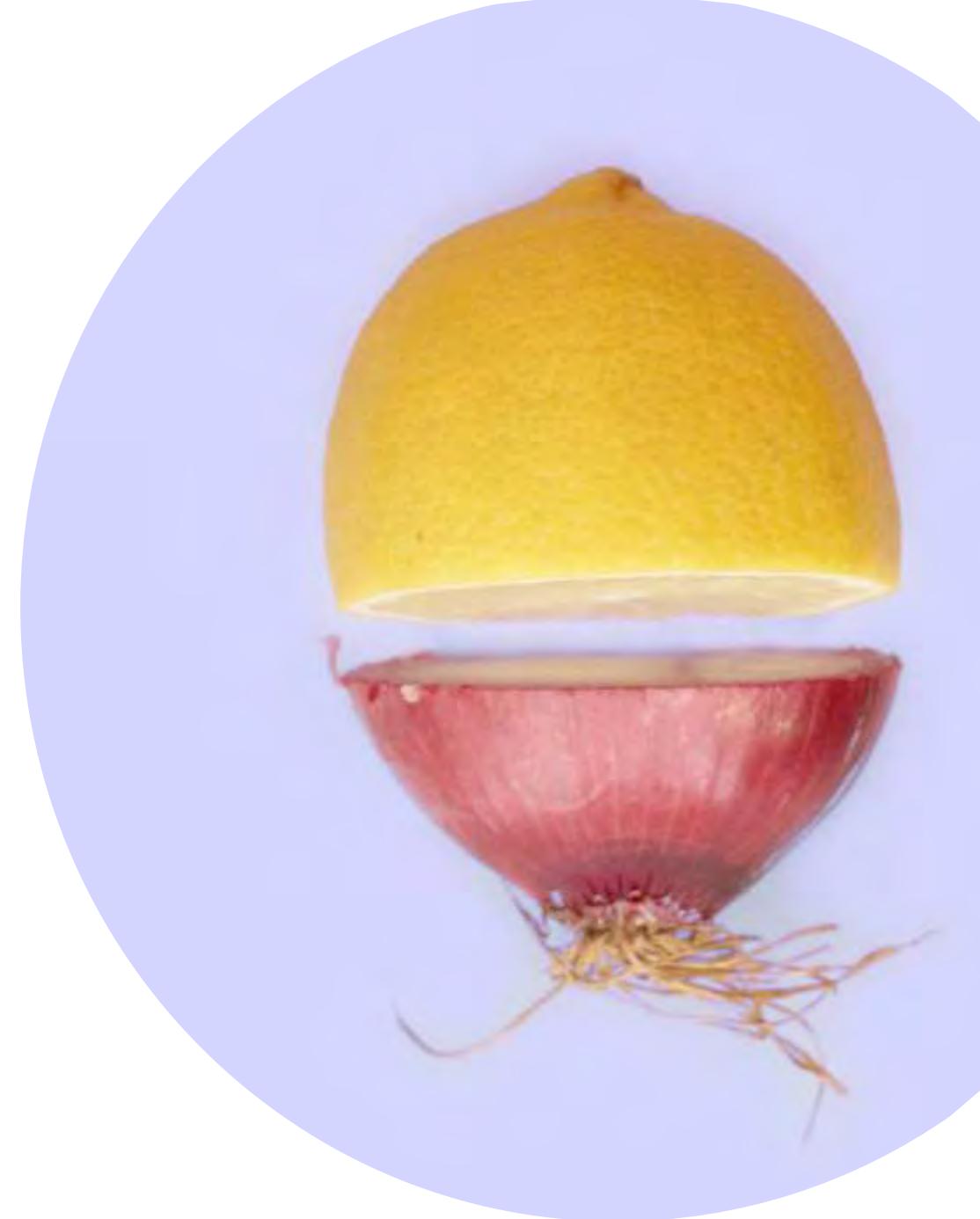
Daily requirements:

5ug/day
up to 50 y

10 ug/day
51-70 y

15ug/day
71 y+

**Name six
food
sources of
vitamin D**



One 75 g serve of mushrooms/day supports selenium & vitamin D needs



Mushrooms allowed vegetarians to get adequate selenium.



UV-mushrooms enabled all adults to meet their recommended vitamin D intake.

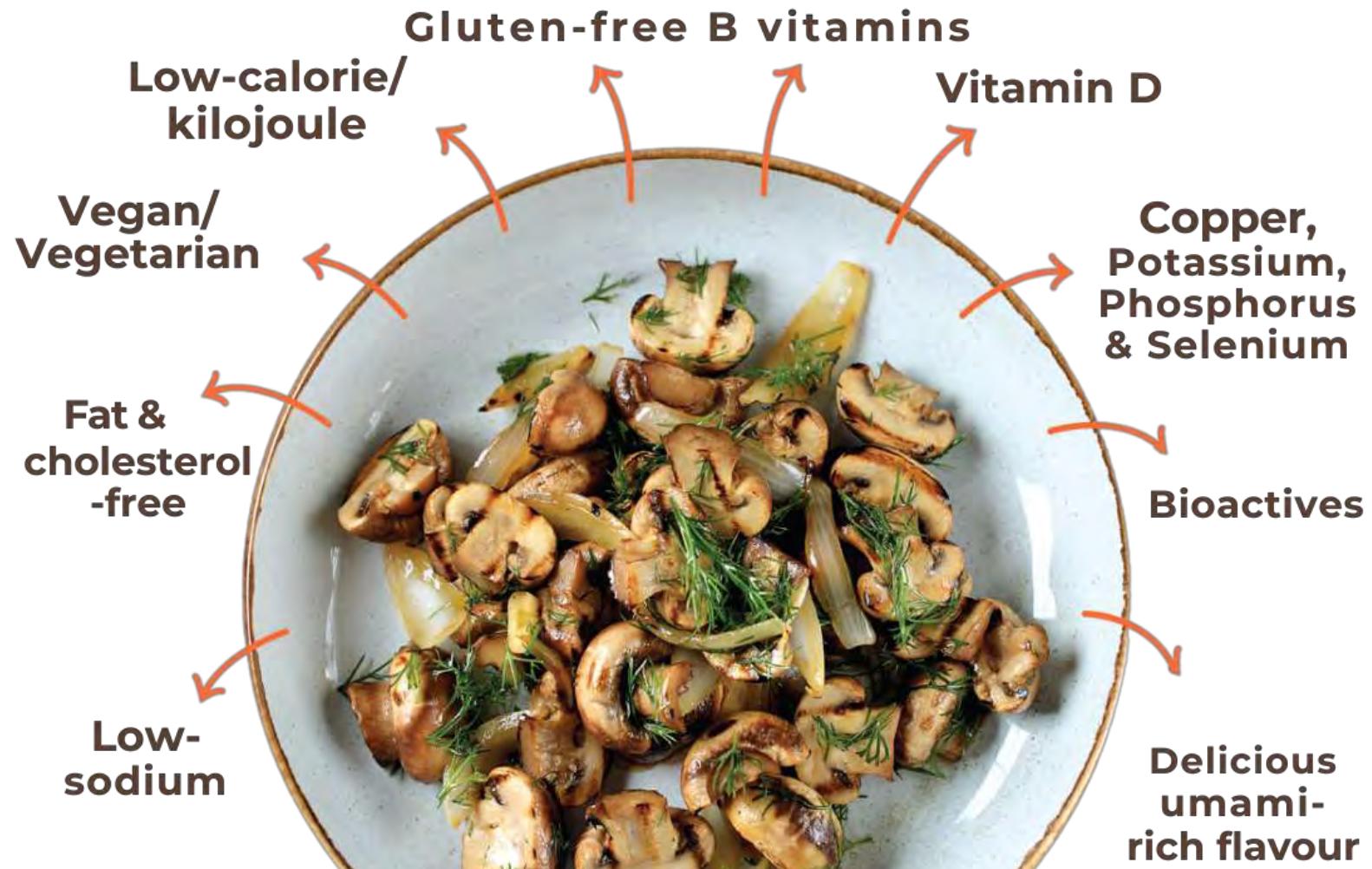


No adverse effects on energy, fat, or sodium intakes.



4 serves per week

Mushrooms are **more** than vitamin D



**If you could
delete one meal
from the menu
where you work,
what would it
be?**



Mushrooms on the **menu**



Are mushrooms a **feasible** strategy to enhance health?

Two case studies:

Mater Health
Brisbane, AUS

- Mushroom-focused menu, with addition of mushrooms to vegetarian meals.



Education of staff, participants, and community to increase confidence & inspire usage



Shoreline Residential
Aged Care facility
Coffs Harbour, AUS

- Addition of UV-exposed mushrooms to food service menu to increase vitamin D intake.
- Residential care + independent living

Food-first approach



The preference to use food-based interventions before nutrition supplementation products when able.



Recipe idea

Australian mushrooms

Mushrooms - a vitamin D superstar!

Mighty Mushrooms





Mater Hospital

Innovator in institutional
food service



The opportunity

Increased demand for **plant-based meals**, recognised to be **low in vitamin D**



- ✓ Mushrooms as nutritional boost in plant-based meals

Increase vitamin D delivery and maintain acceptability of vegetarian meals.



- ✓ Staff & community Education

Educate to raise awareness & knowledge on nutrition, health, culinary benefits Australian Mushrooms (*Agaricus bisporus*) to inspire usage.



The mushroom-focused initiative



Luke Mangan Menu



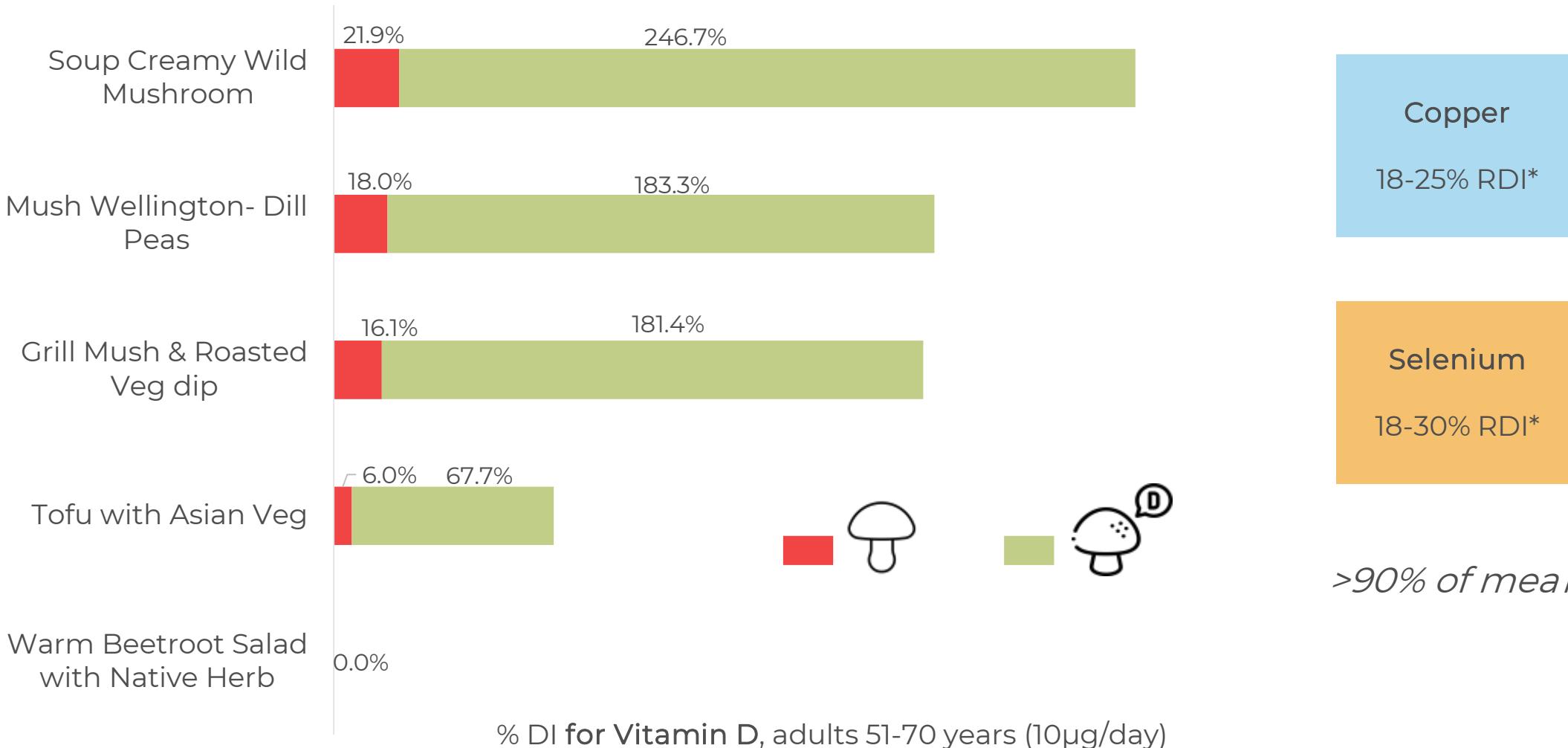
Staff Masterclass



Patient & Community Education

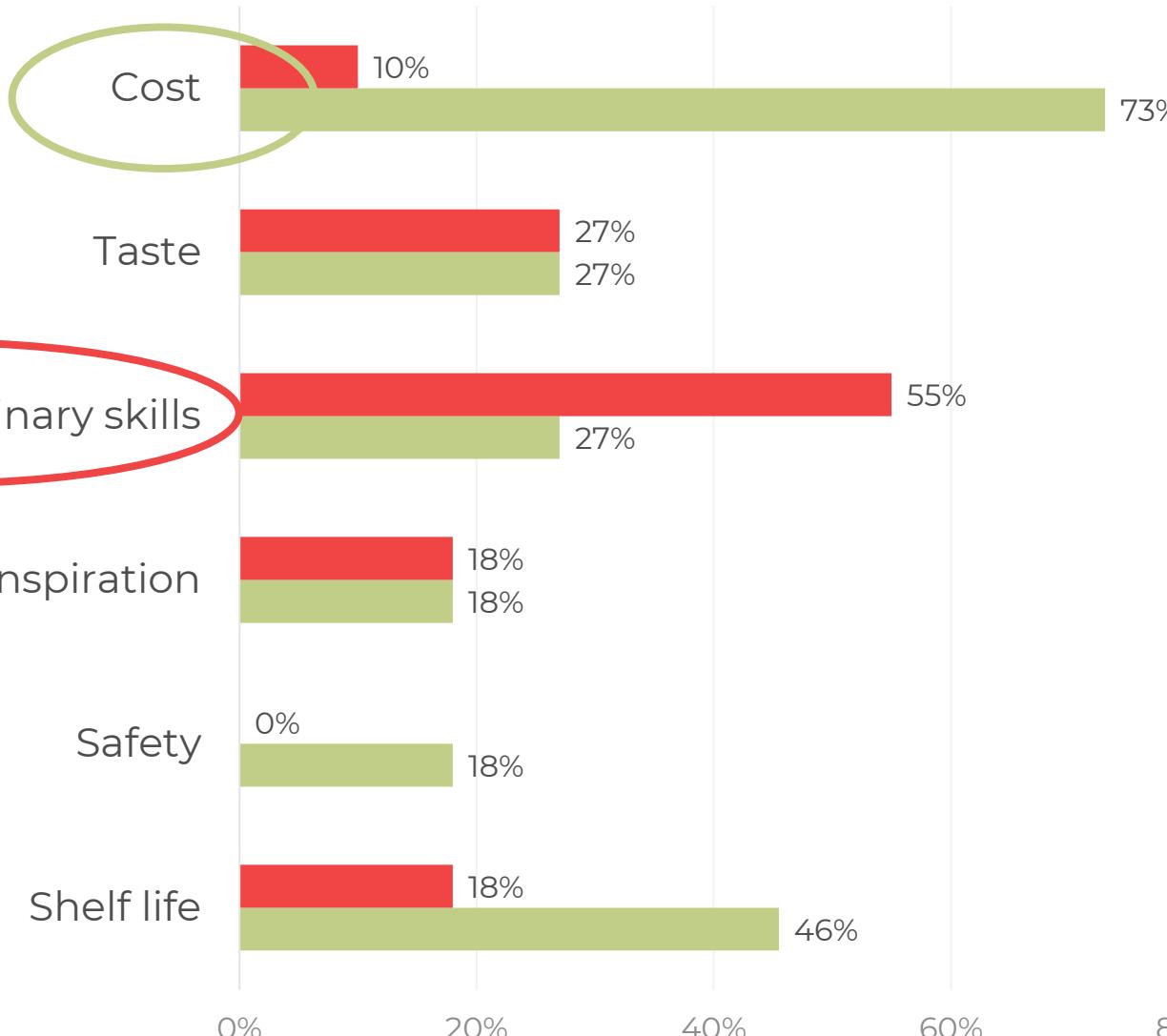


Mushrooms boost vitamin D intake



Perceived barriers to mushroom use

Dietitians



Chefs



“

“One of the greatest outcomes of the initiative is that it has **inspired increased usage** of mushrooms in menu development ”

- Sally McCray

Education is key

- ✓ **Confidence** in discussing mushroom nutrition and health nearly doubled after masterclass; 70% vs 37% “Quite or very confident”
- ✓ **Motivation** 100% agreed that ‘Being educated about mushrooms made me more motivated to include mushrooms in meals and menu development’.
- ✓ **Usage**
 - Ease of usage and versatility most surprising
 - 89.5% were planning to actively include more mushrooms on the menu
 - Flexitarian meal offerings biggest opportunity





The Shoreline Residential Care Facility

Prioritise food-first
approach to health



The Opportunity

Malnutrition prevalent in residential aged care (RAC)

- particularly vitamin D- **up to 80%**



✓ Staff Education

Education of chef to raise awareness & knowledge on nutrition, health, culinary benefits to inspire usage resulted in funding of a study!



✓ Use of vitamin D mushrooms (commercial UV-exposed)

Motivation so high to incorporate vitamin D provision-led to the **MOM Study**; mushrooms already prevalent on menu

Mushrooms On The Menu: MOM Study

Malnutrition prevalent in residential aged care- particularly vitamin D- **up to 80%**

Residential Care



Menu modified to include 28 mushroom meals *at lunch & dinner*



75g = 18ug
vitamin D per serve



Order a minimum of one mushroom meal each day



60 residents | 87.2 y | BMI 26.4 |
72% female

Independent Living



Education session with nurse, dietitian, chef



Provided with vitamin D mushrooms + recipe book



Prepare at least one meal each day containing 75g

12 residents | 71.6 y | BMI 29.5 |
75% female



Vitamin D* of meals & intake increased



Standard
Menu

Residential Care
(lunch + dinner)

Vitamin D
of meals

3.7ug
per meal

Vitamin D
intake

6ug from
lunch/dinner

Meeting
NRV (15ug)

0%

Independent Living
(all meals-daily)

Vitamin D
intake

8.7ug
per day

Meeting
NRV (15ug)

18%



MOM

22ug
per meal

18.7ug from
lunch/dinner

75%

73.1 ug
per day

100%

6 times
more vitamin D
provided

vitamin D intake
tripled

3 in 4
meeting targets

8.4
times higher
intake

1 in 5 to
ALL
meeting targets

*Mean

Meals were well accepted & feasible

Staff

Meals were **easy** to prepare
100% were supportive of mushrooms on menu

Residential care

80% of meals consumed
> 75% meals rated good/excellent for taste, enjoyment & overall presentation
66% of the meals would be ordered again.

Independent Living

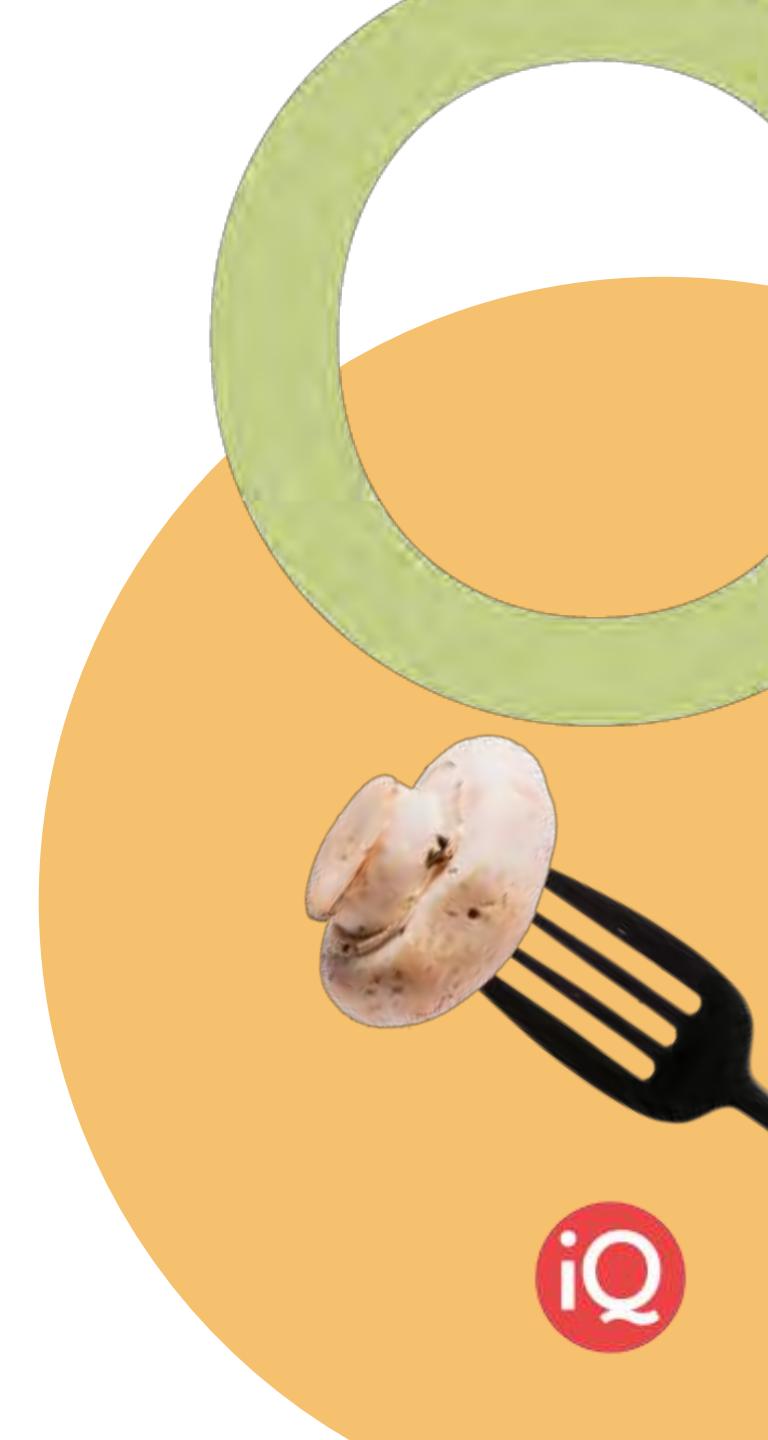
100% rated mushroom meals as good to excellent
100% would cook them again.

Additional Cost

None
Cost neutral meals.
Additional cost able to be contained in existing budget.



**Which recipe
could you
currently adapt
to include
mushrooms?**



PLACEHOLDER SLIDE
Embedded video

Ingredients for success



Vary the Menu

Variety of inclusions (spag bol, quiche, sauce, soup)

Select a proportion of meals with added mushrooms; leverage plant-rich offerings

Combination of feature and blended



Make it easy

No need for new recipes

Adapt existing

Higher than expected popularity of meals- phased approach needed



Education is Motivation

Staff and residents

Cooking, preparation and health benefits

Inspiration via recipe book

Community synergy



“

“Weeks past the study
we have monthly
breakfast for the
independent living
residents and I have
people coming up and
making sure I have
mushrooms on the
menu”

-Andy Wright , Food
Service Manager

Key takeaways



Vitamin D mushrooms are a feasible way to increase
vitamin D provision & intake and meet targets



Versatile ingredient across recipes & diets



Starts with education and you have an important
role to play



Mush thanks to the FOODiQ team:



MUSHROOM
HEALTH SCIENCE
AUSTRALIA



iQ

Thank YOU!

 foodiqglobal

 @foodiqglobal  @drflavs

 foodiqglobal  drFlav

 info@foodiq.global

 www.foodiq.global



Mushrooms THE X-FACTOR INGREDIENT FOR PLANT-BASED EATING

Plant-based eating: BIGGEST GLOBAL TREND OF THE PAST DECADE



SUSTAINABILITY
AND/OR HEALTH =
key reasons to
reduce or eliminate
animal products.



>1/3 of Australians
are eating less
meat, or no meat
at all.

Key future growth strategy

Recent Australian research indicates
that the food service sector is not
tapping into the opportunity¹.

A lack of variety of
plant-based options is a
key frustration for
clientele when eating out.



What is a PLANT-BASED DIET?

'Plant-based' diet is either **mostly** or
entirely comprised of plant foods, with
limited to no animal-derived products.

DID YOU KNOW?

Some people choose to reduce meat intake and not label their dietary choice, while others consider themselves vegan, vegetarian, flexitarian or plant-based. All identify as following a plant-based diet.

Research shows Australians enjoy eating meat but want to eat less and enjoy more plants.¹

Most popular plant-based approaches include some meat.
Vegan and vegetarians make up less than 10% of population.²

TYPES OF PLANT-BASED EATING:

	VEGAN	LACTO-VEGETARIAN	LACTO-OVO-VEGETARIAN	PESCATARIAN	FLEXITARIAN
PLANT	✓	✓	✓	✓	✓
DAIRY	✗	✓	✓	✓	✓
EGGS	✗	✗	✓	✓	✓
FISH	✗	✗	✗	✓	✓
MEAT	✗	✗	✗	✗	✓

FLEXITARIAN =
Flexible approach
to eating

- ✓ Aim to eat 'vegetarian' most of time but occasionally include animal-based foods when confident in quality and sourcing.
- ✓ Driven by health, environment and ethical reasons.

VEGAN = Often a lifestyle choice based on environment, health, ethical and animal welfare concerns.

Mushrooms A DELICIOUS MEAT SUBSTITUTE



The X-Factor INGREDIENT

Unique umami taste and texture
= delicious meaty flavour



- ✓ Contributes moisture = improved mouth-feel and sensory appeal³
- ✓ Enhances flavour³
- ✓ Reduces salt⁴
 - Umami sensitises tastebuds to salt, meaning you can use less salt but still maintain flavour³
 - Research shows you can reduce salt by 25% but still maintain flavour⁴

Unique package of nutrients and bioactives = nutrition boost to any meal



- ✓ Vitamin D⁵
- ✓ B-vitamins (B3, B5, B7, B9), copper, potassium, phosphorus & selenium⁵
- ✓ 3 unique bioactives (ergothioneine, ergosterol, chitin)⁶⁻⁸

Based on 100g⁵

DID YOU KNOW?

Mushrooms are not a good source of protein, but can be easily combined with legumes, nuts or soy products to create a plant-based meal that delivers adequate protein if required.



Key foods in a plant-based diet

Fungi such as mushrooms

Vegetables

Fruit

Whole grains (e.g., quinoa, barley, rye, wheat, oats)

Legumes (e.g., lentils, chickpeas, soybeans)

Oils (e.g., extra virgin olive, avocado, canola)

Nut and seeds

Mushrooms = VITAMIN D SUPERSTAR!

Like humans, clever mushrooms produce vitamin D on sunlight exposure.⁹

100g of mushrooms provides 20% of daily vitamin D needs.⁵

But placing a serve of mushrooms in the sun for about 15 minutes can provide **over 100% of daily vitamin D needs.**⁹



OF DAILY VITAMIN D NEEDS



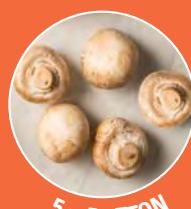
OF DAILY VITAMIN D NEEDS



1x PORTOBELLO



3 x CUP



5 x BUTTON

GETTING ENOUGH protein?



Aside from legumes, vegetables and mushrooms are not a good source of protein.

BUT... Mushrooms are great when reducing or substituting meat as they deliver richer, meatier flavour and texture to dishes with other added nutrition benefits.

Protein rich plant foods:



legumes such as soy, lentils, chickpeas, nuts and seeds and wholegrains such as quinoa and amaranth.



Soy products including soy milk, tempeh, tofu



Watch out: Most plant-based 'milks' such as almond, rice and oat are not a source of protein.

Protein is important for*:



cell growth, repair and function



building muscles and healthy bones

Mushrooms are unique as they are a **non-animal and natural source of vitamin D.**



With 1 in 4 Australians deficient in vitamin D, choosing foods like mushrooms that provide vitamin D is important.¹⁰



Vitamin D* =



✓ Supports healthy bones



✓ Immunity

*As part of a healthy balanced diet



The Blend: THE BENEFITS OF MORE PLANTS BUT WITH LESS MEAT

'The Blend' is an easy cooking technique that can be adopted with any minced meat recipe. There's no need to change the recipes you already know and love... just make room for mushrooms!

Mushrooms can substitute from 25% up to 70% of minced meat in your favourite recipes, like spaghetti, lasagne, tacos, burgers and meatballs, without changing the meaty flavour and texture. Simply adjust the ratio of mushrooms to mince for each recipe, to allow for the extra moisture from the mushrooms.

SUBSTITUTE:

25% mushrooms for burgers or meatballs, 50% mushrooms for bolognese or lasagne, 70% mushrooms for chilli con carne or ragu. Making meals delicious, nutritious and sustainable with mushrooms is as easy as **chop, blend and COOK!**

- ✓ Enhanced flavour⁴
- ✓ Reduced calories, fat and salt⁴
- ✓ Added nutrition⁴
- ✓ Higher yield and cost effective



1 CHOP

- ✓ Chop the mushrooms into approx 2mm x 2mm up to 5mm depending on the grind size of the mince.
- ✓ This can also be easily done by quickly pulsing in a food processor.



2 BLEND

- ✓ Blend the mushrooms with any type of mince (beef, pork, chicken, lamb or turkey) and cook the recipe as standard.
- ✓ If mincing the mushrooms in with meat, the recipe may need to be adjusted due to excess water.



3 COOK

- ✓ Cook your delicious blended mushroom-meat!

References: 1. Latrobe Uni, Health and environmental concerns reduce meat intake in Australia. 2022. <https://www.latrobe.edu.au/news/articles/2022/release/health-environment-drops-meat-eating>. 2. Statista. 2019. <https://www.statista.com/statistics/1232881>. 3. Feeney, M. Nutr. Today, 2014. 49 (6): 301-307. 4. Myridal, A., et al, Mushrooms. J. Food Science, 2014. Vol.79, Issue 9. 5. Australian Food Composition Database, 2019. 6. Pusztafelyi T. Mycology. 2018;9(3):189-201. 7. Weete et al. PLoS One. 2010;5(5). 8. Halliwell et al. FEBS Lett. 2018;592(20):3357-66. 9. Phillips, J Nutr Food Sci 2013;3:236. 10. Dunlop et al. J Hum Nutr Diet. 2022 Mar 7.

Copyright © 2023 Horticulture Innovation Australia | Australian Mushrooms | All rights reserved. **For educational purposes only.**

Mushrooms

PRO CULINARY NUTRITION TIPS & TRICKS



Belonging to the Fungi biological kingdom, mushrooms are neither plant nor animal, containing a unique package of nutritional and flavour compounds that make them truly an X-factor culinary ingredient.

Here are some pro tips and tricks from **Chef Adam Moore** and **Nutrition Scientist Dr. Flav** to making the most of the culinary and nutritional benefits of the mighty mushroom.



Chef Adam Moore



Nutrition Scientist Dr. Flav

YOUR GUIDE TO White mushrooms (AGARICUS BISPORUS FAMILY)



SELECT



'Veil' should be attached to stalk on smaller mushrooms



Gills intact and moist on larger ones

- ✓ Smooth appearance, firm (not slippery) dry and plump surface, with uniform colour.

STORE

- ✓ Original packaging or ventilated cardboard box.
- ✓ Never freeze fresh mushrooms.
- ✓ Sautéed mushrooms can be frozen up to one month.

- ✓ Keeps for up to 1 week in the fridge



PREPARE



Whole mushroom can be used with no waste.



Stems contain flavour and nutrition. Finely chop if a little tough or use in sauces, soups or stocks.



Gently wipe with a damp cloth.



A soft pastry brush is best to remove any dirt.



Whole mushrooms can be washed but should be quickly dried before use.



Don't soak in water or wash sliced mushrooms.



Cook to order and serve immediately. Cooked mushrooms (other than sauces) should not be left to sit in a bain-marie.

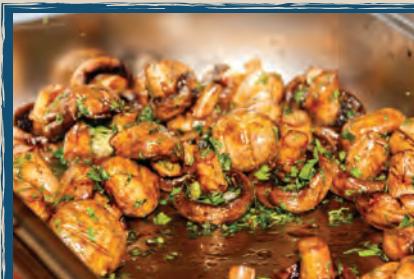


Leave room in the pan for the moisture to evaporate when cooking.

GETTING THE MOST *flavour* FROM MUSHROOMS



Sauté mushrooms with butter or oil and caramelise until golden brown to unleash their flavoursome meaty umami flavour.



Roast mushrooms to get more sweet, salty and umami tastes with caramelised, nutty and buttery flavours.



Sear mushrooms for a more intense roasted, charred and smoky flavour and overall aroma.

Roasted **WHOLE** mushrooms are perfect for:

- ✓ vegetarian dishes such as lasagnes or coated as a schnitzel
- ✓ marinated with balsamic and topped with goats cheese for an entrée
- ✓ coated in a tandoori marinade for an alternative burger

“ **Mushrooms offer a nutritious, lower salt but still flavoursome way to provide the savoury ‘umami’ taste that can help drive palatability of other foods.** ”

CHEF ADAM MOORE



For more flavoursome, meaty and plumper mushrooms:

1. In a hot fry pan add the fat (10g), mushrooms (200g), seasonings (1g), and water (50ml)
2. Bring to a boil until water absorbs
3. Sauté until golden brown in the residue

Try this flavour bomb! Coat mushrooms in miso paste and sauté or sear them for the ultimate in savoury umami flavour.

PRO TIP
Use bigger mushrooms for enhancing flavour in any recipe!

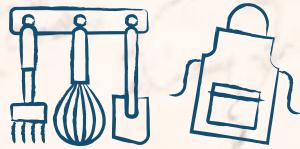
As mushrooms mature, their cell walls break down more easily and release their flavour compounds.

Drying, freezing and boiling are also good methods to degrade cell walls.

Flat and portobello are more mature mushrooms, often considered the tastiest.



MUSHROOM Inspiration



Make a mushroom **duxelle** with onion, parsley, thyme and butter for a great breakfast addition or function canapé.



Use mushrooms as a **stuffing** in a chicken instead of bread crumbs for a great flavour boost and gluten free option or a tasty accompaniment.



Mushrooms **perfectly pair with** apples, asparagus, bacon, balsamic or cider vinegar, beef, Brussel sprouts, burrata, butter, cabbage, carrots, cashews, cauliflower, charcuterie, cheese, chicken, chickpeas, chilli, coconut, coriander, cream, eggs, garlic, lamb, leeks, lettuce, limes, oysters, paneer, parsley, peanuts, peas, pork, potatoes, prawns, parsley, salmon, seafood, sourdough and bread, spinach, sweet potato, thyme, white wine, wasabi, and zucchini.

DID YOU KNOW?

If you put mushrooms straight in the pan with fat, the water coming out of the mushrooms will buffer the temp of the oil and keep it low so you won't get that Millard reaction.



Mushrooms make an amazing **savoury custard** called a chawanmushi, which is a Japanese steamed egg custard that is full of flavour.



Mushrooms can be used for most dietary needs

- ✓ Flexitarian
- ✓ Gluten-free
- ✓ Halal
- ✓ Limiting/reducing animal foods
- ✓ Keto
- ✓ Kosher
- ✓ Low-carb
- ✓ Low-fat
- ✓ Low-salt
- ✓ Low-sugar
- ✓ Nut-free
- ✓ Plant-based
- ✓ Vegan
- ✓ Vegetarian

GETTING THE MOST *nutrition* FROM MUSHROOMS



Looking to reduce meat or sodium in a meal?



- ✓ Umami taste and unique meaty texture = Great meat substitute
- ✓ Pasta sauce, stews, casseroles, mince and other mixed dishes

Need to create a delicious plant-based dish with enough protein?



- ✓ When replacing meat with mushrooms, add extra plant protein - at least 1 cup legumes or 1/4 cup nuts per person.

The entire mushroom is edible from CAP to STEM!

While the **cap** of mushrooms is a richer source of bioactives,¹ its **stem** contains 40% more of the soluble fibre beta-glucan.²



“
Exposing one portobello mushroom to about 15 minutes of sunlight can provide the same amount of vitamin D as a low dose vitamin D supplement (1000 IU).

DR FLAV



GETTING THE MOST VITAMIN D in your mushrooms

You can buy UVB exposed mushrooms or easily do it yourself!



1 Spread out the mushrooms



Increasing surface area to UVB light helps increase the amount of vitamin D that is made, so face 'gills' (the underside of the mushroom) to the sun or slice mushrooms for maximum vitamin D.³

2 Put in the sun for about 15 minutes



Vitamin D is stable during cooking mushrooms, particularly at low temperatures, and for up to 8 days refrigeration.^{3,4}



Adding lemon juice to mushrooms when cooking can help to retain their vitamin D content.⁵

References: 1. Vetter. Food Chemistry. 2007;102:6-9. 2. Sari et al. Food Chem. 2017;216:45-51. 3. Roberts et al. J Agric Food Chem. 2008;56(12):4541-4. 4. Ng et al. Journal of Food Science and Technology. 2017;54(12):4100-11. 5. Ložnjak et al. Food Chem. 2018;254:144-9

Copyright © 2023 Horticulture Innovation Australia | Australian Mushrooms | All rights reserved. For educational purposes only.

Mighty Mushrooms FROM FARM TO YOU!

While often considered a vegetable, mushrooms are in fact neither animal or plant. They are part of a separate biological kingdom called **Fungi**, from well before plants were on Earth.^{1,2}

- ✓ Unique culinary and nutrition characteristics

3 KEY BIOLOGICAL KINGDOMS:



ANIMAL
(meat and dairy)

PLANT
(fruits, vegetables, seeds, oils, grains)

FUNGI
(mushrooms)

PINHEAD

Pushing out of the ground, it grows into a miniature mushroom the size of a pinhead.

MUSHROOM

Grows into a mature mushroom, opening its veil to release spores for the growing cycle to continue.

STARTS WITH:

SPORES RELEASED FROM GILLS ON UNDERSIDE OF CAP
Mature mushrooms drop as many as 16 billion spores.

Fun FACT:

The mushroom above the ground is called the fruiting body, consisting of a **stem** and **cap**.

HYPHAL KNOT

Hypphae strands bundle together and prepare to grow a mushroom.

How do MUSHROOMS GROW?

Mushrooms grow in a unique & fascinating way.

MYCELIUM

Consist of many super-thin threads that absorb nutrients from the environment.

GROW INTO HYPHAE

Spores grow into fine white fibres (hyphae).

HYPHAE MEET AND COMBINE

A hyphae join, forming roots called mycelium.

THE INCREDIBLE AUSTRALIAN

White mushroom journey



Always in season

and grown all year round indoors.



Can grow in light and darkness

Unlike plants, mushrooms don't need sunlight to grow, but when exposed to UV light, they can make over 100% of daily vitamin D needs*.³



A scientific marvel AND a precise art

- ✓ For a mushroom to grow, the temperature, humidity and carbon dioxide levels are varied and carefully monitored around the clock.
- ✓ Farmers respond as required.



Mushrooms are sustainably farmed, using circular farming methods

- ✓ Growers use solar power and recycled water.
- ✓ Recycled waste from other farms (straw and animal manure) is made into compost for mushroom growing, with the compost at end of production then sold to other farms or nurseries.
- ✓ Vertical growing = less land usage.
- ✓ Less water used compared to meat production.

*Based on 100g⁴

FROM THE FARM TO YOU in 5 steps

5. PACKAGING & SHIPPING

- ✓ Mushrooms are packed whole, or sliced and immediately refrigerated. Shipped within 24 hours of being harvested.



1. COMPOST (DAYS 1-30)

- ✓ Recycled waste from other farms (straw and poultry manure) is made into compost (which growers refer to as substrate) which is pasteurised before use for mushroom growing. At the end of mushroom production, compost is sold to other farms or nurseries for use as a growing medium for other crops.



2. SPANNING (DAY 31)

- ✓ Commercial mushroom growers use spawn that is propagated from mycelium onto a sterilised cereal grain, which are produced under controlled conditions.
- ✓ The spawn is mixed through the compost. Mycelium then colonises the compost, after which, the mushrooms form.

4. HARVESTING (DAYS 58-79)

- ✓ Substrate removed and on sold as a growing medium for other crops.
- ✓ At harvest end, growing rooms are steamed at 65°C to eliminate pest contamination.

- ✓ Carefully harvested by hand.

- ✓ Mushrooms double in size daily.



3. GROWING (DAYS 31-58)

- ✓ Colonised compost is extruded into the beds. A casing layer is applied on top, to promote the mushroom fruit body.

3. GROWING (DAYS 31-58)

DID YOU KNOW?

Mushrooms keep growing a little after they have been picked.

Mushroom harvesting cycle is called a 'flush'.

There are 2-3 'flushes' from a growing cycle over a 3-week period.

Get to know THE DIFFERENT VARIETIES

There are more than 2000 varieties of edible mushrooms worldwide, with the white button mushroom from the *Agaricus bisporus* species the most common.⁵



White Mushrooms (*AGARICUS BISPORUS*)

Most common but ever so versatile variety making up 95% of Australian fresh consumption.

DID YOU KNOW?

Australian grown mushroom varieties (white, swiss brown and portobello) are the same species (*Agaricus bisporus*)! The difference is simply their age and stage of harvesting as mushrooms double in size in every day.



Button mushrooms
= Harvest day 3



Cup mushrooms
= Harvest day 4



Flat mushrooms
or Portobello
= Harvest day 5

Fun **FACT:** the longer a mushroom is allowed to grow, the more its flavour develops. So, a white button mushroom has a very mild flavour, and a 'flat' mushroom has a robust flavour.

THE *AGARICUS BISPORUS* Family



Great size and texture to use whole

- Being the first harvested, their veil is tightly closed and texture very firm.
- Almost pure white, with the mildest umami flavour.

- Perfect for any cooking application with a crisp bite raw.
- Great whole, skewered for the BBQ, or in stews and in slow cooking.
- Fantastic crumbed and as a deep fried snack.



Perfect raw or cooked, Australia's favourite all-rounder

- Being second stage harvest, gills can be slightly open.
- Mild and delicate flavour, perfect for any recipe.
- Firm texture maintained during cooking.

- Creamy white colour great for pasta and risotto.
- Most versatile - great raw in platters or salads, whole roasted, stuffed and baked or diced and blended with meat dishes.



Perfect for the BBQ

- Dense spongy texture, slightly softer than buttons and cups.
- Rich intense umami flavour and dark colour to sauces.

- Great whole, simply brushed with olive oil and put on BBQ, stuffed and oven baked or crumbed whole and shallow fried.
- Great fine diced and added to blended meat dishes or cooked and blended in soups or sauces.



Great for casseroles or slow cooking

- Slightly nutty and richer umami flavour than white mushrooms.
- Brown mushrooms have less water content than white mushrooms, resulting in a firmer texture that allows it to hold together better in slow cooking.

- Good for beef, wild game and vegetable dishes.
- Best for high heat and long cooking applications.
- Great for casseroles, stew and skewering on BBQ as they hold their shape in slow cooking.



Great for stuffing and slow cooking

- Largest cultivated mushroom.
- Hearty, savoury and meaty with lots of umami.

- Great for both meat and meatless dishes.
- Delivers hearty juiciness, rich flavour and firm, steak like texture, that keeps shape when cooked whole.
- Great for burgers and excellent for grilling, sautéing and roasting or diced and used in blended meat dishes.

Speciality MUSHROOMS



Flammulina velutipes Perfect for stir-fries

- Very mild and sweet slightly fruity taste when cooked.
- Firm crisp texture.
- Trim roots at base, discard and gently separate each strand.

- Must always be cooked and best cooked briefly before eating as becomes chewy if overcooked.
- Great sauteed and added cooked to salads, attracting flavours from the dressing/sauces, or added at the end of cooking for stir-fries, soups or risottos.

Pleurotus eryngii Add to stir-fries or simply sauté. Great seafood substitute

- Delicate, nutty flavour and a firm, meaty texture.
- When cooked, texture mimics seafood, like scallops, particularly when stem sliced crosswise.
- Large size and savoury flavour can feature as centre for any entrée for any cuisine.

- Versatile for slicing and serving from large-to-small dice to slicing lengthwise to shredding.
- Cut lengthwise for slices -ideal for grilling, sautéing, roasting.
- Fork-shred for serving as a meaty option for barbecue sandwiches, tacos, or serving atop grilled meats.

Hericium erinaceus Great accompaniment to seafood

- Seafood-like with mildly sweet flavour and tender texture like scallops, crab, or lobster.

- Can be seared and served centre of plate.
- Accompaniment or alternative to seafood.
- Dry sauté in a hot skillet until water releases and edges brown, then add butter and seasonings.

Grifola frondosa Distinct rippling fan, provides visual appeal to any dish

- Delicate, rippling fan shape that almost resembles feathers.
- Distinct aroma, rich, woodsy flavour with a succulent texture.

- Cooked as a whole cluster or torn into smaller pieces to suit any recipe.
- Lends itself to any dish - great for mains, side dishes and soups.
- Delicious sauteed in butter or oil, browning its delicate edges to desired degree of crispness.

Morchella esculenta Delivers rich flavour in sauces and soups

- Distinctive savoury flavour.
- Rich earthy flavour.

- Best sautéed but can add a rich flavour to soups or sauces.
- Great in slow cooked dishes.

Pleurotus ostreatus Velvet but firm, best sauteed

- Velvety and dense in texture.
- 'Briny' or delicate seafood flavour.
- Colourful dish addition - found in grey, yellow, pink and blue.

- Trim stems and discard.
- Can be sliced and stir-fried or gently cooked in large pieces to preserve unique appearance.
- Best lightly sauteed. When pan-fried, edges turn crisp.

Lentinula edodes Great for stir-fry, pasta and risotto

- Earthy, woody flavour and a rich meaty-yet-buttery texture when cooked.
- Dense, meaty flesh with slightly chewy texture.

- Tough stems can be removed and saved for soups and stocks.
- Good for pizza, pasta and dishes that call for bold flavours.

Lypophyllum or *Pleurotus* species Perfect hero for stir-fry

- Firm texture with meaty but mildly sweet, nutty flavour.
- Separate from clumps at base.

- Perfect as hero in stir-fry. Loves sauce and can be added whole to soups, salads or pasta.

Fun FACT:

Mushrooms boast a delicious savoury flavour, known as **UMAMI** - the Japanese word for 'tasty' or 'meaty', which is considered the fifth basic taste along with sweet, salty, sour and bitter.



WHICH MUSHROOM IS BEST *when cooking?*

Perfect for...	WHITE BUTTON	WHITE CUP	WHITE FLAT	SWISS BROWN	PORTOBELLO	ENOKI	KING TRUMPET	LION'S MANE	MAITAKE	MOREL	OYSTER	SHIITAKE	SHIMEJI
BBQ	✓	✓	✓	✓	✓		✓						
BURGER	✓	✓	✓	✓	✓		✓		✓		✓		
CRUMB & FRY	✓	✓					✓				✓		
FLASH FRY						✓		✓			✓		
GRILL		✓	✓	✓	✓		✓	✓	✓				
PASTA	✓	✓		✓			✓			✓	✓	✓	✓
PICKLED	✓	✓		✓			✓		✓		✓	✓	✓
PIZZA	✓	✓	✓	✓	✓		✓				✓		
RAW	✓	✓	✓	✓									
RISOTTO	✓	✓		✓			✓			✓	✓	✓	✓
ROAST	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	
SALAD	✓	✓		✓			✓						
SAUCE	✓	✓	✓	✓	✓					✓			
SAUTE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SEAR	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	
SLOW COOK	✓	✓	✓	✓	✓	✓							
Soup	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
STIR-FRY	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓
STUFFED	✓	✓	✓	✓	✓	✓							



White mushrooms are one of the most cost-effective and versatile mushrooms across all cooking methods and meal occasions.

CHEF ADAM MOORE



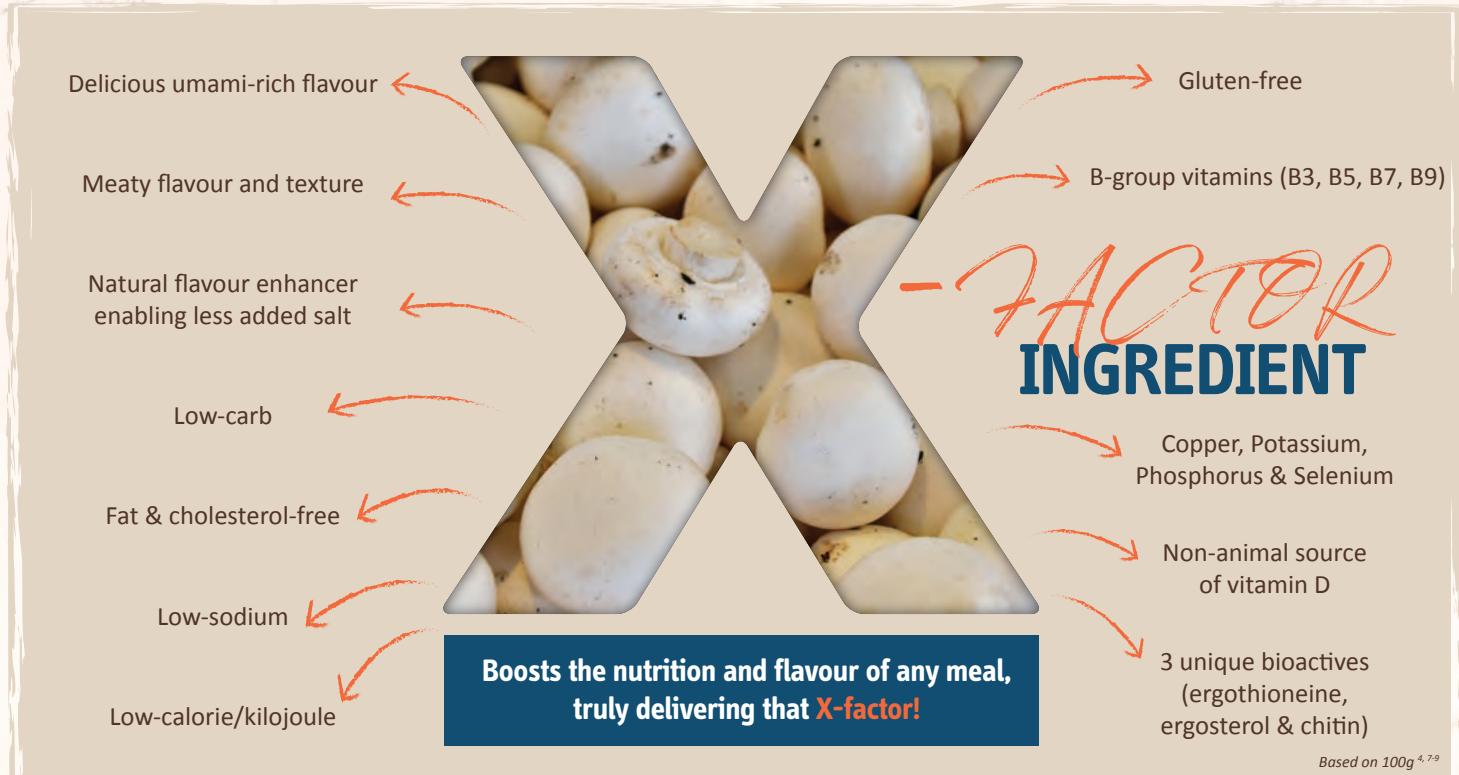
UMAMI Power

Mushrooms contain distinctive flavour compounds including glutamates, ribonucleotides, and several synergistic volatiles.⁶

Together, they give the characteristic 'umami' savoury taste associated with cooked mushrooms and can enhance flavour of meals with less salt.⁶

Umami is found in:





Based on 100g^{4, 7-9}



“ Adding mushrooms with its natural umami flavour can help bump up the taste and make it easier to use less salt in cooking.

DR ELAVIA FAYET-MOORE



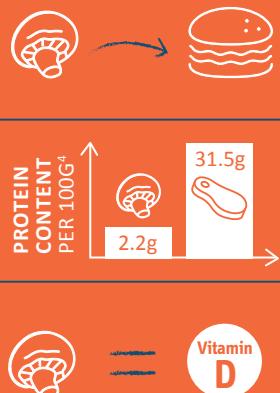
DID YOU KNOW?



With their fabulous meaty flavour and texture, and less salt and fat, **mushrooms are a great meat replacer.**

However, lower in protein, mushrooms are not an equivalent protein replacement for animal protein.

But, they are a **natural and non-animal source of VITAMIN D**, important when 95% of Aussies are not meeting daily needs and 1 in 4 are deficient.^{3, 10}



Applicable for many dietary needs

✓ Flexitarian

✓ Gluten-free

✓ Halal

✓ Limiting/reducing animal foods

✓ Keto

✓ Kosher

✓ Low-carb

✓ Low-fat

✓ Low-salt

✓ Low-sugar

✓ Nut-free

✓ Plant-based

✓ Vegan

✓ Vegetarian

References: 1. Naranjo-Ortiz et al. Biol Rev Camb Philos Soc. 2019;94(6):2101-37. 2. Loron CC, et al. Nature. 2019;570:232–235. 3. Phillips, J Nutr Food Sci 2013;3:236. 4. Australian Food Composition Database, 2019. 5. Valverde et al. Int J Microbiol. 2015;2015:376387. 6. Miller et al. J Food Sci. 2014 Sep;79(9):S1795-804. 7. Pusztaehelyi T. Mycology. 2018;9(3):189-201. 8. Weete et al. PLoS One. 2010;5(5). 9. Halliwell et al. FEBS Lett. 2018;592(20):3357-66. 10. Dunlop et al. J Hum Nutr Diet. 2023; 36: 203– 215.

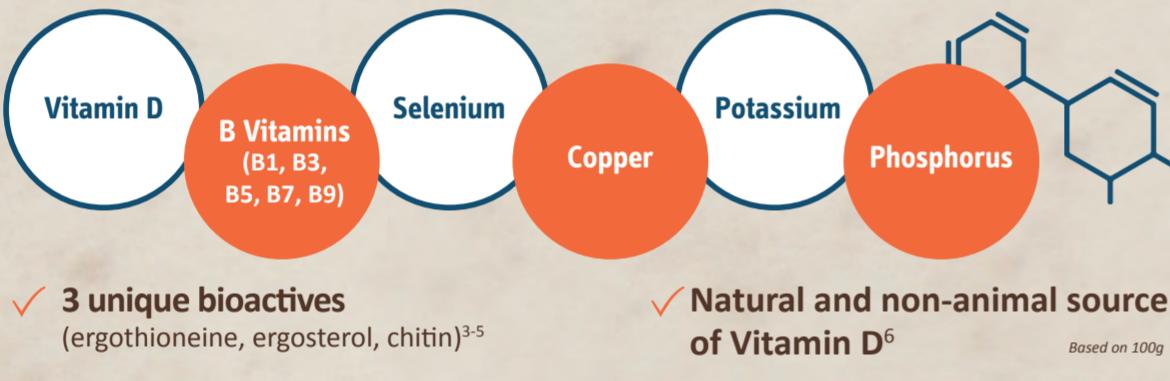
Copyright © 2023 Horticulture Innovation Australia | Australian Mushrooms | All rights reserved. **For educational purposes only.**

Mushrooms = X-FACTOR INGREDIENT

Unique umami TASTE & TEXTURE

- ✓ Contributes moisture = improved mouth-feel and sensory appeal¹
- ✓ Enhances flavour¹
- ✓ Reduces salt²
 - Umami sensitises tastebuds to salt, meaning you can use less salt but still maintain flavour¹
 - Research shows you can reduce salt by 25% but still maintain flavour²

Unique package of NUTRIENTS & BIOACTIVES



Mushrooms produce VITAMIN D ON SUNLIGHT EXPOSURE

100g of mushrooms provides 20% of daily vitamin D needs.⁶
But placing 100g of mushrooms in the sun for about 15 minutes can provide over 100% of daily vitamin D needs.⁷



DIETARY USES:

✓ Flexitarian	✓ Low-fat	✓ Limiting/reducing animal foods	✓ Nut-free
✓ Gluten-free	✓ Low-salt	✓ Keto	✓ Plant-based
✓ Halal	✓ Low-sugar	✓ Kosher	✓ Vegan
		✓ Low-carb	✓ Vegetarian

WHICH MUSHROOM IS BEST when cooking?

AGARICUS BISPORUS FAMILY												SPECIALITY		
Perfect for...	WHITE BUTTON	WHITE CUP	WHITE FLAT	SWISS BROWN	PORTOBELLO	ENOKI (<i>Flammulina velutipes</i>)	KING TRUMPET (<i>Pleurotus eryngii</i>)	LION'S MANE (<i>Hericium erinaceus</i>)	MAITAKE (<i>Grifola frondosa</i>)	MOREL (<i>Morchella esculenta</i>)	OYSTER (<i>Ostreatus</i>)	SHIITAKE (<i>Lentinula edodes</i>)	SHIMEJI (<i>Lyophyllum</i> or <i>Pleurotus</i> species)	
BBQ		✓	✓	✓	✓				✓					
BURGER	✓	✓	✓	✓	✓				✓		✓			✓
CRUMB & FRY	✓	✓							✓				✓	
FLASH FRY							✓		✓				✓	
GRILL		✓	✓	✓	✓		✓	✓	✓					
PASTA	✓	✓					✓				✓	✓	✓	✓
PICKLED	✓	✓					✓		✓		✓	✓	✓	✓
PIZZA	✓	✓	✓	✓	✓		✓						✓	
RAW	✓	✓	✓	✓	✓									
RISOTTO	✓	✓					✓				✓	✓	✓	✓
ROAST	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
SALAD	✓	✓					✓							
SAUCE	✓	✓	✓	✓	✓		✓					✓		
SAUTE	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
SEAR	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
SLOW COOK	✓	✓	✓	✓	✓		✓							
SOUP	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
STIR-FRY	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
STUFFED	✓	✓	✓	✓	✓		✓							

References:

1. Feeney, M. Nutr. Today. 2014. 49 (6): 301-307.
2. Myridal, A., et al. Mushrooms. J. Food Science. 2014. Vol.79, Issue 9.
3. Pusztaehelyi T. Mycology. 2018;9(3):189-201.
4. Weete et al. PLoS One. 2010;5(5).
5. Halliwell et al. FEBS Lett. 2018;592(20):3357-66.
6. Australian Food Composition Database, 2021.
7. Phillips, J Nutr Food Sci 2013;3:236.

Copyright © 2023 Horticulture Innovation Australia | Australian Mushrooms | All rights reserved. For educational purposes only.



Mighty mushrooms

THE X-FACTOR INGREDIENT FOR FOODSERVICE

Australian
MUSHROOMS



Table of: CONTENTS

Introduction	Pg 3
How Mushrooms grow	Pg 4
Mushroom varieties, selection, cooking	Pg 6
Culinary and Nutrition Benefits	Pg 10
Plant-based eating	Pg 14
Pro-tips: Culinary	Pg 17
Pro-tips: Nutrition	Pg 19
References	Pg 20

MUSHROOMS

Neither plant nor animal

While often considered a vegetable, mushrooms are in fact neither animal or plant. Mushrooms are part of a separate biological kingdom called Fungi, from well before plants were on Earth.^{1,2}

With their unique culinary and nutrition benefits, mushrooms are truly the **X-factor ingredient** to *any* meal, but particularly plant-based menu options, a growth sector within the foodservice market.

The most consumed edible mushroom worldwide is the *Agaricus bisporus* species, commonly referred to as white mushrooms. **White Australian mushrooms** are cost effective and highly valued for their cooking versatility across many cooking methods and meal occasions.



In this e-book, **Chef Adam Moore** and **Nutrition Scientist Dr. Flav** share with you some of the fascinating culinary and nutritional properties of the mighty mushroom, including how they grow, the different varieties, and how to select and make the most of this **X-factor ingredient**.



Chef Adam Moore



Nutrition Scientist Dr. Flav

3 KEY BIOLOGICAL KINGDOMS:

While often considered a vegetable, mushrooms are in fact neither animal nor plant. They are part of a separate biological kingdom called Fungi, from well before plants were on Earth.^{1,2}



ANIMAL
(meat, dairy and eggs)



PLANT
(fruits, vegetables, seeds, oils, grains)



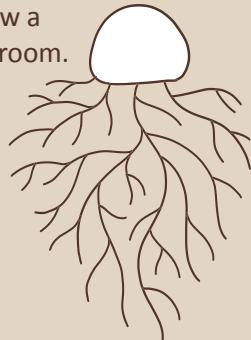
FUNGI
(mushrooms and yeast)

PINHEAD

Pushing out of the ground, it grows into a miniature mushroom the size of a pinhead.

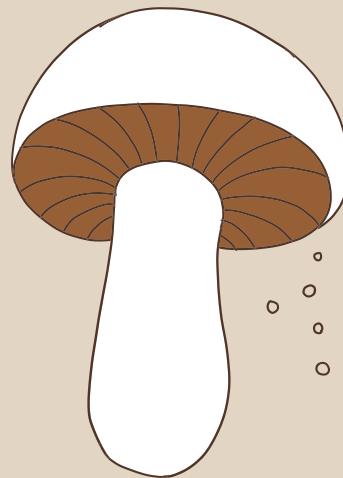
HYPHAL KNOT

Hyphae strands bundle together and prepare to grow a mushroom.



MUSHROOM

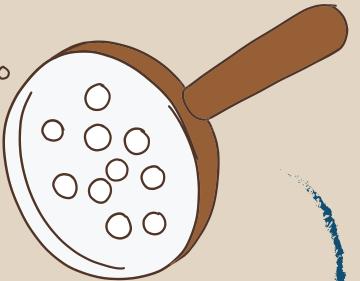
Grows into a mature mushroom, opening its veil to release spores for the growing cycle to continue.



STARTS WITH:

SPORES RELEASED FROM GILLS ON UNDERSIDE OF CAP

Mature mushrooms drop as many as 16 billion spores.



How do MUSHROOMS GROW?

Mushrooms grow in a unique & fascinating way.

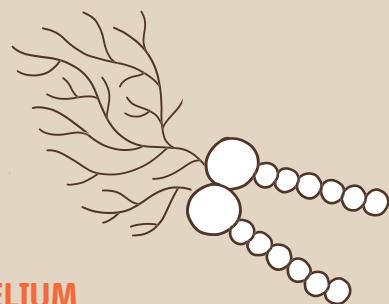
GROW INTO HYPHAE

Spores grow into fine white fibres (hyphae).



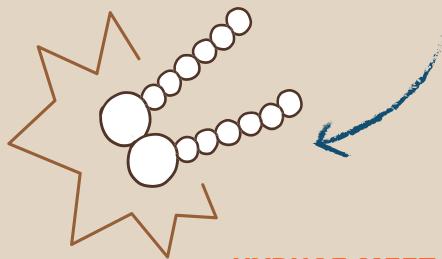
MYCELIUM

Consist of many super-thin threads that absorb nutrients from the environment.



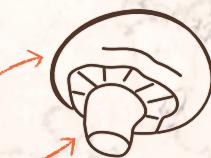
HYPHAE MEET AND COMBINE

A hyphae join, forming roots called mycelium.



Fun FACT:

The mushroom above the ground is called the fruiting body, consisting of a **cap** and **stem**.



THE INCREDIBLE AUSTRALIAN

White mushroom journey



Always in season

and grown indoors all year round.



Can grow in light or darkness

Unlike plants, mushrooms don't need sunlight to grow, but when exposed to UV light, they can make over 100% of daily vitamin D needs*.³



A scientific marvel AND a precise art

- ✓ For a mushroom to grow, the temperature, humidity and carbon dioxide levels are varied and carefully monitored around the clock.
- ✓ Farmers respond as required.



Mushrooms are sustainably farmed, using circular farming methods

- ✓ Growers use solar power and recycled water.
- ✓ Recycled waste from other farms (straw and animal manure) is made into compost for mushroom growing, with the compost at end of production then sold to other farms or nurseries.
- ✓ Vertical growing = less land usage.
- ✓ Less water used compared to meat production.

*Based on 100g⁴

FROM THE FARM TO YOU in 5 steps

5. PACKAGING & SHIPPING

- ✓ Mushrooms are packed whole, or sliced and immediately refrigerated. Shipped within 24 hours of being harvested.



1. COMPOST (DAYS 1-30)

- ✓ Recycled waste from other farms (straw and poultry manure) is made into compost (which growers refer to as substrate) which is pasteurised before use for mushroom growing. At the end of mushroom production, compost is sold to other farms or nurseries for use as a growing medium for other crops.



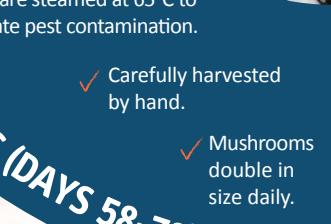
2. SPANNING (DAY 31)

- ✓ Commercial mushroom growers use spawn that is propagated from mycelium onto a sterilised cereal grain, which are produced under controlled conditions.
- ✓ The spawn is mixed through the compost. Mycelium then colonises the compost, after which, the mushrooms form.



4. HARVESTING (DAYS 58-79)

- ✓ Substrate removed and on sold as a growing medium for other crops.
- ✓ At harvest end, growing rooms are steamed at 65°C to eliminate pest contamination.
- ✓ Carefully harvested by hand.
- ✓ Mushrooms double in size daily.



3. GROWING (DAYS 31-58)

- ✓ Colonised compost is extruded into the beds. A casing layer is applied on top, to promote the mushroom fruit body.
- ✓ Growing rooms have long shelves called growing beds, stacked 4 to 8 beds high.

DID YOU KNOW?
Mushrooms keep growing a little after they have been picked.

Mushroom harvesting cycle is called a 'flush'.
There are 2-3 'flushes' from a growing cycle over a 3-week period.

Get to know THE DIFFERENT VARIETIES

There are more than 2000 varieties of mushrooms worldwide, with the white button mushroom from the *Agaricus bisporus* species the most common.⁵



White Mushrooms (*AGARICUS BISPORUS*)

Most common but ever so versatile variety making up 95% of Australian fresh consumption.

DID YOU KNOW?

Australian grown mushroom varieties (white, swiss brown and portobello) are the same species (*Agaricus bisporus*)! The difference is simply their age and stage of harvesting as mushrooms double in size in every day.



Button mushrooms
= Harvest day 3



Cup mushrooms
= Harvest day 4



Flat mushrooms
or Portobello
= Harvest day 5

Fun FACT: the longer a mushroom is allowed to grow, the more its flavour develops. So, a white button mushroom has a very mild flavour, and a 'flat' mushroom has a robust flavour.

THE *AGARICUS BISPORUS* Family



Great size and texture to use whole

- Being the first harvested, their veil is tightly closed and texture very firm.
- Almost pure white, with the mildest umami flavour.

- Perfect for any cooking application with a crisp bite raw.
- Great whole, skewered for the BBQ, or in stews and in slow cooking.
- Fantastic crumbed and as a deep fried snack.



Perfect raw or cooked, Australia's favourite all-rounder

- Being second stage harvest, gills can be slightly open.
- Mild and delicate flavour, perfect for any recipe.
- Firm texture maintained during cooking.

- Creamy white colour great for pasta and risotto.
- Most versatile - great raw in platters or salads, whole roasted, stuffed and baked or diced and blended with meat dishes.



Perfect for the BBQ

- Dense spongy texture, slightly softer than buttons and cups.
- Rich intense umami flavour and dark colour to sauces.

- Great whole, simply brushed with olive oil and put on BBQ, stuffed and oven baked or crumbed whole and shallow fried.
- Great fine diced and added to blended meat dishes or cooked and blended in soups or sauces.



Great for casseroles or slow cooking

- Slightly nutty and richer umami flavour than white mushrooms.
- Brown mushrooms have less water content than white mushrooms, resulting in a firmer texture that allows it to hold together better in slow cooking.

- Good for beef, wild game and vegetable dishes.
- Best for high heat and long cooking applications.
- Great for casseroles, stew and skewering on BBQ as they hold their shape in slow cooking.



Great for stuffing and slow cooking

- Largest cultivated mushroom.
- Hearty, savoury and meaty with lots of umami.

- Great for both meat and meatless dishes.
- Delivers hearty juiciness, rich flavour and firm, steak like texture, that keeps shape when cooked whole.
- Great for burgers and excellent for grilling, sautéing and roasting or diced and used in blended meat dishes.

Speciality MUSHROOMS



Flammulina velutipes Perfect for stir-fries

- Very mild and sweet slightly fruity taste when cooked.
- Firm crisp texture.
- Trim roots at base, discard and gently separate each strand.

- Must always be cooked and best cooked briefly before eating as becomes chewy if overcooked.
- Great sautéed and added cooked to salads, attracting flavours from the dressing/sauces, or added at the end of cooking for stir-fries, soups or risottos.

Pleurotus eryngii Add to stir-fries or simply sauté. Great seafood substitute

- Delicate, nutty flavour and a firm, meaty texture.
- When cooked, texture mimics seafood, like scallops, particularly when stem sliced crosswise.
- Large size and savoury flavour can feature as centre for any entrée for any cuisine.

- Versatile for slicing and serving from large-to-small dice to slicing lengthwise to shredding.
- Cut lengthwise for slices -ideal for grilling, sautéing, roasting.
- Fork-shred for serving as a meaty option for barbecue sandwiches, tacos, or serving atop grilled meats.

Hericium erinaceus Great accompaniment to seafood

- Seafood-like with mildly sweet flavour and tender texture like scallops, crab, or lobster.

- Can be seared and served centre of plate.
- Accompaniment or alternative to seafood.
- Dry sauté in a hot skillet until water releases and edges brown, then add butter and seasonings.

Grifola frondosa Distinct rippling fan, provides visual appeal to any dish

- Delicate, rippling fan shape that almost resembles feathers.
- Distinct aroma, rich, woodsy flavour with a succulent texture.

- Cooked as a whole cluster or torn into smaller pieces to suit any recipe.
- Lends itself to any dish - great for mains, side dishes and soups.
- Delicious sautéed in butter or oil, browning its delicate edges to desired degree of crispness.

Morchella esculenta Delivers rich flavour in sauces and soups

- Distinctive savoury flavour.
- Rich earthy flavour.

- Best sautéed but can add a rich flavour to soups or sauces.
- Great in slow cooked dishes.

Pleurotus ostreatus Velvet but firm, best sautéed

- Velvety and dense in texture.
- 'Briny' or delicate seafood flavour.
- Colourful dish addition - found in grey, yellow, pink and blue.

- Trim stems and discard.
- Can be sliced and stir-fried or gently cooked in large pieces to preserve unique appearance.
- Best lightly sautéed. When pan-fried, edges turn crisp.

Lentinula edodes Great for stir-fry, pasta and risotto

- Earthy, woody flavour and a rich meaty-yet-buttery texture when cooked.
- Dense, meaty flesh with slightly chewy texture.

- Tough stems can be removed and saved for soups and stocks.
- Good for pizza, pasta and dishes that call for bold flavours.

Lyophyllum or Pleurotus species Perfect hero for stir-fry

- Firm texture with meaty but mildly sweet, nutty flavour.
- Separate from clumps at base.

- Perfect as hero in stir-fry. Loves sauce and can be added whole to soups, salads or pasta.

Fun FACT:

Mushrooms boast a delicious savoury flavour, known as **UMAMI** - the Japanese word for 'tasty' or 'meaty', which is considered the fifth basic taste along with sweet, salty, sour and bitter.





YOUR GUIDE TO *White mushrooms* (AGARICUS BISPORUS FAMILY)



SELECT



‘Veil’ should be attached to stalk on smaller mushrooms



Gills intact and moist on larger ones

- ✓ Smooth appearance, firm (not slippery) dry and plump surface, with uniform colour.

STORE

- ✓ Original packaging or ventilated cardboard box.
- ✓ Never freeze fresh mushrooms.
- ✓ Sautéed mushrooms can be frozen up to one month.

✓ Keeps for up to 1 week in the fridge



PREPARE



Whole mushroom can be used with no waste.



Stems contain flavour and nutrition. Finely chop if a little tough or use in sauces, soups or stocks.



Gently wipe with a damp cloth.



A soft pastry brush is best to remove any dirt.



Whole mushrooms can be washed but should be quickly dried before use.



Don't soak in water or wash sliced mushrooms.



Cook to order and serve immediately. Cooked mushrooms (other than sauces) should not be left to sit in a bain-marie.



Leave room in the pan for the moisture to evaporate when cooking.

WHICH MUSHROOM IS BEST *when cooking?*

Perfect for...	WHITE BUTTON	WHITE CUP	WHITE FLAT	SWISS BROWN	PORTOBELLO	ENOKI	KING TRUMPET	LION'S MANE	MAITAKE	MOREL	OYSTER	SHIITAKE	SHIMEJI
BBQ	✓	✓	✓	✓	✓		✓						
BURGER	✓	✓	✓	✓	✓		✓		✓		✓		
CRUMB & FRY	✓	✓					✓				✓		
FLASH FRY						✓		✓			✓		
GRILL		✓	✓	✓	✓		✓	✓	✓				
PASTA	✓	✓		✓			✓			✓	✓	✓	
PICKLED	✓	✓		✓			✓		✓		✓	✓	✓
PIZZA	✓	✓	✓	✓	✓		✓				✓		
RAW	✓	✓	✓	✓									
RISOTTO	✓	✓		✓			✓			✓	✓	✓	
ROAST	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	
SALAD	✓	✓		✓			✓						
SAUCE	✓	✓	✓	✓	✓					✓			
SAUTE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SEAR	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	
SLOW COOK	✓	✓	✓	✓	✓	✓	✓						
Soup	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
STIR-FRY	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
STUFFED	✓	✓	✓	✓	✓	✓							



White mushrooms are one of the most cost-effective and versatile mushrooms across all cooking methods and meal occasions.

CHEF ADAM MOORE



Mushrooms

CULINARY & NUTRITION BENEFITS

Delicious umami-rich flavour

Meaty flavour and texture

Natural flavour enhancer enabling less added salt

Low-carb

Fat & cholesterol-free

Low-sodium

Low-calorie /kilojoule

B-group vitamins (B3, B5, B7, B9)

Gluten-free

Copper, Potassium, Phosphorus & Selenium

-FACTOR INGREDIENT

Vegan source of vitamin D

3 unique bioactives (ergothioneine, ergosterol & chitin)

Based on 100g^{4,6,8}

Boost the nutrition and flavour of any meal with **MUSHROOMS** to deliver that **X-FACTOR!**



Mushrooms can be used for most dietary needs

- ✓ Flexitarian
- ✓ Low-fat
- ✓ Gluten-free
- ✓ Low-salt
- ✓ Halal
- ✓ Low-sugar
- ✓ Limiting/reducing animal foods
- ✓ Keto
- ✓ Nut-free
- ✓ Kosher
- ✓ Plant-based
- ✓ Low-carb
- ✓ Vegan
- ✓ Vegetarian



“ Adding mushrooms with its natural umami flavour can help bump up the taste and make it easier to use less salt in cooking.

DR FLAVIA FAYET-MOORE

”

UMAMI Power

Mushrooms contain distinctive flavour compounds including glutamates, ribonucleotides, and several synergistic volatiles.⁹

Together, they give the characteristic ‘umami’ savoury taste associated with cooked mushrooms and can enhance flavour of meals with less salt.⁹

Umami is found in:

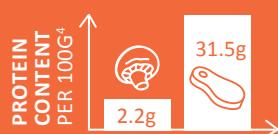
- Mushrooms
- Tomatoes
- Cheese
- Soy sauce
- Miso paste
- Fish sauce

DID YOU KNOW?

With their fabulous meaty flavour and texture, and lower salt and fat content, **mushrooms are a great meat replacer.**



Mushrooms are not an equivalent protein replacement for animal protein as they are lower in protein.



Mushrooms are unique as they are a vegan and natural source of Vitamin D.



With 95% of Australians not meeting daily vitamin needs and 1 in 4 deficient, choosing foods like mushrooms that provide vitamin D is important.¹⁰



Vitamin D* =



*As part of a healthy balanced diet

✓ Supports healthy bones



✓ Immunity

GETTING ENOUGH *protein*?



Aside from legumes, vegetables and mushrooms are not a good source of protein.

BUT... Mushrooms are great when reducing or substituting meat as they deliver richer, meatier flavour and texture to dishes with other added nutrition benefits.

Protein rich plant foods:



legumes such as soy, lentils, chickpeas, nuts and seeds and wholegrains such as quinoa and amaranth.



Soy products including soy milk, tempeh and tofu.



Watch out: Most plant-based 'milks' such as almond, rice and oat are not a source of protein.

Protein is important for*:



cell growth, repair and function



building muscles and healthy bones

*As part of a healthy balanced diet

Mushrooms = VITAMIN D SUPERSTAR!



Like humans, clever mushrooms produce vitamin D on sunlight exposure.³

100g of mushrooms provides 20% of daily vitamin D needs.⁴

But placing a 100g of mushrooms in the sun for about 15 minutes can provide **over 100% of daily vitamin D needs.**³



OF DAILY
VITAMIN D NEEDS



OF DAILY
VITAMIN D NEEDS



1 x PORTOBELLO



3 x CUP



5 x BUTTON

Mushrooms

THE X-FACTOR INGREDIENT FOR PLANT-BASED EATING

Plant-based eating: BIGGEST GLOBAL TREND OF THE PAST DECADE



SUSTAINABILITY AND/OR HEALTH = key reasons to reduce or eliminate animal products.



>1/3 of Australians are eating less meat, or no meat at all.¹¹



Key future growth strategy

Recent Australian research indicates that the food service sector is not tapping into the opportunity¹¹.

A lack of variety of plant-based options is a key frustration for clientele when eating out.



What is a PLANT-BASED DIET?

'Plant-based' diet is either **mostly or entirely** comprised of plant foods, with limited to no animal-derived products.

DID YOU KNOW?

Some people choose to reduce meat intake and not label their dietary choice, while others consider themselves vegan, vegetarian, flexitarian or plant-based. All identify as following a plant-based diet.

Research shows Australians enjoy eating meat but want to eat less and enjoy more plants.¹¹

Most popular plant-based approaches include some meat. Vegan and vegetarians make up less than 10% of population.¹²

TYPES OF PLANT-BASED EATING:

	VEGAN	LACTO-VEGETARIAN	LACTO-OVO-VEGETARIAN	PESCATARIAN	FLEXITARIAN
PLANT	✓	✓	✓	✓	✓
DAIRY	✗	✓	✓	✓	✓
Eggs	✗	✗	✓	✓	✓
FISH	✗	✗	✗	✓	✓
MEAT	✗	✗	✗	✗	✓

FLEXITARIAN =
Flexible approach to eating

- ✓ Aim to eat 'vegetarian' most of time but occasionally include animal-based foods when confident in quality and sourcing.
- ✓ Driven by health, environment and ethical reasons.

VEGAN = Often a lifestyle choice based on environment, health, ethical and animal welfare concerns.



The X-Factor INGREDIENT

Unique umami taste and texture
= delicious meaty flavour



- ✓ Contributes moisture = improved mouth-feel and sensory appeal¹³
- ✓ Enhances flavour¹³
- ✓ Reduces salt¹⁴
 - Umami sensitises tastebuds to salt, meaning you can use less salt but still maintain flavour¹³
 - Research shows you can reduce salt by 25% but still maintain flavour¹⁴

Unique package of nutrients and bioactives
= nutrition boost to any meal



- ✓ Vitamin D⁴
- ✓ B-vitamins (B3, B5, B7, B9), copper, potassium, phosphorus & selenium⁴
- ✓ 3 unique bioactives (ergothioneine, ergosterol, chitin)⁶⁻⁸

Based on 100g⁴





The Blend: THE BENEFITS OF MORE PLANTS BUT WITH LESS MEAT

'The Blend' is an easy cooking technique that can be adopted with any minced meat recipe. There's no need to change the recipes you already know and love... just make room for mushrooms!

Mushrooms can substitute from 25% up to 70% of minced meat in your favourite recipes, like spaghetti, lasagne, tacos, burgers and meatballs, without changing the meaty flavour and texture. Simply adjust the ratio of mushrooms to mince for each recipe, to allow for the extra moisture from the mushrooms.

- ✓ Enhanced flavour¹⁴
- ✓ Reduced calories, fat and salt¹⁴
- ✓ Added nutrition¹⁴
- ✓ Higher yield and cost effective

SUBSTITUTE:

25% mushrooms for burgers or meatballs, 50% mushrooms for bolognese or lasagne, 70% mushrooms for chilli con carne or ragu.

Making meals delicious, nutritious and sustainable with mushrooms is as easy as *chop, blend and COOK!*

1 CHOP



- ✓ Chop the mushrooms into approx 2mm x 2mm up to 5mm depending on the grind size of the mince.
- ✓ This can also be easily done by quickly pulsing in a food processor.

2 BLEND



- ✓ Blend the mushrooms with any type of mince (beef, pork, chicken, lamb or turkey) and cook the recipe as standard.
- ✓ If mincing the mushrooms in with meat, the recipe may need to be adjusted due to excess water.

3 COOK

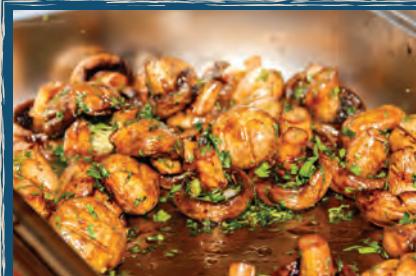


- ✓ Cook your delicious blended mushroom-meat!

GETTING THE MOST *flavour* FROM MUSHROOMS



Sauté mushrooms with butter or oil and caramelise until golden brown to unleash their flavoursome meaty umami flavour.



Roast mushrooms to get more sweet, salty and umami tastes with caramelised, nutty and buttery flavours.



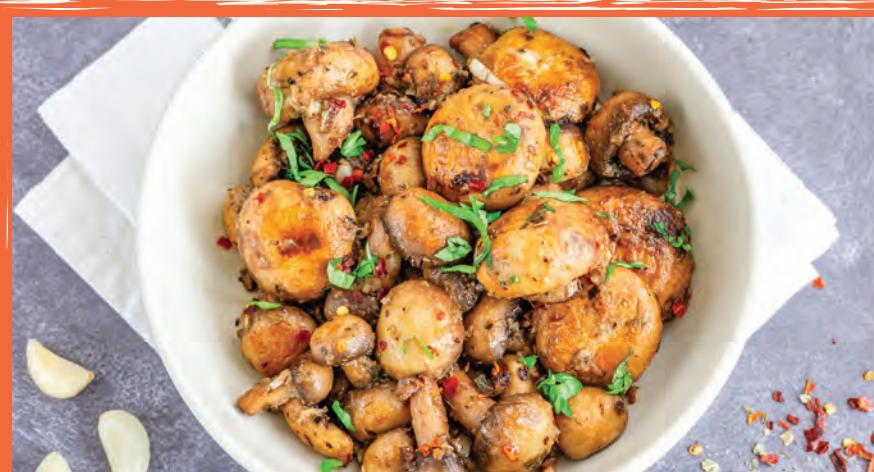
Sear mushrooms for a more intense roasted, charred and smoky flavour and overall aroma.

Roasted WHOLE mushrooms are perfect for:

- ✓ vegetarian dishes such as lasagnes or coated as a schnitzel
- ✓ marinated with balsamic and topped with goats cheese for an entrée
- ✓ coated in a tandoori marinade for an alternative burger

“ **Mushrooms offer a nutritious, lower salt but still flavoursome way to provide the savoury ‘umami’ taste that can help drive palatability of other foods.**

CHEF ADAM MOORE



For more flavoursome, meaty and plumper mushrooms:

- 1. In a hot fry pan add the fat (10g), mushrooms (200g), seasonings (1g), and water (50ml)
- 2. Bring to a boil until water absorbs
- 3. Sauté until golden brown in the residue

**PRO
TIP**

Try this flavour bomb! Coat mushrooms in miso paste and sauté or sear them for the ultimate in savoury umami flavour.



Use bigger mushrooms for enhancing flavour in any recipe!

As mushrooms mature, their cell walls break down more easily and release their flavour compounds.

Drying, freezing and boiling are also good methods to degrade cell walls.

Flat and portobello are more mature mushrooms, often considered the tastiest.



MUSHROOM Inspiration



Make a mushroom **duxelle** with onion, parsley, thyme and butter for a great breakfast addition or function canapé.



Use mushrooms as a **stuffing** in a chicken instead of bread crumbs for a great flavour boost and gluten free option or a tasty accompaniment.



Mushrooms **perfectly pair with** apples, asparagus, bacon, balsamic or cider vinegar, beef, Brussel sprouts, burrata, butter, cabbage, carrots, cashews, cauliflower, charcuterie, cheese, chicken, chickpeas, chilli, coconut, coriander, cream, eggs, garlic, lamb, leeks, lettuce, limes, oysters, paneer, parsley, peanuts, peas, pork, potatoes, prawns, parsley, salmon, seafood, sourdough and bread, spinach, sweet potato, thyme, white wine, wasabi, and zucchini.



Mushrooms make an amazing **savoury custard** called a chawanmushi, which is a Japanese steamed egg custard that is full of flavour.

DID YOU KNOW?

If you put mushrooms straight in the pan with fat, the water coming out of the mushrooms will buffer the temp of the oil and keep it low so you won't get that Millard reaction.



GETTING THE MOST *nutrition* FROM MUSHROOMS



Looking to reduce meat or sodium in a meal?



Simply replace 1/4 to 1/2 of the meat with mushrooms

- ✓ Umami taste and unique meaty texture = Great meat substitute
- ✓ Pasta sauce, stews, casseroles, mince and other mixed dishes

Need to create a delicious plant-based dish with enough protein?



- ✓ When replacing meat with mushrooms, add extra plant protein - at least 1 cup legumes or 1/4 cup nuts per person.

The entire mushroom is edible from CAP to STEM!

While the **cap** of mushrooms is a richer source of bioactives,¹⁵ its **stem** contains 40% more of the soluble fibre beta-glucan.¹⁶



“

Exposing one portobello mushroom to about 15 minutes of sunlight can provide the same amount of vitamin D as a low dose vitamin D supplement (1000 IU).

DR. FLAVIA FAYET-MOORE

”



GETTING THE MOST VITAMIN D in your mushrooms

You can buy UVB exposed mushrooms or easily do it yourself!



1 Spread out the mushrooms

2 Put in the sun for about 15 minutes



Increasing surface area to UVB light helps increase the amount of vitamin D that is made, so face 'gills' (the underside of the mushroom) to the sun or slice mushrooms for maximum vitamin D.¹⁷



Vitamin D is stable during cooking mushrooms, particularly at low temperatures, and for up to 8 days refrigeration.^{17,18}



Adding lemon juice to mushrooms when cooking can help to retain their vitamin D content.¹⁹



References: 1. Naranjo-Ortiz et al. Biol Rev Camb Philos Soc. 2019;94(6):2101-37. 2. Loran CC, et al. Nature. 2019;570:232–235. 3. Phillips, J Nutr Food Sci 2013;3:236. 4. Australian Food Composition Database, 2021 5. Valverde et al. Int J Microbiol. 2015;2015:376387. 6. Pusztahelyi T. Mycology. 2018;9(3):189-201. 7. Weete et al. PLoS One. 2010;5(5). 8. Halliwell et al. FEBS Lett. 2018;592(20):3357-66. 9. Miller et al. J Food Sci. 2014 Sep;79(9):S1795-804. 10. Dunlop et al. J Hum Nutr Diet. 2023; 36: 203– 215. 11. Latrobe Uni, Health and environmental concerns reduce meat intake in Australia. 2022. <https://www.latrobe.edu.au/news/articles/2022/release/health-environment-drops-meat-eating>. 12. Statista. 2019. <https://www.statista.com/statistics/1232881>. 13. Feeney, M. Nutr. Today, 2014. 49 (6): 301-307. 14. Myrdal, A, et al. Mushrooms. J. Food Science, 2014. Vol.79, Issue 15. Vetter. Food Chemistry. 2007;102:6-9. 16. Sari et al. Food Chem. 2017;216:45-51. 17. Roberts et al. J Agric Food Chem. 2008;56(12):4541-4. 18. Ng et al. Journal of Food Science and Technology. 2017;54(12):4100-11. 19. Ložnjak et al. Food Chem. 2018;254:144-9

Copyright © 2023 Horticulture Innovation Australia | Australian Mushrooms | All rights reserved. **For educational purposes only.**



AUSTRALIAN MUSHROOM FARM TOUR INFORMATION PACK 2025

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

Overview	<p>This document serves as a guide for Australian Mushroom Growers to host farm tours for retailers, food professionals, health professionals, culinary schools and primary/high schools.</p> <p>The info pack includes:</p> <ul style="list-style-type: none">• Objectives of farm tours• Educational resources to share with farm tour attendees• How to plan and promote farm tours• Example run sheet and guide to running the tour day
Why host a farm tour?	<p>Hosting farm tours are a cost-effective way for your farm to build relationships with their customers, raise the profile of your farm within the local community, educate health professionals of the nutritional benefits of mushrooms, and inspire chefs to add more mushrooms to their menus. Farm tours provide an engaging learning experience to:</p> <ul style="list-style-type: none">• Showcase Australian mushroom provenance and how they are grown,• Educate guests of the unique nutrition and health benefits of mushrooms,• Educate guests of the unique culinary benefits and flavours of mushrooms,• Educate guests on high food safety standards• Educate guests on mushrooms sustainable production and circular farming methods• Inspire greater mushroom consumption and usage, in turn boosting business and sales. <p>TIP! Talk with the group ahead of the farm tour to find out what the desired outcomes of the tour are. E.g., if it's a culinary school bringing apprentice chefs, they may have educational outcomes and curriculum points to meet, or areas of particular interest. This way, you can tailor the tour to the groups' needs.</p>
Who should I invite for a farm tour?	<p>Think about what types of businesses or organizations are in your local community. Who you'd like to build a relationship with who would benefit from a mushroom farm tour, groups who would benefit from mushroom education or would like get involved to learn more about mushrooms, groups who have the capacity to purchase or use more mushrooms, and individuals who are influential in the local food scene, health space or local community, who can inspire others and share messaging about mushrooms?</p> <ul style="list-style-type: none">• Food Service: Restaurant owners, chefs, caterers, café owners<ul style="list-style-type: none">○ Do you have direct customers, or a local providore that can help you identify who to invite?○ Is there a local RSL or Surf Club that has a large number of staff?• Health professionals: Dietitians, nutritionists, chefs within health care<ul style="list-style-type: none">○ Is there a local Aged Care village?

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

	<ul style="list-style-type: none">○ Is there a local hospital with a catering team? ● Culinary students:<ul style="list-style-type: none">○ Do you have a local TAFE or culinary school? ● School Students<ul style="list-style-type: none">○ Do you have a local primary or high school interested in mushroom education?○ Are any of your local schools taking part in the AMGA led mushrooms schools' education program? <p>TIP! If you need help identifying who is in your local area, or which local schools are participating, contact the AMGA for assistance.</p>
How to host a farm tour	<ol style="list-style-type: none">1. Choose the group you wish to engage with. Start locally and utilise your existing network. 2. Choose the date. This could align with the culinary school curriculum, the primary school mushroom education program, or align with a date in the calendar – like World Mushroom Day, Ag Day or International Chefs Day. 3. Build the contact list. Find the best person to contact, either via their website, LinkedIn, or give them a call. (Refer to the phone script example in appendix). 4. Share invitation (Refer to example in appendix). 5. Await response and organise date/ time, confirm group numbers and find out if the group has any particular desired outcomes from the tour, so that you can plan the tour accordingly to meet their needs. 6. Inform your tour contact of the health and safety requirements for visiting your farm. E.g. Must wear flat enclosed shoes. No jewelry. PPE will be provided. 7. Host tour – explain the compost process, growing process, harvesting and packing. (Refer to the example run sheet in appendix) 8. Use the relevant educational resources we have developed to incorporate into your tour or give out to your guests. (Refer to the resources section) Ensure they are connected with where to find more information. 9. Give them some free mushrooms to inspire cooking. VERY IMPORTANT! 10. Encourage guests to take photos on the farm and/or photos of what the mushroom dish they have prepared. Ensure they have your social media tags... and ours!

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

	<p>11. Think about inviting them again next year. This is a good idea for large scale organisations with high staff turnover (Eg. RSLs, Hospitals), or students at culinary schools and local primary/high schools. Working with one regular contact to organise an event to reach a new audience will be easier.</p> <p>TIP! If you need some advice, access to resources or assistance connecting with local groups, food, health or education professionals to initiate farm tours, contact the AMGA.</p>
<p>Where can I refer my guests for more information or to access educational resources?</p>	<p>Food Service Professionals & Health Professionals</p> <p>The AMGA website hosts great resources developed specifically for health professionals and food industry professionals.</p> <p>Website: https://australianmushroomgrowers.com.au/food-industry/</p> <p>TIP! If you need physical paper resources to hand out to your guests, please contact the AMGA.</p> <p>-----</p> <p>Health Care Professional - Nutrition Science</p> <p>For more robust nutrition research information, the Mushroom Health Science Australia website is an evidence-based resource hub developed specifically for health care professionals. View videos, download resources, search the research hub.</p> <p>Website: https://mushroomhealthscienceaustralia.org/</p> <p>TIP! This site is for health care professionals only (E.g Dietitians, Nutritionists, Doctors). Do not give health and nutrition advice to health care professionals, please refer them to the resources on this website.</p> <p>-----</p> <p>Culinary School – Lesson plans and resources</p> <p>The AMGA website hosts lesson plans, resources and curriculum aligned recipes to support culinary school educators teach their apprentice chefs.</p> <p>Website: https://australianmushroomgrowers.com.au/culinary-schools/</p> <p>-----</p> <p>Primary School educational resources</p> <p>The AMGA provides free curriculum aligned lesson plans, student learning resources and mushroom kits to primary schools, to encourage students to become Mini Mushroom Growers. Free mushroom kits are on offer during term 3.</p> <p>Website: https://australianmushroomgrowers.com.au/mushrooms-in-schools/</p> <p>-----</p> <p>High Schools educational resources</p>

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

	<p>PIEFA have created curriculum aligned lesson plans and resources for years 7 – 10</p> <p>Website: https://primezone.edu.au/resource/the-mighty-mushie/</p>
The resources and materials to hand out to tour attendees	<p>We recommend you provide a 'goodie bag' with free mushrooms to take back to the kitchen and cook, along with printed learning materials for your guests. If you have a TV in the lunchroom, you could play the educational videos.</p> <p>Food Industry Professionals:</p> <p>Fact Sheets:</p> <ul style="list-style-type: none">1. The X-Factor Ingredient for Plant-Based Eating. Download here.2. Pro Culinary Tips and Tricks For Mushrooms. Download here.3. From Farm to You - Learn How Mushrooms Grow. Download here. <p>e-Book:</p> <ul style="list-style-type: none">1. Combines the fact sheets into one e-book. Download here. <p>Kitchen Poster</p> <ul style="list-style-type: none">1. including mushroom varieties and characteristics. Download here. <p>Videos</p> <ul style="list-style-type: none">1. The X-Factor Ingredient for Plant-Based Eating. View here.2. Pro Culinary Tips and Tricks for Mushrooms. View here.3. From Farm to You - Learn How Mushrooms Grow. View here. <p>Health Care Professionals:</p> <p>Two excellent videos were produced to showcase research case studies to provide evidence for how mushrooms boost nutrition and taste in institutional settings:</p> <ul style="list-style-type: none">1. Mushrooms on the Menu at Shoreline View here Vitamin D Feasibility Study facilitated in an aged care facility.2. Mushrooms on the Menu at the Mater View here Mushroom menu intervention with the Mater Hospital Brisbane <p>The Mushroom Health Science Australia website contains a range of excellent resources specifically for health care professionals</p> <p>https://mushroomhealthscienceaustralia.org/mushroom-resources/</p> <p>Giveaway bag content ideas: You don't need to spend a fortune on branded bags. Simple brown paper bags from your local business supply shop will do.</p>

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

	<ul style="list-style-type: none">• Printed fact sheets relevant for your guests – you can print these out in colour on your computer• Punnet of mushrooms <p>Optional: Contact the AMGA to ask what they have in stock</p> <ul style="list-style-type: none">• Printed kitchen poster• Printed Foodservice Booklet• Mushroom recipe cards• Any branded merchandise you'd like to include to promote your business e.g. hats, aprons, pens etc
Social media, hashtags and branding	<p>You can encourage farm tour attendees to share what they've learnt on social media (Facebook, Instagram, X, Linked In, TikTok) and tag the relevant pages, including relevant hashtags.</p> <p>AMGA & Australian Mushrooms Hashtags:</p> <ul style="list-style-type: none">• #australianmushrooms @australianmushrooms• @australianmushroomgrowers <p>Encourage attendees to share content using the AMGA, Australian Mushrooms and your own hashtag and social media handles.</p>

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

APPENDIX 1: EXAMPLE RUNSHEET FOR THE FARM TOUR

Make sure you have advised the group contact of the farm address and brief summary of the day in the lead up. Ensure they are aware of what to wear (ie. Enclosed shoes, that will get wet) Make sure you've asked them if there's any areas of interest to cover in the tour, so you can ensure you include information that's particularly relevant to them.

TIME	WHAT'S HAPPENING
08:00	Farm tour group arrives.
08:15	<ul style="list-style-type: none"> Ask guests to sign in. Check they are wearing proper attire. Take the group to an area that is suitable for short presentation, offer food/drink. Share an overview and introduction to your farm business Advise group of where to find toilets and facilities Explain the workplace health and safety rules for your farm Explain why they must use of foot dips Ask them not to touch the mushrooms Hand out Personal Protective Equipment (PPE) i.e. Gloves & hats
08:45-10.30	<p><u>Farm tour in progress</u></p> <p>Tell the group where you will take them, and what they are going to see.</p> <p>As you move through the farm:</p> <ul style="list-style-type: none"> explain the growing process: <ul style="list-style-type: none"> how compost is made what spawn and mycelium is (why different to how plants grow) show difference between flushes Explain how to harvest mushrooms – ask them to try Farm procedures fun facts about mushrooms <p>Be sure to cover:</p> <ul style="list-style-type: none"> Sustainable farming practices - circular farming Energy efficient measures Compost pasteurisation Food safety procedures & certification standards showcase monitoring systems and tech Cool rooms and trucks Explain growing process through to harvesting and supply chain <p>TIP! Refer to approved key messaging document in the appendices for guidance on what you can and cannot say about mushrooms.</p>
10:30	Morning tea / coffee / bathroom break
11.00	Farm tour continues. If you have a kitchen or area suitable for tasting freshly harvested mushrooms, we recommend doing this, and sharing any of your personal cooking tips and tricks.

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

12.00	<ul style="list-style-type: none">• Lunch and wrap up. Ideally, you'll offer them a mushroom dish.• Connect the group with resources, and hand out materials.• Share any educational messaging that is relevant to that audience.• You can also play the Australian Mushroom videos while guests are eating.• Ask the group what they were most surprised to see, or what they gave learned.• Allow for guests to ask questions throughout the tour and have dedicated question time at the end of each part of the tour.
1.00pm	Tour end, guest depart

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

APPENDIX 2: EXAMPLE INVITATION/ COMMS FOR FARM TOUR

Sourcing contacts phone script example

"Hi, I'm *enter name* from *Enter farm/business name*, reaching out to see if *enter target group name* may be interested in participating in a tour of our farm to expand their knowledge of Australian Mushrooms. Who would be the best person to chat to to organise a farm tour for the relevant people in your organisation"

Email invitation example

SUBJECT: INVITATION: Mushroom Farm Tour at *Add your farm name*

EMAIL COPY:

Good morning/afternoon,

I'm *enter your name*, mushroom grower from *enter farm name* in the *enter region/location*, reaching out to invite you and your team at *enter group/ company name* along for a farm tour.

What to expect:

- Walk-through of our farm, explanation of mushroom growing processes, technology, local mushroom provenance.
- Taste freshly harvested mushrooms and hear about our favourite ways to cook mushrooms
- Hear about mushroom cooking tips, growing and health information direct from the growers!

Why?

As you're a fellow local business/ work in a related industry, we'd love to connect with you and share our insights, celebrate Australian mushrooms and local produce. *choose relevant/ adapt if necessary*

If you'd like to come along for a tour of our farm, please advise:

- Preferred dates and times
- Group number and who would like to come along

I look forward to hearing from you, please don't hesitate to give me a call to chat through further details.

Thanks,

Enter your name and number

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

APPENDIX 3: APPROVED AUSTRALIAN MUSHROOMS KEY MESSAGES

Some growers are not sure what they can and cannot say in relation to health claims about mushrooms. Below is a list of key messages, with approved wording you can use to educate your farm tour guests.

It is important when making health claims, particularly if it's written somewhere rather than spoken, it's important to reference the body of research.

CAUTION! When communicating with healthcare professionals, be careful you're not making unsubstantiated health claims, refer to key messaging and direct health professionals to the Mushroom Health Science Australia - <https://mushroomhealthscienceaustralia.org/>

SUSTAINABLE, PRECISION FARMING

- Mushrooms are the ultimate sustainable food: they are grown from a nutrient dense substrate, which recycles waste streams from wheat growers, as well as other organic materials. Mushroom growers use vertical farming methods, with mushroom beds stacked up high, in energy efficient climate-controlled rooms.
- Mushrooms grow very quickly, they double in size every day – so growers can produce a high volume of food using little land and resources.
- Once the mushroom crop is harvested, the nutrient-dense mushroom substrate is on-sold to other agricultural industries, or as a highly sought-after potting mix and garden mulch, closing the loop on a complete circular farming method, in the most sustainable way.
- Button, cup, flat mushrooms, swiss browns and portobello mushrooms are all of the '*Agaricus bisporus*' species grown by Australian Mushroom growers.
- The cup and the flat mushrooms are the same variety, picked at different stages so they are different sizes. One day it will be a button mushroom, then it grows to be a cup and matures to become a large flat or 'BBQ' mushroom. The same with a Swiss Brown mushroom, which grows to become a large Portobello, it is the same mushroom, just harvested at different ages.

HIGH SAFETY STANDARDS

- In Australia, mushroom farmers grow *Agaricus bisporus* all year round, indoors in a highly controlled environment. They are grown on a bed of pasteurised compost, which is specific for that species.
- Pasteurisation removes any harmful elements, ensuring the compost is completely clean and uncontaminated to produce the highest quality mushrooms.
- *Agaricus bisporus* spawn is propagated in a commercial laboratory and added to the compost. Mycelium forms and mushroom fruiting bodies start to grow within a few weeks.
- Australian mushroom growers adhere to world-leading food safety standards and work with major retailers to ensure traceability through the supply chain.
- Commercially grown mushrooms, produced in Australia, are safe and high quality. If you want safe mushrooms, buy fresh, Australian-grown mushrooms.

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

TASTE, HEALTH & NUTRITION

- Mushrooms are part of the Fungi kingdom with a unique set of nutrients found across different food groups, including vegetables, grains, nuts, and meats, as well as their own unique bioactive compounds that are beneficial for health.
- The bigger the mushroom is, and the more 'gills' you see, the stronger the mushroom flavour. This is because the mushroom has been allowed to grow and mature.
- Mushrooms are unique in that they produce vitamin D on exposure to UV light. Three UV exposed cup mushrooms (75g serve) can provide over 100% of Australian's vitamin D daily needs.^{1,2} Research shows that nearly one in three Australians are vitamin D deficient.³
- Mushrooms are one of the only natural vegan sources of vitamin D, important for supporting a strong immune system and valuable in the growing demand for plant-based diets, they cater to gluten-free, dairy-free, nut free, heart healthy, diabetes, vegan, vegetarian needs.
- Mushrooms have a unique umami and meaty taste profile, making it an excellent ingredient to 'blend' with meals to boost nutrient intake in a population at high risk of nutritional inadequacies while also enhancing flavour and reducing the need for added salt.
- Mushrooms are naturally very low in saturated fat and sodium, and contain essential vitamins and minerals such as B-vitamins, selenium and copper.⁴ They also contain unique bioactives like ergothioneine, which may support long-term health.
- You may wish to share your preferred mushroom dishes.

References

1. Starck C, Cassettari T, Wright J, Petocz P, Beckett E, Fayet-Moore F. Mushrooms: a food-based solution to vitamin D deficiency to include in dietary guidelines. *Front Nutr.* 2024;11:1384273.
2. Cardwell G, Bornman JF, James AP, Black LJ. A Review of Mushrooms as a Potential Source of Dietary Vitamin D. *Nutrients.* 2018;10(10).
3. Cui A, Zhang T, Xiao P, Fan Z, Wang H, Zhuang Y. Global and regional prevalence of vitamin D deficiency in population-based studies from 2000 to 2022: A pooled analysis of 7.9 million participants. *Front Nutr.* 2023;10:1070808.
4. Australian Food Composition Database, 2019.
5. Pusztahelyi T. *Mycology.* 2018;9(3):189-201
6. Weete et al. *PLoS One.* 2010;5(5).
7. ⁵⁻⁷Halliwell et al. *FEBS Lett.* 2018;592(20):3357-66.

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

APPENDIX 4: Farm Tour Evaluation Form

Thank you for participating in our farm tour! Your feedback is valuable to us and will help improve future tours. Please take a few minutes to complete this evaluation form.

Date of Tour: _____ Name (optional): _____

1. Tour Content & Experience

a) How satisfied were you with the overall farm tour?

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied

b) Was the information provided during the tour clear and easy to understand?

- Yes, very clear
- Mostly clear
- Neutral
- Somewhat unclear
- Very unclear

c) What aspects of the tour did you find most interesting or enjoyable? (Check all that apply)

- Farm operations
- Crop production
- Sustainability practices
- Equipment and machinery
- Learning about the nutritional benefits of mushrooms
- Other: _____

2. Tour Guide & Presentation

a) How engaging and informative was the tour guide?

- Very engaging, I learned a lot about mushrooms
- Somewhat engaging, I learned a bit about mushrooms
- Neutral, I have nothing good or bad to say
- Not very engaging, I didn't learn anything
- Not engaging at all. I should have stayed home.

4. Education

a) After your tour today, do you feel more confident your understanding of the unique nutritional benefits of mushrooms?

- I learned a lot. I now have an academic level of knowledge.

AUSTRALIAN MUSHROOMS FARM TOUR INFORMATION PACK

- I learned about the health benefits of mushrooms, but I can confidently specify them.
- Neutral. I didn't learn anything new
- I learned about the health benefits of mushrooms, but I still cannot specify them.
- I still don't understand that mushrooms offer unique health benefits

b) Can you identify the unique nutritional properties of mushrooms? (Tick all that apply)

HINT! Some answers below are incorrect.

- Selenium
- Vitamin D
- Folate
- Potassium
- High in protein
- Selenium
- Vitamin D
- Antioxidants
- Cholesterol Free
- Prebiotics
- Ergothioneine
- I don't know

3. Organization

a) How would you rate the organization of the tour?

- Excellent
- Good
- Fair
- Poor

b) Was the length of the tour appropriate?

- Too short
- Just right
- Too long

4. Suggestions & Comments

a) What did you like most about the tour? _____

b) What improvements would you suggest for future farm tours? _____

5. Additional Comments

Please share any other thoughts or feedback: _____

Thank you for your time and feedback! We appreciate your participation and hope to see you again soon.

MEDIA RELEASE

31 January 2022



NEW RESEARCH LOOKS TO MUSHROOMS TO SOLVE NUTRITION PROBLEMS

New Australian research has begun, to uncover ways the humble Aussie mushroom could solve some of the nations biggest nutrition problems.

With the Australian Food Industry representing around \$172 Billion AUD (1), the industry has a profound influence on the nation's overall health. Research leaders, Nutrition Research Australia (NRAUS) aim to identify nutrition problems within the Australian Food Industry's Food Service Sector - and use mushrooms to solve them.

CEO of NRAUS, Dr. Flavia Fayet-Moore explains that the humble Australian mushroom has unique nutritional and culinary properties, which make them valuable commodities in the nation's food supply. "Mushrooms are neither a plant nor an animal, but actually a fungi, and have a very unique set of nutrients that are typically found only found in grains, or vegetables, or animals- like vitamin D. The science is clear, and the opportunity to increase mushroom consumption via the food supply may lead to several improvements in the health of Australians."

The research aims to engage with high quantum of influence organisations, such as Hospitals, Aged Care, Quick Service Restaurants and Food Manufacturers to identify opportunities for Australian mushrooms to be included in menus, to improve health outcomes.

"In this project, we will engage with and educate food industry professionals on the nutritional and health benefits of mushrooms and encourage the food service sector to use fresh mushrooms (*Agaricus bisporus*) on menus to not only improve their nutritional profile, but most importantly, taste. This may be an easy and effective strategy to improve the health of Australians." Dr. Fayet-Moore added.

One of the nutrition problems the team believe mushrooms can help solve is vitamin D deficiency, a nutrition problem for one in four Australians, particularly for those who spend majority of their days indoors. Vitamin D deficiency can lead to significant health complications if left unaddressed.

"Research shows that many residents in aged care facilities have insufficient vitamin D. By simply including sun exposed mushrooms in aged care menus, it could boost their vitamin D intake and potentially solve a serious nutritional issue in aged care facilities." says Project lead Dr Flavia Fayet-Moore.

As consumer demand trends continue to lower their intake of animal foods, the team highlights the uniqueness of mushrooms as being a nutritious and tasty meat alternative, that remains undiscovered by many consumers.

The team will also work alongside culinary educators, such as Tafes, to provide mushroom nutrition education to curriculums to help educate the food service industry at the grassroots level.

This three-year research project is managed by the Australian Mushroom Growers Association and funded by Hort Innovation using the mushroom research and development levy funds from the Australian Government.

- ENDS -

MEDIA CONTACT

Leah Bramich - AMGA Communications Manager
leah.bramich@amga.asn.au | 0450 504 675

1. Foresight Fi. The nature of the foodservice market. 2020.

MEDIA RELEASE

27 April 2022



MUSHROOM GROWERS CALL ON FOOD INDUSTRY PROFESSIONALS TO SHARE THEIR NUTRITION KNOWLEDGE

Australian Mushrooms has teamed up with Nutrition Research Australia in a new nutrition education program, calling on food industry professionals to help uncover ways the mighty Aussie mushroom could solve some of the nation's biggest nutrition problems.

With the Australian Food Industry representing around \$172 Billion AUD (1), the industry has a profound influence on the nation's overall health. The Australian Mushrooms research program will engage key players in the food industry, including Hospitals, Aged Care, Quick Service Restaurants and Food Manufacturers to identify opportunities for Australian mushrooms to be included in menus, to improve health outcomes.

CEO of NRAUS, Dr. Flavia Fayet-Moore explains that as a fungus, rather than a vegetable or fruit, mushrooms have a unique set of nutritional properties that can fulfil dietary needs that many other foods cannot. "Mushrooms contain several minerals that can be difficult to obtain in vegan diets, making mushrooms an extremely valuable ingredient on cafes, restaurants, and establishments' menus - in an environment where flexitarian and vegan diets are on the rise."

Before the program kicks off, Australian Mushrooms would like to find out what the current level of mushroom usage and knowledge is within the industry, calling on food industry professionals to tell them what they know about the mighty mushroom via [a quick survey](#).

By completing [the quick survey](#), participants will have the chance to win one of five \$100 Visa Gift Cards, and will pass on valuable insights to the mushroom growers and nutrition researchers aiming to improve the health of Aussies.

After finding out current knowledge levels, the team will work alongside culinary educators, such as Tafes, to provide mushroom nutrition education to curriculums to help provide tools and resources to the food service industry at the grassroots level.

As consumer demand trends continue to lower their intake of animal foods, the team aims to spread awareness of mushrooms as being a nutritious alternative that could hold the key to fulfilling nutritional needs, and lead to several improvements in the health of Australians.

"Research shows that just under one in four Australian adults had a Vitamin D deficiency, an issue that increased mushroom consumption can help tackle", says Dr. Flavia Fayet-Moore.

Food industry professionals can take part in the Australian mushrooms survey here: <https://bit.ly/ausmushroomsurvey>. Answers are anonymous and estimated time to complete the survey is less than 5 minutes. This is also an opportunity to help local mushroom growers in their latest nutrition education project, and become part of the Australian mushroom growers community.

This three-year research project is managed by the Australian Mushroom Growers Association and funded by Hort Innovation using the mushroom research and development levy funds from the Australian Government.

- ENDS -

MEDIA CONTACT

Leah Bramich - AMGA Communications Manager
leah.bramich@amga.asn.au | 0450 504 675

1. Foresight Fi. The nature of the foodservice market. 2020.

MEDIA RELEASE

26 April 2023



MUCH MORE TO MUSHROOMS THAN TASTE

Initial research undertaken by Nutrition Research Australia (NRAUS) in partnership with the Australian Mushroom Growers' Association (AMGA) reveals the Australian food industry has a lot more to learn about the health benefits of the mighty mushroom – beyond the known taste and culinary attributes.

The research, part of the larger 'Educating the food industry about Australian Mushrooms' project that has been funded by Hort Innovation using mushroom research and development levy and contributions from the Australian Government, has identified an opportunity to promote the vast nutritional benefits of mushrooms in the nationally accredited commercial cookery curriculum.

NRAUS chief executive officer, Dr Flavia Fayet-Moore, explains that mushrooms are part of the fungi kingdom boasting a unique set of nutritional properties found across different food groups, including vegetables, grains, nuts and meats, as well as three unique bioactive compounds not commonly found in animals or plants.

"Mushrooms provide essential vitamins and minerals such as B vitamin and selenium, and are a natural non-animal source of vitamin D," Dr Fayet-Moore said. "With one in four Australian adults having Vitamin D deficiency, this provides a great opportunity for the institutional sector, such as hospitals and aged care facilities, to tap into a 'food as medicine' approach to mushroom cooking and consumption."

"Mushrooms and fungi more broadly are not recognised as a food group within the nationally accredited commercial cookery curriculum. There is an opportunity to provide further education about the qualities of the unique fungi kingdom and its ability to support the many diverse dietary requirements of Australians – including the growing flexitarian, vegetarian, vegan, dairy free and gluten free needs."

Qualitative in-depth interviews with 12 key opinion leaders in the food industry and quantitative research conducted with 654 food industry professionals revealed there is a common misconception with non-health industry professionals that mushrooms are a 'meat protein equivalent'.

"Mushrooms have a unique umami taste; which is that delicious savoury taste profile, imparted by glutamates, making them a great culinary replacement for meat," Dr Fayet-Moore said. "From a nutritional perspective, unlike meat, mushrooms contain minimal protein, but they also contain no saturated fat. With their combined umami and nutritional profile, mushrooms can help to reduce the sodium and saturated fat content of meals when replaced for meat."

Led by AMGA in partnership with NRAUS and involving food industry expert and chef, Adam Moore, the 'Educating the food industry about Australian Mushrooms' project is using mushrooms to tackle some of the nation's biggest nutrition challenges.

The project aims to educate the food industry about the unique nutritional benefits of Australian-grown white and Swiss brown mushrooms. These everyday mushroom varieties provide a unique combination of nutrients that can assist food service providers, in particular catering institutions, achieve their plant-forward menu goals, while reducing fat and sodium, and increasing the nutritional content of menu items – in a cost-effective way.

"We have received great insights from one-on-one interviews with industry professionals and can clearly see that mushrooms can offer significant nutritional and culinary benefits, particularly for the institutional catering sector," Dr Fayet-Moore said.

"Our next step in the project is menu interventions, showcasing how adding Australian mushrooms to menus can be a cost-effective way to vastly improve the nutritional profile and palatability of menus."

MEDIA RELEASE

26 April 2023



Engaging key players in the food industry, including hospitals, aged care, quick service restaurants and food manufacturers, and identifying opportunities for Australian mushrooms to be included in menus, the program aims to improve health outcomes on a large scale.

Food industry professionals can express interest in participating in the project by enquiring on the AMGA website: <https://australianmushroomgrowers.com.au/contact-us/>.

ABOUT HORT INNOVATION

Hort Innovation is a not-for-profit, grower-owned company that delivers more than \$120 million in research, development and marketing activities on behalf of Australian horticulture each year.

MEDIA CONTACT

Leah Bramich
Australian Mushroom Growers Association
Relationship and General Manager
leah.bramich@amga.asn.au | 0450 504 675

MEDIA RELEASE

18 January 2024



MUSHROOMS TO BOOST AGED CARE NUTRITION

FOODiQ Global and Australian Mushrooms have partnered with The Shoreline Luxury Retirement Living in Coffs Harbour to embark on a first-time research study focussing on enhancing vitamin D and overall nutrient intake among aged care residents. The "Mushrooms on the Menu" study explores the impact of incorporating a specially crafted chef and dietitian-designed mushroom-based menu in the Shoreline residential aged care centre. The study will investigate the feasibility of adding vitamin D-rich mushrooms to the menu, and their impact on nutritional intakes of the aged care facility residents, and their overall enjoyment of the menu.

With one in four Australian adults being vitamin D deficient, and seniors being at greater risk for deficiency, mushrooms are a problem-solving ingredient to incorporate into the menu, as they are the only natural non-animal source of vitamin D. Vitamin D is crucial for immunity and bone health³, especially important for seniors who may not be outdoors enough to get adequate vitamin D through the sun and other sources. 3 UV exposed* Cup mushrooms can fulfil a senior's entire daily vitamin D requirements.

CEO of FOODiQ Global, Dr Flávia Fayet-Moore explains that mushrooms are part of the Fungi kingdom with a unique set of nutrients found across different food groups, including vegetables, grains, nuts, and meats, as well as their own unique bioactive compounds that are beneficial for health.

"Research shows that many residents in aged care facilities have insufficient vitamin D. By simply including UV-exposed mushrooms in aged care menus, it could boost their vitamin D intake and potentially solve a serious nutritional issue in aged care facilities with a 'Food as Medicine' approach."

"Mushrooms have a unique umami and meaty taste profile, making it an excellent ingredient to 'blend' with minced meat to boost nutrient intake in a population at high risk of nutrient inadequacies. Mushrooms have no saturated fat and contain other essential vitamins and minerals such as B-vitamins."

Tammie Brenger, Director of Care at The Shoreline, says they are thrilled to be part of this partnership and study.

"We're glad we can offer our 150 residents helpful nutrition solutions to optimise health and wellbeing. Eating well is so important and vitamin D deficiency is an issue amongst adults that needs to be addressed, so we're looking forward to seeing the results of increased vitamin D intake."

As part of the program, Shoreline residents will be provided with chef and dietitian crafted meals and meal plans containing at least 75g of vitamin D-enriched mushrooms (Agaricus Bisporus variety) per person each day for 28 days with nutritional analysis done before, during and after the phase of increased mushroom consumption. Independent living residents will also be supplied with a punnet of mushrooms each week and a recipe booklet so they can consume the recommended daily mushroom servings throughout the program.

Participating residents are aged 65+, an age group that is more susceptible to vitamin D deficiency, with up to 80% of women and 70% of men living in nursing homes in Victoria, New South Wales and Western Australia being found deficient⁴. Vitamin D deficiency is associated with higher risk of falls in this group, with vitamin D supplementation shown to improve fall rate⁵⁻⁷, meaning this study could improve the wellbeing and livelihood of many residents in aged care facilities.

The mushrooms used in the study are the Agaricus Bisporus variety, or cup mushrooms, high quality produce grown by Australian mushroom farmers in controlled environments. The cup mushrooms will already be exposed with sunlight to maximise vitamin D content before they are provided to residents.

MEDIA RELEASE

18 January 2024



The Shoreline “Mushrooms On The Menu” study is part of a three-year research project with FOODiQ Global managed by the Australian Mushroom Growers Association and funded by Hort Innovation using the mushroom research and development levy funds from the Australian Government.

Food and health industry professionals can register interest to take part in the program and find further resources here: <https://australianmushroomgrowers.com.au/food-industry/>

MUSHROOM FACTS AND HEALTH INFORMATION

- **Sunbake your mushrooms:** Mushrooms are unique in that they produce vitamin D on exposure to UV light. One in four Australian adults has Vitamin D deficiency¹ and 100g of mushrooms can provide over 100% of daily vitamin D needs after being exposed to the sun for around 15 minutes².
- **Local mushroom statistics:** NSW mushroom growers produce 31% of Australian mushrooms. That equates to approximately 20,533 tonnes of mushrooms a year.
- **Mushrooms are good for**
 - Heart health: as they are low in kilojoules and sodium, while providing potassium.
 - Brain health and Immunity: as they contain the antioxidants and flavonoids that help our immune system and brain function.
 - Bone and muscle health: as they are a natural source of vitamin D.

ABOUT FOODiQ Global

FOODiQ Global is a global leader in the translation of food and nutrition science. It exists to empower people and organisations with food and nutrition information that is backed by science. They do this by being curious and challenging the status quo to mobilise and spark creativity, innovation and thought leadership in all that they do. They have a multi-disciplinary team of doctors, nutritionists, dietitians, and storytellers with a mission to empower organisations with research, education, and communication for meaningful impact on human health - <http://foodiq.global>.

ABOUT SHORELINE

The Shoreline provides premium residential aged care centered on quality services and compassionate care. It is dedicated to providing residents with highly nutritious and delicious meals - <https://theshoreline.com.au/>.

- ENDS -

MEDIA CONTACTS

- Avril Turner - Genevieve Media
avril@genevievemedia.com | 0400 302 271
- Leah Bramich - Australian Mushroom Growers' Association Relationship & General Manager
leah.bramich@amga.asn.au | 0450 504 675

1. Dunlop et al. J Hum Nutr Diet. 2022 Mar 7
2. Phillips, J Nutr Food Sci 2013;3:236
3. Foresight Fi. The nature of the foodservice market. 2020.
4. Vanlint SJ. Vitamin D and adult bone health in Australia and New Zealand: a position statement. 2005.
5. Cameron ID, Dyer SM, Panagoda CE, Murray GR, Hill KD, Cumming RG, et al. Interventions for preventing falls in older people in care facilities and hospitals. Cochrane database of systematic reviews. 2018(9).
6. Sambrook PN, Cameron ID, Cumming RG, Lord SR, Schwarz JM, Trube A, et al. Vitamin D deficiency is common in frail institutionalised older people in northern Sydney. Medical Journal of Australia.]2002;176(11):560.
7. Flicker L, Mead K, MacInnis RJ, Nowson C, Scherer S, Stein MS, et al. Serum vitamin D and falls in older women in residential care in Australia. Journal of the American Geriatrics Society. 2003;51(11):1533-8.

7 February 2024

MUNCH ON MUSHROOMS TO BOOST VITAMIN D INTAKE

Did you know that 1 in 4 Australians are vitamin D deficient¹? Vitamin D is crucial for immunity and bone health², especially for people who may not be outdoors enough to get adequate vitamin D through the sun and other sources.

Just 3 UV exposed* cup mushrooms can fulfil your entire daily vitamin D requirements, making them an excellent addition to meals from both a nutrition and culinary perspective.

CEO of FOODiQ Global, Dr Flávia Fayet-Moore explains that mushrooms are part of the Fungi kingdom with a unique set of nutrients found across different food groups, including vegetables, grains, nuts, and meats, as well as their own unique bioactive compounds that are beneficial for health.

“Mushrooms have a unique umami, savoury taste profile, making it an excellent ingredient to ‘blend’ into meals to boost nutrient intake. Mushrooms have no saturated fat and contain other essential vitamins and minerals such as B-vitamins.”

“By adding UV-exposed mushrooms to meals, it increases vitamin D intake and removes the need for vitamin D supplements, using the ‘Food as Medicine’ approach to optimise health and wellbeing”

MUSHROOM FACTS AND HEALTH INFORMATION

- ***Suntan your mushrooms:** Mushrooms are unique in that they produce vitamin D on exposure to UV light. One in four Australian adults has Vitamin D deficiency¹ and 100g of mushrooms can provide over 100% of daily vitamin D needs after being exposed to the sun for around 15 minutes².
- **Mushrooms are good for**
 - Heart health: as they are low in kilojoules and sodium, while providing potassium.
 - Brain health and Immunity: as they contain the antioxidants and flavonoids that help our immune system and brain function.
 - Bone and muscle health: as they are a natural source of vitamin D.
- **Local mushroom statistics:** NSW mushroom growers produce 31% of Australian mushrooms. That equates to approximately 20,533 tonnes of mushrooms a year.

NEW MUSHROOM RECIPES

- **Vitamin D Mushroom Brownies:** A sneaky way to increase your vitamin D intake while having a tasty treat
- **Mighty Mushroom Powder:** A great alternative to salt and a healthy way to enhance flavour of your meals
- **Mushroom Coffee Croutons:** Enhance the flavour of meals with mushroom coffee croutons
- **The Best Mushrooms on Toast:** Recommended by Chef Adam Moore and mushroom growers

- ENDS -

MEDIA CONTACTS

- Avril Turner - Genevieve Media
avril@genevievemedia.com | 0400 302 271

1. Dunlop et al. J Hum Nutr Diet. 2022 Mar 7
2. Phillips, J Nutr Food Sci 2013;3:236
3. Foresight Fi. The nature of the foodservice market. 2020

External coverage of the project arising from AMGA media releases

1. AMGA Media Release: [31 Jan 2022](#)

New research looks to mushrooms to solve nutrition problems

- Related article in Good Fruit and Vegetables: [18 Feb 2022](#)
- Related article in QLD Country Life: [18 Feb 2022](#)
- Related article in Food Processing: [24 Feb 2022](#)

2. AMGA Media Release: [27 Apr 2022](#)

Mushroom growers call on food industry professionals to share their nutrition knowledge

- Announcement in Hospitality Magazine: [27 Apr 2022](#)
- Related article in BeanScene Magazine: [10 May 2022](#)
- Related article in Food Mag: [10 May 2022](#)

3. AMGA Media Release: [26 Apr 2023](#)

Much more to mushrooms than taste

- Related article in Food Mag: [27 Apr 2023](#)
- Related article in Food Processing: [1 May 2023](#)

4. AMGA Media Release: [18 Jan 2024](#)

Mushrooms to boost aged care nutrition

- Related article in Inside Ageing: [19 Jan 2024](#)
- Related article in Food Processing: [22 Jan 2024](#)
- Related article in Aged Health: [25 Jan 2024](#)
- Related article in Coffs Coast: [26 Jan 2024](#)
- Related article in HelloCare: [29 Jan 2024](#)
- Related article in News of the Area: [30 Jan 2024](#)

EDUCATING THE FOOD INDUSTRY

Martine Poulain

**Relationship & General Manager,
Australian Mushroom Growers' Association**



AMGA

WILFIRE.poulain@amga.org.au

The AMGA is spearheading a renewed push to educate the food industry about Australian mushrooms. The three year, levy-funded project will develop and deliver a long term strategic program of activities to educate food industry professionals about the health benefits and culinary uses of Australian mushrooms.

The project team, headed by the AMGA Relationship and General Manager Martine Poulain, also involves the AMGA Communications Manager, Leah Bramich, Culinary Director at Culinary Revolutions, Adam Moore and project partner, Nutrition Research Australia (NRAUS), headed by Dr Flavia Fayet-Moore.

Ms Poulain said the project was broader than just foodservice and would examine a range of potential opportunities across the wider food industry sector.

"Importantly, we will be looking to connect all the elements of nutrition research back to the food industry, identifying ways in which an increased understanding of mushrooms can benefit our industry."

She outlined that the first stage of the project would involve a wide-ranging desktop review.

"The review will map the wider food industry – not just those that cook in foodservice – taking into account processing, manufacturing, and institutional catering companies to understand better how they work and the potential opportunities for mushrooms."

She said the experience of Adam Moore would be invaluable to the project.

"Adam is not only a chef of vast experience but has also worked in pubs and clubs and small restaurants through to major corporations. He also works for TAFE, has a strong connection with the Australian Culinary Federation, and works in the education and food development space. So he is an excellent conduit for us to get a comprehensive understanding of the food sector and how it operates."

She said the partnership with NRAUS would allow the team to use their strong track record to deliver high quality science, nutrition translation resources, and education techniques to support the project and its dissemination.

Ms Poulain said the scoping component of the project would look to determine where the nutrition problems are and where the opportunities are for the industry.

"The project will develop a total of eight case studies across areas such as institutional and corporate catering, through to café's, hotels and quick service restaurants. The case studies will bring together the latest nutrition research, developing appropriate

resources to address any identified issues."

"We want to ensure we are not just saying to the food industry 'eat mushrooms because they are good for you'. We intend to engage strongly and develop resources and solutions that solve nutrition problems, and that can be effectively implemented."

"Part of this process will be building on previous work undertaken by the industry and looking at foodservice opportunities. We will look at ways to amplify that work and talk with companies like Sodexo who supply into hospitals, mining and aged care facilities, and other large catering companies that have a high quantum of influence."

Ms Poulain said the experience of Mr Moore would be valuable in working with kitchen staff to help implement change.

"To really cut through, we will incorporate video into the case studies, so we can show exactly how mushrooms solve a particular nutritional issue – such as vitamin D deficiency at aged care facilities, for example."

"During the current discovery stage, we will also be looking at how we can assist





companies in providing food that is not only healthy but also sustainable to meet corporate and social responsibility obligations."

Ms Poulain said the project would look to work with TAFE and culinary education schools.

"If we can identify the opportunity, we will look at ways of adding lesson plans to the curriculum, particularly as there appears to be nothing currently that teaches food students about vegetarian and vegan plant-forward menus."

"Within the first 12 months, we will look to gather the information required to put together a food industry blueprint for the industry. The blueprint will be all about identifying the opportunities and determining the possibilities for mushrooms in the food industry marketplace."

She explained that the project would work cooperatively with other research, such as the current levy-funded study on global innovations.

She said the project would also tap into international experience, with the Project Reference Group, involving local growers and industry participants and the United States Mushroom Council Foodservice Director, Steve Solomon.

"The US Mushroom Council has a wealth of experience to offer, having delivered



The Blend program into foodservice, with large companies like Sodexo taking the blenditarian pledge. We are hoping to learn from the experience and explore whether The Blend – substituting mushrooms for mince – can work as a nutritional solution in the Australian context."

Ms Poulain said the project would also consider the work done to develop mushroom nutrition resources for health professionals.

"There is a crossover with some of the foundational nutritional work that has already been done. In terms of aged care organisations or institutional catering

into hospitals and care facilities, they mostly have nutritionists on site, so we have resources that can immediately showcase mushrooms."

"The blueprint and the communication plan will consider the current resources; however, they will be refined to target the broader food industry."

"What we are trying to do is to connect the dots, connect the relevant projects, and bring together resources and activities that can leave a lasting legacy. If we do that, we can deliver a lasting benefit for the industry in dealing with the broader food industry sector," she said.

**Hort
Innovation**
Investing in your future

**MUSHROOM
FUND**

This project has been funded by Hort Innovation using the mushroom research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

ADDING MUSHROOMS TO THE MENU

Where are the **opportunities?**

By Paulette Baumgartl

The Australian food industry loves mushrooms. With their characteristic umami and meaty taste profile, mushrooms are a unique nutrient rich plant-based food, and while common on menus, they are rarely the main act, seldom featured nor celebrated.



To elevate mushrooms in the minds of food professionals, highlighting their benefits through impactful education and engagement could bring them out of the shadows and into the limelight.

The levy-funded research project MU20003: *Educating the food industry about Australian mushrooms* sought to identify and understand the existing barriers to featuring more mushrooms on Australian menus. Probing industry insiders through a series of one-on-one interviews, combined with quantitative data collected from more than 600 surveys, the objectives were to:

- **Understand existing knowledge** on mushroom nutrition within the Australian food industry
- **Identify pathways and opportunities** to increase this knowledge
- **Gather evidence on the level of impact** that increased knowledge may have on the inclusion of more mushroom-forward meals on menus
- **Identify which of the food industries** would provide the best opportunity to boost mushroom consumption and show benefit to that industry

- **Produce a 'road map' and resources** for mushroom growers to create their own successful business model with the food sector.

The success of this project in achieving these objectives has been greatly enhanced by a unique and fruitful collaboration of industry insiders. Leah Bramich, who leads the projects, has first-hand knowledge of the challenges and opportunities that exist in the industry through her role as General Manager of the Australian Mushroom Growers' Association. Leah has collaborated with two food industry leaders at each end of the hospitality equation, namely the Chief Executive Officer of Nutrition Research Australia Dr Flávia Fayet-Moore and chef Adam Moore.

"Working with Flávia and Adam, both of whom 'speak the language' of their respective industries and have shared expertise with the interviewees, has meant greater access, more openness and deeper and honest insights into the barriers that exist in regard to using mushrooms," Leah said.

"We can be confident that the data we have collected is a true reflection of the situation within the commercial and institutional sector."

Despite 'COVID chaos', twelve in depth interviews with key industry leaders were completed with food service managers, chefs and educators from across the commercial and institutional (health-care) sectors.

Interview questions explored opportunities to expand/feature mushrooms in catering and to include mushrooms in hospitality training curricula. The project team also inquired as to which health and nutrition messages would resonate with food service



Adam Moore



Dr Flávia Fayet-Moore

professionals, and what were the most effective and efficient ways to disseminate and distribute the educational materials.

Divided into two sectors, institutional and commercial, it was clear that the largest potential lay within the institutional sector, including hospitals, aged-care and other facilities.



Although chefs and others within the commercial sector find the nutritional benefits of mushrooms fascinating, menus are nevertheless designed with flavour and texture as a priority. However, catering to dietary requirements does provide an avenue to incorporate more mushroom-forward dishes.

In contrast, nutrition is a key factor in menu creation for the institutional sector, especially in health-care catering. It is in this sector that further systematic studies are planned to provide evidence of tangible health outcomes resulting from 'eating more mushrooms'. An example could be addressing vitamin D deficiency in aged care residents.

Overall, the findings emphasised that while mushrooms were a much-loved ingredient, there was little knowledge among industry practitioners as to their nutritional, culinary, and health benefits. However, when properly informed of these benefits, interest increased dramatically. The insights are summarised on page 12.



Putting these results to work

Using these insights, the project will produce a series of resources confident that they are targeting the best people with right messages and in a useful format.

"We have put a lot of our efforts into sectors and leaders with a high quantum of influence," Leah said.

"This means that achieving cut-through with one person can have a huge trickle-down impact, whether that be through the supply chain or via organisational change."

As well as materials for industry, the team are creating a pack of materials to ensure growers are well equipped with resources and knowledge to run farm tours for nutrition education independently.

Future work on this project will include the development of two case studies: *Improving Vitamin D in an aged care facility through mushrooms* and *Improving health outcomes with mushrooms in 'made to order in room dining' of a private hospital*.

Leah says, "We wanted to achieve some very specific outcomes from the project. Specifically, that food industry professionals will have increased knowledge of the nutrition and health benefits of mushrooms and therefore use them more often, and that the mushrooms industry gains insights into the food industry landscape and the opportunities that exist within."

This research project has provided a unique opportunity to mutually benefit growers, the food industry, and their shared stakeholders, bringing together resources that will have a legacy and help growers work with the food industry.

MU20003 Educating the Food Industry is led by the Australian Mushroom Growers' Association together with Nutrition Research Australia and chef Adam Moore. The project aims to develop ways to educate food industry professionals, uncovering ways that the mighty mushroom can solve some of the nation's biggest nutrition problems.



NUTRITION

Nutrition is not a focus in the National Commercial Cookery Curriculum, with taste being the top priority across the industry.

COMMERCIAL SECTOR

- Nutrition and health are rarely considered
- Nutrition focus limited to catering for dietary intolerances and trends, for which they seek/are open to inspiration

INSTITUTIONAL SECTOR

- Nutrition and health are central to the sector
- Current existing national nutrition standards are sub-standard in the sector



KNOWLEDGE

Mushrooms are best known for their culinary benefits, with most cooking professionals also surprised and delighted that mushrooms were a good source Vitamin D. Education around nutrition and health benefits sparks motivation and interest.

COMMERCIAL SECTOR

- Nutrition and health knowledge are lacking
- Common misconception that mushrooms are a 'meat protein equivalent'

INSTITUTIONAL SECTOR

- Dietitians are the professional group most confident in their ability to talk about nutrition, health and culinary benefits of mushrooms, with management the least confident



USAGE

Mushrooms are considered a highly versatile ingredient and used right across the menu to add flavour and are leveraged in plant based menu items. Barriers to usage were shelf life, lack of top-of-mind awareness and inspiration. Cost can be a barrier but also seen positively when used as a substitute for meat. For specific sub-sectors, food safety constraints and poor performance when thawed from frozen were identified.

COMMERCIAL SECTOR

- Favoured for texture and flavour, not nutrition
- Viewed as a meat replacement

INSTITUTIONAL SECTOR

- Valued for nutritional benefits, including ability to reduce sodium & fat when using mushrooms
- Usage needs to incorporate a cost benefit story for cut through, particularly in institutional sector



COMMUNICATION

HOW

- Materials that are practical, visual, tactile and easy to understand
- Tangible materials that can be used in the kitchen, e.g. posters in the kitchen with QR code
- A digital go-to hub for information and resources
- 'Train the trainer' has potential as high quantum of influence strategy, e.g., master-classes, supply chain educators, executive chef events

WHAT

- Messaging should be targeted
- Irrespective of sector, leading with culinary benefits is key
- Taste, flavour, texture = greater food intake/less waste - common to both sectors
- 'Exploit' plant-based food trends.



OPPORTUNITIES

CATERING ORGANISATIONS

- Plant-based, vegetarian and flexitarian diets are a key opportunity, as well as 'the blend', which offers nutrition & cost saving benefits
- Tapping into 'Food as Medicine' and the provenance story could foster greater uptake
- Inspiring chefs to use mushrooms more, while supporting with fun nutrition and health facts

CULINARY EDUCATION

- Develop proposal to update national curriculum to have mushrooms acknowledged as a separate food group to vegetables
- Individual TAFE or RTO can develop materials that can be used to support the new unit SITHCCC031 - Prepare vegetarian & vegan dishes
- The Learning Vault is currently developing materials to support SITHCCC031



EDUCATION

- Mushrooms are not part of the national culinary education curriculum
- While registered training organisations (RTOs) for commercial cookery need to show evidence of achieving performance criteria and assessment guidelines, they are free to teach the curriculum how they wish
- RTOs often develop their own education materials and many value and utilise the materials produced by leading digital education training company, *The Learning Vault*.
- In practice, while not formally specified in curriculum, mushrooms are an ingredient often chosen to teach various units and different preparation styles due to its versatility.

Information for this article was sourced from Food Industry Insights Final Report

Prepared for: Australian Mushroom Grower's Association July 2022

Prepared by: Nutrition Research Australia Pty Ltd.



This project has been funded by Hort Innovation using the mushroom research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

IMPROVING THE FOOD INDUSTRY MENU, WITH MUSHROOMS.

By Leah Bramich, AMGA

Anyone who has ever spent more than a few days in a hospital, or visited an elderly friend or relative in a care home, would most likely agree - despite the best intentions, the catering is less than inspiring. A collaboration between Nutrition Research Australia (NRAUS) and the AMGA is working hard to show the benefit of adding mushrooms to the menu, not only to improve the palatability of institutional meals, but to boost their nutritional offering as well.

One-on-one interviews highlighted the potential of mushrooms to boost menus in the institutional catering sector, with their significant nutritional and culinary benefits. The next part of the project includes menu interventions, showcasing how adding Australian mushrooms to menus can be a cost-effective way to vastly improve the nutritional profile and appeal of menus in these settings.

Initial research undertaken by Nutrition Research Australia in partnership with the Australian Mushroom Growers' Association reveals the Australian food industry has a lot more to learn about the health benefits of the mighty mushroom, with taste and culinary benefits overshadowing the vast nutritional benefits of mushrooms in the nationally accredited commercial cookery curriculum.

CEO of NRAUS, Dr. Flavia Fayet-Moore explains that mushrooms are part of the Fungi Kingdom with a unique set of nutritional properties found across different food groups, including vegetables, grains, nuts, and meats, as well as unique bioactive compounds not commonly found in animals or plants.

"Mushrooms contain three unique bioactives not commonly found in animals or plants and provide essential vitamins and minerals such as B vitamin,



selenium and are a natural non-animal source of vitamin D. With one in four Australian adults having Vitamin D deficiency, this provides a great opportunity for the institutional sector to tap into a 'Food as Medicine' approach."

"Mushrooms are not specifically recognised as a fungi group within the nationally accredited commercial cookery curriculum. There is an opportunity to provide further education about the qualities of the unique Fungi Kingdom and its ability to support many diverse dietary requirements of Australians - including the growing flexitarian, vegetarian, vegan, dairy free and gluten free needs."

The qualitative in-depth interviews with 12 Key Opinion Leaders and quantitative research conducted with

654 food industry professionals from a broad range of areas, revealed there is a common misconception with non-health industry professionals that mushrooms are a meat protein equivalent.

"Mushrooms have a unique umami and meaty taste profile, making them a great culinary replacement for meat. From a nutritional perspective, unlike meat, mushrooms contain minimal protein, but they also contain no saturated fat. With their combined umami and nutritional profile, mushrooms can help to reduce the sodium and saturated fat content of meals when replaced for meat."

The research is part of a bigger project funded by the Australian mushroom industry to educate the food industry of the unique nutritional benefits of Australian grown white and swiss brown mushrooms. These everyday mushroom varieties provide a unique combination of nutrients that can assist food service providers, in particular catering institutions, achieve their plant-forward menu goals, while reducing fat and sodium, and increasing the nutritional content of menu items - in a cost-effective way.

The educating the food industry of the nutritional benefits of Australian Mushrooms project is a Hort Innovation Mushroom Fund strategic levy investment and is led by the Australian Mushroom Growers Association (AMGA). Together with Nutrition Research Australia (NRAUS) and food industry expert Chef Adam Moore, the project aims to tackle some of the nation's biggest nutrition problems with mighty mushrooms. Engaging key players in the food industry, including Hospitals, Aged Care, Quick Service Restaurants and Food Manufacturers and identifying opportunities for Australian mushrooms to be included in menus, the program aims to improve health outcomes on a large scale.

After consolidating the relevant nutrition research and discovering the unique benefits mushrooms provide in a culinary setting, the project has developed a number of resources, designed by Chef Adam Moore and Dr. Flavia Fayet-Moore of NRAUS. The resources provide nutritional and culinary information specifically relevant for the food industry and will be used as the 'educational tool kit' as the project shifts to the engagement phase. The kit includes educational videos, a kitchen poster, fact sheets and an educational booklet, and are housed on the Australian Mushroom Growers website, <https://australianmushroomgrowers.com.au/food-industry/>. The resources are free to download, will be communicated to the broader food



industry, and will be utilised as the project shifts to the last and most exciting phase - engaging with high quantum of influence food industry organisations.

Leah Bramich, project lead and General Manager of the AMGA explains.

"Right now, we are in preliminary talks with the Mater Hospital in Brisbane, and an aged care facility in Coffs Harbour, to collaborate with NRAUS and Chef Adam Moore for 'mushroom menu interventions'."

"By identifying the organisation's unique nutrition challenges, and working directly with their chefs and kitchen teams to use mushrooms to solve these challenges, we are creating powerful case studies to highlight mushrooms unique culinary and nutritional benefits for the next phase, where we educate the food industry at scale, via a PR campaign and a roadshow conference program."

Exciting opportunities

Renowned chef Luke Mangan is the executive chef of the Mater Hospital, an institution already in the food service and health care spotlight due to its revolutionary in-room on-demand dining service. This presents an exciting opportunity to highlight the unique culinary and nutritional benefits of mushrooms to the wider food service industry.

**Hort
Innovation**
Strategic levy investment

**MUSHROOM
FUND**

This project has been funded by Hort Innovation using the mushroom research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au



Leah Bromich (AMGA GM),
Chef Adam Moore, Dr. Flavia
Fayer-Moore (NRAUS), Rowan
Anderson (White Prince) and
Anita Wilkins (NRAUS)

EDUCATING THE FOOD INDUSTRY ABOUT MUSHROOMS

The AMGA led, levy-funded program MU20003 – *Educating the Food Industry of the Nutritional Benefit of Mushrooms* is now in its second year, and as we transition to the more exciting phase of the project, Food Industry engagement and mushroom menu interventions, we have some exciting resources and news to share.

The project is being facilitated by Nutrition Research Australia (NRAUS) and Chef Adam Moore, who have developed a range of educational resources, which are now available for download from the AMGA website <https://australianmushroomgrowers.com.au/food-industry/>. These resources consolidate the evidence-based nutritional advice from NRAUS, based on years of scientific research, and extensive culinary tips from

Chef Adam Moore, to create a valuable 'mushroom educational toolkit' of resources specifically designed to upskill the food industry.

The 'toolkit' includes three educational fact sheets, an eBook, a handy 'which mushrooms is best for cooking' reference poster for food service kitchens, and three educational videos (which at the time of writing, have been filmed, but yet to be produced).

The resources provide information on three key food service educational themes:

- **Mushrooms, the X-factor ingredient for plant-based eating** - Dr. Flav talks about the different dietary trend chefs need to cater for, and how mushrooms are the x-factor ingredient for plant-based diets.

- **Culinary Tips and tricks** – with Chef Adam Moore in the kitchen teaching us his top tips for cooking mushrooms in a food service kitchen.
- **Farm to Plate** – Providing information on how mushrooms grow, as special guest Rowan Anderson of White Prince takes Adam and Dr. Flav on a tour of Premier Mushrooms, west of Sydney.

These resources will be communicated broadly to the food service industry, provided as an ongoing resource for culinary schools; used to assist the upcoming 'mushroom menu intervention' case studies, and presented to attendees at the very exciting 'Mushroom Masterclass' conference roadshow, which will be delivered in the last year of the project.

CULINARY SCHOOL FARM TOUR

As part of the projects 'top down, bottom up' approach to culinary education, culinary students are an important part mushrooms food service future. The first culinary school farm tour was conducted in mid-May, with 40 emerging chefs from The Star Culinary Institute visiting Elf Farms compost facility, Premier Mushrooms, and White Prince, to witness firsthand how compost is made, how mushrooms grow right through to picking and packing. The culinary students were taken on a tour by David Tolson, Chris Tolson and Matthew Fensom, and received educational fact sheets to support their learning. The White Prince team organised an exceptional lunch to showcase to the students how mushrooms could be used to create delicious meat-free pies, blended burgers, vegetarian quiche, and fancy chicken and mushroom vol au vents - perfect for catering. The students took boxes of mushrooms back to The Star, to start creating their own mushroom dishes.



Dr. Flav and Chef Adam Moore in the kitchen studio



MUSHROOMS ON THE MENU AT THE MATER HOSPITAL

By Leah Bramich

The AMGA, along with Nutrition Research Australia (NRAUS) are pleased to announce an exciting development within the 3-year project MU20003: *Educating the Food Industry about the Nutritional Benefit of Mushrooms*. **The Mater Hospital has been engaged to run a special mushroom-focused menu for patients, which will run from late August to early December this year.**

This Hort Innovation project, funded by the Australian mushroom industry aims to tackle some of the nation's biggest nutrition problems with mighty mushrooms. Engaging key players in the food industry, including Hospitals, Aged Care, Quick Service Restaurants and Food Manufacturers and identifying opportunities for Australian mushrooms to be included in menus, the projects objective is to improve health outcomes on a large scale.

The Mater Hospital is a busy private hospital based in Brisbane that provides a wide range of adult surgical, medical and cancer services, including intensive and coronary care, day surgery, day oncology and day respite, as well as busy medical, cancer and surgical units.

In 2013, Mater Private Hospital Brisbane, was the first hospital in Australia to implement room service. This private hospital study reported an increase in nutritional intake, improved patient satisfaction and reduced plate waste and patient meal costs compared to traditional models. This award winning in-room dining service allows patients choose from an a-la-carte menu and dial the Room Service Call Centre to place an order. The dining service delivers restaurant quality dishes within 45-minutes, and orders can be placed from 6.30am to 7pm.



Mater Hospital actively seeks to include foods on the menu that are cost effective, versatile, and nutritious and favours locally sourced, sustainable produce. Mater also have a particular focus on plant-based diets - therefore mushrooms were an ideal ingredient to feature.

The special mushroom menu has been developed for patients by celebrity chef, and Mater Hospital ambassador Luke Mangan, in conjunction with Mater Director of Dietetics and Food Services Sally McCray. The menu features a range of delicious mushroom dishes, which are available from breakfast through to dinner, with mushroom meal options catering to all dietary requirements.

The impact of the mushroom menu will be tracked by number of mushroom meals ordered, and plate wastage, along with meal costs.

The mushroom menu forms part of a 'menu intervention' program, which was developed by NRAUS, taking a 'top-down, bottom-up' approach to nutrition education. Not only are mushrooms the feature of the hospital menu for three months, but the intervention also includes nutrition and culinary education, delivered via a series of in-person workshops and educational materials for hospital staff, including dietitians and nurses, chefs and kitchen staff, as well as the in-room dining team. The workshops will be delivered in mid-October, and are supported by mushroom education materials delivered to patients, staff and community, completing the wholistic approach to the nutrition education program.

The intervention specifically involves:

- **A mushroom-focused menu developed by Chef Luke Mangan:** weekly menu containing a different mushroom dish for four weeks, rotated over three months from 23rd August 2023 to 6th December 2023.
- **Patient education leaflet:** educational material on the nutritional benefits, how to use and inspiring recipes at home, to support the mushroom-focussed menu.
- **Staff education:** mushroom-focussed nutrition and culinary masterclass delivered to chefs and catering staff, dietitians, nurses and customer service staff involved with patient menu ordering.
- **Community education:** social media campaign driving key nutrition messages and inspiration around Australian mushrooms.

The Educating the Food Industry project is designed to utilise mushrooms in institutional meals and menus to solve nutritional problems. The experience will be monitored, and a case study recorded, with the ambition to share the impact and learnings with the wider institutional foodservice industry, in turn creating awareness and inspiration about the versatility of mushrooms.

FOOD INDUSTRY – AUSTRALIAN MUSHROOMS NUTRITION EDUCATION RESOURCES

The Educational Toolkit is now complete. These resources are specifically designed to upskill the food

industry and consolidate the evidence-based nutritional advice from NRAUS, based on years of scientific research, and extensive culinary tips from Chef Adam Moore.

The educational tool kit includes:

- Three educational fact sheets:
 1. Mushrooms: Pro culinary tips and tricks
 2. Mushrooms: The x-factor ingredient for plant-based eating
 3. Mushrooms: From farm to you
- eBook: Mighty Mushrooms – The X-Factor Ingredient for Food Service
- Food Service kitchen poster 'Which mushrooms are best when cooking?'
- Three (new) educational videos:

1. Australian Mushrooms Nutrition and Culinary tips <https://www.youtube.com/watch?v=Xhc5UZczyj8&t=6s>

Watch Chef Adam and Nutrition Scientist Dr. Flav provide their top tips to making the most of the culinary and nutrition benefits of the Mighty Mushrooms.

2. Australian Mushrooms and Plant based diets: https://www.youtube.com/watch?v=nQHDoeHV7_M&t=5s

Watch Chef Adam Moore and Dr. Flav to learn about the growing plant forward food trend and why mushrooms are the X-factor ingredient.

3. Australian Mushrooms – Farm to Plate: <https://www.youtube.com/watch?v=g79aVFHLPjQ&t=5s>

Watch Chef Adam Moore and Dr. Flav with Rowan Anderson at Regal Mushrooms farm, NSW to see and learn how Australian mushrooms are grown and produced.

These resources will be communicated broadly to the food service industry, provided as an ongoing resource for culinary schools, used to assist the upcoming 'mushroom menu intervention' case studies, and presented to attendees at the very exciting 'Mushroom Masterclass' conference roadshow, which will be delivered in the last year of the project.

Food industry professionals can view or download educational resources from the AMGA website: <https://australianmushroomgrowers.com.au/food-industry/>

EDUCATING ON THE BENEFITS OF MUSHROOMS IN HEALTH CARE SETTINGS

Educating food and health professionals about the nutrition and culinary benefits of Australian mushrooms: Progress update.

By Leah Bramich

If the proof of the pudding is in the eating, then get set for some fascinating data coming soon. Now in its final year, the 3-year Hort Innovation-funded project, *MU20003: Educating the food industry*, has moved onto the 'showing' phase of its mission.

Collaborating with research partner FOODiQ (formally NRAUS) and chef Adam Moore, the AMGA has engaged two leading examples of the institutional food sector to educate food and health care professionals about the unique nutritional benefits of Australian-grown *Agaricus bisporus* mushrooms.

Major interventions are underway with Mater Hospital Brisbane and Shoreline Aged Care in Coffs Harbour to add more Australian mushrooms to the menu. The team will investigate the impact on nutritional intakes of residents and patients, as well as enjoyment of the menu.

Leah Bramich, General Manager of the AMGA, says the project is showcasing the impressive health and culinary impacts that mushrooms can have, while catering to a breadth of dietary needs and preferences.

"Plant-based eating is the biggest global trend of the last decade, with more than one third of Australians choosing to eat less meat, or no meat at all, yet research shows that the food service sector is not tapping into the opportunity. Our education campaign is highlighting

to food and health care professionals that mushrooms tick all the boxes – they boost the nutrition and flavour of meals while catering to the growing demand of plant-forward dietary preferences including vegan, vegetarian, and flexitarian.

"The initial industry blueprint and research identified the institutional food sector (aged care and health care organisations) to have the largest opportunity to influence, so to work with Mater Hospital and Shoreline Aged Care is a big win. We'll be able to provide evidence of the incredible benefits mushrooms can have in a health care and residential aged care setting, and most importantly, showcase this to the wider industry and community."

MUSHROOMS ON THE MENU AT SHORELINE LUXURY AGED CARE

With partners Shoreline Luxury Retirement Living in Coffs Harbour, the team have embarked on a first-time research study focusing on enhancing vitamin D and overall nutrient intake among aged care residents.

The *Mushrooms on the Menu* study is investigating the feasibility of adding vitamin D enriched mushrooms to the menu at Shoreline residential aged care centre and the impact of this specially crafted mushroom-based menu, designed by Shoreline's executive chef and nutritionist. The team will evaluate the impact of

the menu on nutritional intakes of the aged care facility residents as well as their overall enjoyment of the menu. The vitamin D enriched mushrooms for the study are being supplied by White Prince Mushrooms.

The Shoreline Residential Aged Care (RAC) facility has been chosen as a focal point to evaluate the acceptability, demand, practicality, and implementation of the mushroom menu intervention within an aged care environment. Given the imperative to address malnutrition in RAC facilities, especially regarding vitamin D deficiency, and the growing momentum towards prioritising food-first nutrition approaches, mushrooms stand out as a remarkable ingredient to incorporate into daily menus. Recognised for their flavour-enhancing properties and content of vitamin D and other nutrients, mushrooms present a unique opportunity to enhance nutrition and patient satisfaction in aged care settings.

While the benefits of dietary intake of UV-exposed mushrooms in improving vitamin D status and enhancing flavour are acknowledged in research, there remains uncertainty regarding the feasibility of integrating UV-treated mushrooms into RAC facility menus and their impact on residents' food and nutrient intake. This study aims to bridge this research gap, offering valuable insights to the scientific community and gaining real-

world evidence of the transformative potential of a mushroom-focused menu on the nutrition and overall well-being of older adults in RAC settings.

To launch the study, Chef Adam Moore hosted a live cooking demonstration for Shoreline residents in January. As part of the study, Shoreline residents will be provided with the opportunity to select a mushroom meal at main meal occasions and must select at least one mushroom meal (containing at least 75g vitamin D enriched mushrooms) each day for 28 days. Food intake will be assessed before and during the mushroom-menu intervention with nutritional analysis carried out to compare intake. Independent living residents are also being recruited to take part, with participants receiving two punnets of mushrooms each week and weekly recipe cards for meal inspiration, to prepare their own daily mushroom meal throughout the study intervention.

Participating residents are aged 65+, an age group that is more susceptible to vitamin D deficiency. Studies have shown that up to 80% of women and 70% of men living in nursing homes in Victoria, New South Wales, and Western Australia are vitamin D deficient. Vitamin D deficiency is associated with higher risk of falls in this group, with vitamin D supplementation shown to improve fall rate, meaning this study could improve the wellbeing and livelihood of many residents in aged care facilities.

The study is currently underway, and findings expected to be finalised by mid-year.

MUSHROOMS ON THE MENU AT MATER HOSPITAL BRISBANE.

The project team also partnered with The Mater Hospital Brisbane, for a comprehensive initiative aimed at elevating their services through a mushroom-



Top left, discussing mushrooms in the Shoreline kitchen; top right, delicious mushroom pastries; bottom left Shoreline residents being introduced to the program.

focused program. The initiative was born out of Mater's recognition of mushrooms as a unique, versatile, and vegan source of vitamin D, aligning seamlessly with their commitment to prioritising food first dietary solutions for health and wellness.

With one in four Australian adults being vitamin D deficient¹, the Mater saw mushrooms as a problem-solving ingredient to incorporate into the hospital menu, as they are the only natural non-animal source of vitamin D². Vitamin D is crucial for immunity and bone health, and in an era when plant-based dietary preferences are on the rise, plant-forward meal options providing vitamin D are especially important in health care environments.

The mushroom menu was designed by dietitians and Chef Luke Mangan to optimise nutritional intake and the culinary experience for patients choosing plant-based meals, and continues Mater Hospital's dedication to innovative food and beverage programs.

The Mater provides a wide range of adult surgical, medical and cancer services, including intensive and coronary care, day surgery, day oncology and day respite, as well as busy medical, cancer and surgical units. It was the first hospital in Australia to implement room service and is already known as an innovative leader in hospital catering.

"The partnership is a holistic approach involving a multi-disciplinary team incorporating Mater's dietitians, chefs and customer service staff together with celebrity chef Luke Mangan, together with input from FOODiQ and AMGA to achieve a plant forward, nutritious food program," says Leah Bramich.

The initiative encompasses multifaceted efforts including educating nutrition and food service professionals, as well as supporting them in their education of patients and the community. Central to this initiative was the introduction of 'Mushrooms on the Menu' specials menu within their private hospital campus, featuring a dedicated mushroom centric plant-based meal option integrated into their existing four-week rotating Luke Mangan specials patient menu.

Three workshops were conducted to increase the culinary and nutritional knowledge of the chefs and kitchen team, customer service team, and dietitians, led by experts Dr Flavia Fayet-Moore (FoodIQ), Chef Adam

Moore (Culinary Revolutions), and Leah Bramich (AMGA). These workshops were instrumental in disseminating knowledge and motivation to include mushrooms in the menu.

The team provided an educational toolkit comprising printed resources and complimentary punnets of mushrooms (provided by Brisbane based grower, Marland Mushrooms). Patient resources were developed by the Mater Hospital alongside hospital social outreach initiatives that educated staff and patients about mushrooms for a holistic approach to nutrition and culinary education - from the Mater Hospital chefs, dietitians and food service team through to the patient consumer.

Initially slated for a 3-month duration, the 'Mushrooms on the Menu' intervention garnered such positive reception from the Mater team that it was extended for an additional three months, now scheduled for completion by March 31, 2024.

THE NEW EDUCATION RESOURCES FOR FOOD AND HEALTH PROFESSIONALS

Throughout the project, a suite of informative resources has been created, specifically for food and health professionals, available on the AMGA website.

The AMGA and FOODiQ will host an educational roadshow this year to present the results of the MU20003 research study, inviting key opinion leaders, nutritionists, dietitians, and food industry professionals to attend the events and conference opportunities.

A growing database of health and food professionals has also been developed, allowing the resources and updates to be regularly shared with the wider health care and food industry as the project progresses.

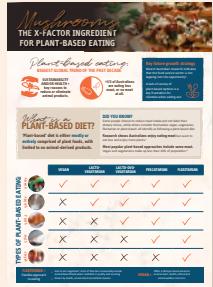
An online portal of educational and inspirational resources for food and health care professionals has been developed on the AMGA website, featuring a suite of new videos, facts sheets and an e-Book.

Health and food professionals can visit the site for nutrition and cooking information, trends, statistics, insights, tips, and tricks about Australian mushrooms. The resources include three YouTube videos and associated fact sheets.

Click each video or fact sheet to view or download from australianmushroomgrowers.com.au/food-industry/



Video 1: How to cater to plant-based dietary preferences and mushrooms as a meat substitute. This video contains a variety of surprising tips on how to cook mushrooms to retain optimum flavour and boost the nutritional content of meals, from Chef Adam Moore and Dr Flavia Fayet-Moore (Dr Flav), Nutrition Scientist.



Video 2: Pro culinary tips and tricks: Dr Flav and Chef Adam Moore discuss the different plant-based diets, and the importance of including Australian Mushrooms within each diet, due to their unique nutritional and culinary benefits.



Video 3: From farm to you: learn how mushrooms grow. Dr Flav and Chef Adam visit Australian mushroom grower, Rowan Anderson at White Prince Mushrooms, a farm located in the Hawkesbury region west of Sydney, to learn about (*Agaricus bisporus*) mushrooms' unique growing process, from compost to harvest.



IN THE MEDIA

The project has already generated significant positive media coverage. You can view recent coverage, including local newspapers and industry related publications. View the full list at <https://australianmushroomgrowers.com.au/press/>.

"We look forward to seeing the results of the MU20003 studies, and sharing the findings widely with food and health professionals, in turn encouraging other institutional organisation to add more mushrooms to menus," says Leah Bramich.

LEARN MORE

Food industry professionals can express interest in participating in the project by enquiring via the form on the AMGA website: <https://australianmushroomgrowers.com.au/food-industry/>

Hort Innovation MUSHROOM FUND

This project has been funded by Hort Innovation using the mushroom research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au

This Australian Mushrooms project is a Hort Innovation Mushroom Fund strategic levy investment and is led by the Australian Mushroom Growers Association (AMGA). Together with FOODiQ Global, and food industry expert, Chef Adam Moore, the project aims to tackle some of the nation's biggest nutrition problems with mighty mushrooms. Engaging key players in the food industry, including Hospitals, Aged Care, Quick Service Restaurants and Food Manufacturers and identifying opportunities for Australian mushrooms to be included in menus, the program aims to improve health outcomes on a large scale.

READ MORE

The resources can be found here: <https://australianmushroomgrowers.com.au/food-industry/>



The project delivery team, from left: Leah Bramich, Shoreline executive chef Andrew Wright, chef Adam Moore, Dr Flavia Fayet-Moore, and Lucy Downey

Nutritional powerhouse: The Final Year of Australian Mushrooms' MU20003 Project

As this ambitious three-year Hort Innovation mushroom R&D levy investment MU20003 (*Educating the food industry about Australian Mushrooms*), enters its final year, the industry is buzzing with anticipation on the results of the first institutional case studies.

This project, centred on educating the food sector about the unique nutritional benefits of Australian-grown *Agaricus bisporus* mushrooms, has been a significant undertaking aimed at transforming menus across Australia.

In collaboration with research partner FOODiQ Global (formerly Nutrition Research Australia), the Australian Mushroom Growers Association (AMGA) has engaged major organisations in the institutional food sector. Their goal? To educate food and healthcare professionals on the nutrition, health and culinary benefits of including Australian mushrooms in meals and menus.

Significant progress has been made at Mater Hospital in Brisbane and Shoreline Residential Aged Care in Coffs Harbour, with both institutions implementing interventions to integrate more mushrooms into their menus. The project team is now analysing the impact on nutritional intake and overall enjoyment for residents and patients, paving the way for broader industry adoption.

SHARING THE INSIGHTS: UPCOMING EVENTS

The results of these interventions will be revealed in an upcoming educational roadshow, with key events set to inspire food and health industry professionals on how mushrooms can enhance their menus:

- World Mushroom Day Breakfast (15 October 2024, Sydney): This special breakfast event will gather 100 food and healthcare industry professionals to showcase the latest findings and resources from the Mater and Shoreline initiatives.



• IHHC Conference (4-6 November 2024, Perth): At this annual healthcare hospitality event, Dr Flávia Fayet-Moore will discuss the health benefits of mushrooms and present the results of the Shoreline and Mater initiatives, targeting Foodservice Managers, Executive Chefs, and other professionals.

In late August, project partner Dr Fayet-Moore presented the results at the Dietitians Connection Food Service Symposium, a professional development event for dietitians working in food service.

RESOURCES FOR INDUSTRY PROFESSIONALS

To further support the industry, the AMGA has developed an extensive online portal on their website, featuring educational and inspirational resources. The portal includes new videos, fact sheets, kitchen poster and an eBook tailored for food and healthcare professionals. These resources can be accessed at <https://australianmushroomgrowers.com.au/food-industry/>, where users can also sign up for updates, resources, and tips on cooking with mushrooms.

Food industry professionals interested in participating in the project can register their interest via the form on the AMGA website: <https://australianmushroomgrowers.com.au/food-industry/>



TRANSFORMING THE FOOD INDUSTRY WITH AUSTRALIAN MUSHROOMS: THE RESULTS OF MU20003

The results of the AMGA's three-year project MU20003: Educating the food industry, show the truly positive impact Australian Mushrooms can have on the overall health of Australians. With the potential of Vitamin D mushrooms to triple Vitamin D intake of residents in aged care, mushrooms can address this widespread deficiency while catering to most dietary preferences. Further, with the rise of plant-based trends and flexitarian diets, research also shows substantial potential for the entire food service industry to adopt more mushrooms on menus to improve health outcomes.

WHAT WAS THE PURPOSE OF THE PROJECT?

This project, led by the Australian Mushroom Growers Association (AMGA), aimed to increase the knowledge of food service and health care professionals about the nutritional and health benefits of mushrooms. The objective was to upskill the food industry, improving the nutritional profile of foods served to clientele and inspiring the adoption of more mushrooms within food service.

FOODiQ Global together with Chef Adam Moore and food industry experts Straight to the Source, took a 'top-down, bottom up approach' to education, engaging with culinary schools and students, executive-level chefs, healthcare professionals, and food industry key opinion leaders.

Top down: The project partnered with two high-impact organisations to implement nutrition-focused mushroom interventions, leveraging these initiatives in educational events to inform and inspire the industry.

Bottom up: The project explored opportunities for mushroom education, developed tailored resources, and executed an educational program highlighting the nutrition, health, and culinary benefits of Australian grown fresh *Agaricus bisporus* mushrooms.

By engaging key players in the food industry, and identifying opportunities for Australian mushrooms to be not only included in menus but showcased as the 'main event', the project set out to improve health outcomes on a large scale.

HOW WAS IT IMPLEMENTED?

The three-year project included a range of impactful activities working together to reach and engage food and health professionals, including:

1. A suite of educational and inspirational resources

The AMGA website now features a food industry page with a suite of educational videos, fact sheets, and



Left to right: Sally McCray (Mater Hospital), Tawnya Bahr (Straight to the Source), Chris Tolson (Premier Mushrooms), Dr Emma Beckett (FOODiQ Global), Jutta Wright (FOODiQ Global), Leah Bramich (AMGA CEO) at the World Mushroom Day breakfast event.

an e-Book. The resources can be found here: <https://australianmushroomgrowers.com.au/food-industry/> and on the new mushroom health science site: www.mushroomhealthscienceaustralia.com.au

Video 1: How to cater to plant-based dietary preferences and mushrooms as a meat substitute: This video contains a variety of surprising tips on how to cook mushrooms to retain optimum flavour and boost the nutritional content of meals, from Chef Adam Moore and Dr Flavia Fayet-Moore (Dr Flav), Nutrition Scientist.

Video 2: Pro culinary tips and tricks: Dr Flav and Chef Adam Moore discuss different plant-based diets, and the importance of including Australian mushrooms within each diet, due to their unique nutritional and culinary benefits.

Video 3: From farm to you: Learn how mushrooms grow. Dr Flav and Chef Adam visit Australian mushroom grower Rowan Anderson at White Prince Mushrooms, a farm in the Hawkesbury region west of Sydney, to learn about (*Agaricus bisporus*) mushrooms' unique growing process, from compost to harvest.

Printed and digital resources: Several fact sheets, a poster (mushroom varieties and usage in the kitchen), and an education booklet *Mighty Mushrooms – the X-factor Ingredient in Foodservice* were produced, and used as the educational toolkit.

2. Database of food and health professionals

A database of health and food professionals has been developed as part of the project, allowing the resources and updates to be regularly shared with interested healthcare and food industry professionals. This expanding community of over 2000 new and engaged contacts has received e-newsletters throughout the project duration, with insights, tips and resources that showcase the nutritional and health benefits of mushrooms.

3. 'Mushrooms on the Menu' case study interventions

Research partner FOODiQ Global developed a comprehensive blueprint of the food industry, pinpointing the healthcare institutional food sector, such as aged care facilities and hospitals – as a high-impact

target for implementing mushroom-focused nutrition interventions. Aged care was considered a significant opportunity. Not only does it comprise the biggest volume of the institutional sector, but is predicted to grow significantly as the population ages. The institutional sector has also increasingly been adopting food-first approaches to meet the nutritional needs of clientele, which aligns perfectly with the objectives of this project.

Two organisations were identified to undertake a nutrition-focused mushroom intervention:

The Shoreline Aged Care, Coffs Harbour – Vitamin D feasibility study

Partnering with FOODiQ Global, the research study – an Australian first – focused on the feasibility of adding vitamin D mushrooms to the menu, to enhance vitamin D and overall nutrient intake among aged care residents.

Vitamin D deficiency is a significant public health issue in Australia, particularly in aged care where up to 86% of residents are reported deficient.¹

Residents were divided into those who were in full residential care with all meals provided, and those who were living independently, so preparing their own meals.

Twenty-eight standard lunch and dinner recipes for those in residential care were modified to include 75g UV-exposed *Agaricus bisporus* mushrooms per serving.

Residents living independently were provided with vitamin D mushrooms and shown how to prepare meals with them.

The Mater Hospital

The AMGA and FOODiQ Global engaged this busy metropolitan hospital to develop a nutritionally and culinary superior mushroom-focussed hospital menu, which was offered to patients for six months. The aim was to demonstrate how a 'food first' approach can be used by healthcare professionals to optimise patients' nutritional and culinary needs.

The 'mushroom menu' responded to growing demand for plant-based dishes among patients, showing how mushrooms can cater to diverse dietary needs, such as low-sodium, fat-free, gluten-free, vegetarian and vegan.

Both 'mushrooms on the menu' interventions included on-site workshops with the chefs and kitchen team by Chef Adam Moore, and staff dietitians and support staff learned about the unique nutritional value of mushrooms from Dr Flav.

4. Educational roadshow and ongoing communications

The project research findings and resources were shared with the wider food and health industry via a communications strategy involving partnerships, advertising, media outreach, social media campaigns,

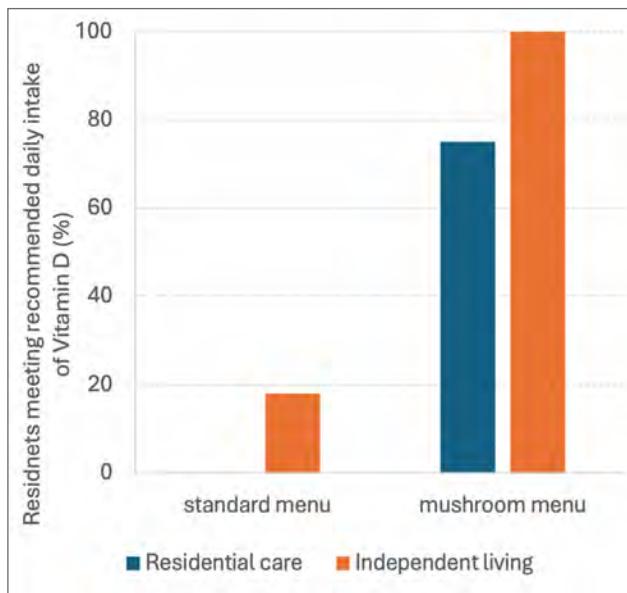
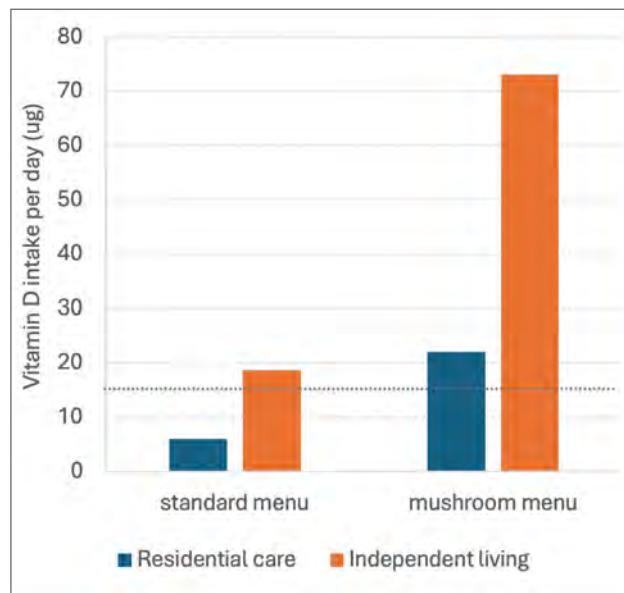


Figure 1. Residents' mean vitamin D intake per day, and the percentage of residents consuming the recommended intake of Vitamin D per day during a one month intervention trial

and events targeting food and health industry professionals.

The AMGA and FOODiQ Global hosted an educational roadshow this year to present the resources and results of the MU20003 project case studies. Key opinion leaders, nutritionists, dietitians and food industry professionals were invited to attend the events, amplifying the learnings amongst industry professionals.

The project resources and 'Mushrooms on the Menu' case studies were presented at:

- Dietitians Connection Symposium for Food Service Dietitians (August 2024)
- World Mushroom Day breakfast for food and health professionals (October 2024)
- Institute of Hospitality in Healthcare (IHHC) Conference (November 2024)

WHAT WAS THE OUTCOME?

Mushrooms On The Menu at The Shoreline – prioritising mushrooms as a key ingredient

The results of the study were remarkable. Mean vitamin D intake from lunches and dinners provided to those in full residential care tripled – from 6 μ g at baseline to an impressive 18.7 μ g during the intervention. Even more striking, the proportion of those in residential care who consumed Australia's recommended daily intake for vitamin D (15 μ g/day) soared from 0% to 75%.

Results were equally impressive for residents in independent living. Vitamin D intake increased more than eight-fold, with ALL reaching the 15 μ g/day target for Vitamin D.

Feedback from residents and staff underscored the success of the intervention. Highlights included:

- Residents rated the taste, presentation, and overall enjoyment of the mushroom-enhanced meals as excellent
- Staff reported that the recipes and menu were easy to implement
- Both groups expressed a strong preference for continuing the use of mushrooms in the facility's meals

The study highlighted that UV-exposed *Agaricus bisporus* mushrooms are a game-changing ingredient for aged care. They are versatile, easy to incorporate,



Chef Adam Moore, Dr. Flavia Fayet-Moore and Rowan Anderson shooting the educational videos.

and, through a food-first approach, can significantly improve vitamin D levels in vulnerable populations. The findings demonstrate a practical and enjoyable solution to a widespread nutritional challenge, showing the potential of mushrooms to make a meaningful difference in aged care nutrition.

These findings, set to be published in a respected nutrition journal, will provide a credible, evidence-based resource for food industry professionals. The publication will provide a strong foundation to advocate for the purposeful incorporation of mushrooms into menu development, with a focus on their potential to boost vitamin D intake.

By highlighting their nutritional and culinary impact, the study empowers professionals and influences decision-makers to prioritise mushrooms as a key ingredient rather than an afterthought. This can ensure mushrooms play a central role in meeting the dietary and culinary needs of their clientele.



Chris Tolson (Premier Mushrooms) delivering a presentation at the World Mushroom Day event, explaining how mushrooms grow.

The Mushroom Menu at The Mater Hospital - mushrooms are an ingredient for everyone

The mushroom menu at The Mater Hospital has showcased the suitability of mushrooms for a diverse range of patients, catering to dietary preferences, while also increasing vitamin D content. It acts as a best-practice example for hospital food service, encouraging other healthcare institutions to increase mushroom dishes on menus.

This project also showed that mushrooms are often overlooked as an ingredient. There is an appetite for a larger bank of dietitian-approved mushroom recipes for use in the hospitality and healthcare sector.

There is great potential to repeat the 'Mushrooms On The Menu' intervention programs, which were activated at The Shoreline and Mater Hospital, with other large scale catering organisations. This could have long-term impacts on food service sector and grow demand.

There is a gap in professional development for mushroom culinary skills, and a huge potential to engage with professional chefs and culinary students to upskill food service on the use of mushrooms.

Mushrooms are missing from the culinary education curriculum, and while the program funded some resources to support culinary school education, there is huge potential for mushroom culinary education within TAFE and private culinary training organisations.

WHAT'S NEXT?

This project has shown that education is key to helping the food service sector improve the nutritional value of menus, offering mushroom dishes as 'natural food' options. Throughout the project, health and food service professionals have widely expressed their appreciation of the education opportunities provided, and interest in engaging and learning more.

An 'always on' approach to health professional and food service education and engagement is recommended.

Greater awareness among food and health professionals

Comments from food and health professionals attending the World Mushroom Day breakfast in Sydney, IHHC Conference and Dietitians Connection Food Service Symposium show that the resources have been well received and launch events have been educational for the food and health industry.

There have also been direct enquiries from healthcare sector catering managers looking for local suppliers of vitamin D mushrooms. This is proof that greater awareness is increasing demand and intention to implement mushroom menus in the workplace.

"I loved coming to the Mushroom Day breakfast. Thank you for inviting me, such valuable information both personally and professionally. I will definitely be sharing the resources with my colleagues and patients."

"Thank you for inviting us to the event - I really enjoyed the setting, the speakers, and the valuable insights shared."

"The presentation had heaps of practical advice for integrating vitamin D enriched mushrooms into the menu."

"It was very informative with great ideas to help support menus and recipes for older Australians."

The project generated significant positive media coverage. View recent coverage at: <https://australianmushroomgrowers.com.au/press/>.

Explore further: A new community of mushroom-loving food and health professionals

The community of food and health professionals developed within this project (over 2000 subscribers) will continue to receive new research, educational tips and tricks to improve the nutritional profile of meals and menus by incorporating more Australian-grown fresh *A. bisporus* mushrooms. This community will allow Australian mushroom growers to have an ongoing relationship with and impact on the food and health industry.

The project resources are available on the AMGA site and www.mushroomhealthscienceaustralia.org to provide ongoing inspiration and information for food and health professionals (see page 31 for more about the mushroom Health Science Australia website)



EDMs to communicate about the project to mushroom industry stakeholders.

Note – screenshots show information relevant to the final report. Content unrelated to the project has not been included.

1. EDM from MushroomLink (2022): [June e-bulletin](#)



The image shows the header of the June 2022 e-bulletin. At the top is the MushroomLink logo, which consists of a stylized orange 'M' shape followed by the text 'MushroomLink' in a bold, orange, sans-serif font. Below the logo is a photograph of a person in a white lab coat and a hat, working in a laboratory or food processing facility. The main title 'Bulletin' is in a large, white, sans-serif font, with 'June 2022' in a smaller font below it. The background of the header is orange. The main content area has a white background with a yellow border. On the left, the heading 'In this edition:' is followed by a bulleted list of topics: 'Introduction to MushroomLink', 'Marketing update', 'Latest in R&D', 'Watch and Listen', and 'News and Events'. To the right of the list is a small image showing two publications: 'MushroomLink' magazine and 'AMGA JOURNAL'. A red circle with the text 'NEW LOOK magazine + the return of the AMGA Journal' is overlaid on the image. Below this section is a horizontal line with the heading 'R&D Report – Linking growers to the food industry' in a small, bold, black font. To the left of this heading is a text block about the food industry's lack of mushroom representation. To the right is a photograph of two people in a kitchen or food preparation area, with a box of 'MUSH BROWN BAG' mushrooms on the counter.

R&D Report – Linking growers to the food industry

The Australian food industry loves mushrooms. However, mushroom dishes are rarely featured or celebrated. Instead, they are often hidden among the vegetarian options.

The central aim of the Educating the Food Industry on Mushrooms project (MU20003) is to find ways to elevate mushrooms, bringing them out of the shadows and into the limelight.

[CLICK HERE](#) to read an update on the project from Leah Bramich and Dr Flavia Fayet-Moore.

EDM 1 links to [this report](#) written for MushroomLink – it wasn't published as an article in the magazine

consumers - reports - nutrition 20 June

Linking growers to the food industry

- By Paulette Baumgartl

PROJECT MU20003: Educating the food industry about Australian mushrooms

The Australian food industry loves mushrooms. With their characteristic umami and meaty taste profile, mushrooms are a unique nutrient rich plant-based food. Yet, all too often mushroom- dishes are hidden amid the vegetarian and plant-based options.

While common on menus around Australia, mushrooms are rarely the main act, seldom featured and celebrated.

To elevate mushrooms in the minds of industry insiders, highlighting their benefits through impactful education and engagement could bring them out of the shadows and into the culinary and nutritional limelight.

Barriers to cooking with mushrooms, and how these barriers may be overcome, is the central aim of the *Educating the Food Industry on Mushrooms* project. This research and education program led by Leah Bramich (General Manager at Australian Mushroom Grower's Association) in collaboration with CEO of Nutrition Research Australia Dr Flavia Fayet-Moore and industry insider Chef Adam Moore, has entered its second phase with some clear results.

In Phase 2, key stakeholders identified during Phase 1 were interviewed. Questions were devised to understand existing barriers, and extract further insights into how an education project could be designed and delivered for maximum effectiveness.

Specific questions in these one-on-one interviews delved into opportunities to expand/feature mushrooms in catering and to include mushrooms in hospitality training curriculums. The researchers also explored which health and nutrition messages would resonate with food service professionals, and what are the most effective and efficient ways to reach organisations and industry professionals.

Interview subjects included a director of nutrition and food services at a leading hospital, an instrumental player in innovation within foodservice delivery at hospitals, an executive chef at a leading hotel chain, and a prominent food industry educator.



The findings emphasised that while mushrooms were a much-loved ingredient, there was little knowledge among industry practitioners on the nutritional, culinary, and health benefits. However, when properly informed of these benefits, interest increased dramatically.

With the global surge in plant-based diets, there is capacity for mushrooms to be incorporated more across multiple food industries. This is particularly relevant for hospitals and other institutions, where demand for plant-forward meals is high, and lower sodium and saturated fat options are deciding factors when creating menus.

There was further evidence that greater awareness and knowledge could propel mushrooms as a culinary force in the commercial sector, although taste and texture, more than nutritional value, were the more important factors.

So, filling a knowledge gap helps reduce barriers, but how can this best be applied?

Findings from this study point to practical and simple engagement at the workplace. The *train the trainer* method was an approach identified as being useful in this context; train the executive chefs and sales teams who can deliver informal educational sessions on mushrooms with the staff at their workplace. On site education and engagement is likely to get more traction than classroom learning or webinars, and furthermore supports executive chefs in their roles as teachers.

Communication materials were also identified as an approach that could inspire creativity and connect and engage food industry staff. Chefs reported that they would love to see posters in their work environment that could educate and inspire with preparation techniques and recipes.

Tapping into the provenance story of mushroom was also identified as another great opportunity to drive a greater desire for mushrooms on menus. As diners become more discerning and environmentally aware, provenance is having a greater impact on choice than ever before. The provenance narrative of *this mushroom from that place* provides another avenue to promote mushrooms as a showcase ingredient.

This research project provides a unique opportunity to mutually benefit growers, the food industry, and their shared stakeholders, bringing together resources that will have a legacy and help growers work with the food industry.

MU20003 Educating the Food Industry is led by the Australian Mushroom Growers Association together with Nutrition Research Australia and chef Adam Moore. The project aims to develop ways to educate food industry professionals, uncovering ways that the mighty Aussie mushroom can solve some of the nation's biggest nutrition problems.



2. EDM from MushroomLink (2023): [March e-bulletin](#)



The image shows the header of the March 2023 issue of the MushroomLink e-bulletin. At the top left is the MushroomLink logo, which consists of a stylized orange 'M' shape followed by the text 'MushroomLink'. Below the logo are two smaller logos: 'ahr' (Agricultural Horticultural Research) and 'Hort Innovation' (Strategic levy investment). The main title 'Bulletin' is in a large, bold, white font, with 'March 2023' in a smaller, italicized font below it. The background of the header is a dark, out-of-focus image of mushrooms.

In this edition:

- Autumn 2023 magazine out now
- Feature: Horticulture meets robotics meets AI
- Interview: Geoff Price from Giorgi Mushrooms
- Podcast: CSIRO researcher Dr Damien Belobrajdic and nutritionist Dr Falvia Fayet-Moore (NRAUS) discuss the narrative around mushroom nutrition
- Marketing update: 70,000 shoppers engaged with the in-store sampling program
- Mushroom Link resources



The image shows a thumbnail for a podcast episode. At the top is a yellow button with the word 'Listen' in white. Below it is the title 'Mushrooms exemplify food as medicine'. Below the title is a photograph of a meal in a black bowl, featuring what appears to be mushrooms, eggs, and potatoes. The bowl is on a wooden table with a blue and white checkered napkin and a small plate next to it.

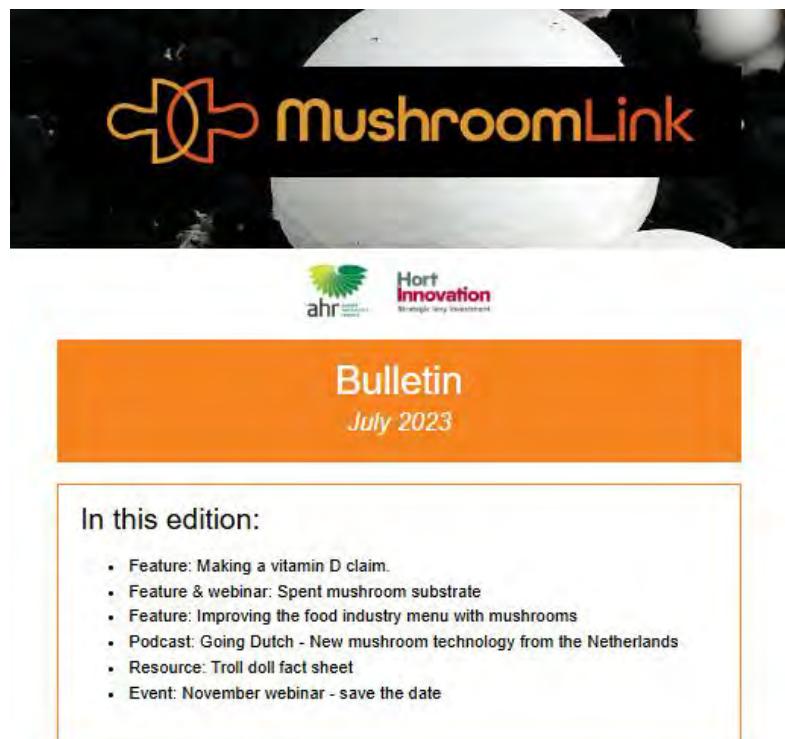
How can 'mushrooms as medicine' help boost the Australian mushroom industry?

In this podcast, Dr Damien Belobrajdic discusses how his work with CSIRO is the first step in achieving an FSANZ health claim, and Dr Falvia Fayet-Moore makes the case that mushrooms exemplify the 'food as medicine' concept.

[Listen here](#)

Podcast is available via [this link](#)

3. EDM from MushroomLink (2023): [July e-bulletin](#)



In this edition:

- Feature: Making a vitamin D claim.
- Feature & webinar: Spent mushroom substrate
- Feature: Improving the food industry menu with mushrooms
- Podcast: Going Dutch - New mushroom technology from the Netherlands
- Resource: Troll doll fact sheet
- Event: November webinar - save the date

Feature: Improving the food industry menu with mushrooms



Anyone who has ever spent more than a few days in a hospital or visited an elderly friend or relative in a care home, would most likely agree - despite the best intentions, the catering is less than inspiring. A collaboration between NRAUS and the AMGA (funded via the Hort Innovation R&D levy) is working hard to show the benefit of adding mushrooms to the menu, not only to improve the palatability of institutional meals, but to boost their nutritional offering as well.

Read more about the project [here](#)

EDM links to article in MushroomLink (issue 5, [pages 24-25](#))

4. EDM from MushroomLink (2024): [March e-bulletin](#)



Bulletin March 2024

In this edition:

- MushroomLink magazine: Autumn issue out now
- Feature article: Cold mushrooms are quality mushrooms
- Marketing: What's planned in the coming months?
- Podcasts: Revisit the MushroomLink podcast back catalogue
- Fact sheet: Actions points to control Sciarid and Phorid flies
- AMGA conference scholarship
- Nuffield scholarships now open



MushroomLink magazine Autumn

A digital copy of our [Autumn issue \(Issue 8\)](#) is now available to download, with print copies due for delivery in April.

We hope you like our latest issue, which includes an extended feature from Dr Warwick Gill and Judy Allan on exclusion as part of an IPDM program, the latest from the levy-funded project making headway in health care catering, and updates from the Hort Innovation marketing team.

[Read full issue here](#)



Cover image relates to article in MushroomLink (issue 8, [pages 7-11](#))

5. EDM from MushroomLink (2024): [April e-bulletin](#)



The image shows the header of an EDM from MushroomLink. At the top is the MushroomLink logo, which consists of a stylized orange mushroom icon followed by the text "mushroomLink" in a lowercase, sans-serif font. Below the logo is a yellow horizontal bar containing the word "Bulletin" in white. Underneath "Bulletin" is the text "April 2024" in a smaller white font. At the bottom of the yellow bar are five small circular icons with white symbols: a person, an envelope, a linked circle, a video camera, and a feed symbol. A thin horizontal line separates this header from the main content.

In this edition:

- Feature article: Mushrooms in health care settings
- Publication: Supporting mushrooms as a food-based solution to vitamin D deficiency in dietary guidelines
- Marketing: New strategy to inform FY2025
- NEW Podcast: Dr Mark Loftus from Sylvan Bioscience
- Training: Mini series - mushroom farm hygiene
- Webinars: Save the date for the mushroom supply chain webinars
- AMGA Conference 2024

Good reads



Feature article: Educating on the benefits of mushrooms in health care settings

Collaborating with research partner FOODiQ (formally NRAUS) and chef Adam Moore, in this Hort Innovation levy-funded project, the AMGA has engaged two leading examples of the institutional food sector to educate food and health care professionals about the unique nutritional benefits of Australian-grown *Agaricus bisporus* mushrooms.

[Read full article here](#)

EDM links to article in MushroomLink (issue 8, [pages 7-11](#))

6. EDM from AMGA (October 2024): World Mushroom Day breakfast



HAPPY WORLD MUSHROOM DAY

Welcome to our October AMGA Update!

In this issue:

- Attend the Agriculture Victoria Mushroom Disease Forum This Friday
- Watch the Australian Mushrooms New Campaign Launch Webinar Replay
- Celebrate World Mushroom Day – Tuesday 15 October
- Welcome Carly Rosewarne, AMGA Research, Development & Extension Manager
- Last Chance to Register for the AU & NZ Mushroom Growers Conference



What's Happening this Mushroom Day

Happy World Mushroom Day. This year, the AMGA are celebrating by:

- **A Influencer Marketing Toolkit** – focusing efforts on collaborative marketing with content creators and media partners in the foodie and wellness space. This toolkit includes digital assets, incredible mushroom recipes videos and and so much more. Access the Influencer Toolkit [Here](#).
- **Social Media and Digital Marketing:** *Sign up to Win 1 of 1000 Mushroom Lovers 2025 Calendars* – sign up to receive Mushroom Lovers recipe emails, to go in the draw - view the campaign and share [here](#).
- **Influencer Marketing** – Paid partnership with past MasterChef Grad, Chef and EXTREME Mushroom Lover, Amina Elshafei across with Instagram and TikTok - [Share this post](#).
- **World Mushroom Day Breakfast** - As part of the AMGA managed, Hort Innovation R&D project MU20003 – Educating the Food Industry of the Nutritional Benefits of Mushrooms, FOODiQ Global and the AMGA are hosting a World Mushroom Day Breakfast for food and health professionals, to educate and showcase the health and culinary benefits of using mushrooms in menus and dishes.