## Horticulture Innovation Australia

**Final Report** 

## **Mushrooms and Health Global Initiative**

**Kevin Tolson** 

Australian Mushroom Growers Association Ltd

Project Number: MU12015

#### MU12015

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#### Summary

The Mushrooms and Health Global Initiative (MHGI, Initiative or Project) collects, evaluates, and communicates scientific findings on mushrooms' health and nutrient benefits to establish the mushroom industry as the credible and reliable source of nutrition research information related to fresh mushrooms. A primary objective of the Initiative is to base informational materials, customized for health influencers and media so that they can accurately and efficiently communicate mushrooms' benefits, on research findings. Credible scientific information, translated into easy to understand articles about mushrooms appearing regularly in various communication channels, can be instrumental in changing consumers' purchase patterns from "nice to have" to "must have" and make mushrooms an essential, easy, and tasty way to better health – thus supporting the Australian mushroom industry's strategic positioning.

The Initiative:

- Uses the 2014 Mushrooms and Health Report as the scientific basis for global communications linking mushrooms and health;
- Distributes quarterly *Bulletins* as a communications vehicle that interprets and customizes research findings for use by others in different multiple markets;
- Maintains and updates the Mushrooms and Health Global Initiative website that serves as the repository of the project's outputs (*Mushrooms and Health Report* and *Bulletin*);
- Draws upon the expertise of an international resource directory of mushroom researchers that share research-supported public relations efforts among interested individuals, mushrooms organizations, researchers, academic institutions and media.

Market research suggests that health messages can alter consumer behavior and informal comments from Initiative participants suggest that health messages have helped create media interest and provide a more lasting unique selling proposition for mushrooms. Since the Initiative's beginning about a decade ago, progress has been made to establish the Initiative as the recognized global science and communications site for the media, news bureaus, researchers, health professionals, and the industry seeking credible information on mushrooms' health and nutrient benefits. Greater participation from mushroom producing countries, enhanced technology to support the Initiative's outputs and capitalizing on the global reach of social media could result in greater impact. The submission of the Final Report completes the Initiative's current project statement.

## Keywords

Mushrooms and Health Global Initiative; MHGI; mushroom nutrition; mushrooms and health; mushroom research communication

## Introduction

The Australian mushroom industry has strategically focused its R & D and marketing investments towards the generation of information linking mushrooms to improved overall health and well-being. This strategy has also been adopted by other mushroom producing countries, particularly the United States, Spain, United Kingdom, Ireland, Canada, France, Belgium, Poland, Italy, Netherlands and South Africa.

The Australian Mushroom Growers Association's (AMGA's) market research indicates that specific health associations between mushroom consumption and positive health outcomes are of key interest to consumers. In this information age, however, there is also misinformation. The Mushrooms and Health Global Initiative collects, evaluates, and communicates scientific findings on mushrooms' health and nutrient benefits to establish the mushroom industry as the credible and reliable source of nutrition research information related to fresh mushrooms.

Consistently identifying and frequently communicating compelling scientific reasons for consumers to eat more mushrooms, and disseminating this information through global channels are accomplished through the Initiative's outputs: the *Mushrooms and Health Report*, *Bulletin* and website.

## Methodology

The Mushrooms and Health Global Initiative uses several methodologies to produce its outputs:

- Updating and utilizing the 2014 Mushrooms and Health Report as the basis for globally communicating the science linking mushrooms and health
- Summarizing abstracts of recent mushroom nutrition and health research for inclusion in the *Bulletin*
- Showcasing media-ready interpretation of the research results/implications for dissemination and use by multiple markets/countries/locales in the *Bulletin*
- Sharing health-based informational activities in the *Bulletin* that demonstrate how various countries customize and interpret research results locally
- Facilitating exchange of ideas and resources via social media websites and blogs for Australia, Canada, Italy, Netherlands, South Africa, United Kingdom, Ireland and the United States
- Housing the components of the Initiative (*Mushrooms and Health Report* and *Bulletin*) on the Mushrooms and Health website (<u>www.mushroomsandhealth.com</u>) as a resource for key influencers of consumer behaviour
- Utilizing the expertise of an international directory of mushroom researchers and sharing research-supported public relations efforts among interested individuals, mushroom organizations, scientists, academic institutions and media.

When the Initiative began (2008) there was a plethora of approximately 11,000 published papers on mushrooms and health. There was a need to organize, evaluate and broadly communicate the scientifically validated benefits of *Agaricus bisporus*, specialty and medicinal mushroom consumption. This was accomplished through the Initiative's *Mushrooms and Health Report*, issued in 2008, 2010, 2012 and 2014, which is the underpinning resource document for responding to media inquiries or preparing releases to key influencers.

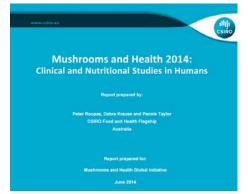
The literature search for the *Report,* (prepared by the Commonwealth Scientific and Industrial Research Organization under MU06019 and MU09002) used the following databases:

- PubMed a service of the US National Library of Medicine that includes over 16 million citations from MEDLINE and other life science journals
- SCOPUS an abstract database covering 25 million abstracts from over 14,000 journals across 4,000 publishers
- CSIRO Electronic Journals Collection (4,000 e-journals)
- FSTA Food Science and Technology abstracts FSTA is the internationally recognised leading Food Science and Technology Abstracts database
- Web of Science 5,700 major journals across 164 scientific disciplines
- CABI Contains over 3.8 million records from over 10,000 journals, books, conferences, reports, and other kinds of literature published internationally
- Cochrane Central (database of Systematic Scientific/Medical Reviews and Cochrane Collaboration Central Register of Controlled Clinical Trials)
- Johanna Briggs Institute (JBI) Library of Systematic Reviews

• U.S. National Institutes of Health (NIH) Registry of Clinical Trials.

Initiative team members (See Acknowledgments) operationalize the project, avoid duplication of efforts, maximise and leverage resources by communicating regularly through e-mail, preparing timelines to generate reports and attend professional conferences to monitor the science relevant to mushrooms' role in nutrition and health. Team members also provide input into the Nutrition Research Discovery Program funded by AMGA and its partners.

#### Outputs



#### 2014 Mushrooms and Health Report - The Scientific Platform for Communications

Using databases identified in the Methodology section, the Commonwealth Scientific and Industrial Research Organization (CSIRO) captured and critically analyzed papers on *Agaricus bisporus* mushrooms (white button, crimini and portabella) and certain culinary specialty and nutraceutical specialty mushrooms published between June 2012 and June 2014. The subsequently titled *Mushrooms* 

and Health Report 2014 (http://www.mushroomsandhealth.com/mushrooms-health-report/) had a particular emphasis on clinical trials and included:

- Nutrient profile and compositional tables for raw, cooked and dried mushrooms compared to recommended intakes
- New applications in human health including brain health/cognition, cancer therapy adjuvants, respiratory tract infections and vaccine adjuvants
- Effects of mushrooms and mushroom components on human health including adjuvants to breast, cervical, ovarian, endometrial, colorectal, gastric, pancreatic and prostate cancer
- Anti-microbial and antiviral properties
- Role of mushrooms in asthma, cardiovascular health, constipation, diabetes, DNA damage, immune function, muscle function and exercise capacity, obesity and body composition, oral health, reproductive health and respiratory tract infections
- Hypersensitivity to mushrooms in humans
- Food safety studies
- Human trials in progress
- Bioactive compounds and proposed mechanisms of action in various health conditions.



of the evidence

Peter Roupas<sup>a</sup>.<sup>\*</sup>, Jennifer Keogh<sup>b</sup>, Manny Noakes<sup>b</sup>, Christine Margetts<sup>a</sup>, Pennie Taylor<sup>b</sup> "SSB0 roda an Nurtisinal Science, Werther, Vistora, Australia "SSB0 roda and Nurtisinal Science, Addate, Sonth Australia, Australia

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Although published October 2012 in the *Journal of Functional Foods*, <u>The role of edible mushrooms in</u> <u>health: Evaluation of the evidence</u>, a shorter review manuscript based on the <u>Mushrooms and Health</u> <u>Report</u> continued in high demand.

#### The Bulletin - Interpreting Scientifically-based Communications

The *Bulletin* provides a strong communications platform to help assure frequent and consistent dissemination of new ideas so mushrooms stay top of mind and includes summarized abstracts of recent research on topics such as:

- Edible mushrooms and antioxidants
- Sunlight and D2 production Dose-response
- Trametes Versicolor and bone in animals
- Mushroom "Blend burgers" in school meals
- Mushroom polysaccharides as prebiotics
- Mushroom control material to harmonize inter-laboratory analysis
- Vitamins indicate quality in frozen *Agaricus bisporus* mushrooms.
- Mushroom effect on measures of oxidative stress in adults at risk for type 2 diabetes.

The *Bulletin* also includes practical examples of how those in public relations/marketing interpret and customize research results for their local markets. Thirty-five issues of this quarterly newsletter have been electronically distributed beginning in 2008. This facilitates ongoing mushroom publicity around the globe, critical to increase worldwide demand. Greater sharing of information and communication is further facilitated by listing countries' social media websites and blogs. The collective media attention generated by individual country activity then spills into all markets globally via media outlets and the internet thus leveraging the messages and reach of the Initiative. Beginning with the August 2014 issue, a customized cover memo sent to the e-distribution list directed readers to the inside content to encourage greater open rate and use of the information inside. The cover memo of the final issue of the *Bulletin* (August 2016) is in Appendix A. Past issues of the *Bulletin* are archived on the Initiative's website: <a href="http://www.mushroomsandhealth.com/mhgi-bulletin/">http://www.mushroomsandhealth.com/mhgi-bulletin/</a> ).

#### Mushrooms and Health Global Initiative Website – Repository of Outputs



Welcome to the Science of Mushrooms and Health website, an information resource for the latest credible scientific information on the health benefits of eating mushrooms.

The website's central document is the Mushrooms and Health Report, a thorough review and evaluation of the state of the science linking mushrooms and health. Since the initial Report in 2008, Mushrooms and Health has been updated in 2010, 2012 and most recently in 2014. The Report is prepared under the direction of Peter Roupas, PhD, Commonwealth Scientific and Industrial Research Organisation (CISIRO; www.csirca.u ), Australia's largest and most diversified food research organization. Click on the Mushrooms and Health Report 2014 tab to read the Initiative's "Crewn Jewel."



The project's website (www.mushroomsandhealth.com) remains the repository for the various outputs (*Bulletin, Mushrooms and Health Report*), and serves as a reference of abstracts and ideas for communication. Alerts on key scientific published papers that generate significant research are posted on the Research News section of the Mushrooms and Health website.

#### Mushrooms and Health Global Initiative: Communicating nutrition research, Presentation to the mushroom industry – International Society for Mushroom Science 2016



Members of the Initiative Team (See Acknowledgements) participated in the 19th International Society for Mushroom Science (ISMS) conference, 29th May - 3rd of June, Netherlands and gave presentations on the "Mushrooms and Health Global Initiative: Communicating Nutrition Research," "Promoting the health benefits of mushrooms to Australian health professionals," and "The trend is to blend...A global mushroom marketing opportunity."

#### Outcomes

Health Research Leads to Global Interest and Product Development

Published in October 2012, <u>The role of edible mushrooms in health: Evaluation of the evidence</u>, based on the <u>Mushrooms and Health Report</u>, remained among the *Journal of Functional Foods* Top 20 most often downloaded articles during the last full quarter of 2014 and was the 15th most downloaded paper for the entire year. The review still is being downloaded from Scopus, the largest abstract and citation database of peer-reviewed literature, more than 10 times a day some 2.5 years after it was published. The review is the 8th most cited among articles published.

In addition, a participant in the Initiative noted the importance the *Mushrooms and Health Report* combined with additional information in the *Bulletin* abstracts had in engaging with European regulatory bodies that allowed a company to overcome the hurdles of approving Vitamin D mushrooms for commercialisation in Europe.

Thirty-five issues of the *Bulletin* have been produced and e-distributed to key health and science researchers and mushroom industry organizations to post on their websites thus extending further reach. Over 70 abstracts of peer reviewed mushroom research appeared in the *Bulletin* between 2013 and August 2016

The *Mushrooms and Health Report* received 20,000 hits and the *Bulletin* 8000 hits from visitors to the Mushrooms and Health Global Initiative website. Traffic to the website appeared to peak in 2012 with a gradual decline to about 1500 visits in a reporting period. The website has been accessed by visitors from all continents except Antarctica.

The ISMS conference drew over 500 participants and is considered the largest congregation of researchers, growers, and service providers in the mushroom industry. ISMS has provided a unique global platform for the mushroom industry to leverage important research findings at a national, regional, and individual producer/marketer level. To emphasize the significance of the 2016 conference, the Organising Committee established the common theme: "New knowledge and new contacts, creates new business" that resulted in 7 keynote lectures, 128 selected oral presentations and numerous posters. Approximately 75 delegates attended the plenary session on "Nutrition, bioactive compounds, medicinal aspects" during which the Initiative Operations Manager discussed the Initiative history, purpose, importance and benefits of communicating nutrition research. Presentations at ISMS eventually appear in the conference proceedings for continued and additional access to the information.



The Australian Mushroom Growers Association engages with doctors and nurses at medical conferences by providing posters, nutrition brochures and leaflets, and writing articles for blogs and association journals. In addition, conference presentations to home economists and dietitians are undertaken; and sponsored programs and breakfasts for registered dietitians and nurses are filled to capacity each year. As a result of the partnership with the Dietitians Association of Australia (DAA), mushrooms have been featured on the association's Facebook page, in their national newsletter, and on their website home page, in particular as part of their involvement in Australia's Healthy Weight Week, held each February. Fifteen fact sheets that are underpinned by the research reported in MU12015 outputs (*Mushrooms and Health Report*, and *the Role of edible mushrooms and health: Evaluation of the evidence*) are available from the <u>australianmushrooms.com.au</u> website, for either online viewing or as a pdf download. Articles on the potential health benefits of mushrooms were written for naturopaths and home economists, and in response to requests from the media.



combine with chopped proteins like beef or turkey can create burgers that are more flavorful, moister, more nutritious and have a better texture. The trend toward combin mushrooms and ground meat has spread rapidly among ...

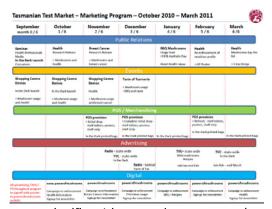
Capitalizing on mushrooms' nutrient profile, health and wellness benefits, the U.S. Mushroom Council (Council), a major supporter of the Initiative, integrated its nutrition research program with foodservice efforts. Research based on mushrooms' nutrient composition demonstrated that consumers could lower the energy density of their meals by replacing higher calorie ingredients/foods with mushrooms. Subsequent research focused on mushrooms' functional ability to 'blend' with other foods thereby integrating taste, nutrient composition, functional characteristics, price and cost efficiencies. A culinary technique known as the Blend involves adding chopped fresh mushrooms, which look, taste and perform like meat, to ground meat to make common recipes

Americans love (burgers, meatballs, and tacos) more healthful and flavorful. From initial research through pilot programs, influencer communication and direct-to-consumer initiatives, the Blend escalated into a fully integrated, new business strategy to open new mushroom applications. Other countries communicated the 'blend trend' to consumers through cooking demonstrations and food blogger campaigns resulting in further media coverage.



## **Evaluation and Discussion**

Promotion Programs Return Results



An initial and continuing user of the information generated by the Initiative, the Australian Mushroom Growers Association revised its marketing strategy to reposition mushrooms in the minds of consumers through a series of messages based on scientific findings about the nutrition and health consequences of regularly incorporating mushrooms into meals.

According to a test-market research project 2010/11, there

was a significant increase in consumer demand for mushrooms, reflected in both an increase in the number of units sold and an increase in the average unit value. Qualitative and quantitative market research suggests that this change in consumer behavior was in response to a change in consumer perceptions of the health consequences of eating mushrooms, the primary message communicated in the advertising campaign (1).



it ratio for Tas

A subsequent evaluation of AMGA's generic promotion programs discovered for the first time that health aspects trumped taste as the major perceived benefit of mushrooms. Ease of use, versatility and flexibility of preparation round out the top five most salient reasons for liking mushrooms suggesting that a bundle of benefits be re-enforced. Although there is increasing awareness of the health benefits such as heart health of eating mushrooms, fewer than half of purchasers are unaware of specific benefits – suggesting more communication work needs to be done (2).

Responding to a query on the benefit of health messages on attracting media attention and sustaining consumer purchase behavior, the South African Mushroom Farmers Association (SAMFA, a regular contributor to the *Bulletin*) commented: "We get more enquiries from media for more information since we shifted our focus onto the health aspects and increased consumer interest when we post health information on our Facebook page. The health message is a more sustainable behavioural driver for increasing consumption than just a recipe because many food products offer recipes but not many food products have the health attributes of mushrooms so that creates a real lasting unique selling proposition (USP)."

The SAMFA salt awareness media coverage resulted in an ROI of 1:5,7. The key message for the campaign was that mushrooms are one of the best low-sodium food choices consumers can make. This was combined with a call to action, encouraging consumers to buy smart by adding low-sodium fresh mushrooms to their daily

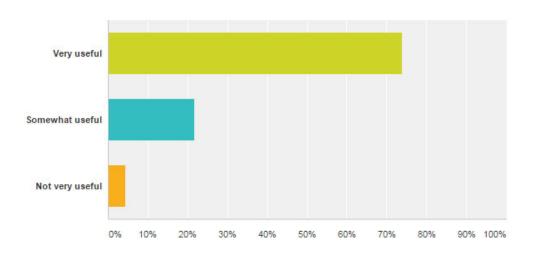


shopping lists. Communications around the message included a news release and a Facebook campaign that resulted in great media coverage and positive interactions on-line.

#### Bulletin Survey

The *Bulletin* is the communications platform to help assure frequent and consistent dissemination of new ideas so mushrooms stay top of mind. The August 2015 issue included a short survey of its readers which discovered that:

- 78% read the *Bulletin* regularly
- 61% share the *Bulletin* with colleagues
- 13% post/share the *Bulletin* on websites
- 35% do not share the Bulletin
- 70% find the research abstracts very useful
- 61% refer back to the MHGI website for the Bulletin
- 74% find the reports from different countries on how to communicate nutrition research very useful



# How useful are the reports from different countries on how they communicate nutrition research?

#### MHGI Website: Repository of Outputs

From July 2015 through June 2016, approximately 2,000 new users, over 10 percent from Australia, visited the website.

Country 1		Acquisition			Behavior		
		Sessions 4	% New Sessions	New Users	Bounce Rate	Pages / Session	
		2,272 % of Total: 100.00% (2,272)	87.28% Aug for View: 67 19% (0.10%)	1,983 % of Tisser 100,10% (1,991)	69.54% Avg for View (05.54% (0.00%)	1.81 Arg for View: 1.81 (0.00%)	
1,	M United States	614 (27.02%)	86.64%	532 (20.80%)	64.50%	1.88	
2.	Australia	304 (13.38%)	90.79%	276 (13.92%)	74,34%	1.65	
3.	United Kingdom	178 (7.83%)	93.82%	167 (8.42%)	81.46%	1.35	
4.	III India	140 (6,10%)	89.29%	125 (0.30%)	65.00%	1.75	
5,	14 Canada	100 (4.40%)	87.00%	87 (4.39%)	61.00%	1.97	
6.	Brazil	85 (3.74%)	96.47%	82 (4,14%)	97.65%	1.02	
7.	Retherlands	60 (2.64%)	75.00%	45 (2.27%)	66.67%	1.95	
8.	(not set)	46 (2.02%)	97.83%	45 (2.27%)	91.30%	1.33	
9.	E Italy	36 (1.50%)	77.78%	28 (1.41%)	63.89%	3.72	
ö.	M China	35 (1.54%)	74.29%	26 (1.31%)	80.00%	1.34	

#### Overview-of-visits-/-sessions-etc¶

1

During this time, most visitors entered the website through the *Mushrooms and Health Report*. and the *Bulletin*. to the website.

#### Landing-Pages¶

Page			Pageviews	% Pageviews
1, 1		di i	1,416	34.48%
2. Amistroom	s-health-report/	<i>B</i>	831	20.23%
3. mational-m	ushroom-associations?	3	830	20.21%
4, imhai-bulle	in/	8	306	7.45%
5. /about-us/		8	227	5.53%
6. /mushroom	a-health-report/mushrooms-and-health-report-2014/	Ø.	59	1.44%
7. imushroom	s-health-report/executive-summary/	<i>#</i>	56	1.36%
8. imhai-bulle	in/mushrooms and health bulletin nov15/	18	44	1.07%
9. Amhgi-bulle	in2/params/product3/33/	<i>a</i>	34	0.83%
10. mhgi-bulle	in/mushrooms-health-bulletin-hebruary-august15/	8	28	0.68%

### Recommendations

Work to be Done

The Initiative was founded on the premise that science-based health messages can drive consumer behavior. Formal market research suggests that health messages do alter consumer behavior. Informal comments from Initiative participants suggest that health messages can help create a more lasting and distinguishing unique selling proposition for mushrooms. Progress has been made over the past years, yet there is still work to be done to increase communication effectiveness and to make the Initiative the recognized global science and communications site for the media, news bureaus, researchers, health professionals, and the industry seeking credible information on mushrooms' health and nutrient benefits. This requires greater participation from mushroom producing countries, enhancing the technology that supports the Initiative outputs and capitalizing on the global reach of social media.

Project assets can be enhanced and leveraged in a variety of ways such as:

- Offering the *Bulletin* in a "news" component on the website in addition to a designed PDF download.
- > Making the website mobile friendly
- > Creating separate webpages on key topics of interest, such as vitamin D
- Increasing traffic to and use of the information on the website.

A refreshed plan with new budget to establish greater recognition, and deliver enhanced value to the investors in the Initiative, should be developed.

## **Scientific Refereed Publications**

Roupas, P., Keogh, J., Noakes, M., 2012. The role of edible mushrooms in health: Evaluation of the evidence. *Journal of Functional Foods* 4, 687-709.

## Intellectual Property/Commercialisation No commercial IP generated.

#### References

- 1. Alston, J.M. and Parks, J.C. 2012 "The returns to promotion of healthy choices in Tasmania: Are you in the dark about the power of mushrooms?" *Australian Journal of Agricultural and Resource Economics* (AJARE) 56, 347-365).
- 2. Mobium Group, *Mushroom Monitor* 2014, 140-145; 154-158).

#### **Acknowledgements**

Greg Seymour, Project Manager, Mushrooms and Health Global Initiative

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Kara Lydon Registered Dietitian Nutritionist, Nutrition Consultant, Mushroom Council, United States

Mary Jo Feeney, Registered Dietitian Nutritionist, Operations Manager, Mushrooms and Health Global Initiative

## Appendices

#### Appendix A: Bulletin Cover Memo – Final issue August 2016

Please see the attached August issue of the Mushrooms and Health Global Initiative *Bulletin.* The project ends August 31 and the Initiative Team appreciates your readership and support over almost a decade of activities. We hope the Initiative has provided you with resources and examples of how to communicate the health and nutrient benefits of mushrooms and encourage you to keep up this important work.

In this the last issue of the Bulletin, read how:

- > South Africa implemented an in-store promotion focusing on men's health
- > Spain participated in the first World Conference on the Mediterranean Diet
- Australia continued supporting health professional conferences and farm tours
- The United States hosted a webinar on the trend toward plant based eating that focused on the Blend.

Thank you again.





An ISMS Global Initiative to increase the worldwide consumption of mushrooms through the collection, evaluation and dissemination of scientifically validated information.



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