



Science Innovation Showcase

13 - 15 December 2022

Executive Summary

This science-first and science-focused event brought together scientists from multiple sectors, at all stages of their careers from graduate students to professors, technical experts to CEOs. Attendees had the opportunity to engage in dialogue and discussion on the data, the technology and science being applied across the food and beverage ecosystem.

With an overarching theme of 'Next Generation,' the focus for the 2022 Science Innovation Showcase included alternative protein sources and other next-gen topics. Some of the Innovation Sessions included presentations from the next generation of scientists - graduate students and post-docs. Other Innovation Sessions included R&D Leaders from emerging brands and Government researchers. Additionally, there were invited sessions:

FDA's Proposed Changes to the Definition of 'Healthy'
Claudine Kavanaugh, Vincent DeJesus, Sarah Gebauer (FDA)

Exploring What it Means to be GRAS
Paul Hanlon (Abbott Nutrition), Alex Eapen (Cargill), Katie Overbey (FDA), Jensen Jose (CSPI)

Transforming Your Team from Burnout to Engagement
Mia Russell (Johns Hopkins University)

Canada's Front of Pack Labelling Regulations
Dino Covone (Health Canada)

Next Generation

2022 Science Innovation Showcase by the Numbers

3

Days of dialogue and exchange in the virtual event

26

Presenters from Government, Industry, Academia and other Non-Profit Organizations

4

Invited Sessions designed to address topics of value to innovators

28%

Government

37%

Industry

35%

Academia

6

Innovation Sessions based on submitted abstracts - with scientists from US, Canada, and Argentina

Tri-Partite Representation at Event



Introduction

Scientists, researchers, and innovators took part in IAFNS 2022 Science Innovation Showcase on December 13-15. Including the food industry, regulatory agencies, graduate students and NGOs, the virtual event featured lively takes on nutrition and food safety. The program centered around the theme of Next Generation topics, including new 'healthy' food labels, plant proteins, sustainable resins for packaging and 'Generally Recognized as Safe' ingredients.

Please track along below as we recap the presenters' main points.

Canada's Front of Pack Labelling Regulations

Health Canada requires a front-of-package nutrition symbol on prepackaged foods high in sodium, sugars and saturated fat. The symbol makes it easier for Canadians to make healthy and informed food choices. A broad range of groups provided input and informed adjustments made to the regulations. This involved collecting input on the icon selected – a magnifying glass – which was compared with other potential symbols and colors on food labels for feedback. Manufacturers have until January 1, 2026, to change their labels and comply with the new requirements to access the Canadian market.

Dino Covone (Chief, Nutrition Regulations and Standards Division, Health Canada)

Perfect Day's Collaborative Approach to a Kinder, Greener Future Food System

Is it possible to create animal protein, without any animal inputs, using precision fermentation? Precision fermentation uses sugar from plant sources and special microflora that have been designed to produce compounds (beta-lactoglobulin in this case). Perfect Day aims to create a new category of sustainable, nutritious and delicious foods using this new application and an exacting fermentation process. According to an outside auditor, production reduces greenhouse gas emissions up to 97% compared to traditional production methods. And because it's identical to milk protein, it offers a way to

leverage environmental benefits with a nod to current tastes and nutrition preferences. Perfect Day's Chief Science Officer Tim Geistlinger shared how the company uses established tools in novel ways to add value to ingredients.

Tim Geistlinger (Chief Science Officer, Perfect Day)

Novel AI Discovery of New Bioactives Elevates the Need for Recommended Intakes at a Population Level

Artificial Intelligence (AI) has collapsed bioactive discovery and biological validation from years to months – and is rapidly revealing new health connections to strawberries, dark chocolate, green tea, among other popular foods. Bioactive compounds in those food items are associated with benefits for heart health, gut health, liver health, skin health, and healthy blood glucose regulation. But unlike recommended intakes for vitamins, minerals and dietary fiber, U.S. Dietary Guidelines do not provide recommended intakes for bioactives. This poses challenges to the public's ability to understand whether their intake is adequate. Although the importance of DHA, EPA, and Omega 3's is recognized by the U.S. Dietary Guidelines, the significance of other bioactives' health benefits has yet to be highlighted.

Jan-Willem van Klinken (Senior Vice President Medical, Scientific & Regulatory Affairs, Brightseed)

Edible Pongamia Oil as a Novel Culinary Food Ingredient

The Pongamia tree is known in many cultures for its aesthetic, medical, and pesticidal purposes. Terviva has found a way to refine the oil, remove the unpalatable, bitter taste elements, and formulate a mid-oleic fatty acid and edible oil. While offering environmental benefits, the tree is hardy and the oil has had a slate of toxicological studies done on it, finding few, if any, effects. This information leads to the conclusion that Edible Pongamia Oil is considered

Mobilizing Government, Industry, and Academia to drive, fund, and lead actionable science in support of public health.

safe and suitable under its intended conditions of use at consumption levels of 7,703 milligrams per day.

Palma Ann Marone (Vice President of Scientific and Regulatory Affairs at Terviva)

Sweet Potato Starch Properties and Sweet Potato French Fries

New sweet potato varieties require a better understanding of the effects of root chemistries on fry and chip textures, especially as they grow in popularity. Sweet potato fry “denseness” – a texture unrelated to composition – was correlated with starch peak viscosity. Sweet potato fry texture predictions using composition plus starch attributes were most improved by starch temperature characteristics. The strongest causal relationships with fry textures were starch gelatinization temperatures along with some interactions. Sweet potato cell wall polymers affect chip texture and fat content – data to consider when selecting varieties for sweet potato chip manufacturing.

Matthew Allan (USDA Agriculture Research Service Researcher)

Cultured Meat: Shifting to a Race-to-Mission

Cultured Meat: Shifting to a Race-to-Mission

Cultured meat companies now number over 150 and more than \$1.5 billion has been invested in their development in 2022 alone, yet challenges remain. With a private-sector heavy field like cellular agriculture, collaboration and data sharing have been sparse, constraining the field with duplicative efforts carried out by multiple players. Instead of racing to market, Yadira Tejada-Saldana of New Harvest shared that the focus needs to be on the mission of transforming our food system. Transparency, data-sharing and collaboration are essential for developing and implementing the technology properly and at speed.

Yadira Tejada-Saldana (Director of Responsible Research & Innovation – Canada at the nonprofit New Harvest)

Managing Workplace Stress and Burnout

Workplace stress and burnout are on the rise – driven by many factors. And, yet, the importance of innovation and day-to-day work across the food and beverage ecosystem is also increasing. Through a discussion on the causes and consequences of burnout, we addressed how to assess the work environment and conditions and how to shift from burnout to engagement. Assessing and acting on signs of burnout can help us maintain a supportive community and care for ourselves as we drive to thrive.

Mia Russell (Author of ‘Fired Up! A Guide to Transforming Your Team From Burnout to Engagement’ and Lecturer at Johns Hopkins University)

Prediction of Protein and Amino Acid Contents in Canola (*Brassica napus* L.) Meal with Near-Infrared Reflectance Spectroscopy

When Canola is crushed into oil, a meal byproduct is leftover and with more study, could become a popular plant-based protein additive for animal feed. Crude protein and amino acid concentration assessment could boost the utility of *B. napus* meal. But predicting protein and amino acid contents in *B. napus* Canola meal presents challenges and this study examined new methods. This study finds that new spectroscopic methods can predict crude protein and amino acid contents simultaneously with acceptable precision.

Junya Liu (University of Manitoba)

Soybean Meal Tempeh as a Novel Source of Alternative Protein

Utilizing soybean meal instead of soybean as raw material in making tempeh is a sustainable way to harvest high-quality alternative protein and add value to castoffs. Two different tempehs from soybean and soybean meal, respectively, were prepared and compared for their nutrient composition, texture, appearance, flavor, and sensory

While innovators face the challenge of moving an idea from a prototype to the market, science-first and science-focused dialogues with regulatory experts, other practitioners, and leaders from non-profits support product development and the advancement of science.

- The opportunities offered by the IAFNS Science Innovation Showcase, and other events, are critical to realizing the potential of innovation in the food and beverage ecosystem.

parameters. The result showed that protein, flavanol, and polyphenol content increased during fermentation. Results showed that optimized tempeh fermentation of soybean meal led to an alternative protein product with a great nutritional value and edibility. The development of soybean meal tempeh could boost soybean by-products and provide a novel plant-based protein source.

Jianfei Shen (University of Massachusetts—Amherst)



Exploring What it Means to be 'Generally Recognized As Safe'

By bridging sectors, we learned what it means for a food ingredient to be Generally Recognized as Safe (GRAS). This involved addressing the steps that ingredient manufacturers can take to ensure their ingredients are GRAS for their intended uses. It also means highlighting ways that finished food product manufacturers can determine whether a food ingredient supplier meets the legal definition of GRAS. Four presentations and a lively panel discussion provided a clearer understanding of how GRAS is important for both the producer and the consumer of the ingredient. GRAS notification aids international trade and increases confidence in the overall safety of the U.S. food supply.

Katie Overbey (FDA)
Alex Eapen (Cargill)
Paul Hanlon (Abbott Nutrition)
Jensen Jose (CSPI)

Novel Single-Fiber Probe to Evaluate Internal Myoglobin Forms of the PSOAS Major Muscle

Myoglobin is the primary protein that gives beef products like steak its characteristic bright-cherry red appearance that appeals to customers. Recently, surface discoloration like browning at retail has been estimated to cost the beef industry approximately \$3 billion annually, resulting in a waste of 13.4 million kilograms of beef. Using probes at different depths, the results of this research support the oxidation of deoxymyoglobin forming metmyoglobin internally. As surface discoloration has a large role in food waste, better understanding the formation of metmyoglobin as well as continuing to develop technology to evaluate color throughout processing and marketing is key.

Morgan L. Denzer (Oklahoma State University)

Estimated Dietary Intake of Essential and Non-Essential Elements Through Four Highly Consumed Vegetables

An analysis of metals was carried out on four vegetables— carrot, onion, potato and Swiss chard — from nine Argentine markets. Aluminum, barium, cadmium, cobalt, copper, chromium, iron, lead, manganese, molybdenum, nickel, strontium, and zinc were analyzed. Results for cadmium, cobalt, chromium, lead, molybdenum, and nickel were non-detectable in all four vegetables. The results showed no significant health risk to the consumer associated with the consumption of these vegetables and the exposure to toxic elements. In a next step, other elements such as arsenic and selenium will be included in the analyses.

Florencia Cora Jofre (National University San Luis, Argentina)

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FDA's Proposed Changes to the Definition of 'Healthy'

On September 28, 2022, the U.S. Food and Drug Administration proposed updated criteria for when foods can be labeled with the nutrient content claim “healthy” on their packaging. This proposed rule would align the definition of the “healthy” claim with current nutrition science, the updated Nutrition Facts label and the current Dietary Guidelines for Americans. Under the proposed definition for the updated “healthy” claim, which is based on current nutrition science, more foods that are part of a healthy dietary pattern and recommended by the Dietary Guidelines would be eligible to use the claim on their labeling, including nuts and seeds, higher fat fish like salmon, certain oils and water. The US FDA remains open to formal public comments and concerns about the labels plan as it seeks to help inform consumers about nutritional quality as they make food choices. While 15% of foods qualify for the “healthy” label currently, under the new criteria, FDA projects that only about 11% will under the proposed revision.

Claudine Kavanaugh (FDA)
Vincent DeJesus (FDA)
Sarah Gebauer (FDA)

Rationale, Design and Baseline Characteristics for the Strategies to Oppose Sugars with Non-Nutritive Sweeteners or Water (STOP Sugars NOW) Trial

Researchers are conducting a practical, ‘head-to-head’ controlled study of the health effects of non-nutritive sweetened beverages (NSBs) as one substitute, as compared with water as another substitute, for sugar-sweetened beverages. Previous concerns have focused on NSBs intended benefits and possibly inducing glucose intolerance through changes in the gut microbiome. The results provide high-level evidence to inform guidelines for SSB replacement and the viability of using NSBs as a sugar reduction strategy.

Sabrina Ayoub-Charette (University of Toronto)



**Institute for the Advancement
of Food and Nutrition Sciences**

Protein Quality and Protein Content Claims of Lentils

Profiling lentils’ proteins and amino acids can benefit breeding programs by improving protein quality and create new value-added products. Improvements can lead to new food formulations and help government agencies and companies ensure valid nutrient content claims. To assist in profiling, this study evaluated 1,290 lentil samples grown in 2016-2017 in Saskatchewan, Canada, for amino acid composition prediction using near-infrared spectroscopy equipment. Choosing different age-category amino acid scoring patterns by FAO/WHO directly impacts the protein quality of lentils. Lentils’ high protein content and uses in new food formulations positions this crop as a promising alternative for high-quality protein foods.

Amanda G. A. Sá (University of Manitoba)

The Effect of Substituting Soy Milk for Cow's Milk on Lipid Markers: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Does the cholesterol-lowering claim of soy milk hold up if you substitute it for cow's milk? There is good indication that this improves LDL-C, non-HDL-C, and HDL-C in adults. This research has shown that soy milk is beneficial – when compared to cow’s milk – as a lipid-lowering agent in adults with varying health conditions. Cardiometabolic disease is a major health burden globally. New methods of prevention and treatment through diet could impact public health initiatives and clinical guidelines targeting the issue.

Madeline Erlich (University of Toronto)

Development of Antimicrobial Nanofiber Food Packaging Film Loaded with Northern Alabama Grown Hemp (*Cannabis sativa*) Extract

Active packaging with natural antimicrobial agents is of growing interest as a tool to impede microbial proliferation during storage. This study evaluated the *in vitro* antimicrobial effect of hemp cultivars and the nanoencapsulated hemp extract (nanofiber active film) against cocktails of *Salmonella enterica* spp and *Listeria monocytogenes*. Cell counts drastically decreased after exposure. Hemp nanofiber's antibacterial effectiveness against *Salmonella enterica* and *Listeria monocytogenes* directs research to food model evaluation. Hemp loaded nanofiber has the potential to boost food preservation and safety in supply chains after nanofiber production facilities are further scaled up.

Aaron Dudley (Alabama A&M University)

Establish Framework for Defining Suitable Recycled Resin and Characterize Potential Chemicals of Concern Based on Intended End-Use

Consumer polymers used in food contact materials can introduce unwelcome additives when recycled. These contaminants are potentially hazardous substances and, if not removed during recycling, can migrate into packaged food. This research provides ways to increase the supply of safer recycled plastics in direct food contact applications by evaluating the presence of phthalates and bisphenols and other non-intentionally added materials with an eye to end-uses. With the increasing trend toward plastic recycling, it is essential to know the safety of post-consumer recycled plastic. This is especially true for food contact materials. In order to protect public health, efforts are needed to prevent toxic exposures to chemicals and metals through recycled products that come in contact with food.

Khairun Tumu (Iowa State University)

Why Should the Food Processing Industry Establish a Public Private Partnership for the Discovery of New Food Packaging Materials?

A significant amount of plastic food packaging is "improperly discarded" to land and waterways and left to degrade into macro, micro and nano size plastic particles. A new partnership is called for to address this growing problem as it involves the food sector broadly. Addressing this challenge comes with a broad set of public affairs, legislative and regulatory issues to navigate, necessitating a broadly-based partnership.

Jack Cooper (Executive Director, Animal Digestible Food Packaging Initiative).



Reflections on the Showcase

To deliver on the vibrant promise of the future of the food and beverage ecosystem requires we transcend conventional barriers between disciplines and sectors. As an organization dedicated to collaboration and inspired to bring together thinkers and doers in unconventional ways, IAFNS launched the Science Innovation Showcase to deliver on this promise.

Across the food and beverage ecosystem, innovation fuels our ability to thrive even as the world around us changes and we need the best possible science to make the best possible decisions for the best possible future. We can not do this on our own. We can only do this together.

IAFNS is proud to provide connections, support collaborations, and catalyze the science that matters - in support of public health.

