Institute for the Advancement of Food and Nutrition Sciences

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Science Innovation Showcase

12 - 14 December 2023

Executive Summary

Science for the Future

With an overarching theme of 'Science for the Future,' the focus for the 2023 Science Innovation Showcase included alternative protein sources and updates from regulatory officials. The showcase included invited sessions with public sector leadership. Additionally, the Showcase included presentations from the next generation of scientists - graduate students and post-docs.

This science-first and science-focused event uniquely brought together researchers from multiple sectors, at all stages of their careers. 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.

We are proud to have invited presentations from:

- **Federal Trade Commission**
- **Good Food Institute**
- **GS1 US**
- **Health Canada**
- **Science Marketing Professionals**
- **US Food & Drug Administration**

2023 Science Innovation Showcase by the Numbers

3 Afternoons of dialogue and exchange in the virtual event

7 Invited Sessions designed to address topics of value to innovators

4 Innovation Sessions based on submitted abstracts - with scientists from US, Canada, the U.K. and Pakistan

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

29%	39%	32%
Government	Industry	Academia

Tri-Partite Representation at Event

To learn more about our work to support positive change in the food and beverage ecosystem – and to join us – please contact:

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Introduction

Scientists, researchers, and innovators took part in IAFNS **2023 Science Innovation Showcase** on December 12-14. Including the food industry, regulatory agencies, graduate students and NGOs, the virtual event featured lively takes on nutrition and food safety topics. The program centered around the theme of 'Science for the Future,' including new regulatory efforts related to food policy, advertising to children, science storytelling and careers in the alternative protein sector.

Please find below a recap of the presenters' main points.

Health Canada: Division 24/25 Modernization

Canada's current regulations for Foods for Special Dietary Purposes (FSDP) are set in Division 24 and 25 of the Food & Drug Regulations (FDR). These regulations are out of date and would benefit from better harmonization with other jurisdictions. To improve the regulatory framework for FSDP, Canada will modernize Divisions 24 and 25 of the FDR by updating compositional requirements to reflect the latest nutritional science, and distinguishing FSDP from other foods through risk-based regulatory requirements. This session focused on vulnerabilities in the market and supply chain to help mitigate shortages of FSDPs like infant formula by fostering innovation, improving accessibility, and strengthening consumer protection.

Dino Covone (Health Canada)

GS1 Standards, Food Traceability & FSMA 204

Today's consumers want to know more about the products they buy and the foods they eat, including details like country of origin, fair trade, sustainability, health benefits and more. Required labeling only goes so far – many want to dig deeper. In a drive to increase supply chain visibility and transparency, retailers are migrating to the use of newer, two-dimensional barcodes that can carry virtually unlimited amounts of data within a very small, digital footprint including information like expiration dates. The extra data capacity offers new opportunities for brands to provide enriched product information that consumers can access with a simple scan on phones. Information on what the product is, allergens, origins and other consumer data can easily be added. Finally, extensive financial transaction information can be carried by QR codes as they move through the supply chain, boosting transparency and promoting efficiency in what are often spaghetti-like networks.

Liz Sertl (GS1 US)

Health Canada: Restricting Marketing to Kids to Support Healthy Eating

Health Canada has made significant progress in recent years on healthy eating initiatives by improving nutrition labelling, eliminating industrially produced trans fats in the food supply, releasing a new *Canada's Food Guide*, publishing new sodium reduction targets for packaged processed foods and introducing front-of-package nutrition labelling. Health Canada's latest initiative would monitor placement of ads during kids' TV programs, and design elements that appeal to children like games and celebrities. While the proposal is still under development, officials are eyeing regulatory considerations, international obligations and the evidence-base from programs in Chile and the U.K. Most recently they are engaging with stakeholders in pursuing a flexible approach that adapts to new research and would grant regulators a spectrum of enforcement options along with the ability to appeal.

Jeremy Fitchell (Health Canada)

Federal Trade Commission's 2022 Updated Health Products Compliance Guidance: Expanding Beyond Supplements

In 2022, the U.S. Federal Trade Commission (FTC) released guidance updating the 1998 document *Dietary Supplements: An Advertising Guide for Industry*. The FTC leveraged over two decades of changes in the marketplace and experience with over 200 cases of false or misleading claims to update and broaden this guidance to encompass not only supplements but foods, over-the-counter drugs, homeopathic

products, health equipment, diagnostic tests and health-related phone apps. The perspective of thethe intended audience is central to the FTC's responsibility in approving product claims.

Michael Ostheimer (Federal Trade Commission**)**

FDA's Front-of-Package Nutrition Labeling Initiative

U.S. FDA is prioritizing its nutrition initiatives, and one goal is to help ensure that consumers in the U.S. have greater access to nutrition information they can use to identify healthier food choices. Front-of-package labeling would complement the 'Nutrition Facts' label that is required on food packages by displaying simplified, at-a-glance nutrition information that gives consumers additional context to help them quickly make more informed food selections. FDA is conducting consumer focus groups, a literature review that captures global experiences and experimental research. The FDA continues to engage stakeholders and tripled the sample size of a planned consumer study in response to public comment. Early data suggest that giving consumers the option to quickly learn about the nutritional content of foods helps them make healthier choices.

Robin McKinnon (US FDA)

Developing a Food-Based Score and Health Application to Translate a Nutrition Therapy for Cardiovascular Risk Reduction

This study compaired a 'Portfolio Diet' with 20 mg lovastatin to evaluate reductions in LDL cholesterol. Cardiovascular disease has grown from 12.1 million cases in 1990 to 18.6 million in 2019 and 80% of these could be prevented by lowering cholesterol. The study found clinically-meaningful results with good validity in addressing hyperlipidemia. The Portfolio Diet has an app that provides personalized feedback. A second study looked at the Portfolio Diet app as a translational tool. It evaluated whether the app educated users and if possible users found it acceptable. A 12-week study comparing the Portfolio Diet with a control group used a seven-day diet record questionnaire and was given to 147 participants. The app appears to reinforce dietary counseling and 13% reductions were seen by 24 weeks.

Meaghan Kavanagh (University of Toronto)

Genetic Modification of the Association of the Portfolio Diet Score and its Components with LDL-C in a Population of Young Adults

Nutritionomics and how genes vary in different responses is a growing area of inquiry. Five genes are involved in cholesterol metabolism and certain 'snips' are associated with elevated LDL cholesterol. In this study, the gene-diet interactions with LDL were studied while subjects were on the Portfolio Diet. As expected, plant-proteins lowered LDL where saturated fats led to elevated LDL. A one-point increase in Portfolio Diet score was significantly associated with lower LDL in only two genotypes.

Victoria Chen (University of Toronto)

The Power of Storytelling in Scientific Communications

Challenges in scientific communication efforts, include misinformation, complexity and specialization in knowledge. An understanding of the narrative arc iwill assist in building storytelling techniques. These elements make science more relatable and easy to grasp and can engage broader audiences. The elements of the narrative arc include: an inciting incident; rising action with conflicts, challenges and obstacles; a climax or turning point that shapes the direction of the story; falling action; and a resolution which is coherent and satisfying. Examples of how Novartis, IBM and the UN spun stories to promote action were shared.

Andi Robinson (Hijinx Marketing, Butler University)

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.

Probiotics Development and CRISPR-Cas System

Strengthening probiotics using CRISPR-Cas gene editing systems is an emerging area of research. Enhanced probiotics could promote immune system health, antimicrobial properties and even shelf-life through editing, removing, adding or altering sections of DNA sequences. Stress tolerance and sugar catabolism were put in gene editors with good results. The biggest health benefits depend on the function or application requested. For example, shelf-life extensions have been achieved using the system but health goals could also be expanded as targets for CRISPR efforts.

Abrar Hussain (University of Karachi)

Development and Mechanisms of Oil-Based Antimicrobial Delivery for Dry Cleaning and Sanitization in the Processing Environments of Low-Moisture Foods

This study focused on low-moisture foods (LMF) like peanut butter and pathogens like *Salmonella*. Production facilities for LMF avoid wet cleaning to prevent residual water which can breed pathogens. Instead, wipes of various kinds are used but alcohol wipes can be flammable so must be carefully used only when conveyors and other equipment is turned off. Cases were reviewed where organic acids were added to peanut oil to attack *Salmonella* and acetic acid was found to synergistically disrupt cell membranes when heated. The cells pull in acids. Water-in-oil emulsions induced membrane disruption and damaged pathogens but the treatment was temperature variable and accelerated anti-microbial delivery.

Shihyu Chuang (Univ. of Massachusetts - Amherst)

Quantification of Total Glutathione in Mushrooms with LC-MS

This research examined glutathione and three amino acid residues in mushrooms and found that they may help regulate immune function. Mushrooms were frozen and homogenized in liquid nitrogen and then studied using analytical methods involving drying, dissolution and filtration. Different mushroom types across batches including White Button and Maitake fungi were examined. Future studies will evaluate the effects of cooking on mushroom glutathione and how much to consume to promote health, especially considering that heat can degrade glutathione.

Yu-Ping Hua (University of California - Davis)

The Potential of Using in vitro *Digestion Models for the Determination of Protein and Amino Acid Digestibility in Assessing Protein Quality*

The U.S., Canada and the Food & Agriculture Organization all currently use *in vivo* methods. The gap lies in validating *in vitro* methods across those countries' approaches. The *in vitro* INFOGEST model showed good correspondence with studies in rats. The model's success suggests it can be a reliable and valid method for all parties to use for protein evaluation. Transitioning to models will reduce dependence on the use of test animals.

Nguyen Bui (The University of Manitoba)

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

Connect, Collaborate, Catalyze

Science that Matters

Relationship Between Global Protein Content Claim Regulatory Frameworks and Nutrient Intakes of Canadians

This study reviewed regulatory paradigms for determining protein content and compared and contrasted the Canadian, U.S, European and Australia/New Zealand approaches. Some of the frameworks have not been updated since 1981 and may hinder plant-based foods from being recognized for their nutritional value. More work is needed to ensure evidence-based methods are used to support national protein regulations and policy modernization.

Songhee Back (University of Toronto)

Assessment of Anti-Nutritional Factors and in vitro Protein Quality in Yellow Peas and Their Derivatives under High-Hydrostatic Pressure

This research examined yellow peas and protein which are enjoying a peak in sales growth. The peas provide protein, carbohydrates, fiber, vitamins and minerals and have a low allergy risk. Using a High-Hydrostatic Pressure Test maintains nutritional values, extends shelf-life and inactivates microorganisms. Next steps include exploring HHP conditions for other products.

Jiayi Chen (University of Manitoba)

Good Food Institute - Career Pathways for Food and Nutrition Scientists in the Alternative Protein Field

Alternative proteins are a powerful tool to mitigate the environmental impact of our food system, decrease the risk of zoonotic disease, and feed more people with fewer resources. With plant-based meat, cultivated meat, and fermentation, we can modernize meat production. In this session led by The Good Food Institute, two career scientists discussed the alternative protein ecosystem, their career trajectories, current research, and opportunities for scientists to engage in alternative protein innovation. Simone Costa described how meat proteins impose severe externalities on our planet as cycling calories through animals is inefficient. Christopher Gregson described his career as a "winding path over varied terrain" as he took on roles in the culinary arts as a chef, a food technologist and researcher with large and small companies, and now a start-up in the alternative protein space. Young scholars and professionals were encouraged to explore careers in the dynamic and growing alternative protein sector.

Simone Costa (Good Food Institute)
Christopher Gregson (Paragon Pure)

Reflections on the 2023 Science Innovation Showcase

The 2023 Science Innovation Showcase demonstrated bringing Government, Industry, and Academia together catalyzes the creation of scientific knowledge. With diverse topics covered - from emerging regulatory topics to cutting edge science - the primacy of science to drive innovation was highlighted.

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 in 2021 to deliver on this promise.

Across the food and beverage ecosystem, innovation fuels our ability to thrive even as the world around us changes. 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.

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