Food and Agriculture Organization of the United Nations

World Health Organization

Joint FAO/WHO Expert Meeting on Microbiological Risk Assessment (JEMRA) on microbiological risk assessment on powdered formulae for infants and young children

FAO HQ, Rome, Italy, 15 – 19 June 2026

Experts participating in the meeting

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Background information

In response to the request for scientific advice from the Codex Committee on Food Hygiene, JEMRA has provided scientific advice related to the safety of powdered formulae for infants and young children since 2004. Past work has included the meetings and reports on *Enterobacter sakazakii* and other microorganisms in powdered infant formula (2004) [1], *Enterobacter sakazakii* and *Salmonella* in powdered infant formula (2006) [2], *Enterobacter sakazakii* (*Cronobacter* spp.) in powdered follow-up formula (2008) [3] and also the risk assessment tool for *Cronobacter sakazakii* in powdered infant formula [4] . These activities contributed to the development of the *Code of Hygienic Practice for Powdered Formulae for Infants and Young Children* (CXC 66 - 2008) [5].

Outbreaks and recalls associated with powdered formulae continue to occur across the globe caused by microorganisms such as *Clostridium botulinum, Cronobacter sakazakii, Bacillus cereus* (cereuride), *Salmonella* spp., *Clostridium perfringens* and *Staphylococcus aureus.* To address the issues and support a potential revision of the *Code of hygienic practice for powdered formulae for infants and young children* (CXC 66-2008), the fifty-fifth session of the Codex Committee on Food Hygiene (CCFH55) requested JEMRA to;

i. conduct a risk assessment on spore-forming pathogens, including *Clostridium botulinum* and *Bacillus cereus*, in powdered infant formula;

[1] FAO and WHO. 2004. *Enterobacter sakazakii* and other microorganisms in powdered infant formula: meeting report. https://openknowledge.fao.org/handle/20.500.14283/y5502e
[2] FAO and WHO. 2006. *Enterobacter sakazakii* and *Salmonella* in powdered infant formula: meeting report. https://openknowledge.fao.org/handle/20.500.14283/a0707e
[3] FAO and WHO. 2008. *Enterobacte*r sakazakii (*Cronobacter* spp.) in powdered follow-up formula: meeting report. https://openknowledge.fao.org/handle/20.500.14283/i0453e
[4] https://www.fstools.org/esak/
[5] https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXC%2B66-2008%252FCXC_066e.pdf

ii. update the existing risk assessment and scientific advice on environmental pathogens (e.g. *Cronobacter* and *Salmonella*); and
iii. provide other relevant scientific advice that would inform recommendations on strengthened control measures across the production environment, covering all stages from primary production and packaging through to the reconstitution of the product, and including environmental monitoring programmes.

The purpose of this meeting is to respond these requests.

List of experts

The following list of experts is proposed for this meeting. Please find below their bio-sketches. If you have any comments, please contact us at JEMRA@fao.org and JEMRA@who.int no later than **25 May 2026.**

Abigail B. Snyder

Abigail B. Snyder is an associate professor and food microbiologist at Cornell University specializing in the safety of infant formula and other infant feeding products. Her work focuses on understanding and controlling microbial hazards in low-moisture foods. She previously served as a co-chair the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) charge on *Cronobacter*. NACMCF contributed to national guidance on microbiological safety and risk management in food.

Snyder directs research and outreach programs that bridge science, policy, and practice, including the Microbial Safety of Infant Feeding lab. Her research integrates applied microbiology, risk assessment, and sanitation science to develop practical, evidence-based strategies for industry and regulators. This includes advancing approaches for environmental monitoring, hygienic design, and sanitation validation in dry processing environments where infant formula is produced. She additionally studies the microbial safety of expressed human breastmilk.

In addition to her research, she advises industry, public health agencies, and international stakeholders on infant feeding safety, translating emerging science into actionable guidance to protect vulnerable infant populations.

Abraham Goodness Ogofure

Abraham Goodness Ogofure is a microbiologist and multidisciplinary researcher specializing in antimicrobial resistance (AMR), One Health surveillance, food safety, and environmental microbiology. He is a Postdoctoral Research Fellow at the University of Johannesburg, South Africa, and Senior Lecturer in the Department of Microbiology at the University of Benin, Nigeria.

His research focuses on the occurrence, transmission, and risk assessment of microbial pathogens across food, environmental, and animal systems, with particular emphasis on antimicrobial resistance and foodborne pathogens. He applies integrated microbiological, genomic, and metabolomic approaches to investigate microbial contamination, resistance dissemination, and the discovery of bioactive compounds with applications in public health and sustainable food systems. He has authored over 50 peer-reviewed publications and has contributed to international collaborative projects, including the UKRI/GCRF-funded RECIRCULATE programme on circular economy and microbial safety.

Ogofure currently serves as a Topical Editor for Frontiers in Fungal Biology and is an active reviewer for several international journals. He is a recipient of competitive research awards, including the Alexander

von Humboldt Research Grant, and has been selected as a Mentor in the American Society for Microbiology Future Leaders Mentorship Fellowship (2026–2028). His work supports evidence-based strategies to improve food safety, advance One Health, and global public health.

Anderson de Souza Sant'Ana

Anderson de Souza Sant'Ana is a Full Professor and the Director of the Faculty of Food Engineering (FEA) at the University of Campinas (UNICAMP), Brazil (2022–2026). With a Ph.D. in Food Science from the University of São Paulo and a research period at Rutgers University, his expertise lies in quantitative food microbiology, predictive modeling, and microbial risk assessment.

A globally recognized researcher, Sant'Ana has been consistently named a Highly Cited Researcher by Clarivate (2020–2023) and received the prestigious Zeferino Vaz Academic Recognition Award. Professor Sant'Ana holds significant international leadership roles, serving as Editor-in-Chief of Food Research International, Food Research International: Reports, Food Research International: Translational Research and Current Opinion in Food Science (Elsevier).

Sant'Ana is also a member of the JEMRA (FAO/WHO) roster of experts and a Deputy Ambassador for the Federation of European Microbiological Societies (FEMS). Dr. Sant'Ana research focuses on the behavior, ecology, and control of pathogens and spoilage microorganisms, as well as the application of beneficial microorganisms in food systems. Throughout his career, Sant'Ana has held key administrative positions, including Coordinator of the Food Science Graduate Program and Research Coordinator at UNICAMP, contributing extensively to the advancement of food safety and microbiological sciences.

Caroline Le Maréchal

Caroline Le Maréchal is a researcher and deputy head of the Hygiene and Quality of Poultry and Pig products Unit at ANSES in France. She holds a PhD in Biochemistry, Molecular and Cellular Biology from the Agrocampus Ouest (Rennes, France) and an Engineer degree in agronomy from INP-ENSAT (Toulouse, France). Since 2012, she has been in charge of the French National Reference Laboratory for avian botulism at ANSES. Her research focuses in particular on the control of zoonotic clostridia in the poultry, swine and cattle sectors, through a multidisciplinary and inter-sectoral approach, including the food safety aspects. She has obtained several national and European grants to develop research activities on botulism as well as on the study of *Clostridioides difficile* and *Clostridium perfringens* through a One Health approach. She is a member of the expert committee on animal health and welfare at ANSES and of the scientific committee of several scientific congresses.

Emma Hartnett

Emma Hartnett is the Vice-President, Risk Modelling and Simulation at Risk Sciences International, and is an internationally recognized expert in probabilistic risk assessment with experience in diverse risk domains including microbiological, toxicological, and nutritional hazards. She holds a BSc. in Microbiology and a Ph.D. in Statistics and Modelling Science. Emma has over 25 years of experience working in public health risk analysis and decision support. This experience has included: quantitative risk assessment and decision support tools for microbial and chemical hazards in food and water, incursion of transboundary animal diseases, simulation-based decision-support tools supporting bioterrorism preparedness and response for both microbial and chemical attack agents, and pandemic surge capacity health system needs.

Emma provides expertise to the World Health Organization (WHO) and Food and Agricultural Organization (FAO) initiatives in microbial risk assessment. Contributions include the development of international guidelines for risk analysis and recently chaired the 2020 expert meeting to update the Guidance of Microbiological Risk Assessment for Food. Emma is an active member of the Society for Risk Analysis (SRA) and was presented the 2016 Chauncey Starr Distinguished Young Risk Analyst Award by the Society for outstanding achievement in science or public policy relating to risk analysis.

Jason Brunt

Jason Brunt is an accomplished Senior Research Scientist with over 17 years of experience in molecular microbiology, specializing in risk assessment, data analysis, and strategic research leadership. His expertise spans a diverse range of fields, including food safety, bioinformatics, gut microbiology, anaerobic bacteria, probiotics, and aquaculture. He has collaborated extensively with global experts and industry leaders, including with the Food and Agriculture Organisation of the United Nations (FAO), where he provided risk assessment expertise on critical food safety issues. He has collaborated with and formed a significant network of leading experts and industry leaders. He carried out innovative original research to become one of the UK's leading experts in *Clostridium botulinum*. His outputs include a substantial publication record of original research that has challenged prior knowledge. Additionally, he has experienced in working on government projects and with large multinational companies with regards to food safety, preservation and detection.

Jeff Farber

Jeff Farber currently works as a global food safety consultant, where he does consulting for various national and international organizations on issues related to microbial food safety. He is also an Adjunct Professor at the University of Guelph, in Guelph, Ontario and a senior advisor for Index Biosystems, a biotechnology company.

Farber most recently was employed as a Full Professor in the Department of Food Science at the University of Guelph, where he was Director of the Canadian Research Institute for Food Safety. He previously worked at Health Canada where he led a group of 60 people working in food safety and has over 200 publications.

He is a Past-President of the International Association for Food Protection, and Executive Director of the International Commission on Microbiological Specifications for Foods (ICMSF). Furthermore, he has extensive experience working at the international level with Codex Alimentarius, WHO and FAO.

Kate Thomas

Kate Thomas is a food microbiologist and microbiological risk assessor with over 20 years' experience spanning regulatory food safety, public health, and international One Health research. She is currently a Senior Adviser (Microbiology) at New Zealand Food Safety within the Ministry for Primary Industries, where she leads and contributes to national-level microbiological risk assessments that inform evidence-based regulatory decisions.

Kate's work includes rapid and full microbiological risk assessments, incident response, and science-to-policy translation across a range of food commodities, including low-moisture powdered foods. She played a key role in New Zealand's response during the 2025–26 cereulide contamination notification involving infant formula and has previously led national risk profile work on *Bacillus cereus*. Her expertise covers a broad range of foodborne pathogens of public health significance.

She holds a PhD in Microbiology and has conducted research in New Zealand, Europe, and East Africa, contributing to over 30 peer-reviewed publications. Kate brings extensive experience in cross-sector collaboration and multidisciplinary research in data-limited and complex supply-chain contexts.

Kristin Schill

Kristin Schill is a Research Assistant Professor at the University of Wisconsin-Madison's Food Research Institute (FRI) and leads the Applied Food Safety Laboratory. In this capacity Kristin works directly with the food industry to design food challenge studies on a wide variety of food products and foodborne pathogens including *Clostridium botulinum* and *Bacillus cereus*. Prior to joining FRI, Kristin served as a research microbiologist for the FDA and her research portfolio encompassed projects involving the genetic characterization of *Clostridium botulinum* and related surrogate organisms, development of botulinum neurotoxin detection methods, evaluation of thermal and nonthermal technologies for *C. botulinum* inactivation and whole genome, metagenomic and transcriptomic sequencing of foodborne pathogens. Kristin is a member of the International Association for Food Protection and co-teaches the IAFP Sponsored Microbial Challenge Testing for Foods Workshop. She also served on the National Advisory Committee for the Microbiological Criteria for Foods (2023-2025). Kristin also served on the United Nation's Food and Agriculture Organization Expert Committee on *Clostridium* in Foods (2025). Kristin earned her Bachelor of Science degree (Microbiology) and Master of Science degree (Food Science) at Iowa State University and her Ph.D. (Food Science) at the University of Wisconsin-Madison.

Mariza Landgraf

Mariza Landgraf is a retired Professor from the University of São Paulo, Brazil, where she acted as professor, researcher and extensionist. Prior to that, she was responsible for the Food Microbiology and Microbiology Control of Drugs at the Faculty of Pharmaceutical Sciences at São Paulo State University. She earned her M.Sc. in Food Science and Ph.D. in Sciences (Microbiology) at the University of São Paulo. During her 46 years as Professor, she advised M.Sc. and Ph.D. students and published more than 100 articles in peer-reviewed scientific journals and has spoken at numerous meetings and symposia.

Mariza Landgraf is a consultant member of the Brazilian Delegation of the Codex Alimentarius Committee on Food Hygiene. She is also a member of the working group on Food Hygiene at the National Sanitary Surveillance Agency (ANVISA), having participated, additionally, as a member of the Technical Group for the Revision of the Food Microbiological Standards (2014-2019).

Monika Ehling-Schulz

Monika Ehling-Schulz is a full professor of microbiology and the Head of the Centre for Pathobiology and the Unit of Microbiology at Vetmeduni Vienna in Austria. Furthermore, she serves as Deputy Head of the Department of Biological Sciences and Pathobiology at the same university. She is internationally renowned for her work on toxigenic Bacilli. Her team has identified key regulators that orchestrate virulence in *Bacillus cereus.* She was awarded the Otto von Guericke Prize for her groundbreaking work on emetic *B. cereus* and the cereulide toxin, which opens new avenues for next-generation risk-based diagnostics. Her group has also been instrumental in advancing AI-assisted FTIR spectroscopy at the intersection of food safety and veterinary medicine within a One Health framework.

Monika Ehling-Schulz is an elected Fellow of the European Academy of Microbiology and served as President of the Austrian Society for Hygiene, Microbiology and Preventive Medicine (ÖGHMP). She is

also the Austrian delegate to the Expert Committee on Microbiology of the Food Chain (CEN TC 463), and a member of Food for Life's Expert Network (FLEN).

Xingchen Zhao

Xingchen Zhao received her Ph.D. in Food Sciences and Nutrition from Ghent University (UGent), Belgium, in 2023, and subsequently continued her research as a postdoctoral fellow for an additional year. In 2024, Zhao joined Research Group for Food Microbiology and Hygiene, National Food Institute at Technical University of Denmark (DTU Food) as a postdoctoral fellow. Since September 2025, she turned into a tenure track assistant professor at DTU Food. Her current research area covers food safety management, and quantitative food microbiology including both predictive food microbiology and quantitative microbiological risk assessment. Her research focuses on the risk mitigation of foodborne pathogens and their toxin production in food systems, including sustainable intervention strategies.

She has published over 33 peer-reviewed papers and one book chapter and has an H-index of 19. Zhao is a frequent speaker at international conferences and plays an active role in the scientific community as both a reviewer and editorial board member**.** As an early-career scientist, she has been involved and is leading or co-leading multiple competitive grants from academic, industry partners and government. She has co-supervised or is co-supervising 2 research assistants, 14 Master students and 8 Bachelor students at DTU and UGent.

Yeru Wang

Yeru Wang is an Associate Researcherand the Deputy Director of the Risk Assessment Division I (Department of Microbial Risk Assessment) in China National Center for Food Safety Risk Assessment. She has mainly engaged in research on food safety, risk assessment, risk modelling, and the application of new technologies in risk assessment.

As a member of the Secretariat of the National Food Safety Risk Assessment Committee of China, she completed the risk assessment of Bacillus cereus contamination in powdered infant formula for the children aged 0-3 years old in 2020 and *Cronobacter* spp. in powdered infant formula in 2022 which have been submitted to the National Committee for review and got approval.

Over the past five years, she has led one National Natural Science Foundation project and two food safety technology Research and Development projects under both the 14th and 13th Five-Year National Research and Development Programs of the Ministry of Science and Technology. Furthermore, she has led and contributed to 15 priority national food safety risk assessment projects, 6 emergency risk assessment projects commissioned by the National Health Commission, and 6 technical guidelines for risk assessment.

Zoe Bartlett

Zoe Bartlett is a Senior Scientist with a decade of expertise in food microbiology and microbiological risk assessment and has worked at Food Standards Australia New Zealand (FSANZ) for the past 6 years. She specializes in hazard identification, exposure assessment, risk characterization, risk management, and risk communication for a wide range of foodborne pathogens. Zoe has experience in risk assessment for powdered formulae focusing on pathogens including *Cronobacter* spp., and *Salmonella spp*. She has also undertaken research focused on *Bacillus cereus* and milk products. Her broader expertise includes developing qualitative and semi-quantitative risk assessments, evaluating spore-

forming and environmental pathogens, interpreting surveillance and outbreak data, and assessing preventive measures in food manufacturing environments. She has contributed to quantitative risk assessments for *Salmonella* spp. and eggs and led a national program on antimicrobial resistance, overseeing study design, stakeholder engagement, and public reporting. Zoe has worked with multidisciplinary teams in national and international food safety contexts, critically appraising scientific evidence and evidence-based advice for standards development.

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