Food and Agriculture Organization of the United Nations

World Health Organization

Joint FAO/WHO Expert Meeting on Microbiological Risk Assessment (JEMRA) on the use of omics-based technologies in microbiological risk assessment

FAO HQ, Rome, Italy, 2 – 6 March 2026

Experts participating in the meeting

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Background information

In response to the request from Codex for scientific advice, FAO and WHO performed, with experts in the field, microbiological risk assessments in several foods since 2000. In 2021, a guidance document was developed on how to perform microbiological risk assessments to harmonize approaches that assess and characterize foodborne risks[1]. Over the last few decades, remarkable technological advancements have transformed analytical methods in the field of food microbiology. These innovations have enabled the adoption of alternative approaches to traditional microbiological techniques, most of which are rooted in molecular biology. The developments in DNA sequencing technologies to identify microbiological hazards have revolutionized clinical diagnostics, and is gradually being adopted by food inspection authorities and industries.

As new molecular-based omics tools are being adopted by researchers and stakeholders, this opens avenues to use this information to enrich and finetune microbiological risk assessments. With these developments in omics in microbiological risk characterisation, the FAO/WHO JEMRA is undertaking new work to evaluate the potential of omics in microbiological risks assessments, and to assess how this development could influence future risk management options undertaken by food authorities and companies.

The meeting objectives are:

1) Compile a catalogue of currently available omics (namely genomics/metagenomics, transcriptomics, proteomics and metabolomics) technologies and methodologies for microbiological risk assessment.

2) Review and assess the challenges, obstacles and benefits of applying these technologies and methods for data generation, collection, and analysis in multidimensional scenarios (different genes, proteins and/or metabolites from different microbiological hazards, different laboratory capacity setting, etc.); map and develop approaches to reduce data variability and increase the interoperability of outputs.

[1] FAO and WHO. 2021. Microbiological risk assessment - Guidance for food. Microbiological Risk Assessment Series No. 36. Rome. https://doi.org/10.4060/cb5006en

3) Provide scientific options on how to choose, analyse, and translate the omics data and methods for microbiological risk assessment purposes.

4) Review and consider practices that require standardized microbiological food safety omics practice by considering in vitro and in vivo (e.g. host genetics), genotype and phenotype, epigenetic, strain variability, microbial interactions (e.g. microbiome, environment), behaviour changes, etc.

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 **20 February 2026.**

Sofia Bashir Mohamed Ali

Sofia Bashir Mohamed Ali is an Associate Professor of Molecular Biology and Bioinformatics with over 20 years of experience in omics-based pathogen characterization and microbiological risk assessment. Her expertise centers on foodborne pathogens, antimicrobial resistance (AMR), and public health applications tailored to low- and middle-income country (LMIC) settings. She excels in whole-genome sequencing, metagenomics, molecular epidemiology, and integrating omics-derived evidence into hazard identification, outbreak investigation, and risk characterization.

As Director and Co-founder of the National University Biomedical Research Institute (NUBRI), she pioneered Sudan's first integrated genomics and bioinformatics infrastructure. This platform bolsters public health surveillance and applied research, enabling advanced molecular diagnostics. Through NUBRI, Dr. Ali has collaborated closely with the Sudanese Ministry of Health and regional authorities, driving AMR surveillance, COVID-19 outbreak response, and capacity building across clinical and public health laboratories nationwide.

Ali established Galaxy-NUBRI, Sudan's inaugural cloud-based bioinformatics platform, supported by the European Galaxy. It delivers standardized, reproducible omics workflows critical for microbiological risk assessment. She also launched the Virtual Bioinformatics and Computational Biology Research Institute – Sudan (VBCRI-Sudan), fostering remote genomics analysis, training, and public health strengthening in fragile, resource-limited environments.

Her interdisciplinary work bridges laboratory genomics, bioinformatics, and evidence-based public health decision-making.

Jean-Christophe Augustin

Jean-Christophe Augustin studied veterinary science and, after obtaining a PhD in microbial ecology, was a professor of food hygiene and safety at the Alfort Veterinary School for 24 years. He has been a microbiologist at Danone's Food Safety Center since 2019.

He works in the field of quantitative microbiology, particularly in predictive microbiology and quantitative risk assessment, analytical method performance, and statistical process control. He has published 70 scientific and technical articles and presented around 100 oral communications at scientific and professional conferences.

He has been a member of the French Food Safety Agency's expert panel on biological risks. He has served as a member of the editorial board of *Food Microbiology*, *International Journal of Food Microbiology*, and *Frontiers in Food Microbiology*. He is a corresponding member of the French Veterinary Academy and a member of the French Academy of Agriculture.

Leen Baert

Leen Baert obtained her Ph.D. in Applied Biological Sciences in 2009 at Ghent University, Belgium on the topic foodborne viruses. She continued as post-doctoral fellowship at Ghent University, Laboratory of Food Microbiology and Food Preservation until 2011. In 2011, she started to work at Nestlé Research in Lausanne, Switzerland in the Microbial & Molecular Analytics group to develop and evaluate molecular detection methods for microbial targets. Since 2014 she specialized on whole genome sequencing, establishing and validating a WGS methodology for microbial source tracking. From 2020 she is part of the Food Safety Microbiology group continuing building knowledge on the use of "genomics" for food safety.

Li Bai

Li Bai is Director of the Microbiology lab, National Centre for Food Safety Risk Assessment, China. She has over 17 years' experience in the food safety sector with a focus on molecular epidemiological microbiology, foodborne disease surveillance and microbiological risk assessment. She has been involved in several national projects about the surveillance and control of foodborne pathogens and the microbiological risk assessment to solve the microbial problem during the food chain. She has published more than 70 papers in peer reviewed journals and was involved in national and international research projects on foodborne pathogens. In addition, she is a member of the National Committee for Food Safety Standards and the National Committee for Food Safety risk assessment, an expert of JEMRA, a member of WHO Foodborne Disease Burden Epidemiology Reference Group (FERG) and an expert member of the WHO Technical Advisory Group on Risk-Benefit Assessment on the Optimal Intake of Animal-Source Foods (TAG-RBA).

Krishna Kumar Ballamoole

Krishna Kumar Ballamoole is an Associate Professor at the Nitte University Centre for Science Education and Research, Nitte (Deemed to be University), Mangalore, India. He holds Bachelor's degree in Fisheries Science, Master's degree in Fisheries Microbiology, and a PhD in Microbiology from Manipal Academy of Higher Education, Manipal, India. He completed postdoctoral research through INSA–JSPS fellowship at the Research Institute for Microbial Diseases, Osaka University. He has over fifteen years of experience in teaching, research, and capacity building in food safety, infectious diseases, and microbial pathogenesis. His research integrates molecular biology, microbial genomics and metagenomics, and immunopathogenesis to elucidate virulence mechanisms, host–pathogen interactions, and pathogen evolution, with emphasis on one health. He also develops monoclonal antibody and nucleic acid based rapid diagnostics for pathogen detection in clinical, food, and environmental settings. Kumar has led funded projects supported by CEFAS (United Kingdom), ICMR, DST-SERB, and the Ministry of Education, Government of India. He has authored over 50 peer-reviewed articles, 9 book chapters, and holds 7 published patents. He served as an Evaluation Specialist for UNESCO Category 2 Centres, reviewer of grant proposals for ANRF, DST-SERB, and A-STAR (Singapore), serves as editorial board members of international journals and previously served as Member Secretary of the Institutional Ethics Committee.

Luca Cocolin

Luca Cocolin is Full Professor of Food Microbiology at the Department of Agricultural, Forest and Food Sciences (DISAFA), University of Torino, Italy. He coordinates the PhD in Food System and from October 2024 he has the role of deputy director of education at DISAFA. Since 2022 he is the Director of the Interuniversity Research Center on Food and Antifraud. He is Member of the Leadership Team of the

European Technology Platform Food for Life. Since its foundation, he is the scientific responsible and master contact for the University of Torino in the EIT Food. He is expert in: (i) Development, optimization and application of molecular methods for the detection, quantification and characterization of foodborne pathogens; (ii) Microbiome exploitation in food and human health; (iii) Bioprotection: molecular characterization of bacteriocin production and its study in vitro and in situ. He is the former Editor in Chief of the International Journal of Food Microbiology and Editor of Microbiology Spectrum. He is Member of Current Opinion in Food Science, Food Analytical Methods, and Applied and Environmental Microbiology.

He is the author of about 379 publications that relate to the microbiology of food, which received 18151 citations, resulting in an h-index equal to 68 as of January 2026.

Heidy den Besten

Heidy den Besten obtained a BSc in Food Technology and a BSc in Mathematics and completed her MSc Food Technology cum laude specialising in Food Safety at Wageningen University. Before starting as Assistant Professor with tenure track in 2011, she completed her PhD project entitled "Quantification of Bacillus cereus stress responses". Since 2023 she is personal professor and her research activities focus on pathogen ecology interlinking functional genomics and prediction of microbial behaviour. Currently, she acts as editorial board member of International Journal of Food Microbiology, and is a board member of the International Committee on Predictive Modelling in Foods. She is a vice chair of the Professional Development Group Modelling and Risk Analysis of the International Association of Food Protection and an international member of the PhD board of the University of Turin. She has been elected twice as a chair of expert groups of the ILSI task force Microbiological Food Safety, and was a member of two JEMRA expert groups.

Den Besten has been supervising 20 PhD students and has an h-factor of 32 (Scopus). She is teaching in the BSc Food Technology programme and the MSc Food Safety programme of Wageningen University and coordinates a BSc Food Microbiology course.

Lawrence Goodridge

Lawrence Goodridge is a food microbiologist whose research focuses on improving food safety through the detection, characterization, and control of foodborne pathogens, with particular emphasis on *Salmonella*. He is a Canada Research Chair in Foodborne Pathogen Dynamics and serves as Director of the Canadian Research Institute for Food Safety (CRIFS) at the University of Guelph.

Goodridge's work is internationally recognized for integrating genomics, bioinformatics, and systems-level approaches to understand how *Salmonella* and other foodborne pathogens emerge, persist, and spread across the food chain. His research leverages whole-genome sequencing and comparative genomic analysis to link pathogen diversity with virulence, antimicrobial resistance, and environmental fitness. These insights are used to strengthen microbial risk assessment, inform regulatory decision-making, and support evidence-based food safety policies.

A central theme of Goodridge's program is the translation of genomic data into practical tools for industry and regulators, enabling more precise risk analysis and targeted interventions. His work has contributed to national and international surveillance initiatives and has helped shape modern approaches to genomics-informed food safety management.

Through his leadership at CRIFS, Goodridge also champions interdisciplinary collaboration, workforce training, and the application of cutting-edge science to protect public health and enhance the safety and resilience of food systems.

Laurent Guillier

Laurent Guillier is a researcher in the Risk Assessment Department at ANSES (the French Agency for Food, Environmental and Occupational Health & Safety). His main research interest is to understand the causes of foodborne diseases and to identify effective strategies to reduce the associated disease burden in human populations.

His work focuses on foodborne pathogens and on the integration of omics data, particularly microbial genomics, into quantitative microbial risk assessment (QMRA). He develops and applies statistical and mathematical modelling approaches to link omics information with predictive microbiology, source attribution, and dose-response assessment.

His research also draws on conventional food microbiology and epidemiology to support hazard characterization and risk management, with a specific interest in how food processing and storage conditions influence microbial risks. Through his work, he contributes to scientific expertise supporting food safety policies and evidence-based decision-making.

Ihab Habib

Ihab Habib is an Associate Professor in Epidemiology, Food Safety, and Veterinary Public Health at the United Arab Emirates University, where he founded and leads the Veterinary Public Health Research Laboratory (est. 2020). From 2015 to 2019, he was a Lecturer and Senior Lecturer in Veterinary Public Health and Epidemiology at Murdoch University, Australia. His research centers on One Health, food safety from farm to fork, foodborne AMR, and the genomic epidemiology and risk assessment of foodborne zoonoses. Ihab Habib holds dual citizenship in Australia and Egypt, graduating with Bachelor of Veterinary Medicine from Alexandria University (Egypt) in 2000. He completed MSc in Food Safety from Birmingham University (UK), a Master in Public Health from Alexandria University (Egypt), an MSc in Epidemiological Data Analysis from the Institute of Tropical Medicine (Belgium), and a Ph.D. in Veterinary Public Health from Ghent University (Belgium) in 2010. Ihab Habib has held academic and research roles in Europe, Australia, and the Middle East. He has co-authored about 100 Scopus-listed articles and contributed as an expert for the JEMRA on controlling *Campylobacter* and *Salmonella* in poultry meat. He is a member of the WHO Technical Advisory Group on Risk-Benefit Assessment of Optimal Intake of Animal-Source Foods.

Marciane Magnani

Marciane Magnani is Full Professor and Head Researcher of the Laboratory of Microbial Processes in Foods, Department of Food Engineering, Federal University of Paraíba, Brazil, since 2011. She holds a degree in Biological Sciences, a Master's degree in Biotechnology, a PhD in Food Science, and postdoctoral training in Molecular Sciences. She is currently National Coordinator of the Food Science area in Brazil (2022–2026) and a Level 1A Research Fellow of the National Council for Scientific and Technological Development. Magnani is a roster member of the Food and Agriculture Organization of the United Nations (FAO) for 2023–2027 and previously participated in the Joint FAO/WHO Expert Meetings on microbiological risk assessment (JEMRA). Her research focuses on applying omics-based technologies, including whole genome sequencing and molecular tools, to support microbiological risk assessment. Her expertise includes resistance and persistence of foodborne pathogens in foods and food-contact surfaces, predictive microbiology, and integration of omics data into food safety and risk

assessment frameworks. She supervises Master's and PhD students in Food Science, has published over 280 peer-reviewed articles, and serves as Associate Editor of *Food Research International* and *Comprehensive Reviews in Food Science and Food Safety*, and Editor-in-Chief of *Letters in Applied Microbiology*.

Maarten Nauta

Maarten Nauta is employed as Senior Researcher at the department of Infectious Disease Epidemiology and Prevention of Statens Serum Institut (SSI) in Denmark, focusing on foodborne diseases and risk assessment. Educated as mathematical biologist, he previously worked at the National Institute for Public Health and the Environment (RIVM) in the Netherlands and the National Food Institute of the Technical University of Denmark (DTU), where he, among others, specialised in quantitative microbiological risk assessment, the development of methods for "farm to fork" risk assessments and risk-benefit assessments of foods. He is the (co-) author of more than 150 scientific publications in international peer reviewed journals (Google Scholar h-index 56). Next to national and international advisory work, he gave courses in risk assessment at universities and for food safety professionals all over the world, and supervised Master students, PhD students and post-docs in risk assessment and related disciplines. He is co-editor in chief of the journal *Microbial Risk Analysis*, since 2017 he is member of the International Committee of Predictive Modelling in Foods and since 2018 he is a member of the European Food Safety Authorities' expert Panel for biological hazards.

Lucia (Lucy) Rivas

Lucia (Lucy) Rivas is a Science Leader in food safety at the New Zealand Institute of Public Health and Forensic Science (PHF Science). Her work focuses on the application of genomic tools for food safety and public health surveillance. Lucia has led research projects addressing a wide range of food safety challenges, particularly those involving key foodborne pathogens such as *Listeria*, *Yersinia*, and Shiga toxin–producing *Escherichia coli*.

She has authored several scientific publications and client reports, including risk profiles and discussion documents commissioned by New Zealand Food Safety (Ministry for Primary Industries). These contributions demonstrate her strength in translating scientific evidence into practical regulatory and policy outcomes.

Over the past decade, Lucia has developed significant expertise in the use of genomic and other omics-based technologies for food safety and risk assessment. Her work has focused on integrating these approaches to improve the detection, characterization, and management of foodborne hazards within public health and regulatory contexts.

Eric L. Stevens

Eric L. Stevens is a molecular biologist and human geneticist turned food-safety and regulatory science leader who connects omics innovation to practical microbiological risk assessment. He spent more than a decade at the U.S. Food and Drug Administration advancing science, international policy, and partnerships. A central focus of his work was expanding omics-enabled surveillance and outbreak investigations by strengthening FDA's GenomeTrakr network and integrating clinical, food, and environmental isolates across the supply chain. He collaborated with CDC's PulseNet, USDA, and NCBI's Pathogen Detection program, and delivered workshops and bilateral and multilateral exchanges on sequencing, bioinformatics, data standards, and responsible data sharing for One Health stakeholders.

Stevens also served as a U.S. delegate to the Codex Committee on Food Hygiene, supporting science-based provisions that protect consumer health and enable fair trade. In that role, he helped prioritize

needs for international microbiological risk assessment, framed questions for risk assessors, and translated assessment outputs into microbiological risk management considerations for food hygiene.

He is currently Vertical Segment Manager—Food at Hygiena, guiding diagnostics strategy and helping regulators, laboratories, and industry apply omics data to surveillance, environmental monitoring, verification, and outbreak root-cause investigations worldwide. He emphasizes fit-for-purpose methods, interoperability, and best practices.

Bing Wang

Bing Wang is a human health risk analyst specializing in the assessment of microbial and chemical hazards associated with food and environmental exposures. Research focuses on improving public health decision-making through evidence-based data analysis and risk-informed decision tools, including epidemiology, systematic review, meta-analysis, predictive microbiology, and quantitative risk assessment. This work supports the development of risk-based policies and regulatory frameworks, with applications across food systems, water reuse, and environmental health.

Wang is an Associate Professor at the University of Nebraska–Lincoln. Wang serves as an Expert to the Joint FAO/WHO Expert Meetings on Microbial Risk Assessment (JEMRA) and as a Food Safety Consultant to FAO, and was previously an Appointed Member of the U.S. National Advisory Committee on Microbiological Criteria for Foods (NACMCF).

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