Background information

Based on the Joint FAO/WHO Expert Meeting on microbiological risk assessment (JEMRA) meeting and its report, Codex Alimentarius Commission established the Guidelines on the Application of General Principles of Food Hygiene to The Control of Viruses in Food (CXG 79-2012). The primary purpose of these guidelines is to provide direction on how to prevent or minimize the presence of human enteric viruses in foods, more specifically, Hepatitis A Virus and Norovirus. This guideline is applicable to all foods, with a focus on ready-to-eat food, from primary production through to consumption, for the control of human enteric viruses. It also contains an annex on the Control of Hepatitis A Virus (HAV) and Norovirus (NoV) in Bivalve Molluscs (Annex I) and an annex on the Control of Hepatitis A Virus (HAV) and Norovirus (NoV) in Fresh Produce (Annex II). These annexes provide additional recommendations for control of these viruses in specific commodities.

With the new emerging issues associated with foodborne viruses and recent scientific developments, the Codex Committee on Food Hygiene (CCFH) requested that JEMRA provide scientific advice to inform the review of the guidelines at its 53rd session in 2022.

To support the update of the guidance, the CCFH requested JEMRA provide scientific advice on the following areas.

1. An up-to-date review of the foodborne viruses and relevant food commodities of highest public health concern;
2. A review of the scientific evidence on prevention and intervention measures and the efficacy of interventions in the food continuum;
3. A review of the analytical methods for relevant enteric viruses in food commodities;
4. A review of scientific evidence on the potential utility of viral indicators or other indicators of contamination; and
5. A review of the various risk assessment models with a view towards constructing more applicable models for wide use among member countries, including a simplified risk calculator.
To meet the request of the CCFH, FAO and WHO convened the Part 1 meeting to work on the food attribution, analytical methods and indicators of virus in foods in September 2023. The goal of the Part 2 meeting is to gather and evaluate recent data, evidence and scientific opinions on the topic of prevention and intervention measures and the efficacy of interventions in the food continuum for foodborne viruses based on the outcomes of the Part 1 meeting.

**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 9 February 2024.

<table>
<thead>
<tr>
<th>Expert Name</th>
<th>Bio-Sketch</th>
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<tr>
<td><strong>Ingeborg Laura Agnes Boxman</strong></td>
<td><strong>Ingeborg Boxman has worked in the field of food virology during nearly 20 years. Currently, she is Project Lead of Food Virology projects at Wageningen Food Safety Research, part of Wageningen and University Research (WUR), the Netherlands. WFSR analyses official samples for the presence of food borne viruses RNA in various matrices, such as bivalve mollusks, soft fruits, lettuces, herbs, sausages and liver under Accreditation of the Dutch Accreditation Council. Monitoring- and food-borne outbreak samples are collected by and results are reported to the Netherlands Food and Consumer Safety (NVWA). The group of Ingeborg Boxman is also working on the development of new innovative tools for detection, quantification or (un)targeted sequencing funded by NVWA. In addition, virology at WFSR is the National Reference Laboratory For Food Borne Viruses within the European EURL network. Within the Netherlands, collaborations are ongoing with WUR, RIVM, and ErasmusMC.</strong> Ingeborg Boxman was participant of CEN WG TAG-4/ISO 15216; JEMRA Expert meeting on Viruses in Food, 2007 and 2023; Dutch drafting group Codex Alimentarius/CAC/GL 79 (2012); EFSA WG HAV-trace 2014; and is participating in the ISO/TC34/SC9/WG31 Hepatitis E virus en ISO/TC34/SC9/WG3/PG virus and parasites.</td>
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<td><strong>Nigel Cook</strong></td>
<td><strong>Dr Nigel Cook studies the transmission of pathogens, particularly enteric viruses, through foods and the environment, and the development and application of nucleic acid amplification-based detection methods. He is a Board Member of the International Association for Food and Environmental Virology. He represents British Standards Committee on various standardisation groups and is Convenor of ISO TC34/SC9/WG31 “Hepatitis E Virus”. He was Coordinator of the European Framework 7 project “Integrated monitoring and control of foodborne viruses in European food supply chains (VITAL)”, and Chair of COST Action 929 “A European Network for Environmental and Food Virology” from 2006 to 2010. Between 2009 and 2014, he was a member of various European Food Safety Authority’s Working Groups preparing opinions on the risk of foodborne viruses, and represented the International Standards Organization (ISO) on the Codex Committee on Food Hygiene Working Group developing Guidelines on the Application of General Principles of Food Hygiene to the Control of Viruses in Food. He was a member of the UK Advisory Committee on the Microbiological Safety of Food’s Viral Infections Subgroup. He was the founding Editor of the journal “Food and Environmental Virology”. He holds a Visiting Professorship at the KULeuven University, Belgium.</strong></td>
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Christophe Gantzer
Christophe Gantzer is Professor of Microbiology at Université de Lorraine (UL) in France. He is director of LCPME (Laboratory of Physical Chemistry and Microbiology for Materials and Environment (LCPME) which is a public joint research unit between UL and CNRS. His main research interest lies in food and environmental virology. He published over 100 original international research papers on the topic. He is also deputy director of the french national scientific network for SARS-CoV-2 surveillance using Wastewater Based Epidemiology (OBEPINE network) supported by the French Ministries of Health and Research. He is co-coordinator of the Joint Technological Unit (UMT) ‘ACTIA VIROcontrol’ which is a partnership between Actalia (Agro-Industrial Technical Institute) and LCPME dedicated to management of foodborne viruses through basic and applied projects, supported by the French Ministry in charge of Food. Several years ago he coordinated the “survival and elimination of viruses” axis (17 european countries) from the european COST Action 929 dealing with “Environmental and food virology” and was expert at the French National Agency for Food Security (ANSES) for the microbiology committee.

Miranda de Graaf
Miranda de Graaf is an associate professor in the Department of Viroscience and is the workgroup leader of the Norovirus research group. Her research group explores the role of viral and host factors in the emergence and evolution of viral pathogens. Additionally, she manages the global NoroNet. In her research, she employs a broad interdisciplinary approach that combines phylogeny, molecular biology, glycobiology, and virology. She was awarded a Marie Curie IEF for her research on influenza receptors at Cambridge University (UK). She is a member of the Dutch Commission on Genetic Modification, a member of the International Committee for Norovirus Nomenclature, and manages the international surveillance network NoroNet. She organized the 8th International Calicivirus Conference in 2023. She is involved in several consortia, including the Pandemic Disaster Preparedness Center, which focuses on early detection of new pathogens, an NIH grant for research in low- and middle-income countries with Dr. Mans from South Africa, and GlyoNoVi, a Marie Curie European Doctorate training network that brings together five academic and three industrial leaders in the fields of glycoscience, glycovirology, and noroviruses.

Duncan Gitonga Ithinji
In 2005, he graduated with a Bachelor of Veterinary Medicine (BVM) degree from the University of Nairobi (UoN) and in 2011 completed a Master of Science degree in Veterinary Microbiology, Virology option, from the same institution. He graduated in 2021 with a PhD degree in Animal Science – Immunology and Infectious Diseases – from Washington State University in the USA. Upon BVM graduation, he did large animal private Veterinary practice and then joined Kenya Agricultural and Livestock Research Organization (KALRO) in 2007 as a research assistant. Following the aforementioned studies and training, he is currently serving as a research scientist. He undertakes research primarily on virus-caused transboundary animal diseases and zoonoses that include but not limited to Rift valley fever virus, foot and mouth disease in cattle, peste des petits ruminants in small ruminants and pox viruses for small and large ruminants. Aspects of interest for these diseases are immunology, vaccines and diagnostics. Under zoonoses, he handles matters of one health and food safety. Currently, he is the head of the Virology laboratory at KALRO Veterinary Science Research Institute (KALRO-VSRI).
Lee-Ann Jaykus

Dr Lee-Ann Jaykus is a Distinguished Professor Emeritus affiliated with the Department of Food, Bioprocessing, and Nutrition Sciences at North Carolina State University, where she was employed for almost 30 years. Her formal training is in Food Safety, Food Microbiology, and Public Health. Dr Jaykus’ research efforts have focused on: (1) food virology; (2) development of molecular methods for foodborne pathogen detection; (3) application of quantitative risk assessment in food safety; and (4) understanding the ecology of pathogens in foods. She is probably best known for her efforts in food virology, culminating in her service as scientific director for the USDA-NIFA Food Virology Collaborative (NoroCORE) from 2011-2018. Dr Jaykus has authored over 200 scientific publications, instructed more than 600 university students, and trained over 60 young professionals at the graduate level. Her national and international external activities are vast, spanning service to FAO-WHO, the National Advisory Committee on Microbiological Criteria for Foods, various National Academies of Sciences panels and service as president of the International Association for Food Protection from 2010-2011. Early in the COVID-19 pandemic, Dr Jaykus stepped in to work with the food industry, focusing on analyzing and managing risk of disease transmission in the essential workforce.

Tao Jiang

Tao Jiang is working in the division of Microbiological Lab, China National Center for Food Safety Risk Assessment and he was promoted to level of professor in 2010. He has special interest in the area of foodborne viruses detection and genotyping. He is responsible for revising National Food Safety Standards-Microbiology of The Food Test-Method For Determination of Norovirus Using Real-time RT-qPCR (2020-2021). He also developed the methods for determination of Norovirus, Sapovirus and hepatitis A virus in aquatic products using real-time RT-qPCR, which have been used as guidance for the national monitoring of foodborne virus pollution in shellfish from 2016. He developed the methods for genotyping of Norovirus, Sapovirus, Hepatitis E virus and Astrovirus using RT-PCR and sequencing.

He was responsible for a survey on Norovirus contamination level in shellfish, which was carried out in 10 provinces in China from 2015 to 2016. He conducted a molecular epidemiology survey of Norovirus and Sapovirus in diarrhea fecal in children under 5 years of age from 2018 to 2019 in Beijing, China. He is also responsible for the annual training on foodborne virus detection methods for laboratory personnel from the provincial centers for disease control and prevention nationwide since 2015.

Leera Kittigul

Dr Leera Kittigul is a Professor and Deputy Dean for Human Resource Quality Development at the Faculty of Public Health, Mahidol University, Bangkok, Thailand. She received her Ph.D. (Microbiology) from the Faculty of Science, Mahidol University, Bangkok, Thailand. Her research focuses on food, water, and air virology of enteric viruses including norovirus, rotavirus and hepatitis A virus. She has developed methods for concentrating and detecting of enteric viruses from food and water samples. Genetic analysis of enteric viruses in clinical and environmental samples are assessed for epidemiological surveillance of acute gastroenteritis in Thailand. She was a roster of experts of FAO/WHO on viruses in foods in 2007 and contributed to a meeting report Microbiological Risk Assessment series 13. FAO/WHO, 2008 entitled “Viruses in food: scientific advice to support risk management activities”. She is also interested in the study of SARS-CoV-2 causing COVID-19. She has developed the efficient method for determination of viruses in indoor air samples. She has supervised postgraduate students at the university and published original articles on enteric viruses in international scientific journals.
Kalmia (Kali) Kniel

Dr Kalmia (Kali) Kniel is Professor in the Department of Animal and Food Sciences at the University of Delaware (UD). She completed her graduate studies at Virginia Tech focused on cell biology and microbiology of foodborne pathogens. Her teaching responsibilities include courses on foodborne disease, food microbiology, food systems and security. Dr Kniel’s research includes understanding mechanisms of environmental persistence by bacteria, protozoa, and viruses in pre-harvest agricultural environments. Dr Kniel serves as Co-Chair of the One Health Unique Strength Program and directs the Center for Environmental and Wastewater Epidemiological Research. Dr Kniel is co-author on the textbook, Food Microbiology: An Introduction, more than 100 scientific publications, and more than 170 published abstracts for presentations. In 2015 she was awarded the UD Outstanding Teaching and Advising Award and the Elmer Marth Outstanding Educator award by the International Association for Food Protection (IAFP). In 2020 she was awarded the UD Outstanding Researcher Award. In 2022 she was awarded the IAFP Maurice Weber Laboratorian Award for distinguished laboratory contributions. Dr Kniel is active with Institute of Food Technologists (IFT), American Society for Microbiology (ASM), and IAFP, where she was elected to the board in 2015 and served as IAFP President in 2020.

Catherine MacLeod

Catherine McLeod is Chief Science Officer at the Cawthron Institute. She is the professional food safety scientist with international experience and skills in:

- Foodborne viruses, risk assessment, evaluation of risk management options, harmful algae and natural toxins;
- Management and delivery of multi-agency research programmes;
- Technical input to support the development of international food safety standards;
- Identifying and securing external funding for research programmes;
- Strategic planning, development of objectives and work plans to meet the needs of government and industry stakeholders in the food safety and innovation areas;
- Leading, mentoring and motivating people to deliver high quality science;
- Stakeholder liaison, including identification of needs and communication of science outputs.

10 years in public sector food science roles; 15 years in team management and leadership; two post-graduate degrees focused on foodborne viruses and marine toxins.

Nada M. Melhem

Dr Nada M. Melhem is a Professor of Infectious Diseases and Microbiology (Virology and Immunology) at the Faculty of Health Sciences, American University of Beirut (AUB), Lebanon. Melhem is currently the Director of the Division of Health Professions and the Chair of the Medical Laboratory Sciences Program at the Faculty of Health Sciences. With a unique background and training in virology, immunology and epidemiology, Melhem developed at AUB a transdisciplinary and translational research program focusing on viral immunopathogenesis and the epidemiology of viruses, and their impact on global human health. Melhem’s research focuses on human immunodeficiency virus type 1 (HIV-1), viral diarrheal diseases specifically noroviruses and COVID-19. Melhem is currently leading the SARS-CoV-2 National Surveillance Genomic Program for healthcare workers and hospitalized patients.

In addition to a track-record of productive research work and publications, Melhem has a track record in professional service. She is an elected council member of the International Society for Infectious Diseases and serves on the WHO SARS-CoV-2 Evolution Technical Advisory Group. She is also a member of the National Committee for Communicable Diseases since 2009 serving as a scientific advisor to the Minister of Public Health and the Director General of the Ministry in Lebanon. During the COVID-19 pandemic, Melhem served as a member on the National COVID-19 Crisis Management Committee in Lebanon, the WHO COVID-19 Epidemiology Technical Advisory Group, and was the representative of Low-Resource Settings on Rapid Evidence Assessment of Drug Candidates of the COVID-19 Clinical Research Coalition. Melhem is also the National Polio Containment Coordinator since 2022.
Xiang-Jin Meng
Dr Xiang-Jin Meng is a University Distinguished Professor of Virology at the Virginia-Maryland College of Veterinary Medicine at Virginia Polytechnic Institute and State University (Virginia Tech, Blacksburg, Virginia), and a Professor of Internal Medicine at Virginia Tech Carilion School of Medicine. Prior to joining the faculty at Virginia Tech in 1999, Meng was a Senior Staff Scientist in the Laboratory of Infectious Diseases at the National Institute of Allergy and Infectious Diseases, National Institutes of Health (Bethesda, Maryland, USA). Meng received his medical degree in Medicine in 1985 from Binzhou Medical College (China), Master degree in Microbiology and Immunology in 1988 from Hubei Medical College (China), and PhD in Immunobiology in 1995 from Iowa State University (USA). Meng’s research focuses on numerous emerging and zoonotic viruses of veterinary and human public health significance, with a major interest in understanding the mechanisms of replication, pathogenesis, cross-species infection, and food safety of hepatitis E virus. Meng is an elected member of the U.S. National Academy of Sciences, an elected Fellow of the U.S. National Academy of Inventors, an elected Fellow of the American Association for the Advancement of Science, and an elected Fellow of the American Academy of Microbiology.

Neda Nasheri
Neda did her Masters and PhD in Microbiology and Immunology at the University of Ottawa, studying different viruses such as mumps, and hepatitis C virus. During her post-doc studies, she worked on foodborne viruses such as hepatitis A, E and norovirus. Since January 2018, she has joined the Bureau of Microbial Hazards, at Health Canada, as a research scientist, and the Head of the Food Virology Laboratory. She continues her research on a variety of viruses, and runs a reference service for detection of viruses in food, clinical and environmental samples. She is also an adjunct professor at the Faculty of Medicine, University of Ottawa. Her research interests and projects include detection, genomic characterization, and inactivation of foodborne viruses.

Courage Kosi Setsoafia Saba
Courage Kosi Setsoafia Saba is currently an Associate Professor of Microbiology in the Department of Microbiology of the Faculty of Biosciences and the Director of International Relations and Advancement in the University for Development Studies (UDS). He obtained his first degree at UDS, Ghana in 2005 with a first-class honor in BSc. Agricultural Technology and had his MSc and PhD in Veterinary Sciences (Microbiology option) at the Complutense University of Madrid, Spain where he specialized in food safety and molecular bases for antibiotic resistance in foods, animals, humans and the environment (ONE HEALTH). He returned to UDS after completing his PhD in 2012 to take up a lectureship position. He is also an alumnus of the Galilee International Management Institute, Israel, where he obtained a certificate in Management of Higher Education Institutes. He headed the laboratory complexes of UDS, Nyankpala Campus from 2014 to 2017 and transformed it into a standard Laboratory for teaching research and learning. He won several competitive international grants and also contributed to several international projects. He is a prominent member of the Africa Food Safety Network. He is also the founding father of the African Association for Food Protection now called African Continental Association for Food Protection. He served on the Expert roster for the Joint FAO/WHO Expert meetings on microbiological risk assessment (JEMRA) from 2018 to 2022 and was reappointed on the same committee from 2023 to 2027.
### Donald Schaffner
Dr Donald W. Schaffner is Extension Specialist in Food Science and Distinguished Professor at Rutgers University. His research interests include handwashing, cross-contamination and quantitative microbial risk assessment. He has authored over 200 peer-reviewed publications and educated thousands of food industry professionals around the world. He is a Fellow of the Institute of Food Technologists, the American Academy of Microbiology, the Society for Risk Analysis and International Association for Food Protection (IAFP). He served as an Editor for the ASM journal Applied and Environmental Microbiology from 2005 to 2020. He began serving as a Contributing Editor for the journal Food Microbiology and as Associate Editor for Comprehensive Reviews in Food Science and Food Safety in 2020. Dr Schaffner was the president of IAFP in 2013-2014. In his spare time, he co-hosts the Food Safety Talk and Risky or Not podcasts.

### Magnus Simonsson
Magnus Simonsson is a Doctor in Medical Sciences in the area of medical genetics. The thesis title is “Transformation and Replication Characteristics of in vitro Evolutionary Mutant Papillomavirus Genomes” (1995).

During ten years Magnus worked as a Scientist at the Swedish University of Agriculture Sciences and the Swedish National Veterinary Institute devoted to projects on adenoviruses, retroviruses and processing of the prion proteins. Since 2006 Magnus has been working at the Swedish Food Agency (SFA) building up the competence in the area of foodborne viruses. In 2017 the European Commission designated SFA as the European Union Reference Laboratory (EURL) for Foodborne Viruses. Since then Magnus has been acting as an EURL director. Today the EURL engage around 15 people with different expertise, as virology, molecular diagnostics, method development, risk assessment, epidemiology and proficiency test assessment. The core virology group consists of six people. Magnus has been involved in several different EU and nationally supported scientific projects, mainly on waterborne disease epidemiology and the development of methods for detection of foodborne viruses in food and water. For some years Magnus supported the Serbian Ministry of Agriculture to mitigate the problem with transmission of foodborne viruses through the export of raspberries.

### Fernando Rosado Spilki
Fernando R. Spilki holds a Master’s degree in Veterinary Medicine from Federal University of Rio Grande do Sul (Brazil), and a PhD in Genetics and Molecular Biology from the State University of Campinas (Brazil, 2006). He holds a Full Professor position at Feevale University, Brazil. He is also a fellow of the Brazilian National Research Council, Member of the Brazilian Ministry of Sciences and Technology Virus Network committee, Coordinator of the BR MCTI/Finep Corona-omic Network for genomic surveillance of emerging pathogens and the National Institute of Science and Technology in Virus Genomic Surveillance and One Health. Former President of the Brazilian Society of Virology (2019-2020). His main research interests include the detection and genomic characterization of viruses with potential impact on public health in samples collected from domestic and wild animals, water and food. He led projects for the development of methods for detecting viruses in food, screening for hepatitis E virus and other enteric viruses in products containing pork or beef, and in food transported across borders in Mercosur. He is currently working on the use of metagenomic tools for the detection of new viral markers of food contamination.
Jacquelina Williams-Woods

As a microbiologist for FDA with over 15 years of experience in the fields of virology and microbiology, Dr Jacquelina Woods is a recognized expert in the areas of enteric virus concentration, extraction, detection, characterization, and enumeration in food, clinical and environmental samples. Norovirus is the leading cause of food borne illnesses in the US. Molecular detection of norovirus and other enteric viruses is often hindered by the presence of varied inhibitors which can confound enumeration efforts. Dr Woods has excelled at the development of sensitive and effective methods for concentration and detection of enteric viruses which will help improve food safety. These methods have been used to enumerate and characterize norovirus in several seafood and produce associated outbreaks. Dr Woods has trained over 100 national and international scientists in enteric virus extraction and detection in food and environmental samples. After many years at FDA, her work has resulted in several peer reviewed publications, FDA BAM Chapter, book chapters, and published abstracts.

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