Surviving & Thriving During the Pandemic: Perspectives from Research & the Seafood Industry

**Moderators:** Kevin Edwards, SGS North America, USA
Jessica Jones, FDA Gulf Coast Seafood Laboratory, USA

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Kevin Edwards
SGS North America, USA, United States

Kevin began his career with SGS in July 2000. His management and client experience includes working with manufacturing, import, retail and food service organizations with international supply chain risks.
He is currently responsible for global, market segment development for Herb & Spice and other food segments. Projects include food safety, quality and corporate social responsibility consultancy, including program design, project management, and data management.

Jessica Jones
FDA Gulf Coast Seafood Laboratory, United States

Dr. Jessica Jones is the Branch Chief for the Microbiological Hazards Science Branch in the Division of Seafood Science and Technology/Gulf Coast Seafood Laboratory (GCSL) in Dauphin Island, Alabama. Jessica is involved with multiple areas of seafood safety research, including pathogenic Vibrio species, which is her research focus. She has over 20 years of experience in the development, validation, and application of molecular methods for detection and characterization of seafood-borne Vibrio spp.
SURVIVING AND THRIVING IN THE SEAFOOD SECTOR

Introduction
SURVIVING AND THRIVING IN THE SEAFOOD SECTOR

Resiliency in the Seafood Sector

- Global Supply Chains
- Fishing vessels and gear
- Aquaculture, feed and disease management
- Food Safety
- Commerce (Price, terms, quotas & tariffs)
- ESG: Environmental, Social and Governance
- SARS Covid-19
Douglas Marshall, Eurofins will address the challenges of COVID-19 management plans due to close employee contact.

- How facilities can use multiple analytical tools to measure employee SARS-CoV-2 infection and food or package material contamination.
- Evidence will be provided showing how risk can be measured by testing worn mask, air, and wastewater.
Tracy McConnell, King & Prince. how they "survive and thrive” during the Covid pandemic.

- Initial development of Covid-19 safety protocols, contact testing; and employee training; and prerequisite program changes that enhance employee safety;
- Contact tracing programs using video and employee interviews and Partnering with local healthcare providers for testing and vaccine distribution
Lorenzo De Santis, SGS Peru. Will present the international perspective,

- What was the government’s food safety / HACCP system mandate to the fishing industry;
- How was this collaboration organized and its systems given a critical prioritization?
- What was the impact to the economy of the country?
- What were the main aspects taken in account to protect all people involve in the cycle?
Dr. Reza Ovissipour, Virginia Tech University, He will cover the media reports of SARS-CoV-2 detection on foods that have increased concerns of a public health risk from contaminated foods.

- What is the survival rate of the SARS-CoV-2 on fomites?
- What is the difference between PCR and live virus detection?
- The critical role of developing proper surrogates for risk assessment studies, process and disinfection verification.

- Followed by an interesting Q & A discussion with your panelists.
Dr. Douglas L. Marshall is Chief Scientific Officer with Eurofins Microbiology Laboratories. Formerly he was Associate Dean and Professor of Public Health, College of Natural and Health Sciences, University of Northern Colorado and a Contributing Editor of the scientific journal Food Microbiology. His career focus is to improve the microbiological quality and safety of foods, with numerous publications and consultations in the area. He has received the Mississippi Chemical Corporation Award of Excellence for Outstanding Work and the International Association for Food Protection Educator and Harold Barnum Industry Awards. He is a Fellow of the Institute of Food Technologists.
Surviving and Thriving During the Pandemic: Using Sentinel Environmental Monitoring for SARS-CoV-2 to Improve COVID-19 Control

Douglas L. Marshall, Ph.D., CFS
Eurofins Microbiology Laboratories
douglasmarshall@eurofinsus.com

International Association for Food Protection Seafood PDG
Webinar
April 14, 2021
Health & Safety Is Our Mission

Eurofins provides testing services in four main areas that have a strong impact on human health:

- Founded in 1987
- International network of >900 independent companies in >50 countries with >800 laboratories and >47,000 staff
- Portfolio >200,000 analytical methods with >400 million test performed annually

Our Mission

To contribute to a safer and healthier world by providing our customers with innovative and high quality laboratory, research and advisory services whilst creating opportunities for our employees and generating sustainable shareholder value.
One 380-μm cough or sneeze droplet can contain 230 virus particles and travel up to 200 ft.

* Transmission routes involving a combination of hand & surface = indirect contact.

Source: Otter et al., 2016, J. Hospital Infect.
NAVIGATING THE DISTINCTIVE NATURE OF SARS-COV-2

We’ve made it clear that there’s asymptomatic spread...people are spreading the virus unknowingly. -Dr. Birx

1 https://www.wsj.com/articles/coronavirus-vaccine-frontrunners-emerge-rollouts-weighed-11589707803
2 https://health.ucsd.edu/coronavirus/Pages/FAQ.aspx

Typical average onset of respiratory symptoms.
Why Do Workplace COVID-19 Controls Fail?

• Airborne shedding of Coronavirus by asymptomatic, presymptomatic, and symptomatic individuals is the primary cause of outbreaks. Exposure to a presymptomatic individual up to 5 days before they present symptoms is the leading cause of transmission.

• Workplace controls such as fit-for-duty screens and temperature checks do not detect the majority (56%) of spreaders.

• Mildly symptomatic employees may be encouraged to work if they receive no paycheck and no healthcare benefits while out. Some even receive pay bonus for showing up to work.

• Testing every employee every day is impractical.
Because of Spectacular Failures, Workers are Scared

- Employee unions are suing employers for unsafe working conditions
- Employee walkouts can occur
- If you are a retailer, customers are afraid to enter your business
- If you shut down because you’re hosting a COVID-19 outbreak, your customers will not be likely to return as they’ll find other suppliers during your outage
- Whatever product or service you provide will quickly show degradation in quality and performance due to worker apathy and worker shortage
- Your brand reputation will be seriously damaged
Fomite Spread

- Virus particles deposited on any inanimate object that can serve as a route of disease transmission
- Can involve viruses that spread primarily by fecal-oral, respiratory, or body fluid/tissue spread
- Super shedders/spreaders – asymptomatic individuals who expel much larger quantities of virus than the sick or dying
- Controlled by proper personal hygienic practices
- Controlled by proper disinfection

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SAFER@WORK™

Sentinel Program
Testing services
• Wastewater
• Worn Mask Testing
• Surface Testing
• Air Testing
• Pooling

Sampling and Applications

Food and Package Testing

• Early in pandemic our conversations with US and EU public health authorities revealed a strong bias against testing foods or food-contact surfaces for SARS-CoV-2 for fear that detection will cause widespread public panic about the safety of the food supply. As a result, Eurofins declined multiple requests for such testing.

• When other public health authorities made the presumptive link between exposure to contaminated foods or food package materials and spread of COVID-19, we immediately validated our SARS-CoV-2 surface test as appropriate to verify presence of the virus on food and packaging surfaces.
COVID-19 TEST STRATEGY: ROADMAP TO A SAFER TOMORROW

**SENTINEL TESTING**
- Air
- Wastewater
- Surface
- Baseline PCR
- Worn Mask + Pooled Mask
- PCR Pooling

**RESULT**
- Pooled PCR 5/1
  - Negative
  - Positive

**INDIVIDUAL TESTING**
- PCR (Medical Personnel Observed)
- PCR (Self-Collection (At Home))

**POSITIVE**
- Isolation based on CDC guidance (for individual PCR or POC antigen)

**NEGATIVE**
- Retest every 2-3 days, during exposure risk period. Keep performing sentinel testing in tandem.

**ONGOING SYMPTOM TRACKING**

**LOCAL INFECTIVITY RATES**
MONITORING

**ONGOING ANTIBODY TESTING TO MONITOR**
EXPOSURE
Today’s Participants

Tracy MccConnell
King and Prince, United States

• Vice President, Technical Services With K&P in this role for 8 years
• Oversees quality assurance and food safety, sustainability, Social Compliance, and Regulatory affairs
• Prior experience with Burger King, Wayne Farms, ConAgra, Armour Swift Eckrich
• Education: B.S. in Microbiology - Ohio State University and M.S. in Chemistry - Wright State University
• Certified Quality Engineer (CQE) with the American Society for Quality
• Certified BRC Auditor
• Certified AS 8000 Lead Auditor for Social Accountability
• COVID-19 Workplace Coordinator
Surviving and Thriving Through the Pandemic

April 14, 2021
Brunswick, GA Facility
King & Prince Seafood

• Founded in Brunswick in 1924
• Headquartered in Brunswick, Georgia
• 460 exceptional employees
• Delivering value-added, innovative seafood products to foodservice and restaurant customers
• Team member health and safety are core values
COVID-19 Impact - Late March, 2020

• Sudden business downturn!

• COVID-19 cases reported at our Redmond, WA, seafood processing plant
• Announced a 2 week “pause” in production at all plants
• Developed a plan to resume operations, keep employees safe and service customers
Early Response to COVID-19

- Humanity first, business second approach
- Stopped all travel, and visitors
- Developed a work from home agreement and many employees worked from home
- Regular communication from the CEO
- COVID-19 Policy communicated
- Transparent communication to all of our employees that included notification of every Covid-19 confirmed employee result
Early Response to COVID-19

- Developed COVID-19 Protocols
  - Task Force and Workforce Coordinator
  - Daily temperature checks
  - Reusable masks and PPE
  - Social distancing
  - Enhanced sanitation
  - Signage, signage, signage!
  - Employee sign-off on Protocols
  - Procedures for employees testing positive
  - Formed a relationship with a local health care provider
Managing Through the Pandemic

- COVID-19 training for all employees with a third-party Health and Safety Group
- SGS Disinfection and Monitoring Certification Audit
- Monthly Surface testing for COVID-19 with CAPA resolutions
- Daily high touch ATP analysis with immediate corrective actions
- Free, on-site, weekly, voluntary COVID-19 testing for employees provided
Managing Through the Pandemic

• Contact Tracing
  – Notification of a Covid-19 positive from several sources
    • Our voluntary testing program
    • County Department of Health
    • Employee notification
    • Employee family notification
  – Utilized the 102 cameras in the facility, employee interviews, and traffic and assignment patterns to determine potentially affected employees.
    • Considered any employee within 6 ft for 15 cumulative minutes confirmed positive individual regardless of whether they had masks or face shields
    • Analyzed 3 days of employee interaction
  – Local health provider provides contact tracing for employee with close contact
  – Paid leave for affected employees
Vaccine Strategy

• Health Care provider providing on-site vaccines weekly
• Company president communicating daily to employees
• Vaccine percentage rate goals for company and department with incentives
• Counter acting rampant misinformation with data
• MBA with more than 10 years of experience on managing and creating business in different industries (fishing, construction, industrial, services)

• Focus on commercial, finance and business development.

• Business Manager of Health & Nutrition Division - SGS Perú.
How one government, industry and trade association collaborate to protect a critical industry in Perú
Agenda

01 Peruvian Economy
02 Public – Private Collaboration
03 SGS Critical Role
04 Importance of the Fishery Sector
05 Result
Peruvian Economy pre Covid
Peruvian Economy pre Covid
Peruvian Economy post Covid-19

Graphs showing economic data and analysis.
Due to Covid, Peru enter in strict lockdown

Peruvian economy very affected

Fishing season close to start (April 2020)

There was a “need” to be identified as soon as possible (reactivation)

Strong credibility to their protocols against Covid-19

Negotiation between the National Fishery Society main board the CEO’s of the biggest fishery companies.

Fast track service (15 days)

42 daily plants (12 different locations in all the coast)
Fishery Sector Requirements

**Fishmeal**
- Fishmeal shipment supervision
- Inspection, sampling and analysis in fishmeal production

**Discharge**
- Program for controlling all the fishery activities
- Avoid illegal fishing
- Control unauthorized capture of species

**Oil & Fat**
- Supervision of loading and unloading of vegetable and marine oils
- Weight supervision, bulk oil handling
- Sampling and analysis

**Food Safety**
- HACCP
Crisis Management against Covid 19

- Engage all stakeholders in the process (producers, brokers, buyers, sta...)
- Fast and easy understanding of the “need”
  - Identify 360° critical risks (safety + operative leverage)
  - Identify the flow of the service (“door2door”)
  - SGS mix of experience (when you need to be sure)
- Tailor-made protocol based on knowledge of fishing and hygiene
- Fast and efficient nationwide deployment (41 plants in Perú)
- Capacity to replicate in other sectors
- Continuity to move downstream to protect fishmeal and the catch
Importance of the Fishery Sector

Fishery activity = 1.5% Peruvian GDP

More than 7% of Peruvian exportations (USD 1,000 MM)

Rent and taxes USD 150 – 200 MM

More than 700,000 Jobs per year

Covid investments USD 15 MM
Result

**PBI total, 2020**

(Var. % anual)

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<th>Var. % anual</th>
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**FUENTE:** BCR, Bruno Seminario (2016)  
**ELABORACIÓN:** Macroconsult

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**SGS**
Recomendamos realizar medidas preventivas para prevenir el COVID-19 en nuestras plantas de productos de consumo. Esto incluye el uso de mascarillas, el lavado regular de manos, la social distancing y el uso de espray desinfectante.

#JuntosLoPodemosTodo #SeguridadSostenibilidad

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**Perú - AUSTRAL GROUP paso exitosamente auditoria de cumplimiento de los protocolos del COVID 19**

Martes 21 de abril de 2020

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**SNP: industria pesquera lista para iniciar temporada tras aprobación de protocolo sanitario**

Según la presidenta del gremio, durante el periodo de mantenimiento, el índice de contagio ha estado muy por debajo de 1 por cada 1,000 trabajadores.

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**SGS Peru**

SGS, 1,482 seguimientos 2 días antes

La industria pesquera está lista para iniciar la temporada luego de cumplir con los protocolos sanitarios frente a la Covid-19. En SGS celebramos haber colaborado con la reactivación de las actividades pesqueras a través de dichos protocolos aprobados por el Ministerio de la Producción y por el Ministerio de Salud, para las actividades de mantenimiento de plantas y embarcaciones.


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Result

2,967 inspections
99.44% compliance

10 plants
8 plants
35 plants
18 plants
13 plants
9 plants
How one government, industry and trade association collaborate to protect a critical industry in Perú
Dr. Reza Ovissipour

Virginia Tech, United States

Dr. Ovissipour is an Assistant Professor in the Department of Food Science and Technology (FST), and the Virginia Seafood AREC at VT. He also holds a faculty appointment with Genetics, Bioinformatics, and Computational Biology; Center for Advanced Innovation in Agriculture; and Center for Emerging, Zoonotic, and Arthropod-borne Pathogens. He holds a Ph.D. in Seafood Science and Technology and a Ph.D. in Biological Systems Engineering. Dr. Ovissipour leads the Sustainable Food Production System program, focusing on cellular agriculture, alternative proteins, AI and food processing, and food safety.
An integrated Approach to Address COVID-19 Concerns in Food Supply Chain

Reza Ovissi, Ph.D
Assistant Professor, Department of Food Science and Technology/Seafood AREC

oviassi@vt.edu

International Association for Food Protection
Seafood PDG Webinar
April 2021
Impact of COVID-19 on Food Supply Chain

Farm Level

- Price dropped considerably
- Production remained the same, demand reduced
- Restaurants closures
- Farmers issues with extra production
- Livestock needs feed, energy, land, water, but many processing plants shut down
- COVID-19 transmission among livestock
- Next production cycles uncertainty

Impact of COVID-19 on Food Supply Chain

Processing Level

- Food industry workers cannot telework
- Processing declined significantly
- Wholesale reduction
- Online marketing
- Build resilience during the COVID-19

During COVID-19
May 2020 Compared with May 2019

-15%

After COVID-19
2021 Projections Compared with 2019

2%

Fisheries
-40%

Imports
-37%

Exports
-43%

270% Takeout, delivery, online sell

Impact of COVID-19 on Food Supply Chain

Retail and Restaurant Level

- Food shortage
- Consumers concerns about restaurant
- 2.1 M jobs lost in restaurant industry
- As of Dec. 2020, 110,000 restaurants were closed
- Restaurant industry lost $130 B in sales in 2020
Impact of COVID-19 on Food Supply Chain

Consumers

• How to protect myself in a grocery store?
• Can I get the virus from a tomato I pick up in the grocery store to see if it's ripe, if someone who is infected picked it up before me?
• How to handle my food after purchasing?
• Should I sanitize my food and packages?
• How to order online?
• Shopping behavior changed
• Senior consumers are more vulnerable
The key technical challenges are:

- **Little to no information** about SARS-CoV-2 survival on different foods, food contact surfaces and food packaging materials under different storage and handling conditions is available

- **SARS-CoV-2 inactivation on surfaces** using different commonly used food grade sanitizers has not been evaluated, particularly in the presence of food residues

- A general lack of information about SARS-CoV-2 **transfer mechanisms** in the food supply chain

- Despite developing training courses, factsheets, guidance materials, and webinars regarding COVID-19 in the food supply chain, a **systematic research-extension** program is **required** to develop extension and training materials based on scientific evidence.

- Not that many researchers have access to **BSL-3 labs**

- It requires a cross-disciplinary team including **food scientists and virologists**
Team at Virginia Tech

Dr. Reza Ovissi, Assistant Professor of Food Safety Engineering
Dr. Andrea Bertke, Associate Professor of Virology
Dr. Renee Boyer, Professor of Food Safety and Consumer Services
Dr. Laura Strawn, Associate Professor of Food Safety Extension
Dr. Michael Schwarz, Director of Seafood AREC, Extension
Dr. Tiffany Drape, Assistant Professor of Agriculture Education
Abigail Villalba, Food Safety Extension

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Dr. Mo Jia, Postdoc, Research
Thet Aung, M.Sc. student, Extension
Jonathan Joyce, Ph.D. student, Research
COVID-19 in Food Supply Chain

Survival of Virus on Different Foods and Food Contact Surfaces Under Different Conditions (Obj. 1-2)

- Different Temperatures and RH
- QUATS
- Electrolyzed Water and Nanobubbles
- Sanitizers and Technologies
- Peroxide
- Hydrogen Peroxide
- Chlorine
- UV-C

Contact Surfaces with and without food residues

Fate of Virus in Food Plants (Obj. 3)

Other Foods, contact surfaces and hands

Obj. 4
Developing and delivering a first series of training courses for fresh produce and meat industries to aid in safe distribution of fresh foods and delivering the materials to stakeholders within 3 months
**Aim 1:** Assess survival of SARS-CoV-2 on different foods, food contact surfaces, and packaging materials under different conditions.

### Foods
- Tomatoes
- Avocado
- Oysters
- Shrimp
- Oranges
- Mushrooms

### Conditions for Foods
- Freezing, refrigerator, room

### Food Contact Surfaces

#### Zone 1 to Zone 4
- Polypropylene
- Polyvinyl chloride (PVC)
- Polystyrene
- Polycarbonate
- High Density Polyethylene (HDPE)
- Low Density Polyethylene (LDPE)
- Acrylonitrile butadiene styrene (ABS)
- Polyethylene terephthalate (PET)
- Polystyrene foam
- Polyurethane
- Nylon
- Cardboard
- Stainless Steel
- Wood
- Glass
- Epoxy
- Concrete

#### Conditions for Contact surfaces
- Freezing, refrigerator, room, 40°C
- RH: 20, 50, and 80%

#### Food Contact surfaces with meat and seafood residue
Optimization and preliminary experiments

**Virus**
- *Pseudotype virus*
- HSV-1 BSL2
- SARS-CoV-2 BSL3

**Inoculation media**
- PBS
- Artificial saliva
- Saliva

**Recovery methods**
- Rinsing
- Massaging

**Pseudotype virus**
- Herpes Simplex Virus (HSV-1)
  - 155-240 nm
  - viral envelope glycoproteins
  - DNA Virus

**SARS-CoV-2**
- 50-200 nm
- viral envelope glycoproteins
- RNA Virus
Survival of Virus on Foods

- Virus used: HSV-1 and SARS-CoV-2
- Initial concentration: $1 \times 10^6$ PFU/ml
- Incubation temperature: 4°C
- Time points of evaluation: 0h, 1h, 24h

Plaque assay
Recovery Methods: Rinse vs Massage

- Spot inoculation followed by rinsing of the food pieces with 1 ml DMEM in 12-well plate
- Spot inoculation followed by hand massaging of the food pieces with 1 ml DMEM in Whirlpak® bags
Results: HSV-1 Surrogate: Rinse vs Massage Methods

Rinse Method

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<th>Mushroom</th>
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Massage Method

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HSV-1 on foods: surrogate virus testing

HSV-1
(surrogate virus)

Log(PFU/mL)

Time (hr)

Inoc  0h  1h  24h

Chicken skin  Salmon  Shrimp
Spinach  Apple skin  Mushroom
SARS-CoV-2 on foods: comparison of food type

SARS-CoV-2

Log (PFU/ml)

Time (hr)

Inoc  0h  1h  24h

Chicken skin  Salmon  Shrimp
Spinach  Apple skin  Mushroom

abc
HSV-1 and SARS-CoV-2 on foods: comparison of viruses

**HSV-1** (surrogate virus)

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**SARS-CoV-2**

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SARS-CoV-2 on foods:
infectious virus titer vs. genome copies of virus

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**SARS-CoV-2**

**Infectious Virus Titer/ml**

**Virus Genome Copies/ml**

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Inoculum  
Chicken skin  
Salmon  
Shrimp  
Spinach  
Apple skin  
Mushroom

**0 Hr**  
**1 Hr**  
**24 Hr**
**Aim 2:** Determine the efficacy of different conventionally used and novel sanitizers against SARS-CoV-2 on food and food contact surfaces.

**Conventional Sanitizers**
- Sodium hypochlorite (2 to 20 ppm);
- Hydrogen peroxide (3%);
- Peracetic acid (20 to 80 ppm);
- QUATs (50-200 ppm);
- UV-C

**Emerging and innovative sanitizers**
- Electrolyzed water;
- Nanobubbles;
- Photosensitizers
Aim 3: Measure the transfer rate from hands to foods and food contact surfaces to best mimic the fate of virus.

*Pseudovirus*
**Aim 4:** Develop education materials for food supply chain stakeholders, including farmers, food production workers, food retailers and consumers.

- Industry advisory board
- Interviews for needs assessment were completed
  - Seven, 30-60 minute interviews
  - Challenges included
- Current available resources were analyzed
- The stakeholder needs were prioritized
- Factsheets, training courses, and educational materials are under development

- VCE COVID-19 related resources
  - 35 Video (Webinar, Interview, or Instructional Video)
  - 92 Factsheets (31 in Spanish)
Publications

Manuscripts
- Dhakal, J., Jia, M., Joyce, J., Moore, G., Ovissipour, R., Bertke, AS. Survival of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) and Herpes Simplex Virus-1 (HSV-1) on Foods Stored at Refrigerated Temperature. Manuscript submitted to Foods, Under Review.

Conference Presentations and Abstracts
- Ovissipour, R. Building a Study to Evaluate How Coronavirus Survives on Different Foods and Food Contact Surfaces. Virginia Food Protection Taskforce, AFDO, January 2021, Attendance 198.
- Dhakal, J., Jia, M., Joyce, J., Ovissipour, R., Bertke, A. Study on survival of Herpes Simplex Virus (HSV-1) on foods, a method development for SARS-CoV-2 study. International Association for Food Protection (IAFP), July 2021.
- Dhakal, J., Jia, M., Joyce, J., Bertke, A., Ovissipour, R. Study on persistence and survival SARS-CoV-2 in various foods. IAFP, July 2021.
Thank you Questions?
Questions?

• Questions should be submitted via the Questions section at the right of the screen.
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This webinar is being recorded and will be available for access by IAFP members at www.foodprotection.org within one week.

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