



# 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

Sponsored by the



Organized by the Seafood Safety and Quality PDG

Please consider making a contribution

This webinar is being recorded and will be available to IAFP members within one week.

# Webinar Housekeeping

- For best viewing of the presentation material, please click on 'maximize' in the upper right corner of the 'Slide' window, then click 'Escape' to return to normal view.
- Questions should be submitted to the presenters during the presentation via the **Questions section** at the right of the screen. Questions will be answered at the end of the presentations.

# Webinar Housekeeping

- It is important to note that all opinions and statements are those of the individual making the presentation and not necessarily the opinion or view of IAFP.
- This webinar is being recorded and will be available for access by IAFP members at [www.foodprotection.org](http://www.foodprotection.org) within one week.

# Today's Moderators



**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

WHEN YOU NEED TO BE SURE



- 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.

# Today's Participants



**Douglas Marshall**  
*Eurofins, United States*

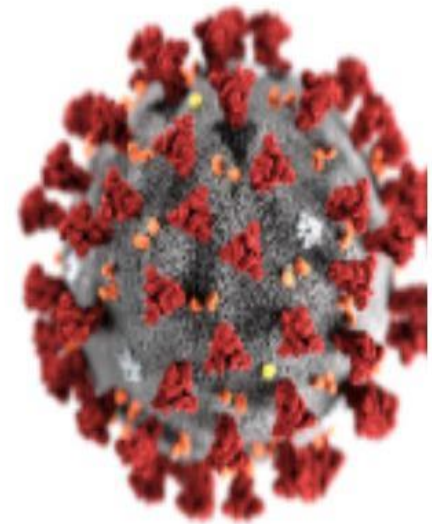
Dr. Douglas L. Marshall is Chief Scientific Officer with Eurofins Microbiology Laboratories. Formerly he was Associate Dean and Professor of Public Health, College of Natural and Health Sciences, University of Northern Colorado and a Contributing Editor of the scientific journal Food Microbiology. His 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](mailto:douglasmarshall@eurofinsus.com)

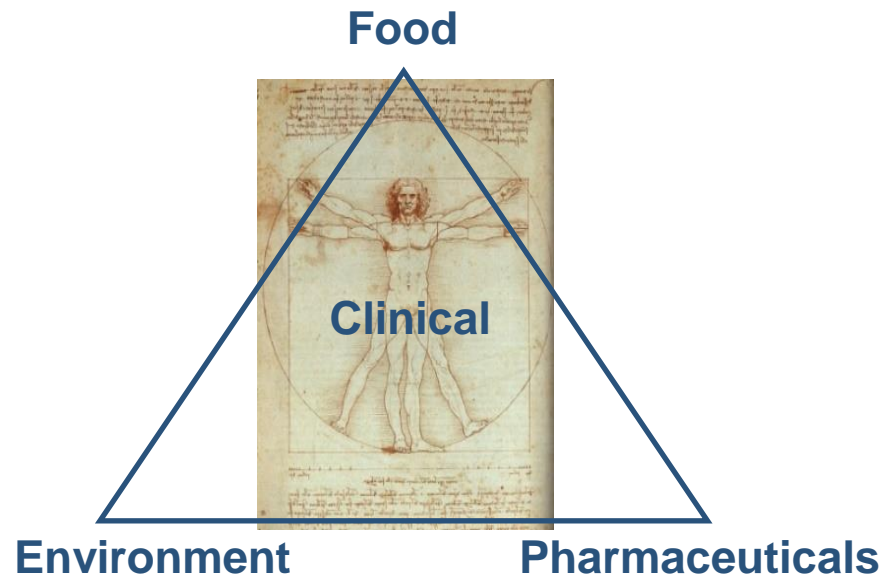
International Association for Food Protection Seafood PDG  
Webinar  
April 14, 2021



# Health & Safety Is Our Mission



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

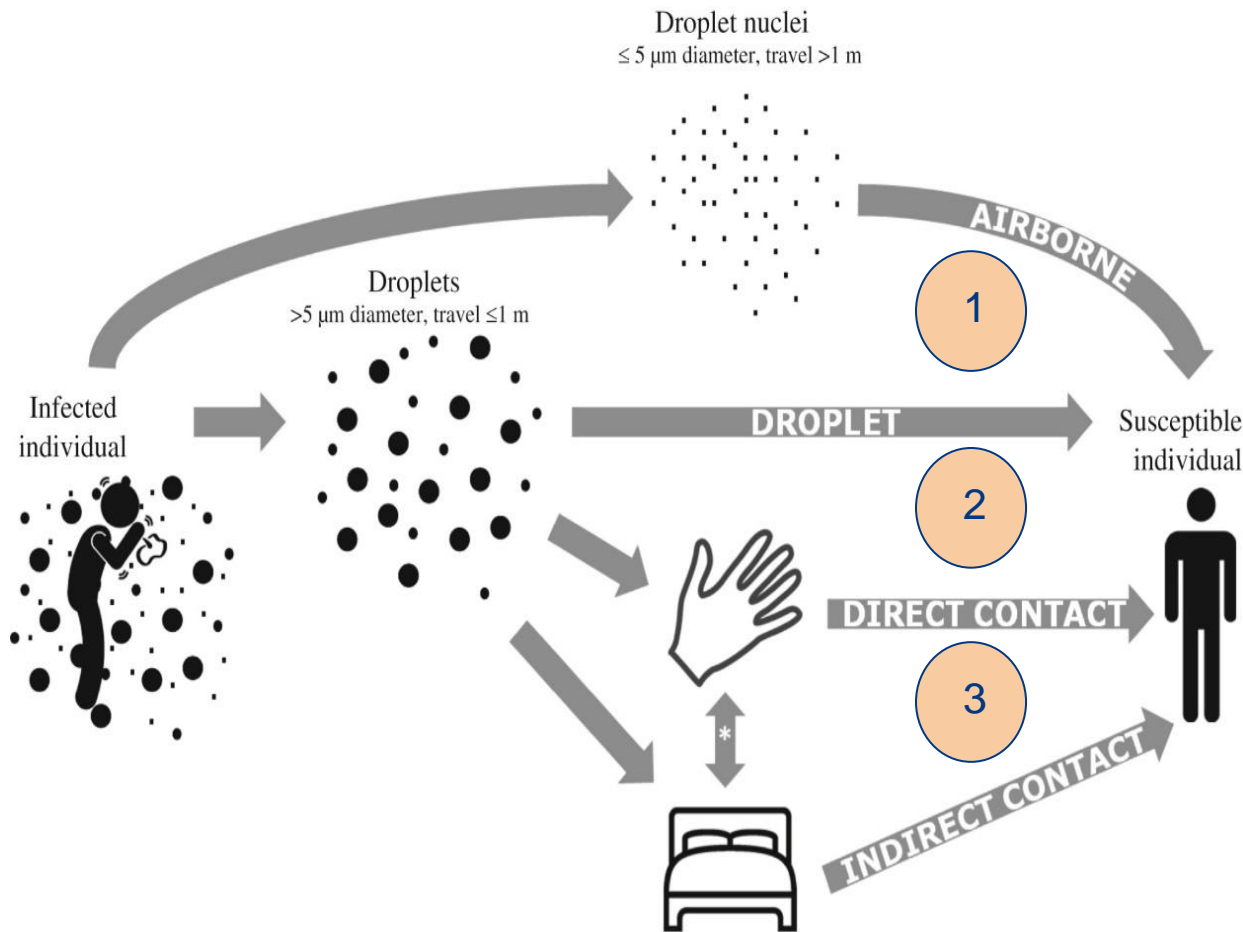


- Founded in 1987
- International network of >900 independent companies in >50 countries with >800 laboratories and >47,000 staff
- Portfolio >200,000 analytical methods with >400 million test performed annually

## 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

# SARS-CoV-2 Transmission



**One 380- $\mu\text{m}$  cough or sneeze droplet can contain 230 virus particles and travel up to 200 ft**

**Source:**  
Otter et al., 2016, J. Hospital Infect.

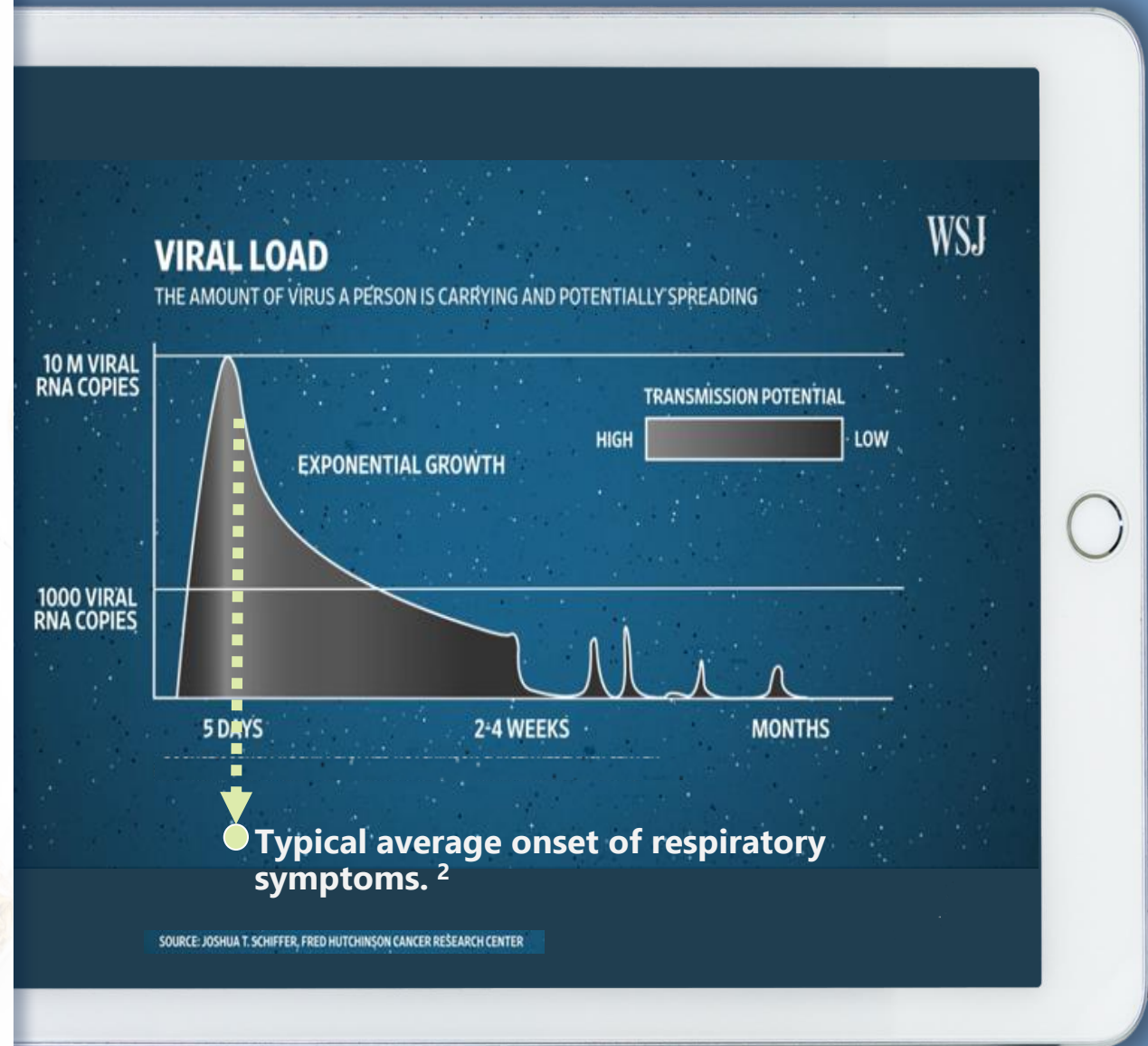
\* Transmission routes involving a combination of hand & surface = indirect contact.

# 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

”



<sup>1</sup> <https://www.wsj.com/articles/coronavirus-vaccine-front-runners-emerge-rollouts-weighed-11589707803>

<sup>2</sup> <https://health.ucsd.edu/coronavirus/Pages/FAQ.aspx>

# 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

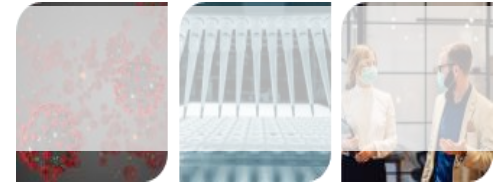


- **Employee unions are suing employers for unsafe working conditions**
- **Employee walkouts can occur**
- **If you are a retailer, customers are afraid to enter your business**
- **If you shut down because you're hosting a COVID-19 outbreak, your customers will not be likely to return as they'll find other suppliers during your outage**
- **What ever 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**



## Sentinel Program

### Testing services

- Wastewater
- Worn Mask Testing
- Surface Testing
- Air Testing
- Pooling

### Sampling and Applications

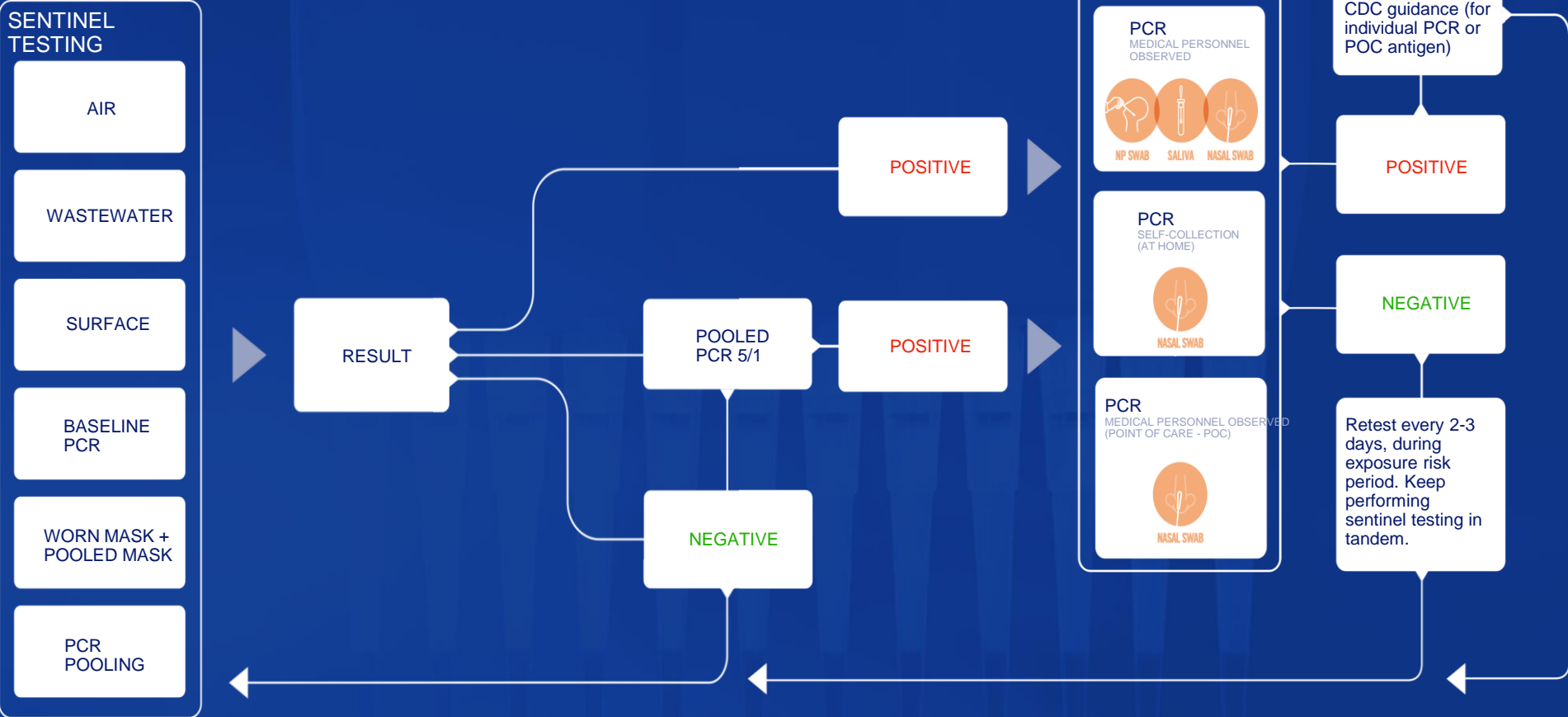


# Food and Package Testing



- 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



ONGOING SYMPTOM TRACKING

LOCAL INFECTIVITY RATES MONITORING

ONGOING ANTIBODY TESTING TO MONITOR EXPOSURE

# Today's Participants



**Tracy McConnell**  
*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

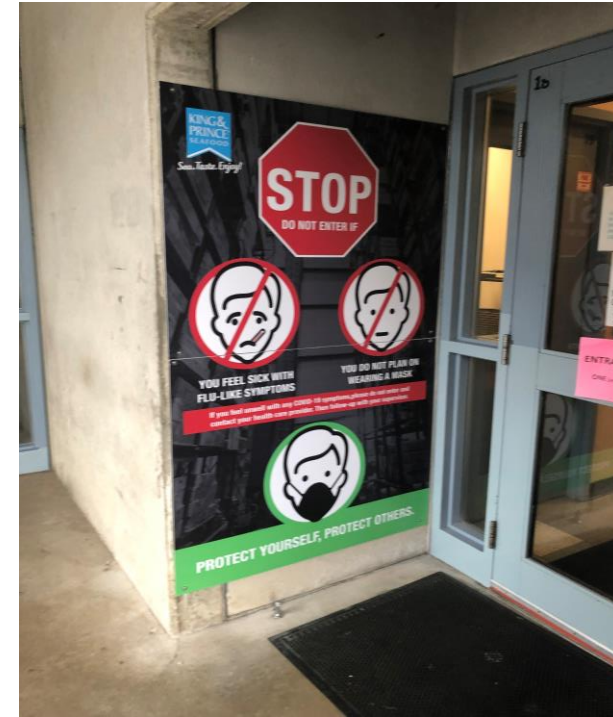
- Sudden business downturn!



- 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



# Today's Participants



**Lorenzo De Santis**

*SGS Peru, Peru*

- 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.

SGS Peru

**How one government,  
industry and trade  
association collaborate to  
protect a critical industry in  
Perú**



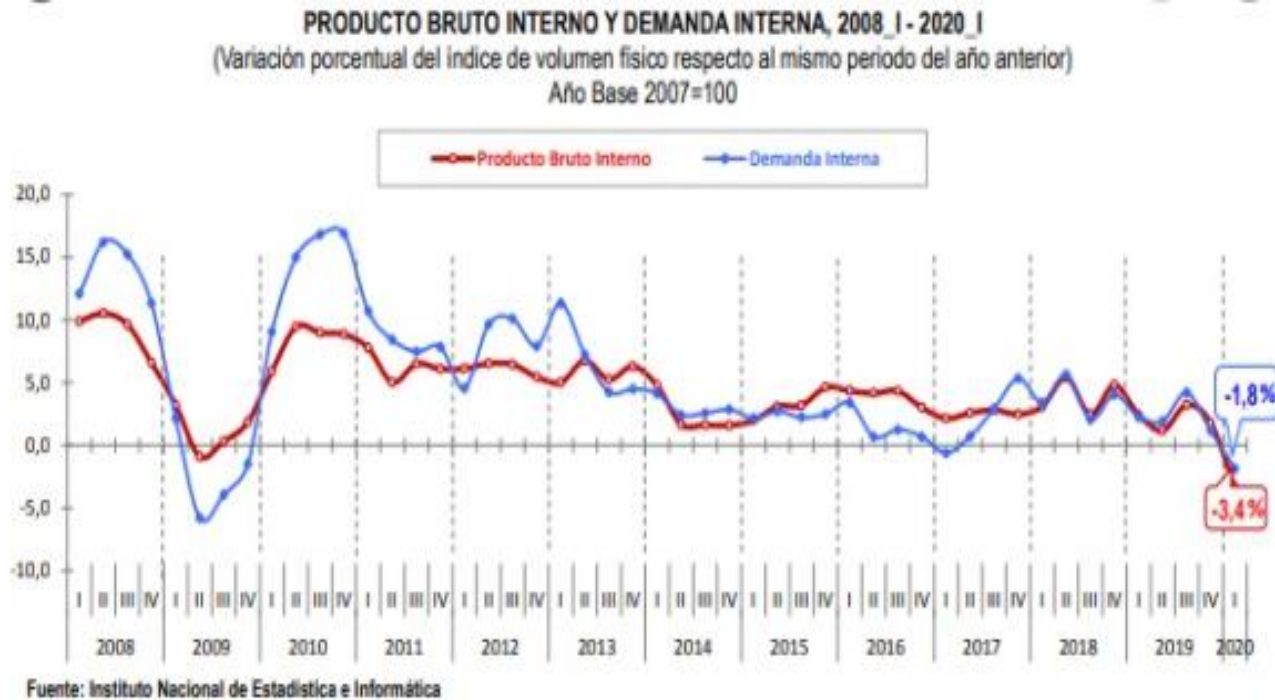
April 2021

# Agenda

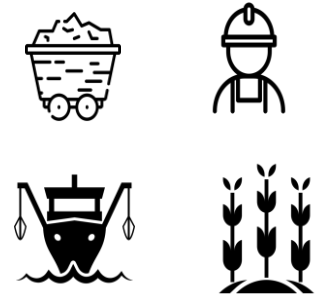
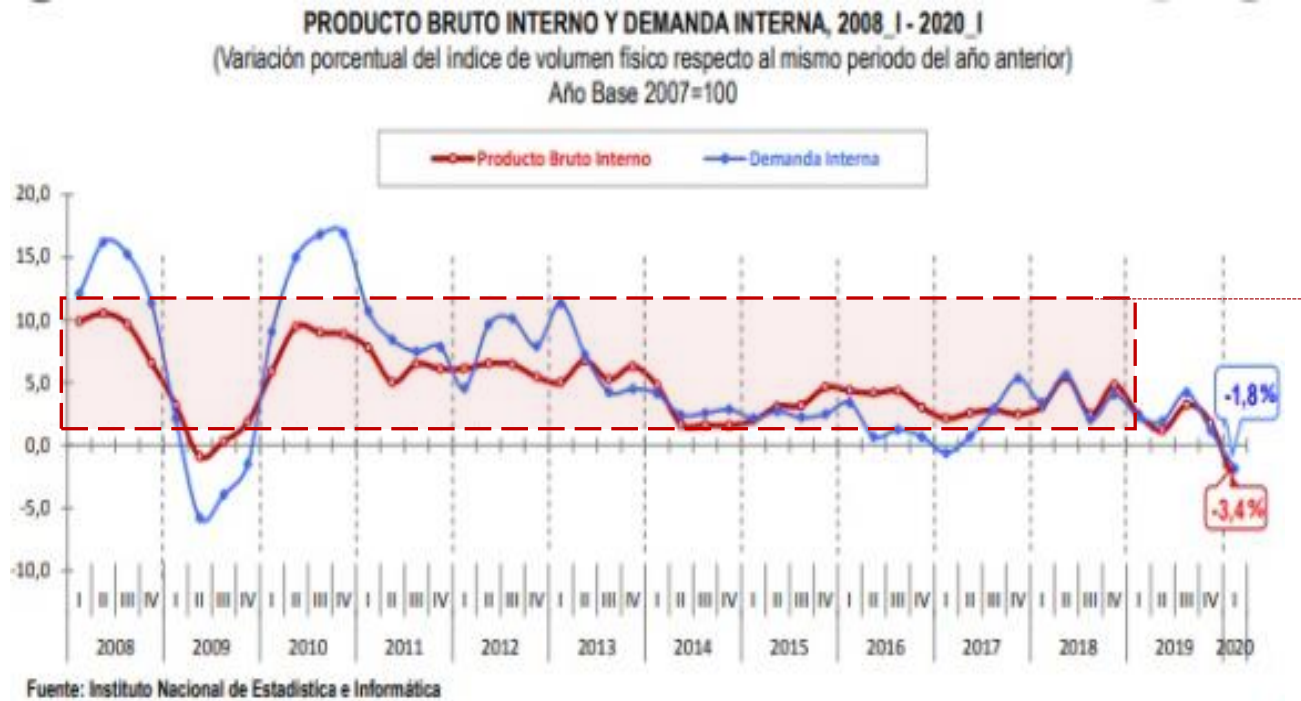


- 01 Peruvian Economy
- 02 Public – Private Collaboration
- 03 SGS Critical Role
- 04 Importance of the Fishery Sector
- 05 Result

# Peruvian Economy pre Covid



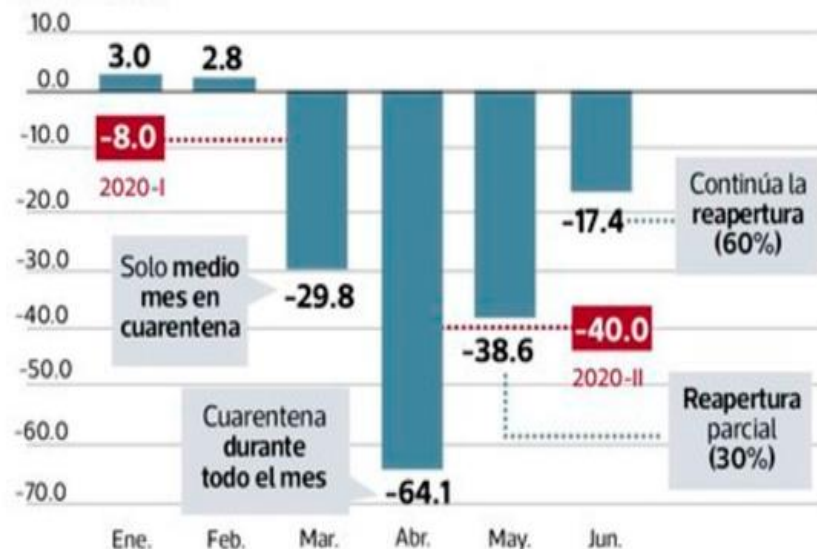
# Peruvian Economy pre Covid



# Peruvian Economy post Covid-19

## PBI total, 2020

(Var. % anual)



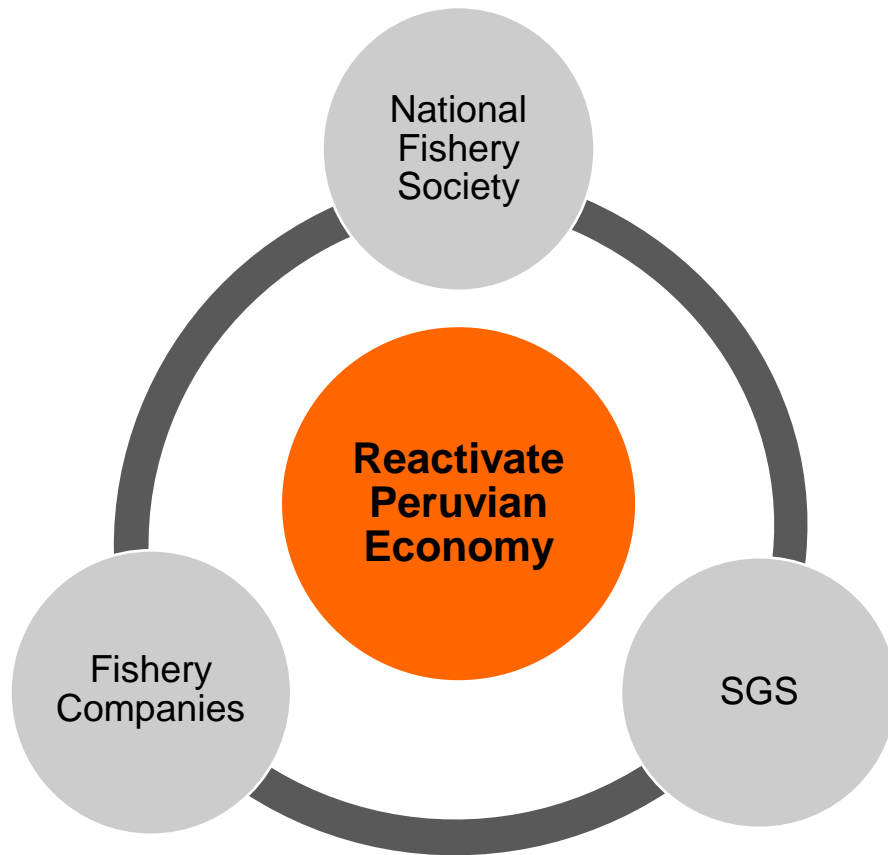
FUENTE: BCR, Bruno Seminario (2016)

ELABORACIÓN: Macroconsult

Var. % real anual; var. % 3m/3m, anualizada<sup>1</sup>



# Public – Private Stakeholders Collaboration



- 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



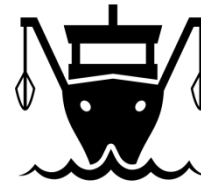
## **Fishmeal**

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



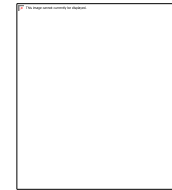
## **Discharge**

- 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

PROYECTA LA PRESIDENTA DE LA SNP

## Pesca aportará más de US\$ 1,000 millones al PBI

Destacarán envíos de harina y aceite de pescado.

El aporte de la actividad pesquera del país se observará sobre todo en el desempeño del producto bruto interno (PBI) de junio y julio de este año, proyectó la presidenta de la Sociedad Nacional de Pesquería (SNP), Cayetana Aljovín.

"A diferencia de abril y de mayo de este año, en junio y julio se registrará el impacto positivo de la actividad pesquera. A finales del quinto mes del año, llegamos a operar al 100% de nuestra capacidad instalada", manifestó en conferencia virtual.

### Participación

La líder gremial proyectó que en este periodo de emergencia nacional la pesca apuntalará a la tan golpeada economía peruana, al contribuir con alrededor de 1,000 millones de dólares en divisas para el país.

"Es el producto de las exportaciones de harina y aceite de pescado, como resultado de la primera temporada",

### Apoyo a la recuperación

Aljovín recordó que la pesca de anchoveta, en la primera temporada, tuvo una cuota de 2.4 millones de toneladas métricas.

"El desembarque a la fecha es de 7.33 millones de toneladas métricas. En las próximas semanas debe cumplirse la

captura total de la cuota establecida para este periodo", añadió. Proyectó que de aplicarse una cuota similar para la segunda temporada, la actividad pesquera ayudaría a disminuir la caída de la economía nacional para este año.

manifestó Aljovín.

Con relación al covid-19, dijo que la industria pesquera implementó estrictos protocolos de bioseguridad tanto durante la etapa de mantenimiento como para la operación en flota y planta.

"Estas medidas demandaron una inversión superior a los 41.3 millones de soles, y convirtió al sector pesquero en un referente para otras industrias en la implementación de protocolos de seguridad", subrayó.



Actividad. La pesca genera divisas a la economía peruana.

La titular de la SNP informó que, según un reciente informe elaborado por Apoyo Consultoría, el 1.5% del PBI es generado por la extracción e industria pesquera.

Añadió que cuando se agrega el efecto indirecto, mediante los encadenamientos interindustriales, el impacto se eleva a 2.5% del PBI.

"En cuanto a la generación de empleo, el sector pesquero contribuye con 700,000 puestos de trabajo. De estos, más de 112,000 empleos son

generados por la extracción e industria pesquera. Además, según el Instituto Peruano de Economía, por cada empleo directo en este rubro, se activan tres indirectos", detalló.

Agregó que el sector pesquero genera 3,300 millones de dólares en divisas, lo que representa el 7% de las exportaciones totales del Perú.

"De este total, la exportación de harina y aceite de pescado representa el 4.7%, y ocupa el tercer lugar de los envíos tradicionales", sostuvo.



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

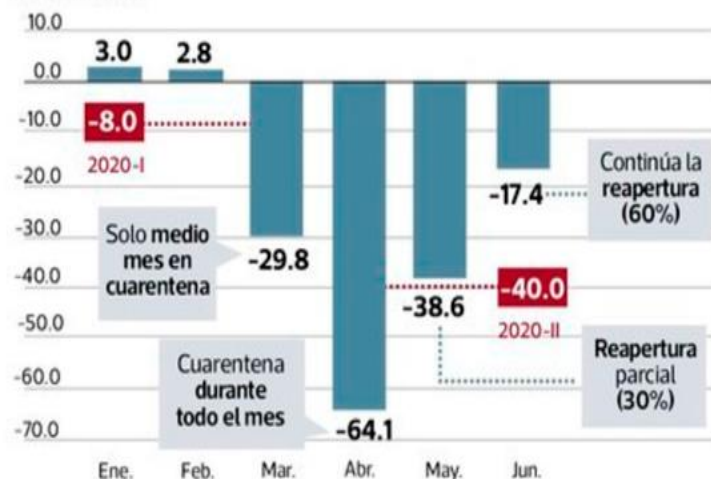


Covid investments USD 15 MM

# Result

## PBI total, 2020

(Var. % anual)



FUENTE: BCR, Bruno Seminario (2016)

ELABORACIÓN: Macroconsult



	2020*	
	RI dic.19	RI jun.20
<b>PBI primario</b>	<b>4.7</b>	<b>-5.5</b>
Agropecuario	4.0	1.3
Pesca	23.0	9.5
Minería metálica	3.6	-10.2
Hidrocarburos	0.9	-14.4
Manufactura	9.3	2.1
<b>PBI no primario</b>	<b>3.6</b>	<b>-14.5</b>
Manufactura	2.7	-23.8
Electricidad y agua	4.0	-7.9
Construcción	5.3	-25.4
Comercio	3.5	-23.6
Servicios	3.6	-9.9
<b>Producto Bruto Interno</b>	<b>3.8</b>	<b>-12.5</b>

# Result



TASA (Empresa del Grupo BRECA)

77.025 seguidores  
3 semanas •

+ Seguir

#OrgulloTASA

Recientemente nuestras plantas de Malabrigo, Chimbote, Végueta, Callao y Pisco Sur pasaron inspección externa de SGS. Esta empresa certificadora fue la encargada de realizar las auditorías en estas plantas y en todas aprobamos con 100% sin ninguna observación.

Fue comprobado que en TASA se cumplen todos los lineamientos del protocolo, se aplican las medidas necesarias para prevenir el COVID-19 y nuestras instalaciones son espacios seguros para trabajar. 🧑‍🏭😊

#JuntosLoPodemosTodo #SeguridadYSostenibilidad



AUSTRAL GROUP S.A.A.

18.564 seguidores  
1 mes •

+ Seguir

Queremos compartirles con mucha satisfacción que hemos aprobado exitosamente la verificación para el sector pesquero que acredita el cumplimiento con los estándares de seguridad y salud ocupacional frente al COVID - 19 en nuestras plantas de Colishco, Chancay y Pisco, realizada por la certificadora SGS Perú. Reafirmamos nuestro compromiso de trabajar bajo rigurosos protocolos de prevención para garantizar una operación segura frente al COVID - 19. #JuntosSomosMásFuertes #JuntosZarparemosMásSeguros



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

martes 21 de abril de 2020



## 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.

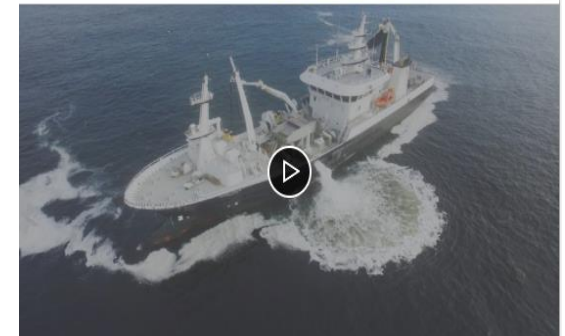


SGS Perú  
1.682 seguidores  
2 semanas •

+ Seguir

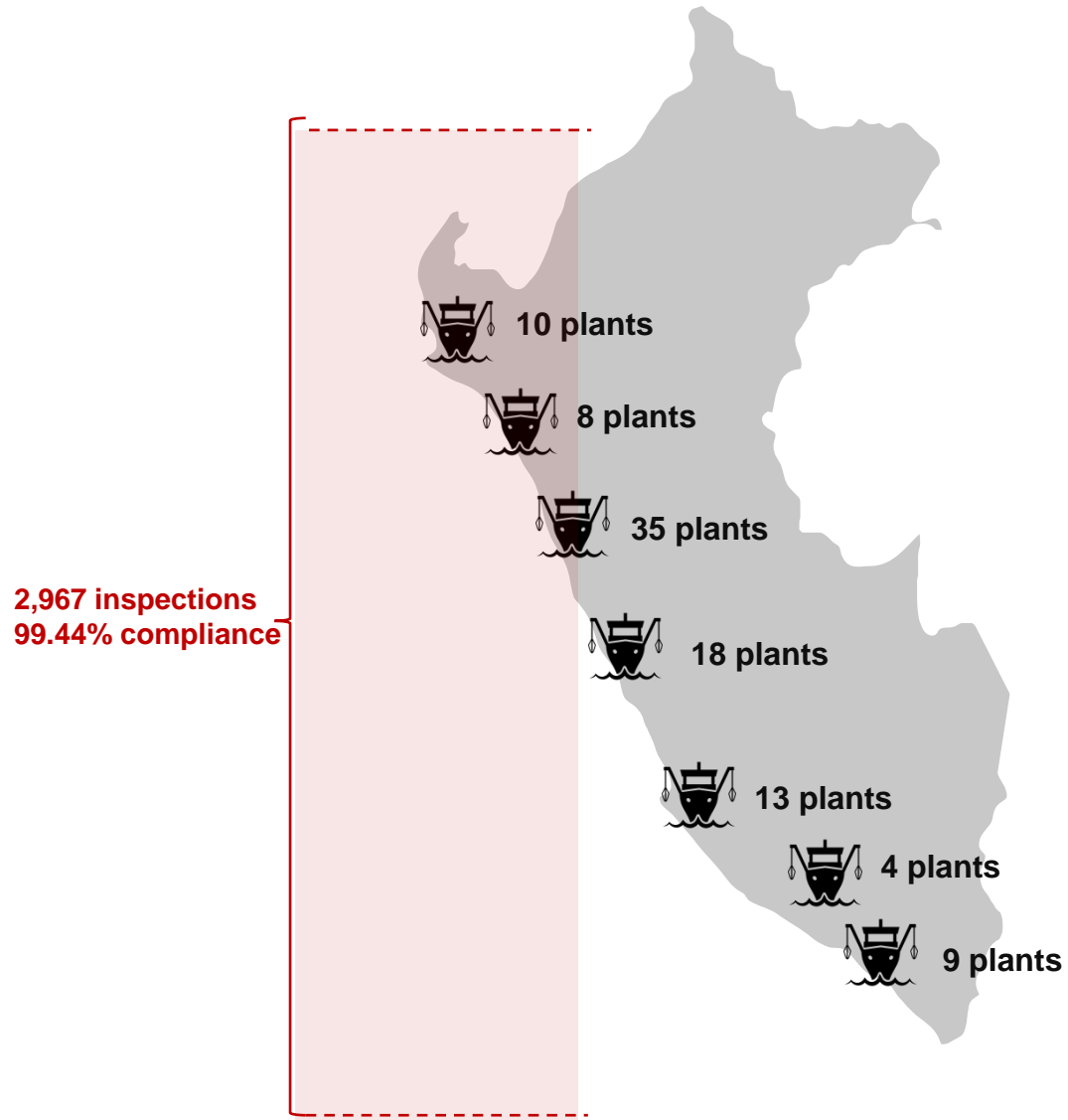
La industria pesquera está lista para iniciar la temporada luego de cumplir con los protocolos sanitarios frente a la Covid-19. En SGS celebramos haber colaborado con la reactivación de las actividades pesqueras a través de dichos protocolos, aprobados por el Ministerio de la Producción y por el Ministerio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

Dale clic al enlace y entérate de más: <https://bit.ly/3dqV1mi>



SNP: industria pesquera lista para iniciar temporada tras aprobación d...  
elcomercio.pe

# Result



SGS Peru

**How one government,  
industry and trade  
association collaborate to  
protect a critical industry in  
Perú**



April 2021

# Today's Participants



**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**

**ovissi@vt.edu**

**International Association for Food Protection  
Seafood PDG Webinar**

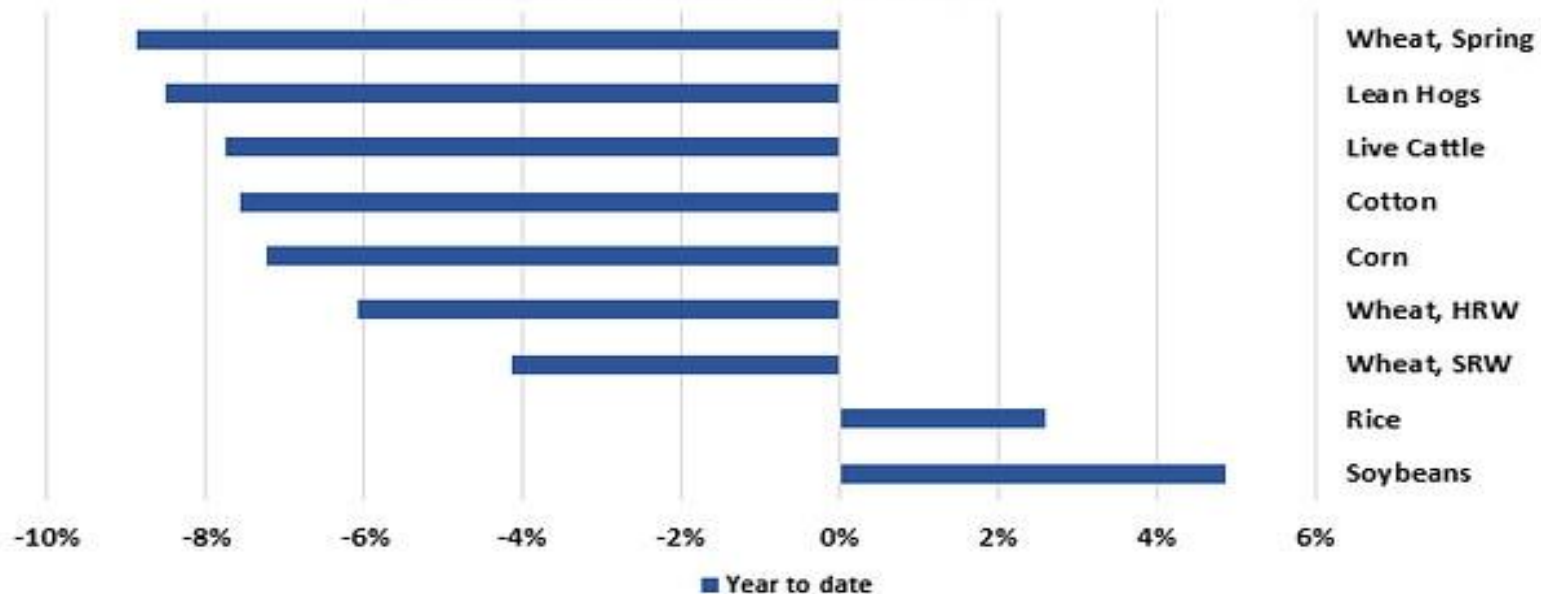
**April 2021**

# 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

**Chart 2: Agricultural Commodity Futures Prices, Changes YTD  
(through mid September 2020)**



Source: Bloomberg. Percentage changes as of closing Sept 17, 2020

# 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%**

**-25%**



**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

## Researchers and Students

**Dr. Lester Schonberger**, Postdoc, Extension

**Dr. Cameron Bardsley**, Postdoc, Extension

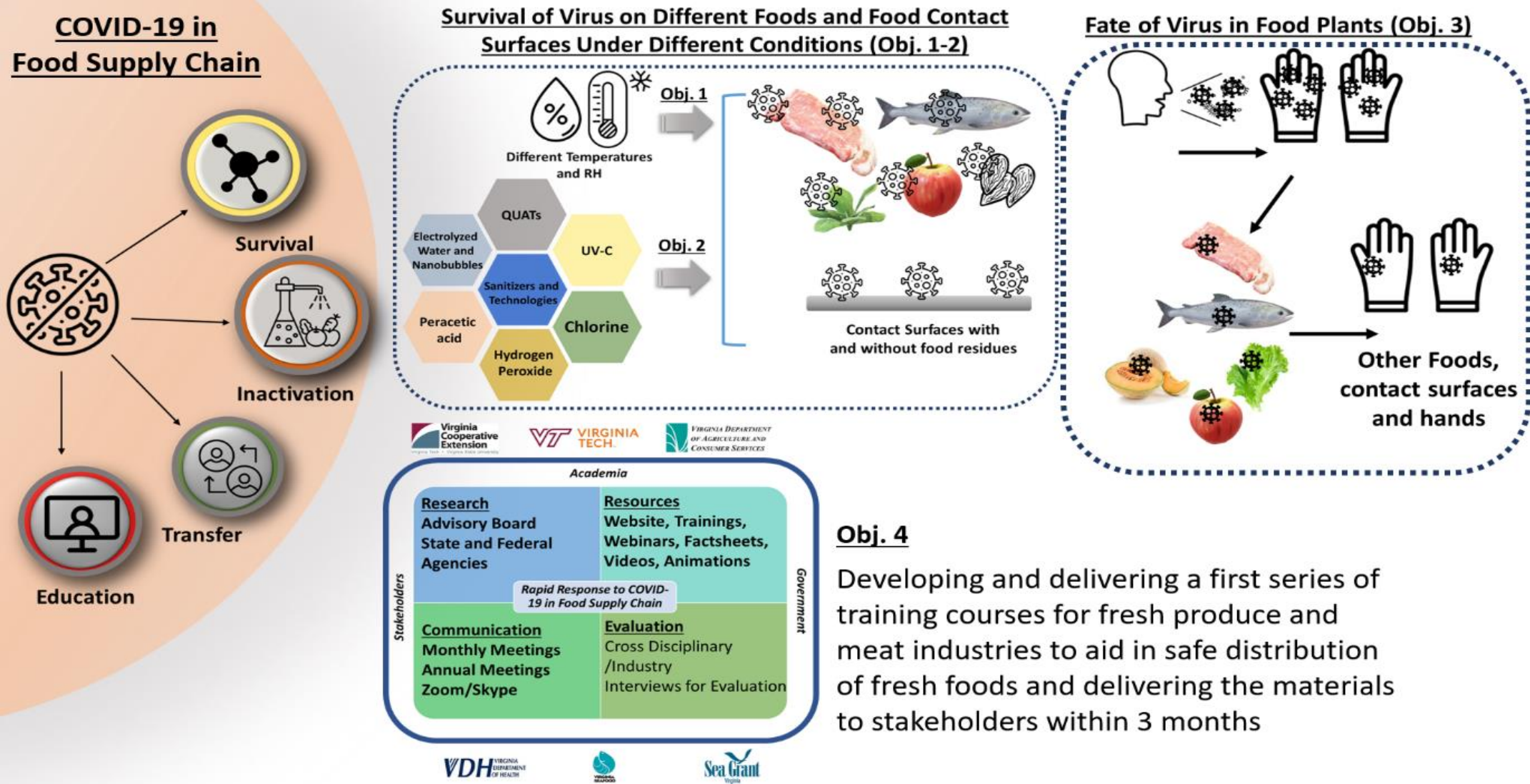
**Dr. Mo Jia**, Postdoc, Research

**Thet Aung**, M.Sc. student, Extension

**Jonathan Joyce**, Ph.D. student, Research

## Advisory Board Council





**Aim 1:** Assess survival of SARS-CoV-2 on different foods, food contact surfaces, and packaging materials under different conditions.

**Foods**



**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 and 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*

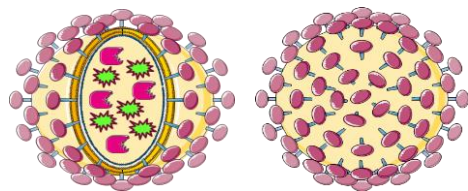
*Artificial saliva*

*Saliva*

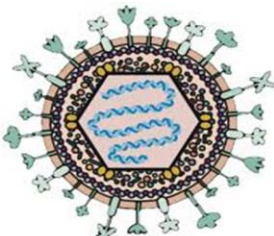
## Recovery methods

*Rinsing*

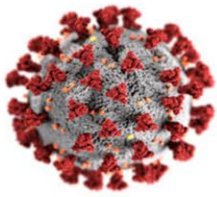
*Massaging*



*Pseudotype virus*



Herpes Simplex Virus (HSV-1)



SARS-CoV-2

155-240 nm

50-200 nm

viral envelope glycoproteins

viral envelope glycoproteins

**DNA Virus**

**RNA Virus**

 SARS-CoV-2 Spike Protein  Luciferase  ZsGreen

# Survival of Virus on Foods

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



Chicken skin (1.5 cm X 1.5 cm)



Chicken thigh (1.5 cm X 1.5 cm; 1.7 gm)



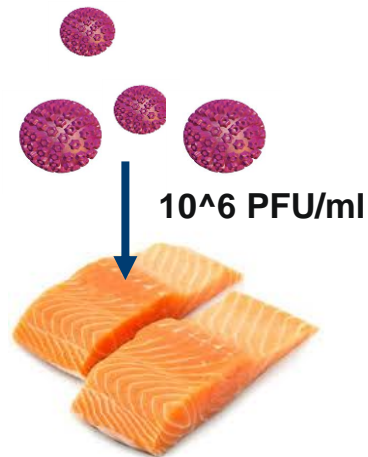
Mushroom (1.5 cm X 1.5 cm)



Salmon with skin (1.5 cm X 1.5 cm; 1.7 gm)



Apple skin (1.5 cm X 1.5 cm)

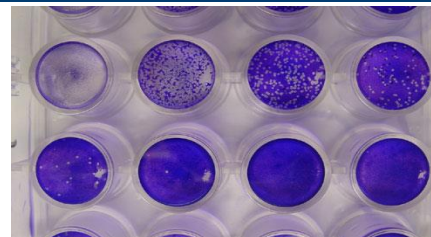


0 min

1 h

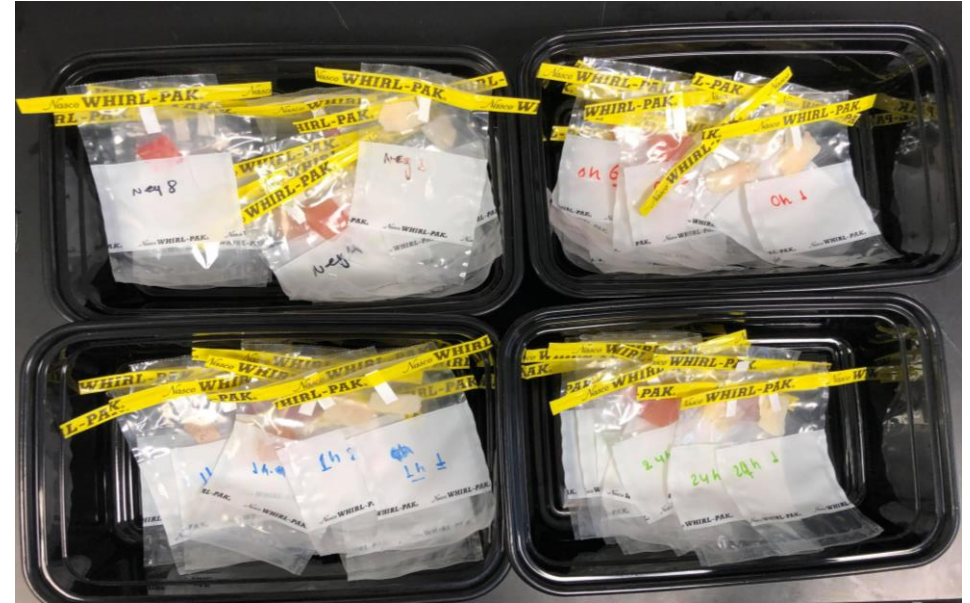
$4^\circ\text{C}$

24 h



Plaque assay

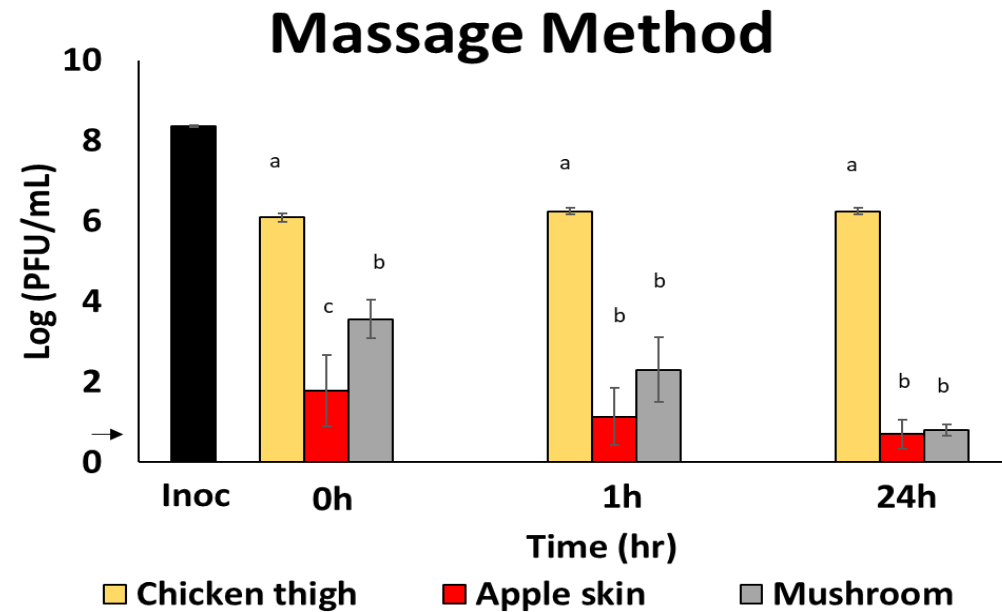
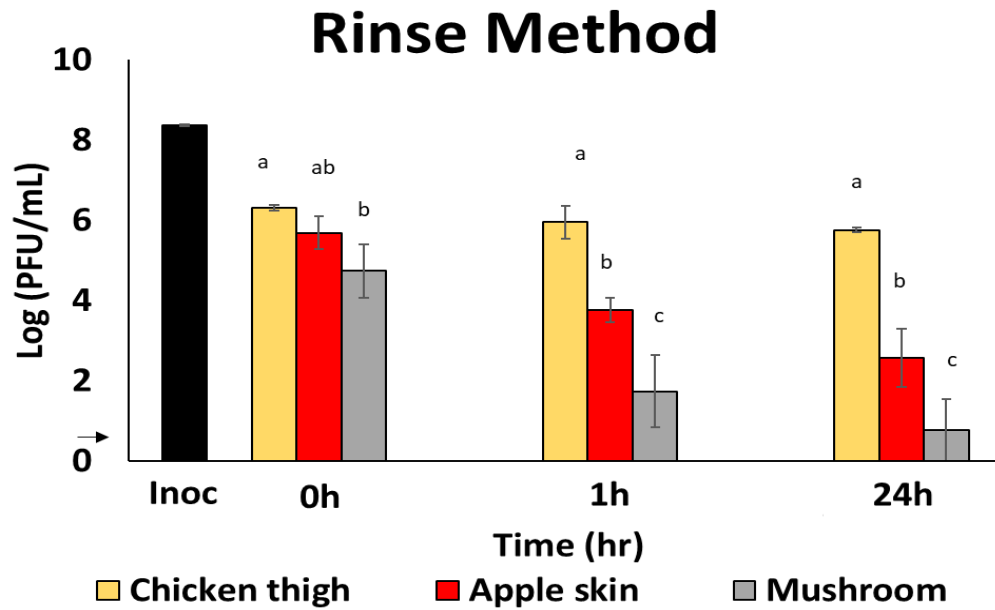
# Recovery Methods: Rinse vs Massage



- 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

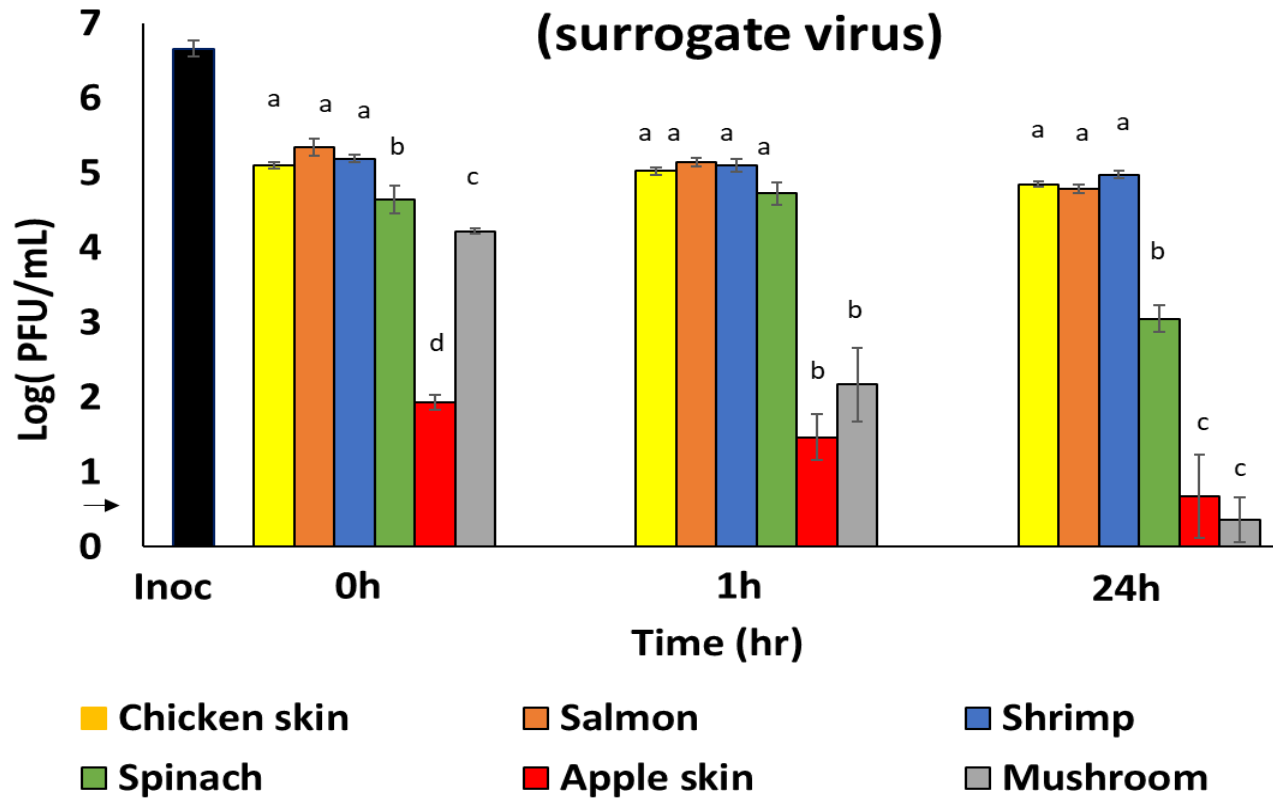
# Results:

## HSV-1 Surrogate: Rinse vs Massage Methods

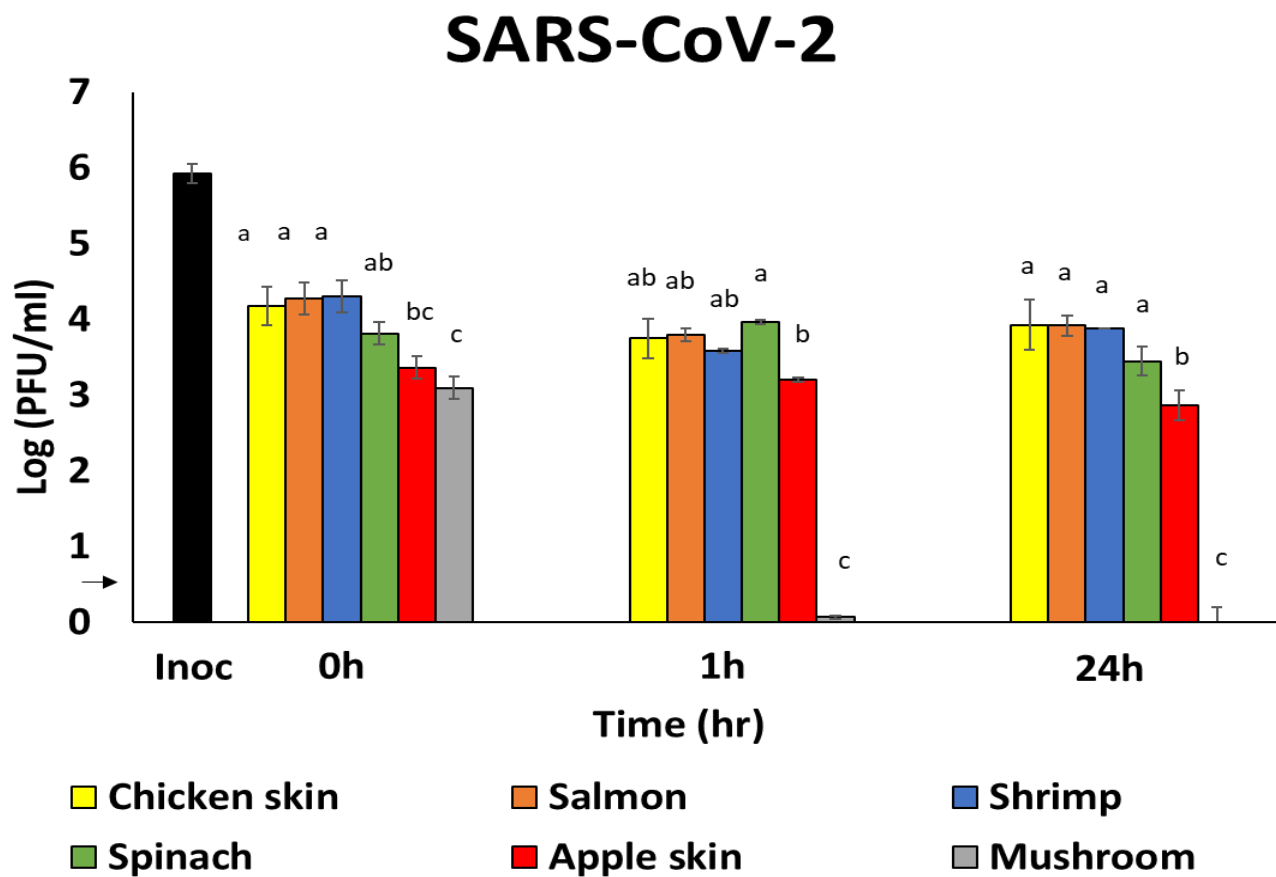


## HSV-1 on foods: surrogate virus testing

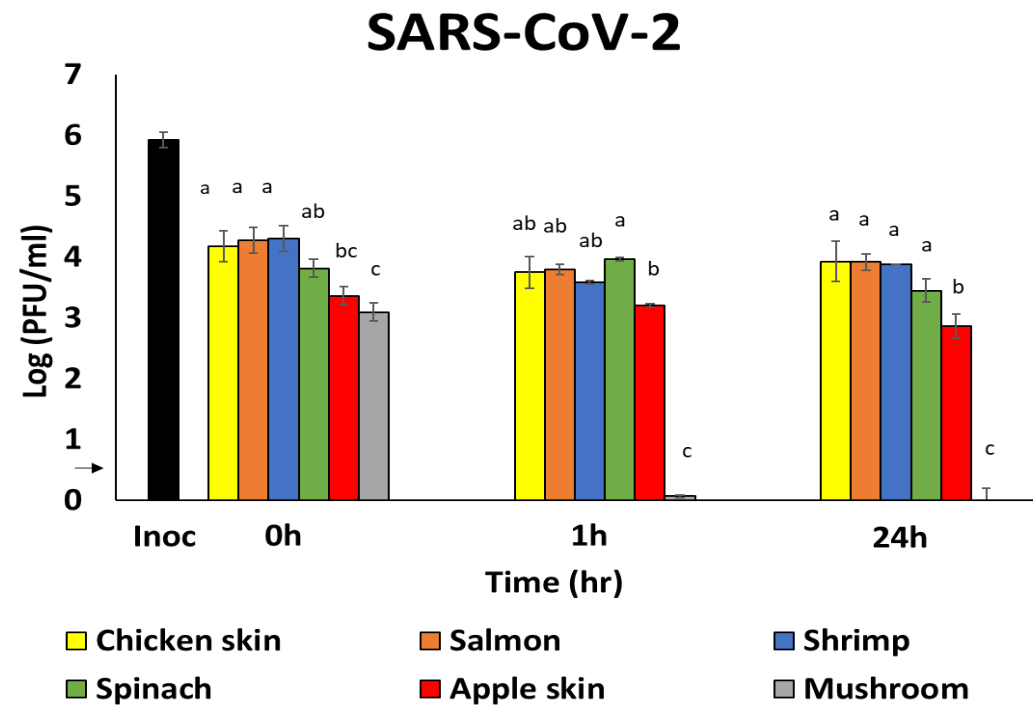
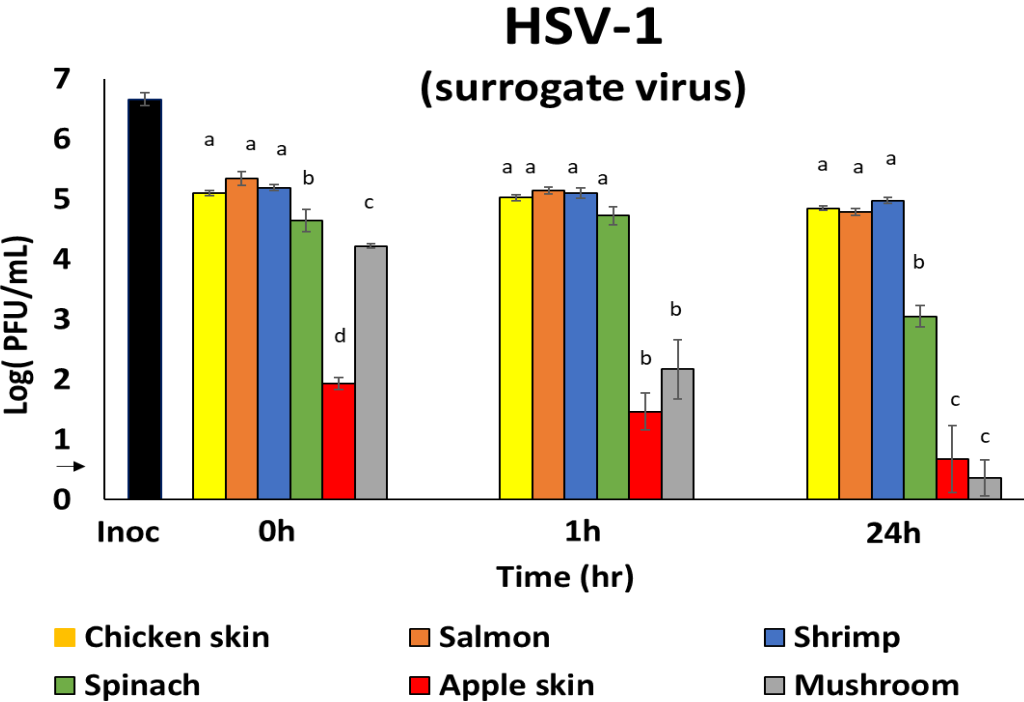
### HSV-1 (surrogate virus)



SARS-CoV-2 on foods:  
comparison of food type

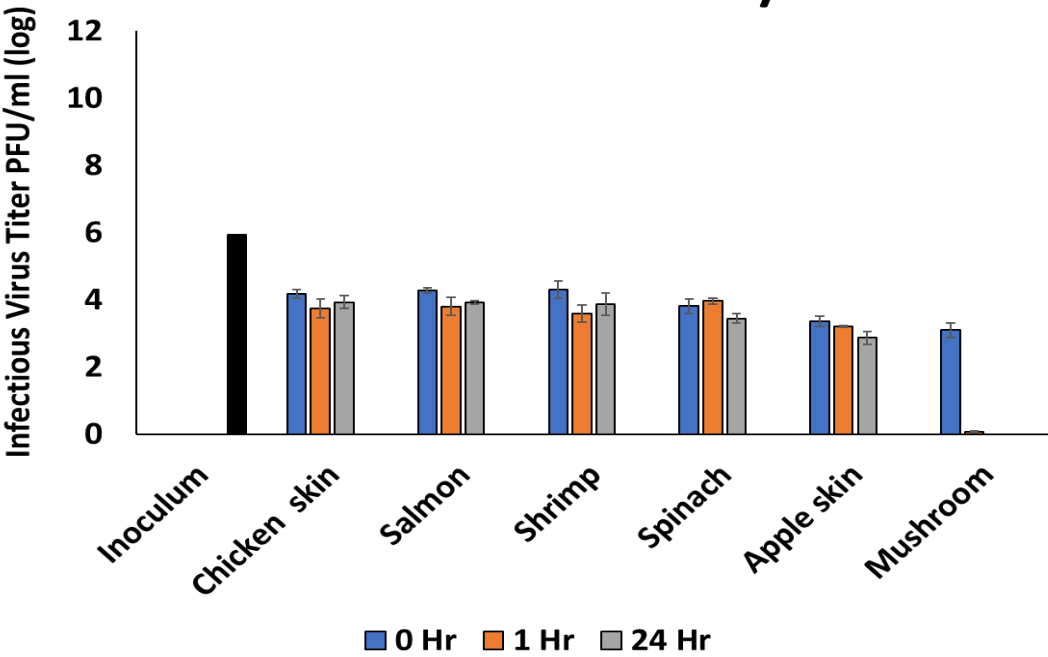


# HSV-1 and SARS-CoV-2 on foods: comparison of viruses

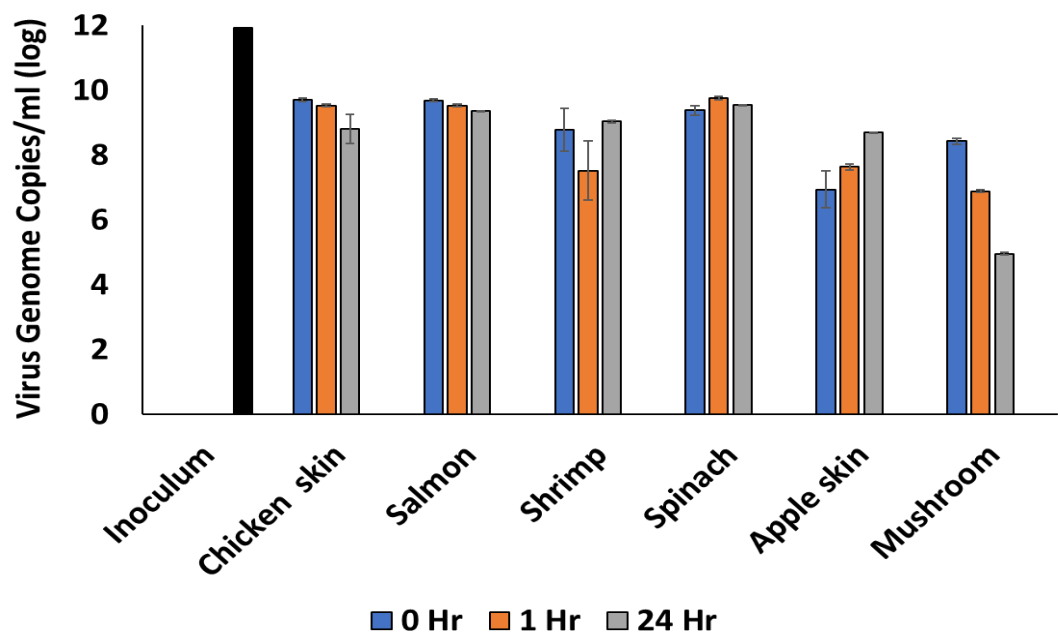


# SARS-CoV-2 on foods: infectious virus titer vs. genome copies of virus

## SARS-CoV-2 Infectious Virus Titer/ml



## SARS-CoV-2 Virus Genome Copies/ml



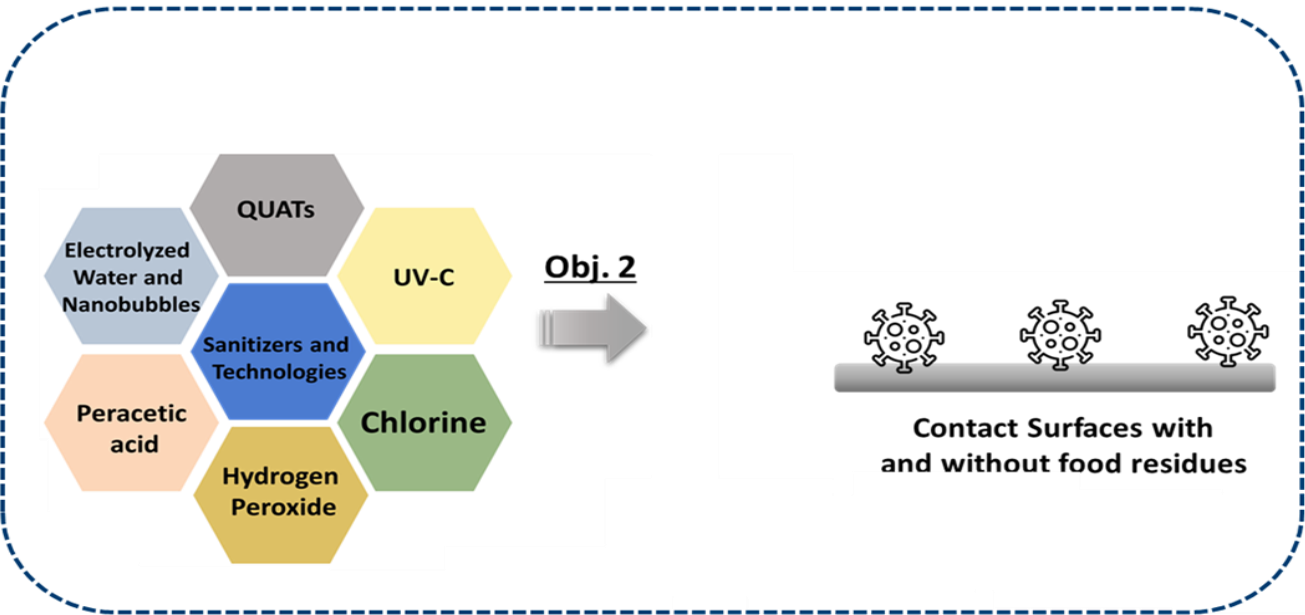
**Aim 2:** Determine the efficacy of different conventionally used and novel sanitizers against SARS-CoV-2 on food and food contact surfaces.

**Conventional Sanitizers**

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

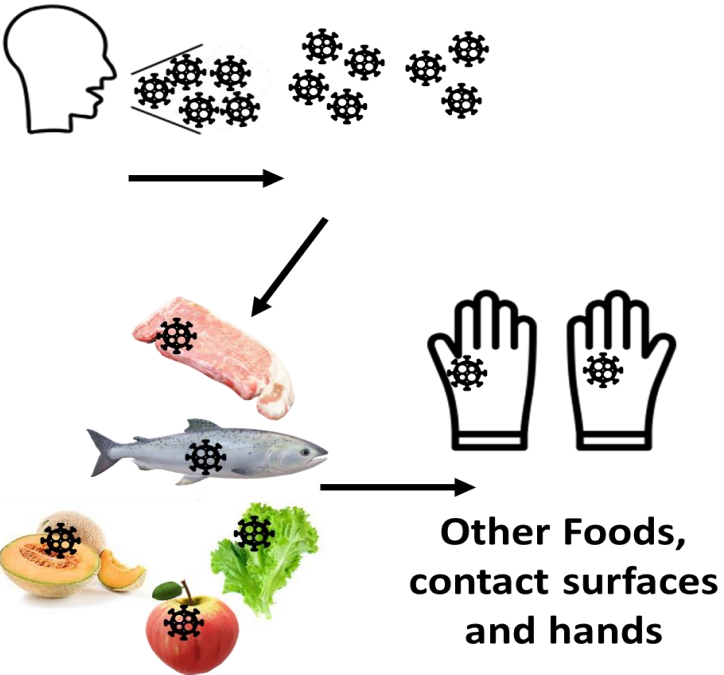
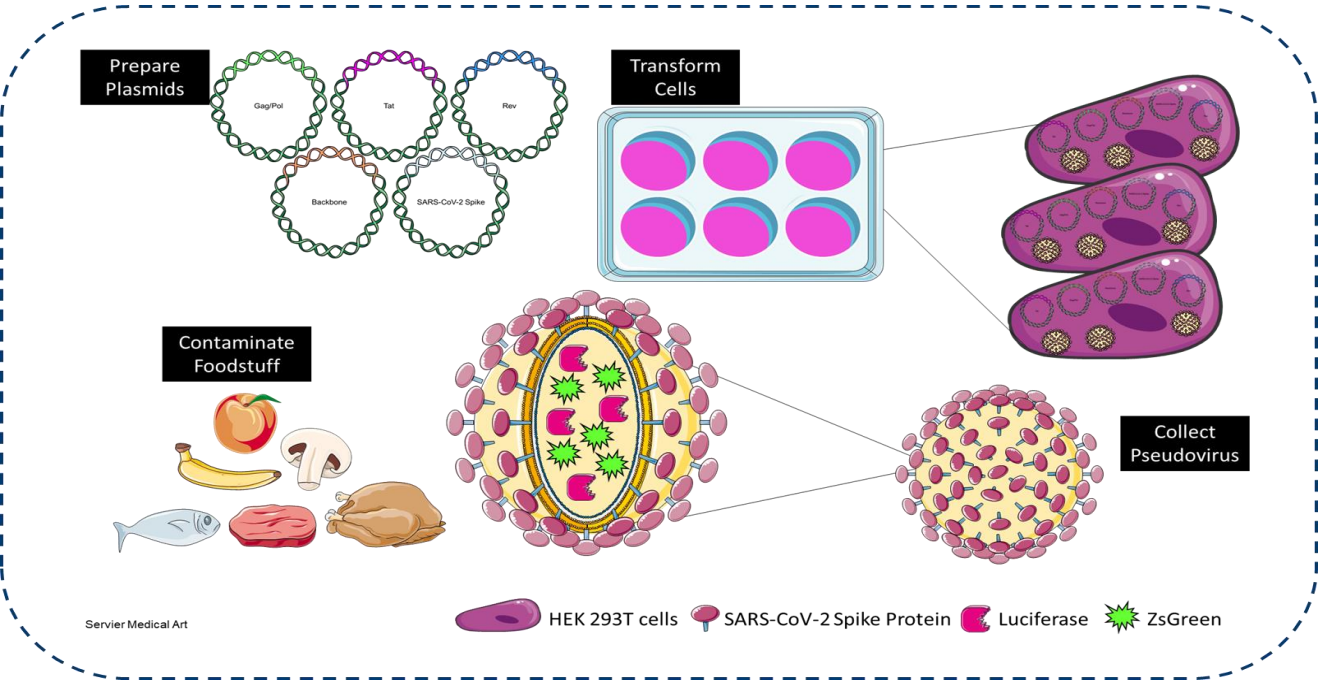
**Emerging and innovative sanitizers**

Electrolyzed water;  
Nanobubbles;  
Photosensitizers



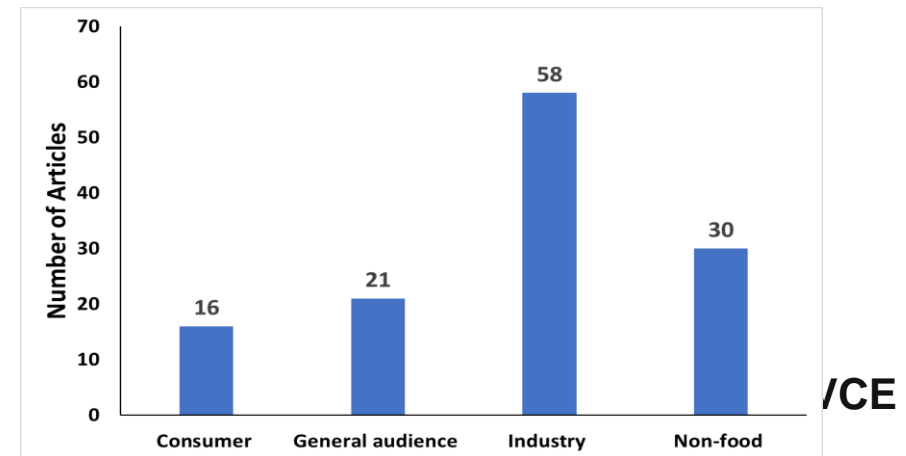
**Aim 3:** Measure the transfer rate from hands to foods and food contact surfaces to best mimic the fate of virus.

*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.
- Dhakal, J., Jia, M., Joyce, J., Ovissipour, R., Bertke, A. Survival of herpes simplex (HSV-1) and COVID-19 (SARS-CoV-2) viruses on foods. American Society of Virology (ASV), July 2021.
- Jia, M., Dhakal, J., Joyce, J., Moore, G., Taylor, T., Ovissipour, R., Bertke, A. HSV-1 as a surrogate for investigating SARS-CoV-2 survival on foods. International Herpesvirus Workshop (IHW), August 2021.
- One Abstract, Atlantic and Gulf Seafood Technology Conference, June 2021.



Thank you  
Questions?





## Questions?

- Questions should be submitted via the Questions section at the right of the screen.



# Contact Information

- [kevin.edwards@sgs.com](mailto:kevin.edwards@sgs.com)
- [jessica.jones@fda.hhs.gov](mailto:jessica.jones@fda.hhs.gov)
- [douglasmarshall@eurofinsus.com](mailto:douglasmarshall@eurofinsus.com)
- [tmccconnell@kpseafood.com](mailto:tmccconnell@kpseafood.com)
- [Lorenzo.DeSantis@sgs.com](mailto:Lorenzo.DeSantis@sgs.com)
- [ovissi@vt.edu](mailto:ovissi@vt.edu)



International Association for  
**Food Protection**®

This webinar is being recorded and will be available for access by **IAFP members** at [www.foodprotection.org](http://www.foodprotection.org) within one week.

**Not a Member?** We encourage you to join today.

For more information go to:

[www.FoodProtection.org/membership/](http://www.FoodProtection.org/membership/)

All **IAFP webinars** are supported by the IAFP Foundation with no charge to participants.

Please consider making a donation to the [IAFP Foundation](#) so we can continue to provide quality information to food safety professionals.

