Florida Association for Food Protection
Annual Educational Conference
2024

Student Poster Addendum

Hilton Bayfront
St. Petersburg FL

Conference Agenda

Tuesday May 14	
2pm - 4pm	Extra Event – Volunteering at Wunderfarm
2pm - 6pm	Registration
2pm - 6pm	Exhibitor Set-Up
6pm - 8pm	President's Reception (Harbor View Room)
Wednesday May 15	
8:15am - 5pm	Exhibitor Area Open
8:15am	President's Welcome
Morning Session Moderator: Jason Scheffler, UF	
8:25am	Matt Mueller, Mindful Innovator – Leveraging Mindful Innovation to Create Food Safety Change Today
9:10am	Audrey Kreske, RBI – RBI Food Safety and FSMA 204 Initiatives
9:55am - 10:40am	Break – in Exhibit Area
10:40am	Student Rapid Presentations

11:10am	John Williamson, Florida Department of Health, Environmental Radiation Section – Radiation and Food Safety
11:55am - 12:55pm	Lunch – enjoyed in Exhibit Area (included)
Afternoon Session Moderator: Vijay Chhetri, FAMU	
1pm	Tim Jackson, IAFP & FDA – Regulatory Food Safety & IAFP Presentation
2:05pm	Luyao Ma, FSU - Smarter food safety: The power of artificial intelligence in the detection of foodborne bacteria
2:50pm	Naim Montazeri, UF – Modeling Coronavirus Persistence and Human Exposure Through Surface-to-Skin Transfer
3:15pm – 3:45pm	Break – in Exhibit Area
3:45pm	Jack Burnett, Diversey - Sanitation Programs: You Cannot Manage What You Do Not Measure
4:30pm	FAFP Awards
5:30pm - 8:30pm	Pool Side Party (Hotel Pool Patio Area)
Thursday May 16	
8am - 3:45pm	Exhibitor Area Open
8:10am	Welcome
Morning Session Moderator: Boce Zhang, UF	

8:20am	Betsy Craig, MenuTrinfo – Allergic Appetites: Navigating the World of Food Allergies
9:05am	Jeff Kuehm, Food Safety Team Extended, LLC - Dude, Where's My Root Cause
9:50am - 10:35am	Break – in Exhibit Area
10:35am	Vanessa Cranford, SSP America - Food Safety Systems for the Global Traveler, An Airport Perspective
11:15am	Debby Newslow, D. L. Newslow & Associates, Inc. – The Internal Audit Program with continued compliance with GFSI recognized CPOs (Schemes)
12 - 1:00pm	Lunch – enjoyed in Exhibit Area (included)
Afternoon Session Moderator: Jamie Irwin, Whole Foods Markets	
1:00pm	Elizabeth Kurpe & Liz Morris, Elite Spice - Spices through a FSMA Lens
2:00pm	Michelle Danyluk, UF – Parasite risks from fresh produce
2:45pm	Closing Remarks, Silent Auction winners
3:00pm - 3:30pm	Break – in Exhibit Area
3:30pm – 4:30pm	FAFP Business Meeting

2024 FAFP Student Posters

Plant protein-based edible film enhanced by essential oil emulsions to extend chicken breast shelf-life

Jingjing Cheng, Frank J. Velez, Prashant Singh, Leqi Cui*

Presenter: Jingjing Cheng, FSU

Introduction: Developing antibacterial packaging materials using biodegradable resources such as plant-based proteins and essential oils is a promising approach to prolonging food shelf life and enhancing food safety.

Purpose: This study aimed to investigate the influence of various concentrations and particle sizes of oregano essential oil (OEO) on the structure and properties of pea protein-based films, including color, mechanical properties, water resistance, and antimicrobial activities. Additionally, the efficacy of fabricated films in inhibiting the growth of bacteria on chicken breast was evaluated.

Methods: Pea protein isolate (PPI)-based antibacterial films were prepared by incorporating 0.5 %, 1.0 %, or 2.0 % of OEO, either in the form of micro-emulsion (MOEO) or nano-emulsion (NOEO).

Results: The particle size and polydispersity index of OEO droplets were 2755.00 nm and 0.63 for MOEO, and 256.30 nm and 0.20 for NOEO. The surface and cross-sectional SEM results revealed the presence of holes and internal pores within the film upon the addition of OEO. At a low concentration (0.5 %), the addition of OEO significantly improved the water vapor barrier and mechanical properties of the film. However, at higher concentrations, these film properties were significantly weakened. Pea protein-based film with 2.0 % OEO inhibited microbial growth in both in vitro tests and chicken breast.

Significance: The study demonstrated that the antibacterial film based on pea protein and OEO is an innovative food packaging material for prohibiting bacteria growth on poultry products.

Impact of Dissolved Organic Compounds on the Thermal Inactivation of Norovirus

Samantha Dicker[1], Razieh Sadat Mirmahdi[1], Naim Montazeri[1]

[1]Food Science and Human Nutrition Department, University of Florida, Gainesville, FL 32611

Presenter: Samantha Dicker, UF

Introduction: Human norovirus is the leading cause of foodborne illnesses in the United States. It is known for its remarkable persistence to heat, particularly when embedded in organic matter. The survival of residual infectious virus particles following cooking may pose significant risks of illness from undercooked food.

Purpose: To examine the inactivation kinetics of norovirus during heat treatment when suspended in organic loads.

Methods: Tulane virus, a surrogate for human norovirus, was suspended at 6 log10 plaque forming units (PFU) in PBS (pH 7.2) or soil load composed of tryptone, bovine serum albumin, and bovine mucin, according to a modified ASTM E2197-17 protocol. Virus suspensions underwent heat treatment at temperatures of 45, 50, 55, 60, and 65°C for 1 minute in a water bath. Various dispersal techniques, including sonication, organic solvents, and sodium pyrophosphate, were employed to the treated samples before enumerating infectious virus particles with overlay plaque assay.

Results: In PBS suspension, a 1-log10 PFU reduction was achieved at 55°C after 1 minute, whereas a 0.5-log10 PFU reduction was observed in viruses suspended in organic load ($p>0.05$). Overall, organic load substantially enhanced the resistance of Tulane virus to thermal inactivation ($p<0.05$). Although not statistically significant, dispersal techniques led to an increased recovery of infectious virus particles ($p>0.05$).

Significance: The outcomes of this study provide further insights into the protective impact of organic load on virus inactivation during heat treatment. Furthermore, it contributes to refining exposure models by highlighting the risks associated with residual virus particles following a cooking method.

Implications of symbiosis on Listeria monocytogenes biofilm on food contact surfaces

Tingting Gu, Boce Zhang

Presenter: Tingting Gu, UF

Introduction: *L. monocytogenes* adheres to food contact surfaces, forming persistent biofilms. Its biofilm is notably affected when forming cocktail biofilms with symbiotic microflora, particularly strong biofilm formers.

Purpose: To investigate how symbiosis with microflora affects *L. monocytogenes*' persistence and how symbiosis is influenced by the environment.

Methods: *L. monocytogenes* biofilm in the cocktail was studied on stainless steel 304 coupons with varying topography, including native finish (SS304-Bare), #4 brushed finish (SS304-#4), micropillar modification (SS304-Dot), and microlines modification (SS304-Line). The coupons were coated with and without Dursan, assessing fouling resistance against *L. monocytogenes* biofilm. Dual-species cocktail biofilms (*L. monocytogenes* + *E. coli* O157:H7, *L. monocytogenes* + *P. fluorescence*, *L. monocytogenes* + *R. insidiosa*) and four-species biofilms were evaluated. Cultivation occurred in lettuce juice extract at 4°C for 7 days, simulating produce processing conditions.

Results: In dual-species cocktail biofilms, *P. fluorescence* strongly enhanced *L. monocytogenes* biofilm on various coupons, while *E. coli* O157:H7 and *R. insidiosa* exhibited varying symbiosis. In four-species cocktail biofilms, consistent synergistic symbiosis with *L. monocytogenes* was observed across conditions. The study implies biofilm symbiosis is influenced by cocktail species, organic loads, surface chemistry, and topography.

Significance: Symbiosis is crucial in *L. monocytogenes* biofilm. Antagonistic symbiosis suggests intervention possibilities, while mitigating synergism with *L. monocytogenes* is essential to prevent adverse food safety outcomes.

Understanding the Potential for Bioaerosol Contamination from Cattle Operation on Adjacent Land

Christina Kessler[1], Laurent Lagos[2], Jason Scheffler[2], and Michelle D. Danyluk[3]

(1) University of Florida, Lake Alfred, FL, (2) University of Florida, Gainesville, FL, (3) University of Florida CREC, Lake Alfred, FL

Presenter: Christina Kessler, UF

Introduction: Bioaerosol contamination from animal operations on adjacent land has been identified as a potential risk to produce. There is little data quantifying populations of potential foodborne pathogens in bioaerosols.

Purpose: This study aimed to quantify risks tied to bioaerosols from cattle production in Florida and Georgia.

Methods: Air samples were collected for 10 min downwind of three cattle operations using 2-stage impact samplers (28.31 L/min). Sampling sites were 0, 50, 100, 400, and 650-1000 m from the animal operation perimeter and at 0.5, 2, and 5 m heights. Chromogenic media was used to isolate coliforms and generic *E. coli*. Meteorological data was collected using sensors mounted next to the impact samplers. Plates were incubated at 35 °C for 48 h before enumeration; the limit of detection is 0.49 log CFU/m3.

Results: At locations 1, 2, and 3, air temperature and relative humidity ranged from 5.8 –34.8, 8.9–26.2, and 16.8–36.9 °C, and 32–86, 32–83 and 21–81%, respectively. Maximum wind speeds were 6.4, 7.0, and 16.0 m/s, respectively. Coliforms were more frequently detected than generic *E. coli* across all sites, distances, and heights. Coliforms were present in 74/336 samples (0.55-2.09 log CFU/m3). The frequency of coliform detection varied by site (22/96, 19/90, and 33/150, respectively), distance (13/72, 36/72, 11/72, 18/72, and 9/48, respectively), and height (30/112, 25/112, and 19/112, respectively). Generic *E. coli* was detected in 17/336 samples (0.55-1.03 log CFU/m3).

Significance: Low levels of coliforms and generic *E. coli* were detected, with frequency generally decreasing as distance increased.

Mitigating Food Waste for Sustainable Food Production: Non-destructive Fruit Quality Assessment Using Smartphone and Convolutional Neural Network

In-Hwan Lee# (il23i@fsu.edu), Zhengao Li (zl23i@fsu.edu), Luyao Ma* (luyao.ma@fsu.edu) Department of Health, Nutrition, and Food Sciences, Florida State University # indicate as presenter, * indicate as corresponding author

Presenter: In-Hwan Lee, FSU

Introduction: Ensuring food sustainability and reducing food waste has become necessary since the growing global population's food demand has continuously increased. Avocados are good food sources to meet nutritional requirements for human health, while undesired food waste from overripe avocados has also increased. Purpose: In this study, user-friendly smartphone photos and deep learning were developed to minimize food waste by predicting avocados' quality and ripe condition.
Methods: The images of avocados (n=70) were taken by smartphone during the storage at room temperature for eight days. Meanwhile, CIE color values (L*, a*, b*, and ΔE values) and firmness were measured to validate the results. Results: The convolutional neural network regression models showed high accuracy in quality assessment and shelf life prediction ($R2 > 0.98$). Significance: This result is expected to inform consumers about avocados' quality and ripe stage before they are overripe. By utilizing a smartphone, our research helps people make wise decisions about their consumption to mitigate food waste.

Searing can inactivate *Salmonella* enterica, *Escherichia coli* O157:H7 and *Listeria monocytogenes* in sous-vide cooked beef steaks

Adeel Manzoor, Laurent Lagos, Isabel Ribeiro, Mia Stewart, Sofia Suarez, Mia Nunez, Beatriz Castanho, Karina Vestergaard, Jason M. Scheffler*
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Presenter: Adeel Manzoor, UF

Introduction: Sous-vide cooking is popular in restaurants and catering industry due to its benefits, including uniform cooking, and precise control over doneness. Our previous studies assessed cooking and storage parameters for both intact and non-intact steaks. Quantifying pathogen inactivation during searing after refrigeration is essential for a more comprehensive food safety assessment of the entire process.
Purpose: This study evaluated pathogen inactivation during searing of sub-optimally sous-vide cooked steaks using two different time-temperature combinations.
Methods: One-inch-thick beef steaks (100±3g) were cut and individually surface inoculated with five strains of *Salmonella enterica*, three strains of *E. coli* O157:H7, and three strains of *Listeria monocytogenes*. To create non-intact steaks, a jaccard tenderizer was used. After pathogen attachment (30 mins) and vacuum packaging, steaks were cooked at 57.5℃ for 16 mins, resulting in a residual microbial load of 5±1 log cfu/g. After crash chilling and refrigeration, samples were seared at 177℃ for 2 mins or 232℃ for 1.5 mins on each side, followed by enumeration. Data were analyzed using a mixed linear model in SAS (Version 9.4).
Results: No difference (P>0.05) was observed between cooking at 177°C for 2 minutes and 232°C for 1.5 minutes. Searing reduced *Salmonella* counts from 4.77±0.31 log cfu/g to 3.19±0.31 log cfu/g in intact steaks, but not in tenderized steaks. *E. coli* reduced 2.08 log cfu/g in intact and 0.78 log cfu/g in tenderized steaks. Similarly, *Listeria* reduced 1.96 log cfu/g in intact steaks and 1.48 log cfu/g in tenderized steaks by searing.

Significance: Searing provides additional inactivation of pathogens in sub-optimally sous vide cooked steaks, but tenderization limits the added benefit.

Managing Adjacent Land Use Risks Associated with *Salmonella* and Shiga-toxin Producing *E. coli* (STEC) from U.S Cattle Operations.

Laurent Lagos Mendoza[1], Christina Kessler[2], Adeel Manzoor[1], Jason M. Scheffler[1], and Michelle D. Danyluk[3]
(1) University of Florida, Gainesville, FL, (2) University of Florida, Lake Alfred, FL (3) University of Florida CREC, Lake Alfred, FL

Presenter: Laurent Lagos Mendoza, UF

Introduction: Livestock operations are suspected sources of pathogens in produce outbreaks. However, there is limited data on quantifying foodborne pathogens like *Salmonella* and STEC in bioaerosols and their spread to nearby areas to determine appropriate interventions.
Purpose: The purpose of this study is to assess the risks associated with aerosol transmission of *Salmonella* and STEC produced in Southeastern U.S cattle operations.
Methods: Sampling was conducted at three cattle operations between November and May 2024. Anderson impact samplers with two stages each, were used at three different heights (0.5 m, 2 m, 5 m). Samples were collected at distances ranging from 0 m to 1000m from the cattle enclosure boarder for 10 minutes each. Chromagenic selective agars were used to isolate *Salmonella* and STEC. Simultaneously, a weather station recorded relative humidity, temperature, and wind direction. Samples were then incubated at 35°C for 48 hours and enumerated.
Results: Temperatures and relative humidities ranged from 5.8-36.9 °C and 21-81% respectively. Maximum wind speeds ranged from 6.4-16.0 m/s, respectively. Presumptive *Salmonella* isolates and STEC were detected up to 1,000m. Suspected *Salmonella* colonies were found in 80/336 samples, followed by STEC with a total of 10/336 suspected samples.
Significance: Understanding the extent to which *Salmonella* and STEC may be transmitted to adjacent lands will help identify appropriate mitigation strategies.

Predicting the infectivity of norovirus based on RT-qPCR results using the Tulane virus as a surrogate

Razieh Sadat Mirmahdi[1], Samantha Dicker[1], Naim Montazeri[1]

Presenter: Razieh Sadat Mirmahdi, UF

Introduction: Human norovirus, the main cause of global viral foodborne illnesses, relies on RT-qPCR for detection due to the lack of a reliable cultivation system. Tulane virus is used as a surrogate to assess environmental fate, but RT-qPCR's ability to distinguish infectious particles remains uncertain compared to infectivity assays.

Purpose: To investigate the correlation between infectivity (plaque) assays and RT-qPCR for quantifying norovirus, utilizing the Tulane virus as a surrogate.

Methods: The Tulane virus lysate, adjusted to 7 log10 PFU/mL, underwent RNA extraction with or without RNase pre-treatment, followed by quantification using probe-based RT-qPCR. Conventional RNase pre-treatment aimed to enhance the detection of intact, potentially infectious virus particles.

Results: A strong correlation (Pearson's coefficient: 0.995) existed between log10 genome copies (GC) and log10 plaque-forming units (PFU) in both RNase-treated and untreated samples. Compared to the infectivity assay, RT-qPCR quantified Tulane virus particles at 3.4±0.1 and 3.7±0.1 log10 higher levels with and without RNase treatment, respectively ($p<0.05$), underscoring RT-qPCR's sensitivity and the potential for overestimating infectious particles.

Significance: This study's findings will enhance the precision of estimating infectious norovirus particles in food and environmental samples by establishing a correlation between virus quantification data from probe-based RT-qPCR and the infectivity assay.

***Escherichia coli* transfer onto and internalization into strawberries dropped on plastic mulch.**

Claudia A. Pegueros-Valencia*, Loretta M. Friedrich, Michelle D. Danyluk.

Presenter: Claudia Pegueros-Valencia, UF

Introduction: The US FDA Produce Safety Rule prohibits the distribution of dropped-covered produce due to the risk of contamination from the ground and the internalization of pathogen.

Purpose: This study aimed to assess *Escherichia coli* transfer onto and internalization into strawberries dropped onto plastic mulch from different heights.

Methods: Unwashed strawberries (n=192), randomly selected and weighed, were dropped new and used plastic mulch inoculated with ~8 Log CFU gfp-tagged *E. coli* using PVC pipes from 15.24, 30.48, 60.96, 121.96 cm. Bacterial transfer (BT) to fruit surfaces was assessed via plate count. To measure bacterial internalization (BI), fruit surfaces were sterilized, prior to homogenization and plate counts followed by enrichment to identify the presence of *E. coli*. ANOVA showed significant differences ($p>0.05$) among scenarios; linear regressions explored correlations between BT/BI and fruit weight.

Results: *E. coli* survived significantly better during drying on new plastic mulch (7.6 ± 0.25 Log CFU/mulch) than used mulch (6.9 ± 0.58 Log CFU/mulch) ($p<0.05$). BT was significantly elevated ($p<0.05$) from new mulch (5.2 ± 2.1 to 5.5 ± 1.0 Log CFU/strawberry) compared to used mulch (2.2 ± 1.2 to 3.7 ± 1.8 Log CFU/strawberry). Internalized *E. coli* was detected in strawberries dropped onto new mulch from heights of 15.24, 30.48, and 121.96 cm, and onto used mulch from heights of 15.21 and 121.92 cm. No correlation was observed between with BT or BI and weight.

Significance: Higher bacterial survival following inoculation and transfer to strawberries was seen from new plastic mulch, emphasizing the importance of not harvesting dropped strawberries.

***Salmonella* cross-contamination risks between tomatoes and brush rollers during postharvest activities**

Mari Schroeder and Michelle D. Danyluk

Presenter: Mari Schroeder, UF

Tomatoes have been associated with salmonellosis outbreaks. The purpose of this study was to evaluate *Salmonella's* transfer potential from contaminated tomatoes to adjacent tomatoes, brush rollers, and wastewater during washing on a brush bed under a spray bar using different concentrations of chlorine (pH 6.5) and peracetic acid.

A bench-top brush washing system which included two roller brushes beneath overhead sprayers. Tomatoes were spot inoculated with a *Salmonella* cocktail (105) and dried for 1h. Inoculated tomatoes were placed on the brushes with an uninoculated tomato on each side. Wash water was mixed with chlorine or peracetic acid to concentrations of 20-100ppm and 20-80ppm, respectively. Tomatoes were washed for 30sec. *Salmonella* from wastewater, tomatoes, and (swabbed) brushes was enumerated. Enrichments were performed following a modified FDA BAM method because counts fell below the limit-of-detection. Results from 18 samples were reported as %positives and statistical significance was determined by chi-squared tests.

A significant ($P \leq 0.05$) decrease in the number of positive enrichments for each enumerated sample was observed as chlorine concentrations increased; at 40, 50, and 70ppm the total number of samples positive was 60, 18 and 0%, respectively. A significant ($P \leq 0.05$) decrease of the %positive samples was observed as PAA concentrations increased at 50, 70 and 80ppm, the total number of samples positive was 46, 14, and 0%, respectively.

The concentration of chlorine and PAA needed to minimize the potential transfer of *Salmonella* does not exceed the recommended concentration of either sanitizer in postharvest processes.

Evaluation of Ultrasonication and Plasma-activated Water (PAW) on White Shrimp (Litopenaeus setiferus) and Atlantic Cod (Gadus morhua) Protein

Chunya Tang, Yaqi Zhao, Xingyi Jiang, Sarajeen Saima Hoque, Youneng Tang, Juzhong Tan, Qinchun Rao

Presenter: Chunya Tang, FSU

Introduction: To ensure seafood freshness and produce lightly processed products with minimal changes in nutritional and sensory properties, non-thermal processing is now gaining enormous attention. Ultrasonication has been applied in many food-processing fields, e.g., washing and thawing, and was reported to alter protein antigenicity. As another promising technique in food preservation, cold plasma technology employs high-energy, reactive gases to prolong shelf-life with minimal processing intervention. (64)

Purpose: Since non-thermal processing techniques effectively improve seafood safety, their potential alternation on protein is still unclear and even controversial. This study aims to provide an implication regarding the effects of ultrasonication and plasma-activated water (PAW) on the structure and antigenicity of seafood proteins, especially tropomyosin and parvalbumin. (47)

Methods: Lyophilized water-soluble shrimp and cod protein extracts were 4:1 (mg:g) mixed with untreated water (UW) or PAW. For ultrasonication, UW-extracted protein was subjected to ultrasonication (20 kHz) with an amplitude of 20 and 50% for 10 min, respectively. Particle size and ζ-potential, protein profile, and immunoreactivity were thoroughly studied. (49)

Results: Ultrasonication significantly reduced shrimp and cod protein sizes by at least 52% and 23%, respectively, and altered shrimp proteins' stability and antigenicity, making them less stable and reducing shrimp tropomyosin antigenicity by over 20%. Additionally, PAW properties, such as pH and conductivity, varied with activation time, and PAW-extracted from air-treated samples showed a 10% decrease in shrimp tropomyosin immunoreactivity compared to controls. (62)

Significance: By understanding the potential benefits and limitations of these innovative techniques, industry and regulatory institutions can apply the non-thermal techniques in seafood protein processing. (24)

Analysis of Surface Water Treatment Efficacy Protocol Using Calcium Hypochlorite and Peracetic Acid against *Salmonella* in Florida Water

LaTaunya Tillman and Dr. Michelle Danyluk

Presenter: LaTaunya Tillman, UF

Introduction: Surface water has been implicated as a source of microbiological contamination for produce. Growers are under market-driven and regulatory pressure to treat surface water before use that contacts produce.

Purpose: This study evaluated the FDA's water treatment efficacy protocol using Florida agricultural water.

Methods: Agricultural waters from a Florida pond and canal were collected, and quality characteristics were measured. Samples (98ml) were inoculated with 1ml of a 7 Rifampicin-resistant *Salmonella* cocktail (ca. 9 log). Water (99ml) was equilibrated at 12 or 32°C for ≥ 30-min. Calcium hypochlorite (Cl) or Peracetic Acid (PAA) was mixed with PBDW to create a stock solution, from which 1ml was added to the 99ml to achieve high and low concentrations of each sanitizer (Cl, 2-4, and 10-12ppm; PAA, 6 and 10ppm). Following sanitizer addition, *Salmonella* populations were determined at 1, 5, and 10-min by serial dilutions in sodium metabisulfite (28 g/L), plated onto Brain Heart Infusion Agar with rifampicin, and incubated at 35±2°C for 24±2h. Colonies were counted and expressed as log CFU/ml; student t-tests and ANOVA were performed (n=9).

Results: Low-range PAA treatment did not achieve a ³ 3 log reduction after 1-min in pond or canal water. High-range Cl treatment showed significant ($p<0.01$) reductions in pond and canal water after 1min. Both treatments achieved a ³ 3 log reduction in pond and canal water within 5-min.

Significance: Water quality characteristics may have impacted reductions; population rebounds were observed during longer treatments. Cl and PAA are effective for surface water treatment of *Salmonella* for Florida ponds and canals.

Immunodetection of Chicken Serum Albumin, an Egg Yolk Allergen

Yaqi Zhao, William Mumby, Qinchun Rao, Florida State University, Tallahassee, FL, USA

Presenter: Yaqi Zhao, FSU

Introduction: Egg is one of the Big Nine allergenic foods in the US and the priority allergen recognized by the World Health Organization, affecting 0.9% of US children. According to the Food and Drug Administration, 8.9% of recalled food products were induced by undeclared egg residues in 2018-2024. Chicken serum albumin (CSA, Gal d 5) was recognized as the allergen in egg yolk.
Purpose: The objective of this study was to develop a method to detect CSA from food products and food-processing surfaces for food allergen risk assessment.
Methods: Western blot was performed to characterize an anti-CSA monoclonal antibody (mAb). An indirect competitive enzyme-linked immunosorbent assay (ELISA) was optimized and validated to (1) interpolate CSA in commercial food products and (2) quantify CSA residues on food-processing surfaces.
Results: One anti-CSA mAb was immunoreactive to poultry serum albumin (i.e., chicken and turkey) and had no cross-reaction with mammalian, fish, and shellfish. 4 ppm of CSA and 2 ppm of anti-CSA mAb were selected as the coating and primary antibody concentration, respectively. The validated immunoassay has a wide working range, excellent selectivity, high sensitivity, and good reproducibility with a low coefficient of variation. This ELISA could detect CSA in commercial egg yolk-containing products and quantify CSA residues on stainless steel and plastic food-processing surfaces with good recovery rates.
Significance: The validated immunoassay can be applied for the risk assessment of allergenic egg yolk residues and hygiene validation of food-processing surfaces. This assay has the potential to improve food safety and quality.