FRI eNews provides updates on research and events at FRI and UW-Madison and other current food safety news.

View this email in your browser

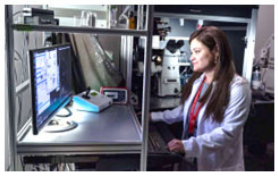
FRI News

FRESH seminars will resume in the spring semester. **Have a suggestion for a topic or speaker for a FRESH seminar?** Contact FRI outreach coordinator **Adam Borger** at adam.borger@wisc.edu.

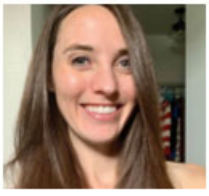
FRI affiliate member **Steve Ricke** has been awarded $650M in USDA-NIFA grant funding to **bioengineer novel bacteriophages to optimize their activity against *Salmonella* serovars and develop a broad-spectrum phage cocktail to reduce *Salmonella* in poultry.** The work is anticipated to benefit not only the poultry industry, but also the beef, pork, and produce industries.

Several former PhD students/postdoctoral researchers mentored by FRI executive committee or affiliate members have been featured recently in multiple publications:

- **Cameron Wicks**, mentored by FRI affiliate member **Brad Bolling**, was interviewed about her graduate research investigating the ability of **natural, sustainable, polyphenols** to minimize ice cream melting and dripping. She formulated an ice cream that did not melt even after four hours at room temperature. The **polyphenol addition also should prevent freezer burn**. *(Photo by Michael P. King, CALS)*



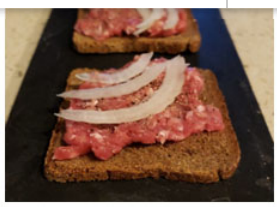
- **Gina Gallego-Lopez**, a postdoctoral researcher with FRI executive committee member **Laura Knoll,** was interviewed about her work investigating how the **foodborne parasite *Toxoplasma gondii* alters the cellular metabolism of the host in order to promote its own growth**. The work is expected to provide insight into therapeutic strategies against *T. gondii* infections.



- **Sarah Engstrom**, mentored by FRI associate director **Kathy Glass**, explains how the use of **functional dairy powders can replace perishable ingredients** in food formulations to mitigate temperature-related quality issues minimize food waste without compromising product integrity in this publication. In addition, Sarah just published a review article that discusses **carbohydrates from a nutritional perspective**.

FRI associate director **Kathy Glass** recently published a review article on **current and future strategies for the food industry to reduce and replace salt in food products** as well as the challenges and potential health consequences of

You can find out by reading here whether or not **native Wisconsinite Kathy Glass will be eating a festive and traditional Wisconsin "cannibal sandwich"** this year over the holidays (and learn her thoughts about why Wisconsin seems to be having more foodborne disease outbreaks recently).



FRI associate director **Kathy Glass and** FRI science writer **Wendy Bedale** teamed with Iowa State University assistant professor **Danny Unruh** to write an article (featured as the Spotlight article in the current edition of Food Safety Magazine) discussing how **reformulation of deli meats to include antimicrobials** (including newer, consumer-friendly, **clean-label options**) could reduce the risks of *Listeria monocytogenes* in these foods. The report highlights notable past *L. monocytogenes* outbreaks associated with deli meats (including the recent outbreak linked to **Boar's Head Meat products** that has now resulted in at least 61 illnesses, 60 hospitalizations, and ten deaths).

The same edition of Food Safety Magazine also includes an article by FRI executive committee member **Jeff Sindelar** on the **importance of food safety education**, emphasizing that it is far more than just training students in an academic classroom, and observing that **food safety education within a food company establishes and encourages the growth of a strong food safety culture.**

Registration is now open for **FRI's Better Process Cheese School** in Madison, Wisc., March 25–26.

Registration is now open for the **IAFP Challenge Study Workshop**, to be held April 2–3, 2025 at the Hilton Garden Inn - O'Hare Airport. FRI executive committee member **Kristin Schill** along with the Kaitlyn Casulli (University of Georgia) and Ann Charles Vegdahl (Cornell) will teach this course.

Save the date (May 20–21, 2025) **for the FRI Annual Spring Meeting** in Madison, Wisc.

FRI is accepting applications now thru Friday, Feb. 7 for its **2025 Summer Undergraduate Research Program in Food Safety**, which will be held will be held May 27 through Aug. 1. Contact Adam Borger at adam.borger@wisc.edu for more information.

Food Safety News

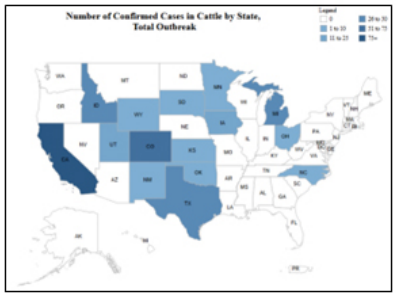
Highly pathogenic avian influenza (HPAI) H5N1 clade 2.3.4.4b **genotype B3.13 in cows and milk** continues to be an important topic in the news.

Breaking news: On Dec. 6, USDA announced a **National Milk Testing Strategy** and issued a new Federal Order with **three main requirements designed to better understand and prevent the further spread of HPAI virus in livestock:**

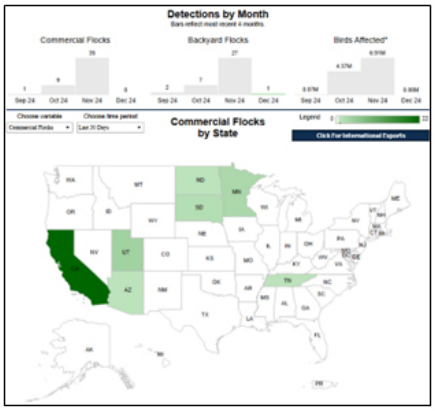
- First, **it requires the sharing of raw milk samples, upon request**, from any entity responsible for a dairy farm, bulk milk transporter, bulk milk transfer station, or dairy processing facility that sends or holds milk intended for pasteurization.

disease surveillance.
- Finally, like USDA's April 24 Federal Order, it requires that **private laboratories and state veterinarians report positive results to USDA** that come from tests done on raw milk samples drawn as part of the NMTS.
- The first round of silo testing under the Federal Order and the NMTS is scheduled to begin the week of Dec. 16.
- USDA will co-host information sessions for all state animal health officials and state dairy regulators the week of Dec. 9 to learn more about the National Plant Silo Monitoring and sampling procedures.

HPAI in Animals



- As of Dec. 3, a total of **695 dairy herds (up from 403 herds as of Nov. 4) in 15 states have had infections with HPAI**. California alone has had 481 infected herds.
- The number of **HPAI detections in commercial and backyard flock of birds has increased** in recent months, as is typical in the fall.
    - In the last month, **~7 million birds in these flocks have been affected**.
    - California alone has lost nearly 6 million commercial poultry birds due to HPAI this year.



- **Until last month, Hawaii was the only U.S. state where HPAI had not been detected in domestic or wild birds**.
    - **HPAI has now been found in one wild bird and eight captive wild birds** in Hawaii (all in Honolulu county).
    - The virus was also detected in a nearby **wastewater treatment plant** which serves the area where the captive wild birds were located.
    - At least 54 humans (including **visitors to a pet fair**) may have been exposed to the infected birds, with 13 developing at least one respiratory infection symptom. Testing of these individuals is underway.
    - The strain found in the Hawaiian captive wild birds is a clade 2.3.4.4b strain **genotype A3,** the same clade but a different genotype currently affected dairy cattle and domestic birds on the U.S. mainland. This genotype has been previously found in Alaska, which may indicate that **migratory birds** introduced the strain to Hawaii.

HPAI in Humans

- **The first case of human case of H5N1 in Canada has occurred in a teenager**, who remains in **critical care** in a children's hospital in Vancouver as of Nov. 26.
    - An extensive investigation identified no additional cases, **nor any evidence of human-to-human transmission**.
    - Test results for household pets, nearby animals, and environment samples were all negative for H5 influenza.
    - While the source of the infection remains unknown, the strain was identified by Canadian health officials as belonging to clade 2.3.4.4b, **genotype D1.1**, which is the strain currently circulating in wild birds and poultry in British Columbia (and is distinct from the B3.13 genotype circulating in U.S. cows and the A3 genotype found in Hawaii but **related to the D1.2 genotype** found in Oregon pigs earlier this fall).
    - One report suggested that the teenager could be infected with a mixture of viruses, some of which a**ppear to have acquired mutations** (possibly by

- **More human cases have been detected in the U.S. recently**, with CDC now reporting at least 57 confirmed cases this year (including 16 new cases this month).
  - **A California child with no known contact with infected animals has also tested positive for H5N1 (genotype not yet reported) in the last month, the first time a U.S. child has been infected.** The child experienced only mild symptoms and was identified via routine influenza surveillance. Family members tested negative for H5 influenza, and a source of the infection remains unknown.
  - Two recent cases in Washington State poultry workers were infected with the D1.1 genotype, but unlike the teenager in Canada discussed above, these cases were mild.

HPAI in Milk and Dairy Products

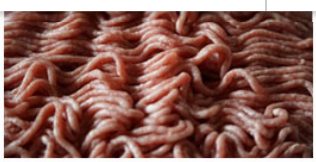
- At least two batches of **raw milk that were available for retail sale in California** (where such sales are legal) **have tested positive for avian influenza virus** by PCR (infectious virus testing is underway now).
  - **Both batches were produced in Fresno County and were sold by the company Raw Farm**.
  - At the request of the state, the company issued a **voluntary recall** on Nov. 24 for the first lot that tested positive for the virus. At least one additional lot tested positive, leading to **additional consumer alerts** by the California Department of Public Health and the Los Angeles Couty Department of Public Health and **expanded recalls now include all raw whole milk and cream products produced after Nov. 9.**
  - The California Department of Food and Agriculture has also placed the farm under quarantine and suspended new distribution of its raw milk products since Nov. 27.
  - The company, whose CEO has said that none of the cows are visibly sick, released a YouTube video in an attempt to reassure its customers.

  - **Raw milk products from the company (previously operating as Organic Pastures) were associated with a *Salmonella* outbreak** that sickened 165 people between fall 2023 and June 2024 as well as **numerous other outbreaks of *Salmonella, Campylobacter* or Shiga toxin-producing *E. coli*.**
- **Pennsylvania** has now joined several other states (California, Colorado, Michigan, Arkansas, Massachusetts, and Oklahoma) in **ordering mandatory testing of bulk milk samples for HPAI.** Pennsylvania (along with Arkansas and Massachusetts) has not yet had any HPAI infections in dairy cattle. Pennsylvania will cover the cost of the testing.

In other food safety news:

As reported by FDA on Dec. 5, an ***E. coli* O157 outbreak** linked to an i**ceberg/Romaine lettuce blend** has sickened at least 69 individuals in ten states. The lettuce blend was served at **catering events, restaurants, and a school**. A common supplier of the lettuce blend (which is now past its shelf life) was found in the traceback investigation.

The **iceberg/Romaine lettuce outbreak** described above may be related to an ***E. coli* outbreak** associated with **Andre's Banquets and Catering** and a school event in **St. Louis, MO** that has sickened 25 individuals, most of whom reporting eating salad. St. Louis County Department of Public Health says that that outbreak has been linked by genetic analysis to a larger outbreak of at least 115 cases in numerous states, with 13 requiring hospitalization and three cases of hemolytic uremic syndrome. The outbreak strain was not found in unopened packages of iceberg lettuce collected at Andre's Banquet Center, however.



Hen House restaurants during November has been linked to **ground beef products from Wolverine Packing Company**. FSIS announced on Nov. 20 that Wolverine Packing Co. in Detroit, Mich., **was recalling** 167,000 pounds of ground beef products that may have been contaminated with *E. coli* O157:H7.

A recent ***E. coli* O121:H19 outbreak** with at least 39 illnesses, 15 hospitalizations, and one death has now been linked to **bagged organic whole and baby carrots** supplied by **Grimmway Farms** marketed under many different brand names across the U.S. and in Canada, Columbia, Hong Kong, and the United Arab Emirates. The carrots were available for purchase at retail from Aug. 14 to Oct. 23. **Voluntary recalls** have been announced for these carrots as well as products made with these carrots.

From mid-October through mid-November, a ***Salmonella* Typhimurium** outbreak associated with **imported cucumbers** has sickened at least **68 people from 19 states, including at least 18 who have been hospitalized**. No deaths have been reported. Of those interviewed, 82% reported eating cucumbers. Voluntary recalls of cucumbers grown by Agrotato, S.A. de C.V. in Sonora, Mexico (and supplied by various companies), along with various salads and sandwiches made with these cucumbers, have occurred, with additional recalls possible.

A newly reported multistate outbreak of ***Listeria monocytogenes* has again been linked to a ready-to-eat meat product. At least 11 illnesses (with one infant death)** that occurred **over more than two years** were linked to Yu Shang Brand products made in the U.S. More than 72,000 pounds of product have now been recalled in the original and expanded recalls. *L. monocytogenes* was detected in product during FSIS routine testing and was subsequently found in environmental samples collected by FSIS.

No one is perfect! Better safe than sorry! **Recalls of green onions in both Canada and the U.S. were rescinded** after a positive *Salmonella* test result occurred with a single product sample was found to have been the result of **cross-contamination with a positive control strain** at the Canadian Food Inspection Agency laboratory. The producer of the green onions, Church Brothers Farms, stated "While we were pleased to hear that our product did not contain the *Salmonella* isolate, we will always act with an abundance of caution when it comes to the health and well-being of our consumers."

A letter signed by 27 members of Congress is urging FDA to ban Red Dye 3 because of its carcinogenic potential. California already banned the dye in 2023, while in the EU, the dye can only be used in **cocktail and candied cherries.** FDA has been actively reviewing an earlier petition to ban the dye that was filed in 2022 by a collection of public interest groups and individuals. FDA has argued that although Red Dye 3 has been shown to be carcinogenic in rats, the mechanism by which it causes cancer in rats doesn't occur in humans, therefore limiting its relevance. Somewhat curiously, however, FDA did ban the use of the dye in cosmetics in 1990. Red Dye 3 is found in more than 2,800 brand name foods, including many candies, cakes, and cakes, but also foods that do not appear red or pink.

Current Literature

A new study investigated how ***E. coli* O157:H7 (STEC) virulence changes after it colonizes alfalfa sprouts** and how **prior seed treatment with a sanitizer solution affects that virulence**. The transcription of STEC virulence genes generally decreased and **STEC became less virulent (as assessed in an insect model) after three days of refrigeration** compared to fresh sprouts. Treatment of the seeds with sanitizer (2,000 ppm calcium hypochlorite) did reduce STEC numbers, although the differences observed between treated and untreated were small (0.6 log). However, **STEC exhibited enhanced virulence when colonizing sanitizer-treated seeds** when compared to untreated seeds.

A recent review article discusses the many **factors that need to be considered when choosing food packaging**, delving into the **pros and cons of different packaging materials** and identifying which packaging materials are most compatible with various foods. The review also highlights consumer factors related to packaging and details numerous **novel and environmentally friendly food packaging options**, such as edible packages, mycelium-based materials (which utilize agriculture wastes), dissolvable produce packaging, and reusable packaging.

A new study in the journal Science reports the solution to a long-standing mystery that could affect **how public drinking water in the U.S. is disinfected**. As explained in the accompanying Perspective, the **chloramines NH_2Cl and $NHCl_2$ chlorine-based used to disinfect ~1/3 of U.S. public drinking water supplies**. However, **a byproduct formed when chloramines are used for water disinfection has been observed but has remained unidentified "for decades."** The new study identifies this byproduct as the **chloronitramide anion** ($Cl\text{-}N\text{-}NO_2^-$). In water collected from various sources, including from U.S. homes, the byproduct was found at high levels (higher than general limits for disinfection byproducts)

suggests that **the byproduct is probably "not harmless" based on its similarity to other toxic molecules**.

A new systematic literature review details the **levels of various heavy metals that have been found in spices and herbs from markets around the world** and discusses their carcinogenic and non-carcinogenic risks.

Other News

Deactivating just two genes (by CRISPR-Cas9 gene editing) in a tomato plant results in a much sweeter tomato without affecting tomato size or yield. The genes that were deleted (both of which encode **proteins that degrade enzymes involved in sugar production**) are found in many other plants, suggesting a similar approach could be used to improve the flavor of other fruits.

Abstracts for IAFP 2025 are due Tuesday, Jan. 14, 2025.

Applications are being accepted until Feb. 28 for the $3,000 **AOAC International/ Eurofins Foundation "Testing for Life" student award**. Eligible students include **full-time undergraduate or graduate students** who are advancing basic or applied science in analytical or molecular testing for food safety, food security, food defense, food authenticity, or health and environmental protection.

UW-Madison and Wisconsin News

The **exquisite sensitivity and specificity with which proteins bind to their small-molecule substrate** is being harnessed by UW-Madison biochemistry professor Vatsan Raman and colleagues to develop **a new platform technology for the detection of small molecules in organisms and the environment**. The method ("Sensor-seq") allows many thousands of protein mutations to be screened simultaneously to identify those that bind to the small molecule of interest (a drug, a metabolite, for example). Those protein mutations that bind the small molecule can be modified (with a GFP reporter protein) to produce a signal when they bind their target, allowing quantitation of the small molecule of interest.

Upcoming training opportunities on the UW-Madison campus include the following:

- Successful Ice Cream Retailing (Jan. 13–14, 2025)
- Batch Freezer Workshop (Jan. 15–17, 2025)
- Meat Curing School (Jan. 21–23)
- Meat Snacks Short Course (Feb. 25–27, 2025)
- Cheesemaking Fundamentals (March 11–12, 2025)
- Confectionary Technology Course ("Candy School") (July 21–Aug. 1, 2025)

Did someone forward this newsletter to you? Click here to sign up to receive future FRI e-newsletters!