Food Safety Awareness and Food Security Challenges Among Hospital Laboratory Employees, and a Comparative Review of U.S. and EU Histamine Regulations in Seafood

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Agency: Irwin Army Community Hospital

Dates: January – July 2026

Outline

- About Me
- Applied Practice Experience Overview
- Portfolio Products
- *Frontier* Field Trips and iMOVES&FB
- MPH Competencies
- Acknowledgements

About Me

- Live in Northeast Kansas
- BS in Clinical Laboratory Science
- MPH Candidate
- Public Health Interest: Food Safety and Biosecurity
- Work as the lead clinical laboratory scientist in the microbiology section of the laboratory at Irwin Army Community Hospital (IACH)



Overview of Applied Practical Experience

Irwin Army Community Hospital Food Safety and Security Questionnaire, Food Safety and Security Presentation, and handout.



international MObility of VEterinary Students & Food Biotechnologists (iMOVES&FB) program

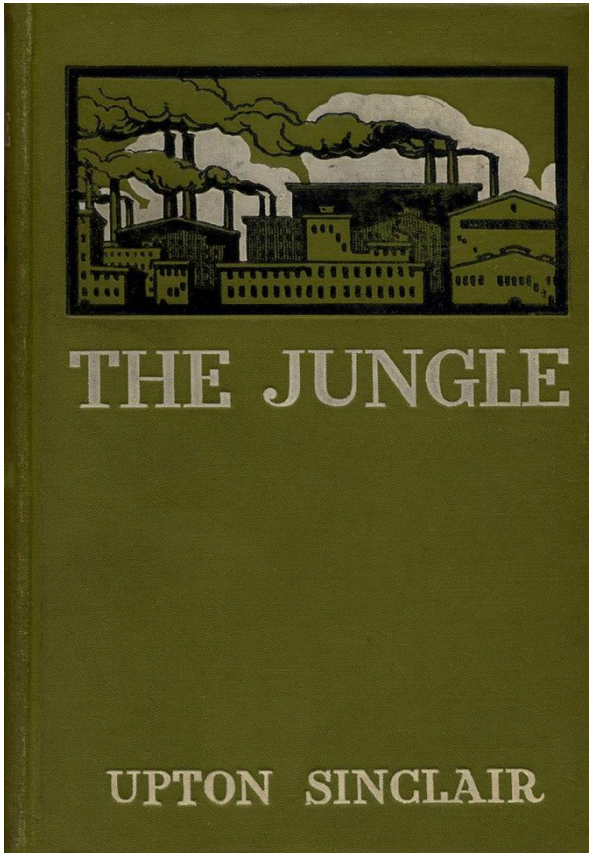
UNIVERSITÀ DI PADOVA
Dipartimento
di Biomedicina comparata
e Alimentazione



Irwin Army Community Hospital (IACH)



U.S. Food Safety: Two “Presidential” Issues





The Bugs That Make You Go Poo (A Lot)









Readiness and Resiliency (Food Security)





Effects of Food Insecurity

1. Physical Health
2. Mental Health
3. Well-Being
4. School and Work

U.S. Food Security





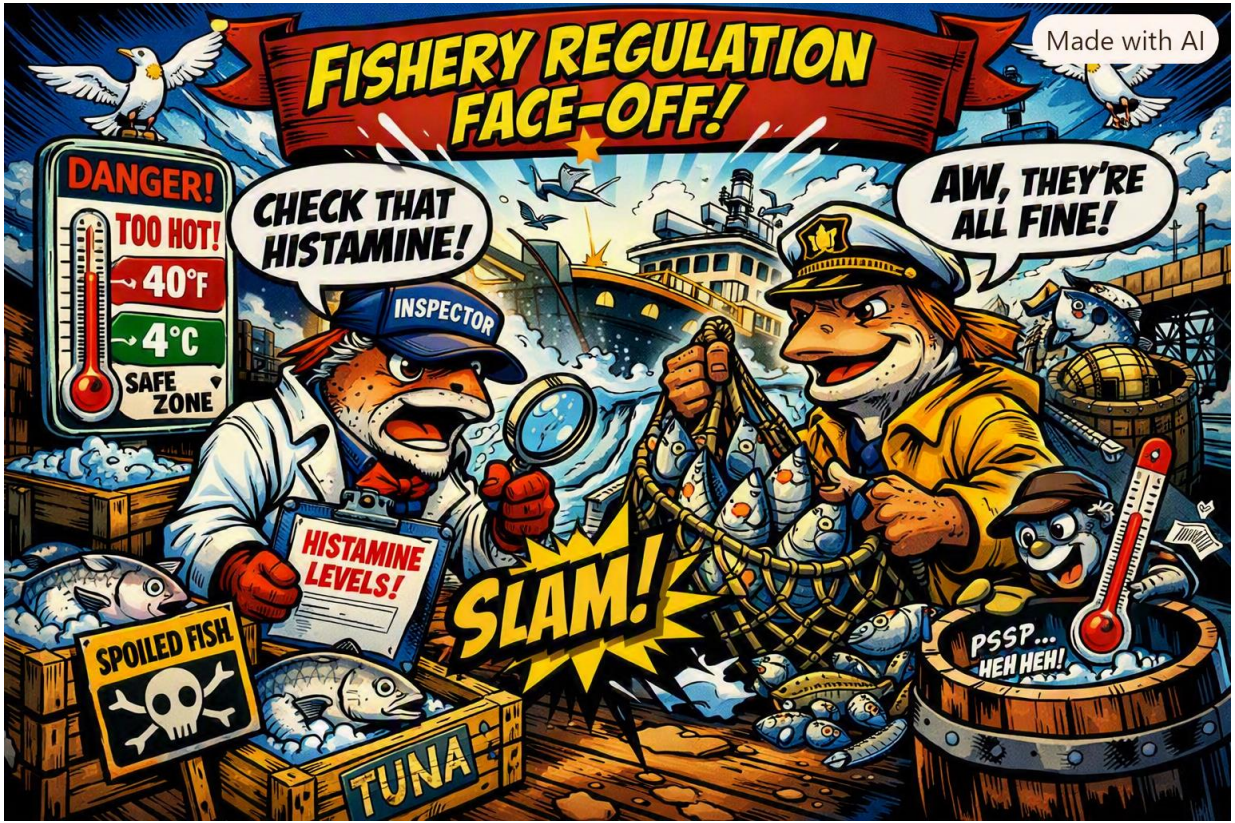


An estimated
24%
of our nation's active-duty service members and their families
ARE FOOD INSECURE.

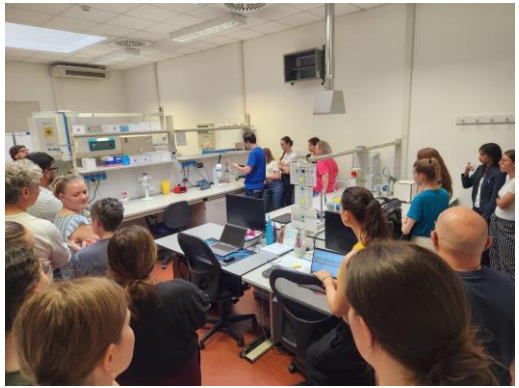
Flint Hills
BREADBASKET
A NON-PROFIT FOOD PANTRY

GEARY COUNTY
FOOD PANTRY

Histamine Regulations



Seafood Safety: Histamine



Seafood: food safety

STANDARD FOR QUICK FROZEN FINFISH, UNEVISCERATED AND EVISCERATED

CODEX STAN 36-1981

Adopted in 1981. Revised in 1995, 2017. Amended in 2013.

"The products shall not contain more than 10 mg/100g of histamine based on the average of the sample unit tested. This shall apply only to species of *Clupeidae*, *Scombridae*, *Scombresocidae*, *Pomatomidea* and *Coryphaenedae* families."

- Codex Alimentarius Commission. Standard for Quick Frozen Finfish, Uneviscerated and Eviscerated (Codex Stan 36-1981), revised 2017, p. 2.

European Union

EUR-Lex

Access to European Union law

REGULATION (EC) No 853/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 29 April 2004

laying down specific hygiene rules for on the hygiene of foodstuffs

Official Journal of the European Union

COMMISSION REGULATION (EC) No 2073/2005

of 15 November 2005

on microbiological criteria for foodstuffs

COMMISSION REGULATION (EU) No 1019/2013

of 23 October 2013

amending Annex I to Regulation (EC) No 2073/2005 as regards histamine in fishery products

NATIONAL ARCHIVES

Code of Federal Regulations

A point in time eCFR system

Title 21

Displaying title 21, up to date as of 8/06/2026. Title 21 was last amended 8/06/2026. view historical versions

Enter a search term or CFR reference (eg. fishing or 1 CFR 1.1)

Title 21 / Chapter I / Subchapter B / Part 123 Previous / Next / Top

ECFR CONTENT

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View table of contents for this page.

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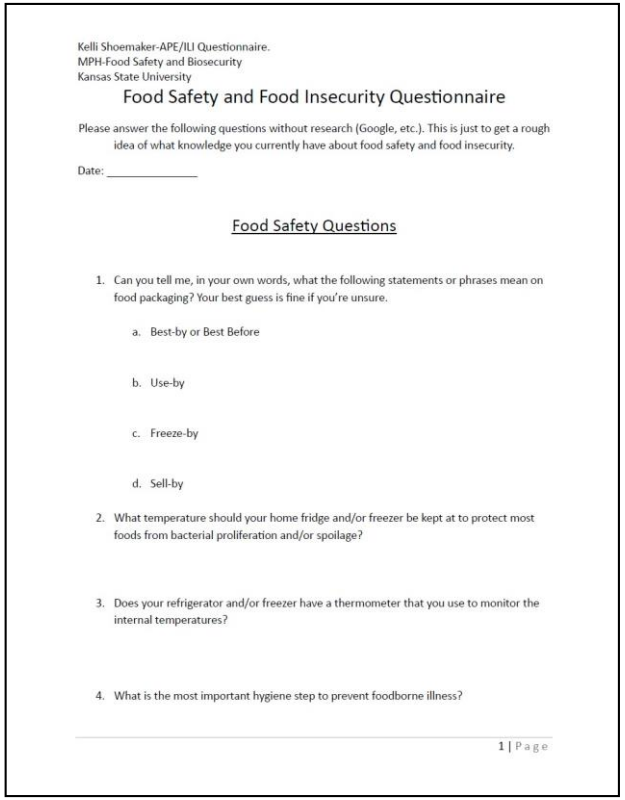
PART 123—FISH AND FISHERY PRODUCTS

Authority: 21 U.S.C. 321, 342, 343, 346, 348, 371, 374, 379e, 381, 393; 42 U.S.C. 241, 241(, 264.

Source: 60 FR 65197, Dec. 18, 1995, unless otherwise noted.



Product 1 – Food Safety and Security Questionnaire with Data Compilation



Kelli Shoemaker-APE/ILI Questionnaire.
MPH-Food Safety and Biosecurity
Kansas State University

Food Safety and Food Insecurity Questionnaire

Please answer the following questions without research (Google, etc.). This is just to get a rough idea of what knowledge you currently have about food safety and food insecurity.

Date: _____

Food Safety Questions

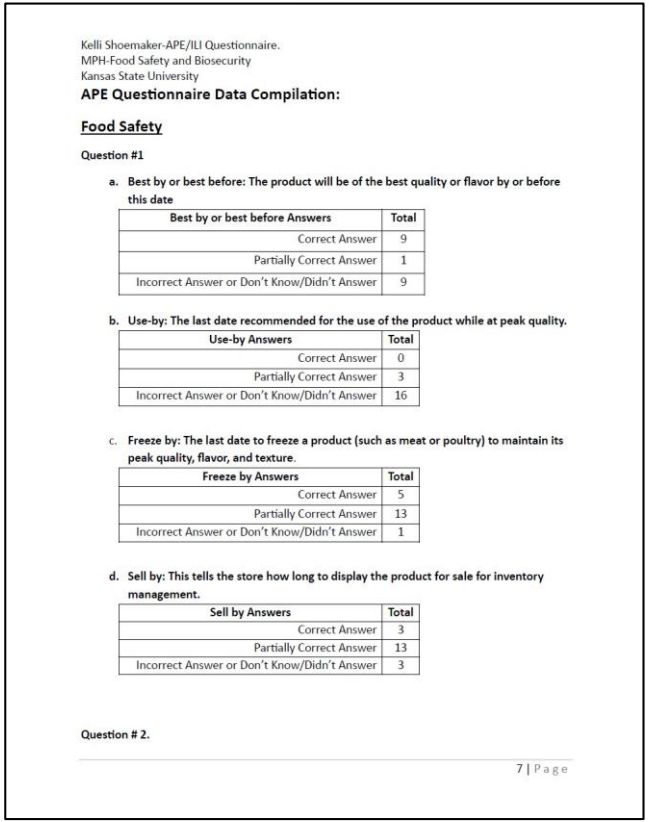
1. Can you tell me, in your own words, what the following statements or phrases mean on food packaging? Your best guess is fine if you're unsure.
   a. Best-by or Best Before
   b. Use-by
   c. Freeze-by
   d. Sell-by
2. What temperature should your home fridge and/or freezer be kept at to protect most foods from bacterial proliferation and/or spoilage?
3. Does your refrigerator and/or freezer have a thermometer that you use to monitor the internal temperatures?
4. What is the most important hygiene step to prevent foodborne illness?

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63.2% of respondents were not thawing frozen meat products correctly/safely

26% of laboratory respondents to the survey have either low food security or very low food security

68% of respondents did not know whom to contact for food assistance or other necessities when unsure how to access assistance.



Kelli Shoemaker-APE/ILI Questionnaire.
MPH-Food Safety and Biosecurity
Kansas State University

APE Questionnaire Data Compilation:

Food Safety

Question #1

a. **Best by or best before: The product will be of the best quality or flavor by or before this date**

Best by or best before Answers	Total
Correct Answer	9
Partially Correct Answer	1
Incorrect Answer or Don't Know/Didn't Answer	9

b. **Use-by: The last date recommended for the use of the product while at peak quality.**

Use-by Answers	Total
Correct Answer	0
Partially Correct Answer	3
Incorrect Answer or Don't Know/Didn't Answer	16

c. **Freeze by: The last date to freeze a product (such as meat or poultry) to maintain its peak quality, flavor, and texture.**

Freeze by Answers	Total
Correct Answer	5
Partially Correct Answer	13
Incorrect Answer or Don't Know/Didn't Answer	1

d. **Sell by: This tells the store how long to display the product for sale for inventory management.**

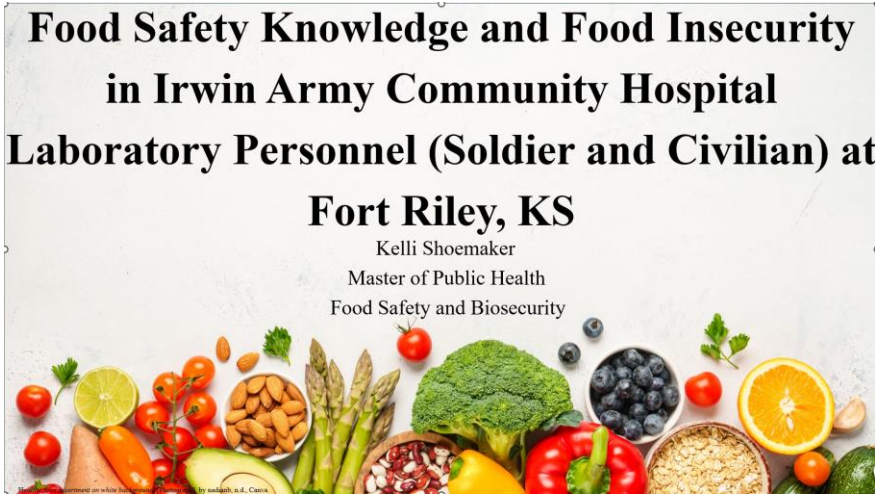
Sell by Answers	Total
Correct Answer	3
Partially Correct Answer	13
Incorrect Answer or Don't Know/Didn't Answer	3

Question # 2.

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Product 2 – Food Safety and Food Security Presentation





Product 3 – Food Safety and Food Security Pamphlet

Increase your food safety knowledge

What do the following statements/phrases mean on food packaging?

Best-by or Best before
This phrase means that the product will be of the best flavor or quality by the date listed. It does not mean that the product cannot be purchased or consumed after the date listed.

Use-by
The last date recommended of use of the product while at peak quality. This is not a discard date. **Note: This does not apply to infant formula. Discard formula after the use-by date.**

Freeze-by
This is the date that food should be frozen to maintain peak quality

Sell-by
This date tells the supplier how long to display the product for sale for inventory management purposes



Minimum internal cooking temperatures for safe food consumption



Safe Minimum Internal Temperature Chart

As measured with a food thermometer

Food	°F (°C)
Beef, Pork, Veal, and Lamb (roast, steaks, and chops)	145 °F (62.8 °C) with a 3-minute "rest time" after removal from the heat source
Ground Meats	160 °F (71.1 °C)
Poultry (whole, parts, or ground)	165 °F (73.9 °C)
Eggs and egg dishes	160 °F (71.1 °C) Cook eggs until both the yolk and the white are firm. Scrambled eggs should not be runny.
Leftovers	165 °F (73.9 °C)
Fin Fish	145 °F (62.8 °C)

NOTE: The internal color of the meat and cooking time are not safe indicators of whether your meat product is cooked properly!

Food thermometers are a must for every household.

Storage practices for foods

Refrigerator temperature

≤40°F (Ideal = 35-40°F); 4°C

Freezer temperature

0°F; -18°C

Refrigerator Storage Guide

Upper Shelves
Ready to eat foods

Middle Shelves
Dairy Products (Milk, Eggs, Cheese)

Lower Shelves
Raw Proteins

Door Shelves
Condiments and Nonperishable drinks

Crisper Drawer (Low Humidity)
Apples, Pears, Avocados, Cantaloupe

Crisper Drawer (High Humidity)
Lettuce, Broccoli, Cucumbers, Peppers, Squash

What are the safest methods to thaw your frozen meat and produce?

1. Thaw in the refrigerator. Note: Most foods require 1-2 days to thaw completely, and large meat items such as turkey, ham, etc. may take longer. It is best to plan thawing 1 day for every 5 lbs. of weight
2. Thaw in a cold-water bath. Place food into a leak-proof bag and immerse in cold water. Change the water every 30 minutes. Once thawed, cook immediately.
3. Defrost using the microwave. Once meat is defrosted, cook immediately, as it may have already warmed enough to begin cooking in certain areas.

Never leave your food on the counter to thaw!

Do you struggle to afford food and sometimes worry about feeding yourself or family members?

If the answer to this question is yes, then you may have food insecurity.



https://www.militaryonesource.mil/resources/millife-guides/food-security-resources-and-support-programs/

Who Can You Reach Out To For Help With Food Insecurity?

1. Military Leadership
2. Chaplain
3. Physician
4. Local Health Department
5. Trusted Friend or Family Member

Food insecurity can happen to anyone. Asking for help is not a weakness, and food assistance does not imply that you're lazy or unemployed.

Note: In 2024, 83.7% of SNAP recipients were employed (U.S. Department of Agriculture, Food and Nutrition Service, 2025).

So what programs are available to help soldiers and families who are food insecure in the Fort Riley, Kansas area?

Riley County Residents (and Fort Riley)

Flint Hills Breadbasket

https://kansasfoodsource.org/category/help-agency/riley-county/ur

Geary County Residents (and Fort Riley)

Geary County Food Pantry

https://kansasfoodsource.org/category/help-agency/geary-county/

Everyone



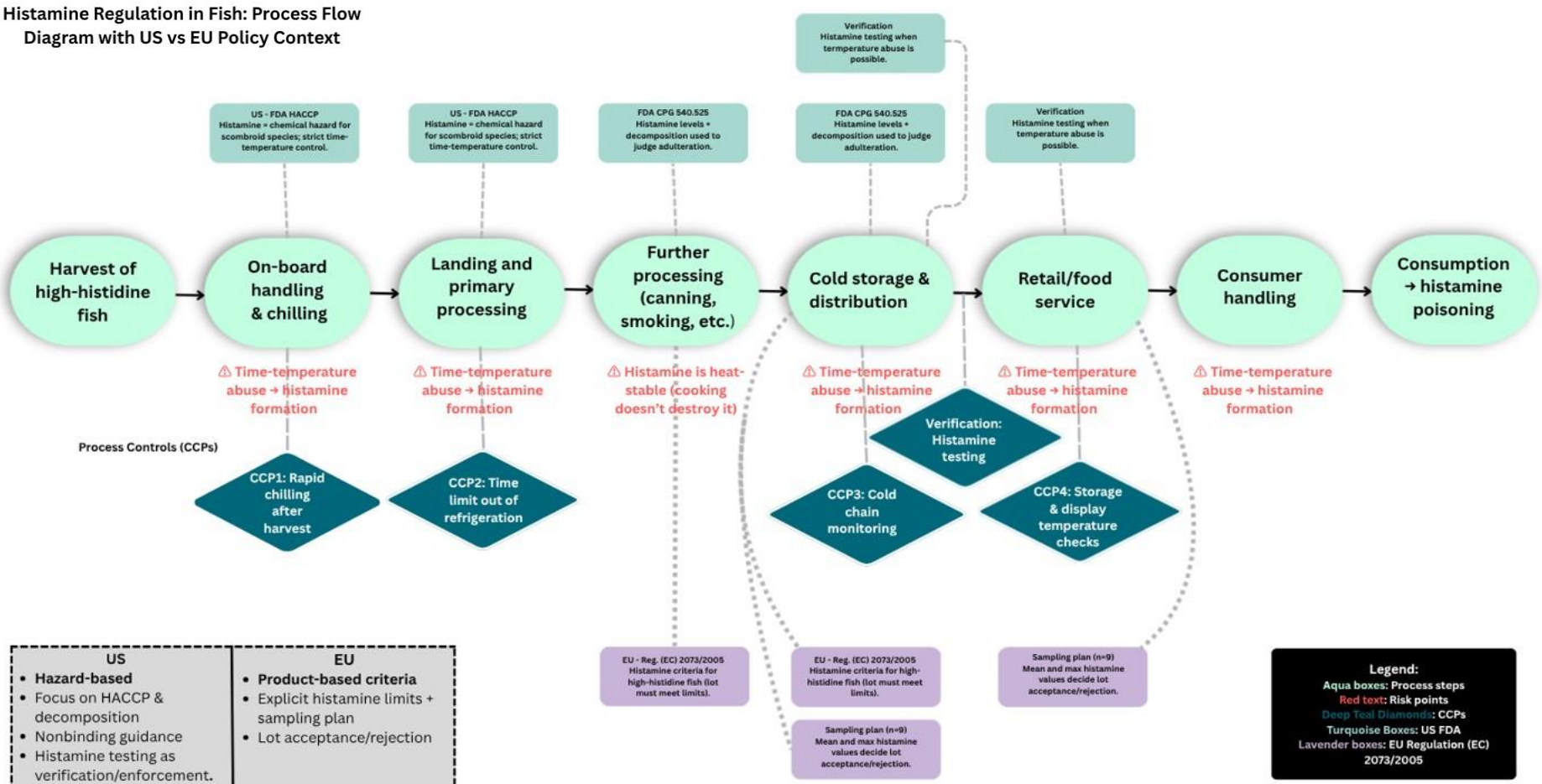


****Note: These food resources are all income based**

Reaching out for help to nourish yourself and your loved ones—whether your children, spouse, or elderly parent—is a sign of strength, not weakness. Nutritious food is essential for brain development, overall health, and well-being, and every person deserves access to it.

Ready to Serve: Building a 'Day-1-Ready' Public Health Workforce for Kansas and Beyond", T52HP46763-01-00, is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award totaling $1,486,217.00 with 0% percentage financed with non-governmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS or the U.S. Government.

Product 4 – Histamine Regulation (EU versus U.S. Policy) Process Flow Diagram



42nd *Frontier* Field Trip

"A Public Health Predicament for the People and the POTUS: What Would You Say?“ Nov. 2024





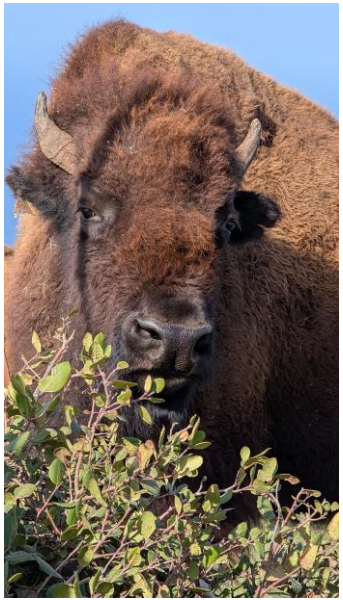


44th *Frontier* Field Trip

"Lessons from the Salton Sea, the Anza-Borrego Desert, and Catalina Island: Floods, Freak Accidents, Falcons, and the Future." March 2025





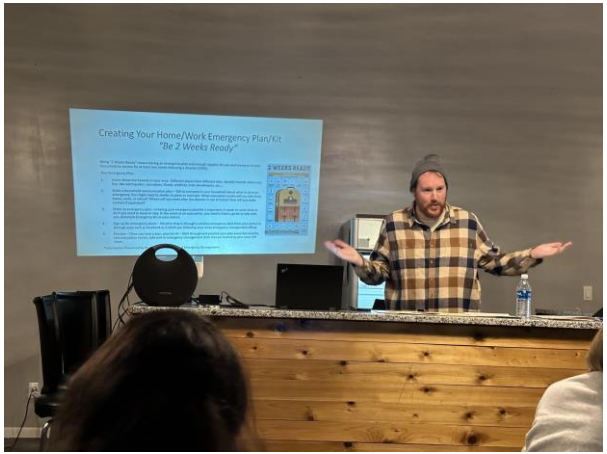






46th *Frontier* Field Trip

"ProjectSafe: Anticipating a cascade of predictable surprises." Nov. 2025







47th *Frontier* Field Trip

“Finding Hope in Kansas” March 2026

Frontier Field Trip connects students with Kansas history, agriculture and community perspectives | Kansas State University

Students later participated in a lunch-and-learn session at Agri Trails Coop, facilitated by Darel Anderson and colleagues. Discussions focused on protecting the food supply, grain marketing and reducing agricultural inputs while continuing to feed a growing global population.

“I really enjoyed learning about how farming has evolved over the last 30-40 years regarding pest and drought management,”said Kelli Shoemaker, a Master of Public Health student with an emphasis in food safety and biosecurity. “What really resonated with me was how agriculture, just like animal and human healthcare, has had to evolve and pivot in response to changes in the environment, costs, and technology. A lot of research is done every year to decide which types of seed the coop should purchase, how much to purchase, the total costs, and the farmers' interests.”

Kelli also learned about how Agri Trails Coop support farmers with decision making in the ever-changing agricultural landscape.

“They spend a lot of time working with each farmer to ensure that the seed they purchase is the best fit for their farms and local environment,” Kelli said. “Since it's a farmer-owned business, the farmers themselves have a stake in how well the coop performs and how well it supports them and their neighboring farms. This, in turn, leads to greater local support and strengthening of communities.”





“Since it’s a farmer-owned business, the farmers themselves have a stake in how well the coop performs and how well it supports them, and their neighboring farms. This in turn, leads to greater local support and strengthening of communities”

https://www.vet.k-state.edu/about/news-events-publications/2026/Frontier-47-2026.html

iMOVES&FB June 2026















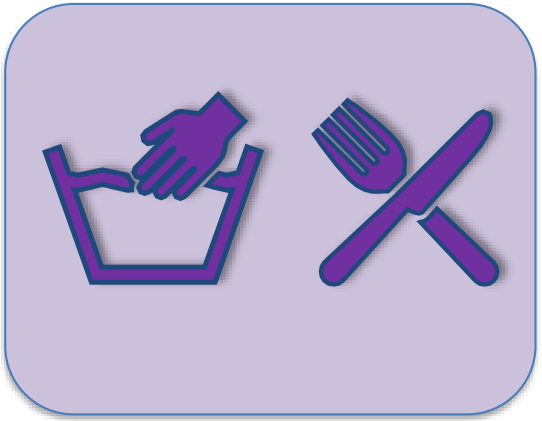
Competencies Achieved (and Integrated)

Number	MPH Foundational Competency
13	Propose strategies to identify relevant communities and individuals, and build coalitions and partnerships for influencing public health outcomes
22	Apply a systems thinking tool to visually represent a public health issue in a format other than standard narrative
	FSB Emphasis Area Competency
5	Multidisciplinary Leadership

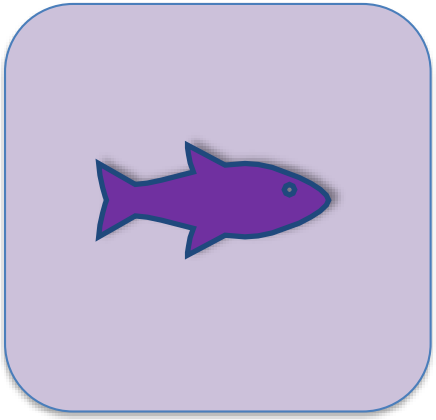
Food Safety and Biosecurity Emphasis and Foundational Area Competencies

Competency	Description of Synthesis and Integration
Apply a systems thinking tool to visually represent a public health issue in a format other than standard narrative – Foundational Competency 22	During June 2026, the investigator produced a process flow diagram, using the program Canva, which visually demonstrated the difference in U.S. and EU histamine regulations. This systems thinking tool allowed the investigator to attain a better understanding of the differences in regulations between the U.S. and EU.
Propose strategies to identify relevant communities and individuals, and build coalitions and partnerships for influencing public health outcomes – Foundational Competency 13	During the APE, the investigator identified a workplace community with potential food safety and food security needs, consulted with key stakeholders to develop assessment tools, identify available assistance programs, and create an educational intervention designed to improve awareness and connect participants to resources. The developed strategies were then used to strengthen partnerships between the participants and community resources to improve public health outcomes.
Multidisciplinary Leadership – FSB Emphasis Area Competency 5	During the APE, the investigator exercised multidisciplinary leadership by collaborating with military, academic, workplace, and international food safety stakeholders to address food safety, food security, and regulatory issues. The investigator assessed the needs of military and civilian laboratorians, worked with the IACH preceptor and major professor to develop and interpret a questionnaire, and created educational products tailored to a non-academic workplace audience. Through the iMOVES&FB program, the investigator also compared U.S. and EU histamine policies and observed seafood safety practices in Italy. These activities required the investigator to contrast stakeholder needs, select appropriate methods of collaboration, and translate technical food safety and biosecurity information (drawn from multiple academic disciplines) into practical education and resources that supported readiness, resiliency, and public health.

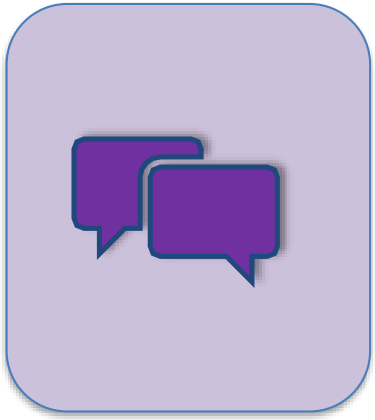
Discussion: How I grew as a scholar-practitioner



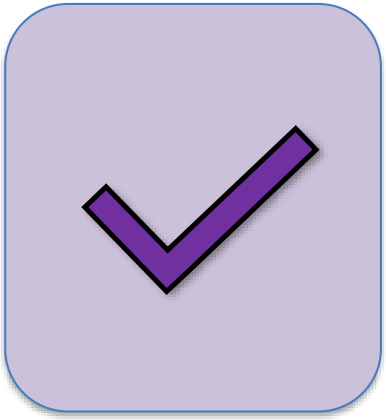
Identified a public health knowledge gap and educational need in a community



Grew in knowledge and understanding of U.S. and EU policies



Improved food safety and food security knowledge through oral and visual presentation



Demonstrated practical application of MPH training

Acknowledgements

- Site Preceptor, 1LT Jeongwon Suk



Irwin Army Community Hospital

- MPH Committee
  - Major Professor: Dr. Justin Kastner
  - Dr. Ellyn Mulcahy
  - Dr. Abbey Nutsch

- MPH Staff, Plern Kongsamut

References

Anthem, P. (2025, July 7). *Food security – what it means and why it matters*. World Food Programme. https://www.wfp.org/stories/food-security-what-it-means-and-why-it-matters

Author unknown. (n.d.). *Norovirus image* [Photograph]. Bing Images. https://www.bing.com/images/search

Author unknown. (n.d.). *Resilient families in the Army* [Photograph]. Bing Images. https://www.bing.com/images/search

California Department of Toxic Substances Control. (2025). *Draft Appendix N: Generation of hazardous waste from geothermal lithium extraction*. Hazardous Waste Management Plan. https://dtsc.ca.gov/wp-content/uploads/sites/31/2025/03/Draft-HWM-Plan_Appendix-N_accessible.pdf

Catalina Island Conservancy. (2026). *Catalina Island Conservancy: Conservation and recreation*. https://catalinaconservancy.org

Centers for Disease Control and Prevention. *Food Safety Basics*. (2026, March 9). Centers for Disease Control and Prevention. Retrieved July 8, 2026, from https://www.cdc.gov/food-safety/about/index.html

Centers for Disease Control and Prevention. (2024, March 2). *Food security*. U.S. Department of Health and Human Services. https://www.cdc.gov/climate-health/php/effects/food-security.html

Defense Finance and Accounting Service. (2025). *2025 basic pay: Enlisted*. U.S. Department of Defense. https://www.dfas.mil/MilitaryMembers/payentitlements/Pay-Tables/Basic-Pay/EM

Doede, A. L., & DeGuzman, P. B. (2020). The disappearing lake: A historical analysis of drought and the Salton Sea in the context of the GeoHealth framework. *GeoHealth*, 4(9), e2020GH000271. https://doi.org/10.1029/2020GH000271

Duchenne-Moutien, R. A., & Neetoo, H. (2021). Climate change and emerging food safety issues: A review. *Journal of Food Protection*, 84(11), 1884–1897. https://doi.org/10.4315/JFP-21-141

European Commission. (2005). Commission Regulation (EC) No 2073/2005 of 15 November 2005 on microbiological criteria for foodstuffs. *Official Journal of the European Union*. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32005R2073

European Commission. (2011). *Guidance on viable parasites in fishery products that may represent a risk to the health of the consumer*. Standing Committee on the Food Chain and Animal Health, Section Biological Safety of the Food Chain. https://food.ec.europa.eu/system/files/2016-10/biosafety_fh_eu_food_establishments-20111214_scfcah_guidance_parasites_en.pdf

Feeding Missouri. (n.d.). *Hunger beyond the headlines: Food insecurity among military families*. https://feedingmissouri.org/hunger-beyond-the-headlines-food-insecurity-among-military-families

Fiorital. (n.d.). *Brochure.* https://fiorital.com/en/brochure/

Flint Hills Breadbasket. (n.d.). *Flint Hills Breadbasket* [Logo]. https://www.flinthillsbreadbasket.org/

Food and Nutrition Administration. (2025). *A short history of SNAP*. U.S. Department of Agriculture. https://www.fna.usda.gov/snap/history

Food and Nutrition Administration. (2026, June 11). *One Big Beautiful Bill Act of 2025*. U.S. Department of Agriculture. https://www.fna.usda.gov/obbb

Food Safety and Inspection Service. (2013, June 15). *The big thaw — Safe defrosting methods.* U.S. Department of Agriculture. https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/food-safety-basics/big-thaw-safe-defrosting-methods

Food Safety and Inspection Service. (2024a, August 27). *Cutting boards.* U.S. Department of Agriculture. https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/food-safety-basics/cutting-boards

Food Safety and Inspection Service. (2024b). *Doneness versus safety.* U.S. Department of Agriculture. https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/food-safety-basics/doneness-versus-safety

Food Safety and Inspection Service. (2025, April 23). *Food product dating.* U.S. Department of Agriculture. https://www.fsis.usda.gov/food-safety/safe-food-handling-and-preparation/food-safety-basics/food-product-dating

References, continued

Food Safety and Inspection Service. (2026a). *Food Safety Acts*. U.S. Department of Agriculture. https://www.fsis.usda.gov/policy/food-safety-acts

Food Safety and Inspection Service. (2026b). *Our History*. U.S. Department of Agriculture. https://www.fsis.usda.gov/about-fsis/history

Food Safety and Inspection Service. (2023, June 9). *Poultry Products Inspection Act*. U.S. Department of Agriculture. https://www.fsis.usda.gov/policy/food-safety-acts/poultry-products-inspection-act

Grover, A. K., Chopra, S., & Mosher, G. A. (2016). Food safety modernization act: A quality management approach to identify and prioritize factors affecting adoption of preventive controls among small food facilities. *Food Control*, *66*, 241–249. https://doi.org/10.1016/j.foodcont.2016.02.001

Hudzicki, J. (2010). *Hektoen enteric agar protocol* (PDF). American Society for Microbiology. https://asm.org/asm/media/protocol-images/hektoen-enteric-agar-protocol.pdf

Hurt, R. Douglas. *American Agriculture: A Brief History*. Ames, Iowa: Iowa State University Press, 1994.

Jack in the Box. (n.d.). *Jack in the Box logo* [Logo]. Bing Images. https://www.bing.com/images/search

Microsoft Copilot. (2026, August 4). *Fishery Regulation Face-Off* [AI-generated image]. Microsoft Copilot.

Microsoft Copilot. (2026). *Question mark made of bacteria, viruses, food, and bacterial culture plates* [AI-generated image]. Microsoft Designer.

Nicastro, L. A. (2022*). Military readiness: DOD assessment and reporting requirements (CRS In Focus, IF12240).* Congressional Research Service. https://www.congress.gov/crs_external_products/IF/PDF/IF12240/IF12240.1.pdf

Orhon, M. (2020). *The leader's guide to building resilient soldiers (NCO Journal).* Army University Press. https://www.armyupress.army.mil/Portals/7/nco-journal/images/2020/September/Resilience/Resilience.pdf

QuickTaxUS. (n.d.). *The supplemental nutrition assistance program (SNAP)* [Photograph]. https://quicktaxus.com/the-supplemental-nutrition-assistance-program-snap

Sinclair, U. (1906). *The Jungle*. Project Gutenberg. https://www.gutenberg.org/ebooks/140 (Accessed from the Project Gutenberg HTML edition.)

Sinclair, U. (1906). The Jungle. Project Gutenberg. https://www.gutenberg.org/cache/epub/140/pg140-images.html

Social Security Administration. (n.d.). *Historical development of U.S. social welfare programs*. Office of Retirement and Disability Policy. https://www.ssa.gov/history/pdf/histdev.pdf

U.S. Department of Agriculture. (n.d.a). *U.S. Codex Office | USDA*. Retrieved July 11, 2026, from https://www.usda.gov/trade-and-markets/policies-and-procedures/us-codex-office

U.S. Department of Agriculture, Food Safety and Inspection Service. (2020). *Kitchen companion: Your safe food handbook.* https://www.fsis.usda.gov/sites/default/files/media_file/2020-12/Kitchen-Companion.pdf

U.S. Department of Agriculture (2026, July 10). *On its 150th Anniversary, USDA Upholds Abraham Lincoln's Vision*. USDA. https://www.usda.gov/about-usda/news/blog/its-150th-anniversary-usda-upholds-abraham-lincolns-vision

U.S. Department of Agriculture. (n.d.b). *WIC timeline: Celebrating 50 years*. https://www.usda.gov/sites/default/files/documents/wic-timeline-celebrating-50-years.pdf

U.S. Food and Drug Administration. (2022, June). *Fish and Fishery Products Hazards and Controls Guidance June 2022 Edition*. Center for Food Safety and Applied Nutrition (CFSAN). https://www.fda.gov/media/80637/download

U.S. Food and Drug Administration. (2024). *Compliance Policy Guide: Sec. 540.525 Scombrotoxin (Histamine)-forming fish and fishery products – Decomposition and histamine (CPG 7108.24).* Office of Inspections and Investigations & Human Foods Program. https://www.fda.gov/media/182955/download

U.S. Food and Drug Administration. (2026, April 13). *Economically motivated adulteration (Food fraud)*. U.S. Food And Drug Administration. https://www.fda.gov/food/compliance-enforcement-food/economically-motivated-adulteration-food-fraud

U.S. Office of Personnel Management. (2026). *General Schedule*. https://www.opm.gov/policy-data-oversight/pay-leave/salaries-wages/2026/general-schedule

Weinroth, M. D., Belk, A. D., & Belk, K. E. (2018). History, development, and current status of food safety systems worldwide. *Animal Frontiers*, *8*(4), 9–15. https://doi.org/10.1093/af/vfy016

Questions and General Discussion



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