HPAI in Michigan:
Human Health Monitoring in MMDHD, CMDHD, and DHD#10

Jennifer Morse, MD, MPH, FAAFP

MDHHS CD Conference, 2025

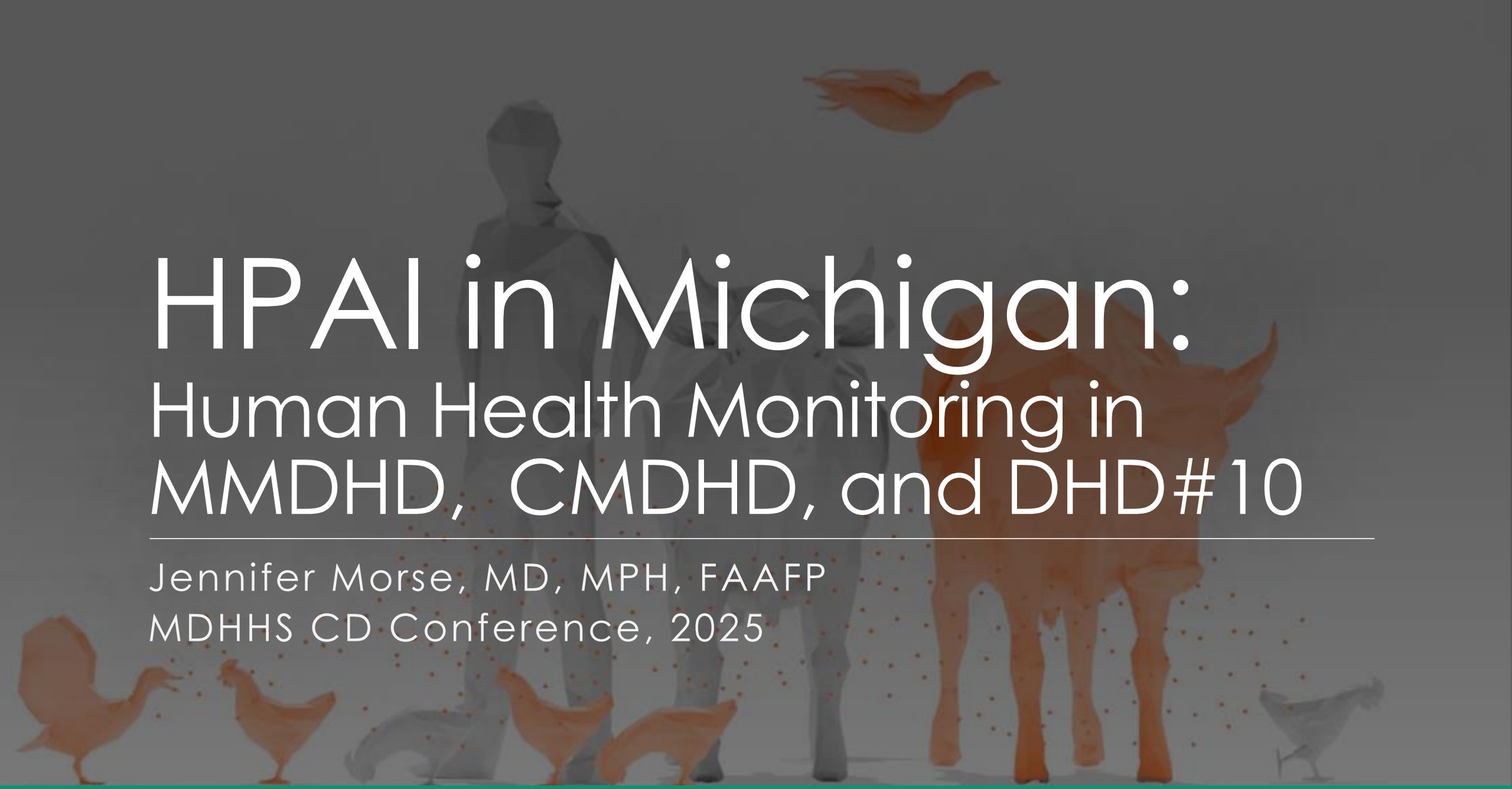


Image from https://www.reuters.com/graphics/HEALTH-BIRDFLU/lgpdndoyrpo/

2024-25 Michigan HPAI Experience (as of May 2, 2025)

- First dairy herd detected March 29, 2024 in Montcalm County
- First commercial poultry flock detected April 2, 2024 in Ionia County
- First backyard poultry flock detected May 9, 2024 in Ionia county
- Since that time, there have been:
  - 9 backyard poultry flocks in 7 counties
  - 13 commercial poultry flocks in 6 counties
  - 31 dairy herds in 13 counties

https://www.michigan.gov/mdard/animals/diseases/avian/avian-influenza

2024-25 MMDHD, CMDHD, and DHD#10 HPAI Experience (as of May 2, 2025)

- First dairy herd detected March 29, 2024 in Montcalm County (first in state)
- First commercial poultry flock detected April 16, 2024 in Newaygo County (fourth in state)
- No backyard poultry flock detected during this time period
- Since that time, there have been (% of state totals):
  - 3 (23%) of commercial poultry flocks in 2 (33%) of counties
    - 1 in Newaygo Co. (DHD#10)
    - 2 in Gratiot Co. (MMDHD)
  - 18 (55%) dairy herds in 5 (38%) of counties
    - 6 in Clinton Co. (MMDHD)
    - 6 in Gratiot Co. (MMDHD)
    - 2 in Montcalm Co. (MMDHD)
    - 2 in Isabella Co. (CMDHD)
    - 1 in Arenac Co. (Recovered/Recovering) (CMDHD)
    - 1 in Missaukee Co. (Recovered/Recovering) (DHD#10)

https://www.michigan.gov/mdard/animals/diseases/avian/avian-influenza#current-status

2024-25 MMDHD, CMDHD, and DHD#10 HPAI Experience (as of May 2, 2025)

- In addition:
  - In the counties of MMDHD:
    - Two human HPAI infections identified in dairy farm workers
    - Two domestic cat HPAI infections identified in household with an adult working on or with dairy farms

Naraharisetti, Ramya. "Highly Pathogenic Avian Influenza A (H5N1) Virus Infection of Indoor Domestic Cats Within Dairy Industry Worker Households—Michigan, May 2024." MMWR. Morbidity and Mortality Weekly Report 74 (2025). https://www.cdc.gov/mmwr/volumes/74/wr/mm7405a2.htm
Morse, Jennifer, et al. "Influenza A (H5N1) virus infection in two dairy farm workers in Michigan." *New England Journal of Medicine* 391.10 (2024): 963-964. https://www.nejm.org/doi/full/10.1056/NEJMc2407264#ap1

Number of Humans Monitored After Exposure 2024-25 MMDHD, CMDHD, and DHD#10 (as of Aprill 22, 2025)

LHD	SOURCE OF EXPOSURE			
	Cattle	Poultry	Domestic Cat	Human
MMDHD	170 (51 active)	6 (0 active)	9 (0 active)*	3 (0 active)
CMDHD	60 (9 active)	0	0	0
DHD#10	0	3 (0 active)	0	0

*24 additional veterinary staff members were monitored by MDHHS only

Number of Humans Still in Active Monitoring, MMDHD, CMDHD(as of Aprill 22, 2025)

LHD	Number still in monitoring	Total Number of Farms Involved	Dates Monitoring started
MMDHD	51	3	5/15/24 5/18/24 5/18/24
CMDHD	9	1	4/12/2024

Dairy Herd Human Monitoring MMDHD, CMDHD (as of Aprill 22, 2025)

- Of the 18 total dairy herds in MMDHD and CMDHD:
  - One farm owner did not reply to attempts at contact
  - Two farms were passive monitoring ownly
  - At the other 15 farms, 230 exposed workers were identified by farm owner/contact person
  - At 9 (60%) farms, the farmer/contact person at the farm wished to received text-based monitoring through the MDHHS Flex Unit* on behalf of all their staff
    - They would answer YES to the screening question if any staff member were experiencing symptoms and then the LHD would follow up
  - This accounted for 130 (57%) of the total identified exposed workers
    - One farm with 10 identified exposed workers unsubscribed from monitoring
    - 51 are still in monitoring
  - At 6 (40%) farms, identified exposed workers' names and contact information was provided; they received text-based monitoring through the MDHHS Flex Unit*
  - This accounted for 100 (43%) of the total identified exposed workers
    - 91 requested removal or unsubscribed from monitoring
    - 9 are still in monitoring

*For more information, see PEG & LHD Connect Updates and Health Monitoring, Testing, and Case Identification Among Persons Exposed to Influenza A(H5N1) — Michigan, 2024

Breakdown of Human Monitoring After Dairy HPAI Exposure MMDHD, CMDHD (as of Aprill 22, 2025)

Total number of farms monitored: 15 Total number of identified exposed workers: 230					
		# of Farms (% of total)	**Total Identified Exposed (% of total)**	**No. Unsubscribed (% in Type)**	**No. Still in Monitoring (% in Type)**
Type of Text Monitoring	**Single Contact Person**	9 (60%)	130 (57%)	10 (8%)	51 (39%)
	Individual	6 (40%)	100 (43%)	45 (45%)	9 (9%)

Poultry Herd Human Monitoring MMDHD, CMDHD (as of Aprill 22, 2025)

- Of the 3 total commercial flocks in MMDHD and DHD10:
  - 9 exposed workers were identified
  - All identified exposed workers' names and contact information was provided; they received text-based monitoring through the MDHHS Flex Unit*
    - 1 (11%) unsubscribed

*For more information, see PEG & LHD Connect Updates and Health Monitoring, Testing, and Case Identification Among Persons Exposed to Influenza A(H5N1) — Michigan, 2024

CD PHN Perspectives

- 9 different communicable disease (CD) public health nurses (PHN) were assigned to worked the 18 dairy herd and 3 poultry flock exposures (3 each from CMDHD, MMDHD, and DHD#10)
- Each were given a survey asking about their experiences to gather information for this presentation
- The survey asked the following open-ended questions:

1. How were you notified of a positive farm or flock?
2. What were your experiences (good or bad) with your notification?
3. What did you do after you were notified?
4. What were your experiences (good or bad) with your notification of/interactions with the farm/flock owner?
5. What type of education did you provide to the owner and/or workers?
6. How receptive were they to education?
7. If offered, were they receptive to PPE?
8. What were your experiences (good or bad) with health monitoring of the workers?
9. What knowledge about HPAI do you feel you were lacking or wish you had in order to better do this work?
10. Do you feel you got good guidance from your regional EPIs or others when needed?
11. What barriers did you face and how did you deal with them?
12. Please provide any other information you can about your experience with this work

The following is a summary of their responses…

How were you notified there was a positive farm or flock? How did this go?

- Some variation of: MDARD notified MDHHS who notified our regional epi who notified someone at our health department and then the information eventually got to the county nurse…either directly from regional epi, or CD coordinator, or health officer.
- Early in the dairy farm cases, the information provided about the farms was not detailed enough to allow for efficient public health follow up, but this improved with time. One nurse thought that perhaps MDARD was concerned about confidentiality but was not aware that those working in public health, especially in CD, know to handle information confidentially.
- The notification emails got more detailed and useful with time, including links to the monitoring protocol and resources.
- PHNs are asked to get animal health information and advise them to report ill animals like barn cats which they felt would have been best handled by MDARD, but they did as asked.
- Some felt there seemed to be a long notification delay, as testing had been done 3-4 weeks prior...this was with the bulk milk testing.

What did you do after you were notified?

- The farms were contacted. The needed information was collected. Education provided, questions answered, encouraged follow up as needed. Then information was entered into OMS.
- For some this contact took multiple attempts. For one farm, all attempts were unsuccessful.
- For the first few farms, there were a lot of follow-up calls needed as there were repeat requests for more information from MDHHS.

What were your experiences with your notification of/interactions with the farm/flock owner?

- Most had good experiences with the farm owners, and they were cooperative and open to sharing their employee information and understood the reason for the nurse's call.
  - It was during one of these initial calls an owner notified PHN of ill employee that ended up having HPAI.
- Some were hard to get ahold of and in rare cases, never answered calls or returned messages.
  - One poultry farm owner was difficult to get ahold of as he was understandably busy with depopulating his farm.
- There was occasional concern/lack of willingness to share employee information which seemed to be for for several reasons, one was immigration concerns.
- There was frustration from farm owners regarding the length of monitoring on the dairy farms.
- Some owners/farmers vocalized they amount of stress they were under, the money they were losing, etc.
- There was initially some confusion and miscommunication with the test results from bulk testing sites in the "recovered farms" status.
- Rarely, the farm owner didn’t know public health would be calling them so that started the call off with some extra confusion to work through.

How receptive were they to education?

- The majority of them were very receptive and appreciative. But it is not known how receptive the farm workers were, or if the education made it to them. Further education and outreach from MSU Extensions was offered.
- On the one occasion when the farm owner could not be contacted, a letter was sent along with all educational materials.
- One nurse commented that all those she talked to were very gracious in answering questions about the farming process when she didn't understand something that they were talking about.

If offered, were they receptive to PPE?

- All were offered PPE and most listened to information about PPE.
- All declined PPE.
- Some replies:
  - They had what they needed
  - That they had it and no one used it.
  - They would reach back out if they needed it.
  - They couldn't force their workers to use it.
  - They didn’t want PPE, they were tired of it from COVID and if he took it to his workers, they wouldn’t wear it.

What were your experiences (good or bad) with health monitoring of the workers?

- Monitoring was too long! Nurses felt frustrated for farms when monitoring went on for extended periods of time, some 6 months or longer. It was hard to promote it especially when everything in print said 10 days.
- Many workers did not speak English, creating a barrier.
- Many workers and employers were uncomfortable providing worker's information.
  - A compromise was to have the owner report for the employees. Owners were very receptive to this and more willing to participate in this version of monitoring, and while MDHHS didn't prefer this method, it allowed for some degree of monitoring where there may not have been any.
- After the work of entering all individuals into OMS, the Flex Unit handled most of the work which was **great**. With the initial farms, there were a lot of emails from the Flex Unit asking for follow up on those that did not reply to their text messages. There were erroneous YES responses that needed follow up. Otherwise, it was a big time saver.

What knowledge about HPAI do you feel you were lacking or wish you in order to better do this work?

- Many felt like they were given enough information. Others felt like it was an education in real-time.
- Wished for a better understanding of the monitoring duration and how to better answer the worker's and owner's questions re: how long monitoring would last as we didn't know what to tell those calling with questions.
  - This was tricky as they were calling us as we were doing the monitoring, but the question was really related to animal health and we didn't know those answers.
- Our nurses did not have an understanding of large commercial poultry or dairy farms, so weren't easily able to understand a person's degree of exposure, or some of the terms or things they were being told..
- There was a lack of understanding of the bulk tank testing, as this wasn't something the PHN were able to keep up to date with. They didn't know if it was random or if all dairies participated. They didn't know how long it took from sampling to return of results. The nurse who had results to follow up on was notified 6.5 weeks after the date of sampling. There is also no clear indication of when passive monitoring ends after a herd is recovering/recovered, so we don't know what to tell farmers for a timeline.

Do you feel you got good guidance from your regional EPIs or others when needed?

Regional epis were very helpful!!! Joe Coyle got a shout out (help with human case and cats)

Other information

- I now know *way* more about dairy farming than I ever thought I would.
- The extended and undefined monitoring period was really an issue, especially for trust in public health. Everything in print/online (which understandably was for poultry) said 10 days, but in the beginning, there was no guidance on this for cattle. We in public health were the ones that had to answer for this and we were just as frustrated.
- Entering all the contacts into OMS was very time consuming, but the Flex Unit monitoring was very helpful.
- It could take days for the daily text messages to start.
- The daily updated spreadsheet from MDHHS reporting who replied to text, who did not, and whether or not they replied positively to symptoms was very helpful.

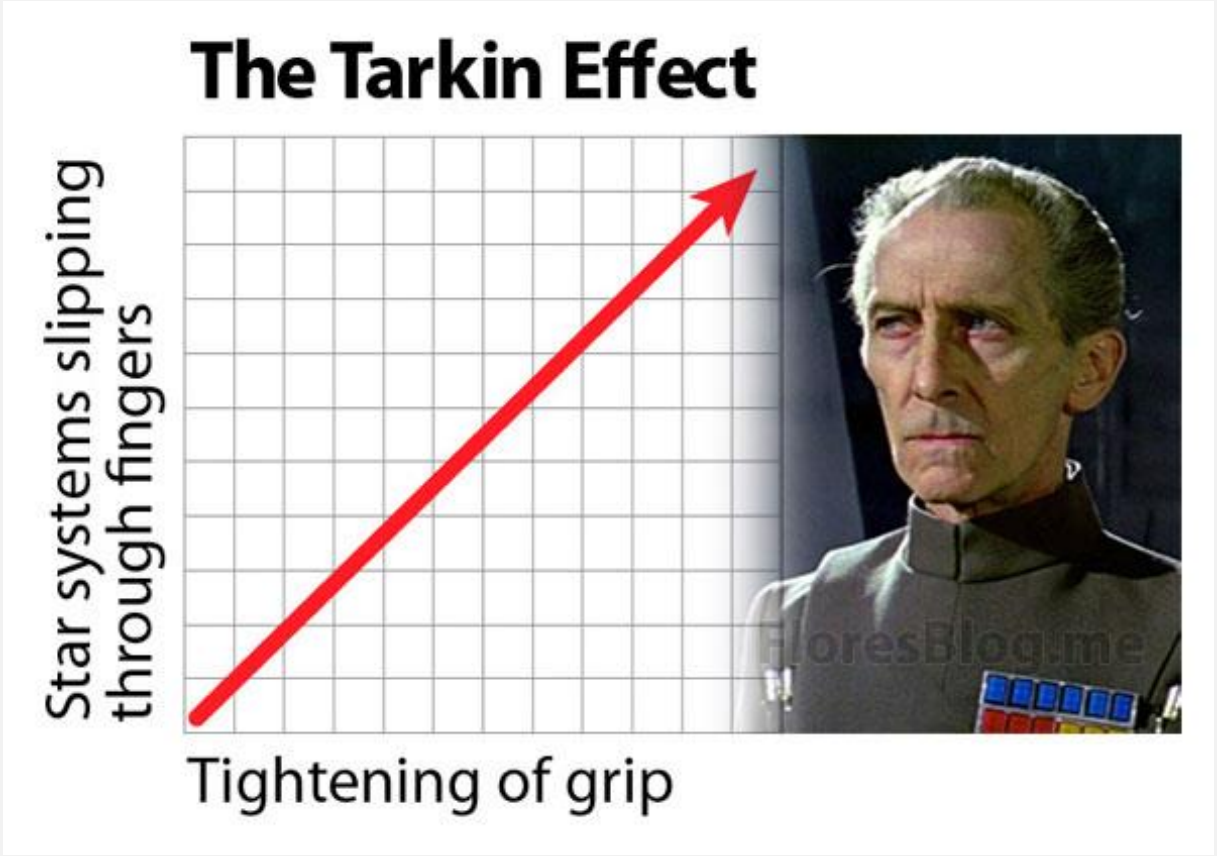
The return on investment

- In the US From March 24, 2024 to April 26, 2025:
  - At least 16,600 people have been monitored after exposure to infected birds, poultry, dairy cows, or other animals (at least 9,300, or 56%, with exposures to dairy cows)
  - At least 880 (5% of those being monitored) have been tested for novel influenza A
    - At least 218 of those with exposure to dairy cows
    - At least 670 with exposures to birds and other animals
  - 70 human cases of HPAI have been diagnosed
  - 41 linked to exposure to infected dairy cows
    - This is 0.2% of those monitored after exposures to dairy cows
  - 26 linked to exposure to infected poultry (24 commercial, 2 backyard flocks)
  - 3 unknown sources

https://www.cdc.gov/bird-flu/h5-monitoring/index.html

Take home thoughts

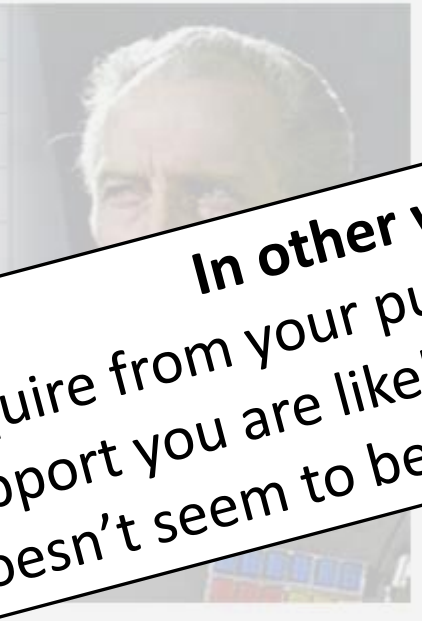
- One health should also = one training, one planning, one preparing, one (and all) awareness, one set of talking point, etc.
- Need to understand what we each don't understand (human health may not understand farming, animal health may not understand human health)
- Need to better understand risk and communicate it in a way that is meaningful to the audience, tailor mitigating recommendations in a way to ensure compliance
  - Could call this the "Tarkin Effect"



"The more you tighten your grip, Tarkin, the more star systems will slip through your fingers."

- Princess Leia

The Tarkin Effect



"The more
fingers."

- Princess Leia

In other words:

The more you request/require from your public and/or the more difficult you make it, the more trust and support you are likely to lose, especially if it is inconvenient, uncomfortable, costly, doesn't seem to benefit them, or doesn't make sense to them.

Things to think about before next surge (my opinion):

- How long are dairy cows contagious (shedding infectious virus) and how long do we really need to monitor exposed humans?
  - Dairy milk tests positive by PCR for extended periods of time despite farmers reporting lack of newly ill cows
    - But how long do they shed infectious virus?
  - In the 41 human cases: when did human illness occur in relation to onset of herd illness?
    - In Michigan, human case #1 developed symptoms 6 days after signs of illness developed in dairy cows (and one day after direct milk splash to eye); human case #2 developed symptoms 1 day after signs of illness developed in dairy cows

- Available research
  - In one study[1], 2 lactating cows were infected via intramammary route, from 14-24 days after inoculation, after cows appeared to be recovering, viral RNA was still detected in the milk, but viable virus was not found in the pooled milk samples after day 12.
  - In another study[2], By 10 days post inoculation via the intramammary route, no infectious virus was recovered, despite remaining RT-qPCR positive throughout the duration of the study (see next slide)

[1] Baker, Amy L., et al. "Dairy cows inoculated with highly pathogenic avian influenza virus H5N1." Nature 637.8047 (2025): 913-920. https://www.nature.com/articles/s41586-024-08166-6
[2] Zhou, Yan, et al. "Highly pathogenic avian influenza virus H5N1 infection in dairy cows confers protective immunity against reinfection." (2024). https://doi.org/10.21203/rs.3.rs-5613077/v1

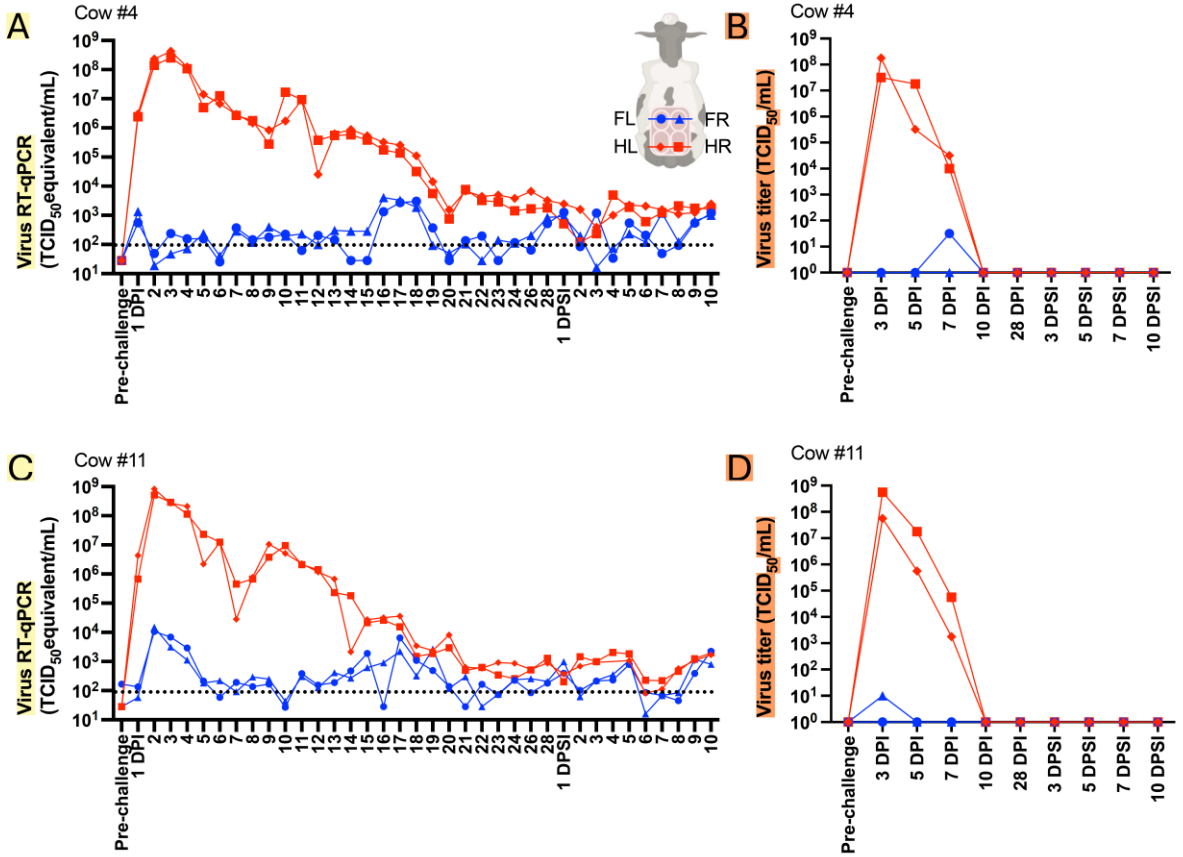


Figure 5. Virus detection in milk. (A, C) Virus detection in milk by RT-qPCR. (B, D) Infectious virus titers in milk. DPI, days post-inoculation; DPSI, days post secondary inoculation. $TCID_{50}$ equivalent was extrapolated from a standard curve generated by down titrating cattle H5N1 virus in milk. HR, hindquarter right; HL, hindquarter left; FR, forequarter right; FL, forequarter left.

[2] Zhou, Yan, et al. "Highly pathogenic avian influenza virus H5N1 infection in dairy cows confers protective immunity against reinfection." (2024). https://doi.org/10.21203/rs.3.rs-5613077/v1

Things to think about before next surge (my opinion):

- What is the best way to monitor farm workers?
  - Individual may be best for accuracy if expected to be 10-21 days
  - For extended periods of time, or when staff confidentiality is a concern (or if there is concern not all staff are being identified), centralized may be best
    - Are there tools to help with this?
- What are the “high yield” efforts?
  - Most exposure and infection with dairy cows appears to be via splashes to eyes
    - Focus on eye protection primarily?
  - Are there ways to avoid penalizing workers for reporting illness (prevent loss in wages, fear of immigration identification, etc.)?
- Likely the biggest potential for pandemic occurs with reassortment during co-infections with different influenza A viruses, rather than adaptive mutations
  - Improving education regarding importance of influenza vaccination for those at risk for HPAI infection, importance for screening for ILI to prevent working when infected with influenza A, etc.

Any Questions?