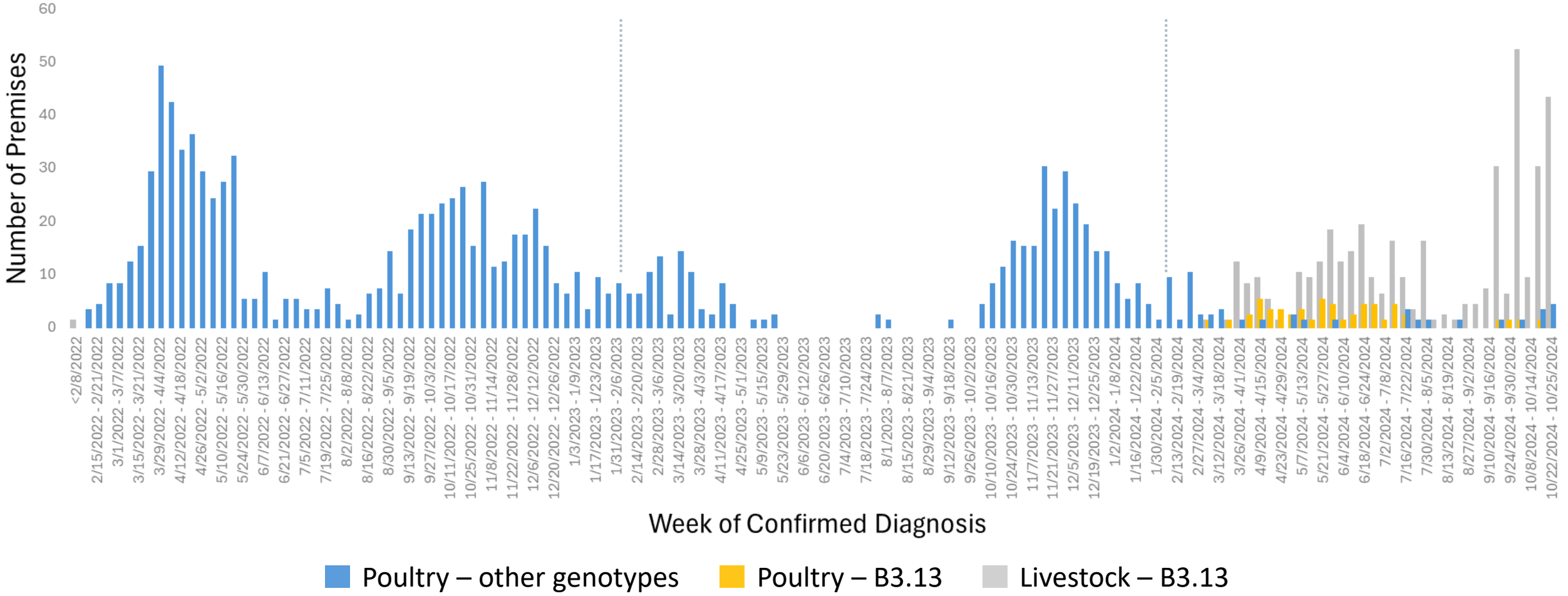
2022–2024 HPAI OUTBREAK
Field Epidemiological Investigations

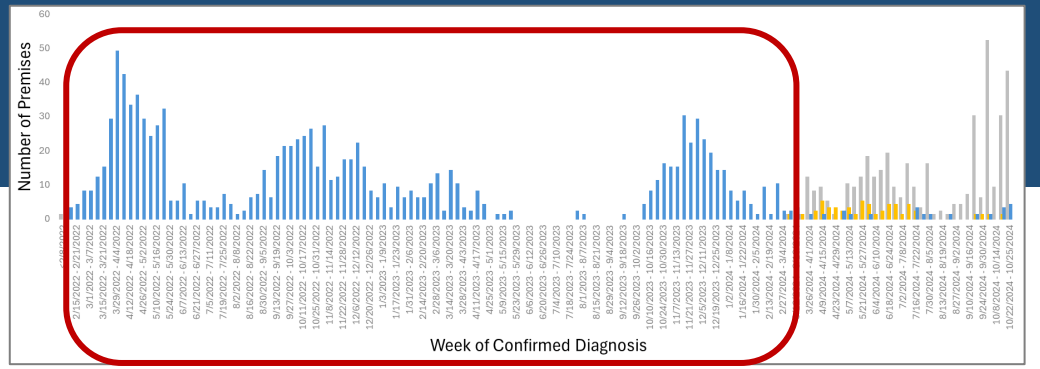
October 29, 2024

Lindsey Holmstrom
VMO Staff Officer
National Preparedness and Incident Coordination Center
Strategy & Policy
APHIS Veterinary Services



2022 – 2024
HPAI in Poultry & Livestock

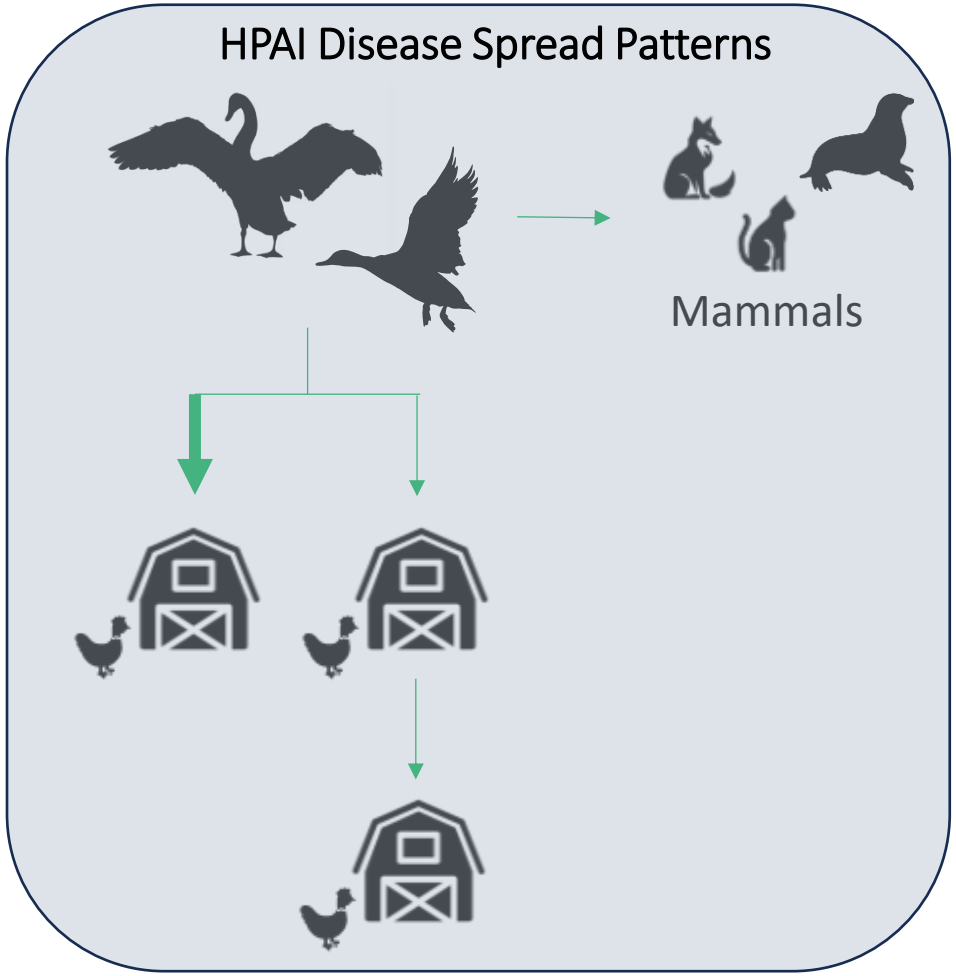




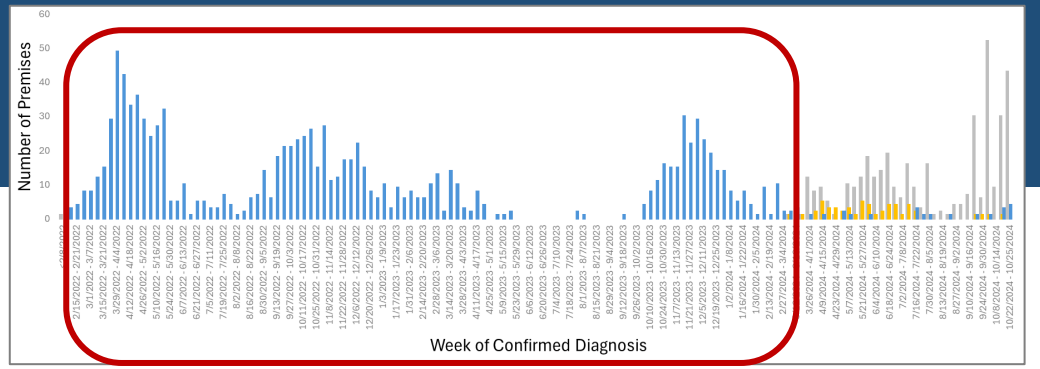
HPAI Poultry: Disease Spread Feb 2022 – Feb 2024

Key Messages

- Primary transmission route is independent wild bird introduction
- Improvements in biosecurity, biosecurity messaging, early reporting/detection, and rapid depopulation has been successful in minimizing lateral (farm-to-farm) spread
- Disease detections between states mostly due to migratory waterfowl transmission routes



HPAI Poultry: Disease Spread



Lateral/Common Source Transmission

- Worker comingling
- Shared equipment & vehicles
- Service personnel visits
- Located in a Control Area

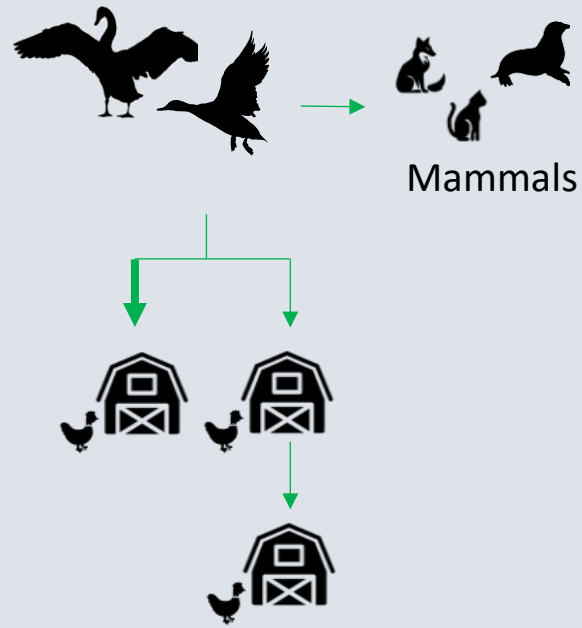
22% Lateral/ Common Source

Independent Wild Bird Introduction

- Wild birds on farm, near a waterbody
- Barn enclosure defects

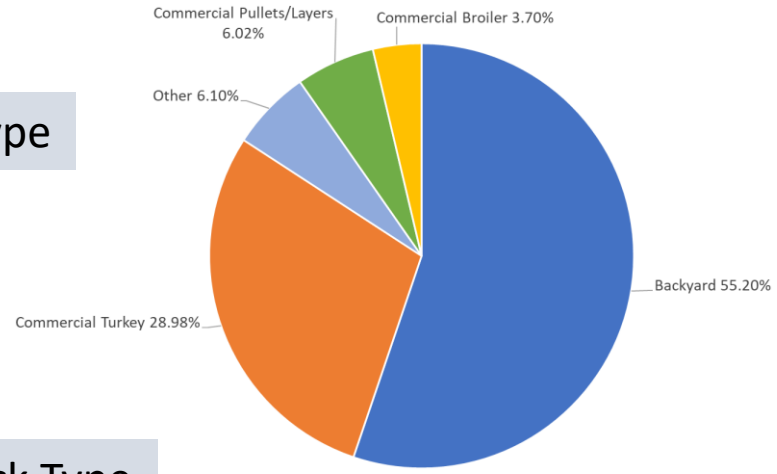
78% Independent Wild Bird

HPAI Disease Spread Patterns

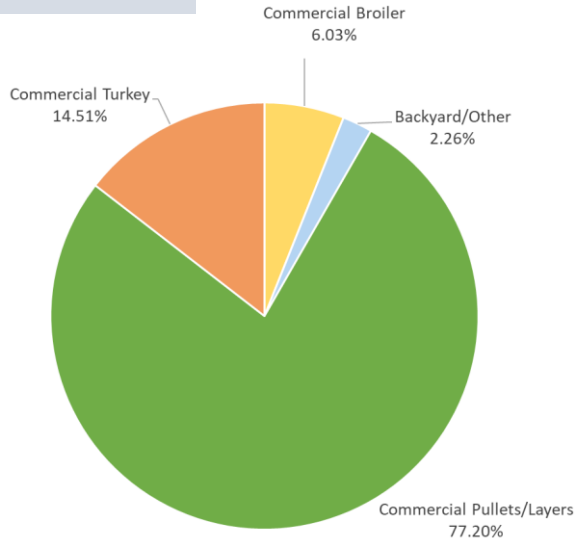


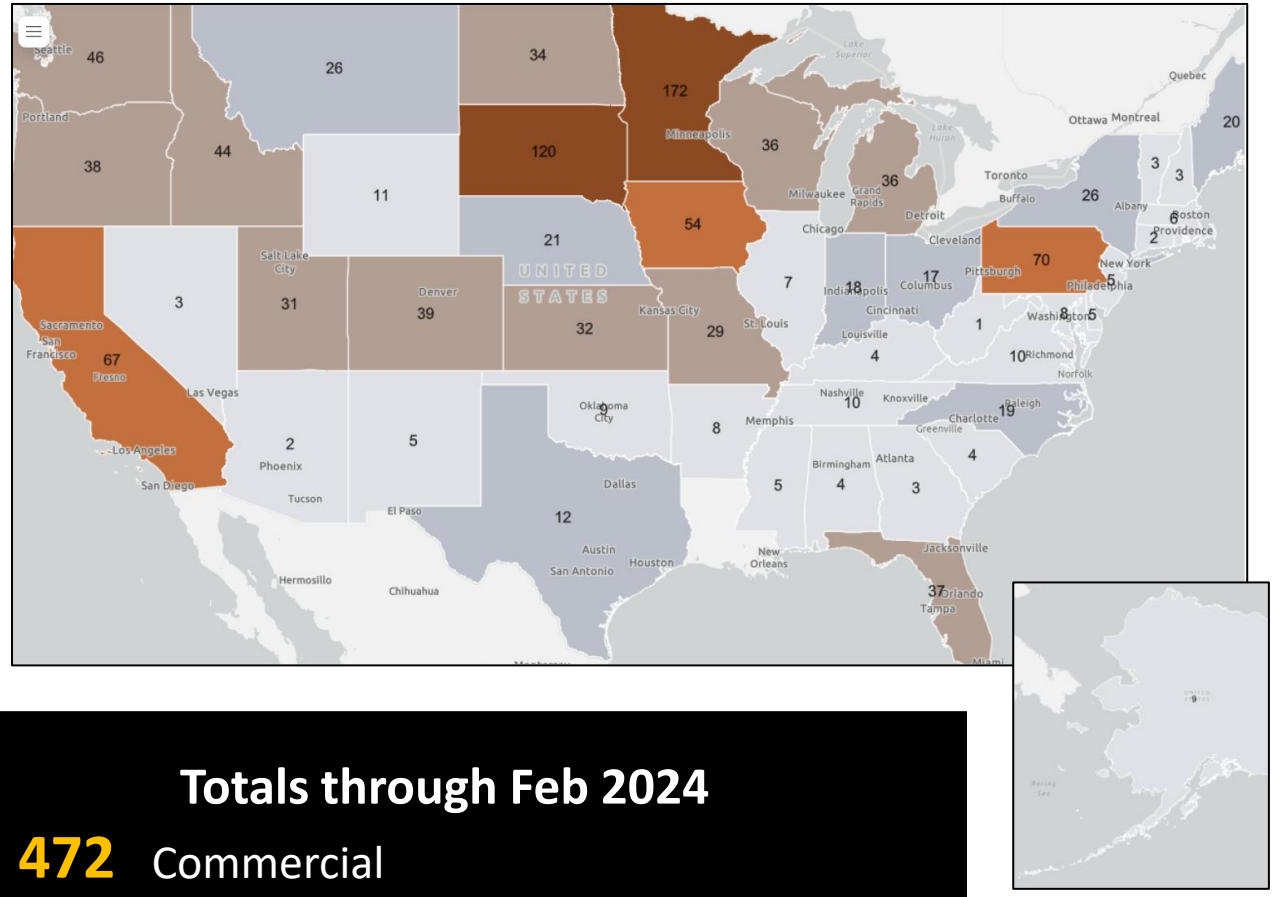
Total # of Confirmed Poultry Premises through February 2024

HPAI Cases by Flock Type



HPAI Mortality by Flock Type





Totals through Feb 2024

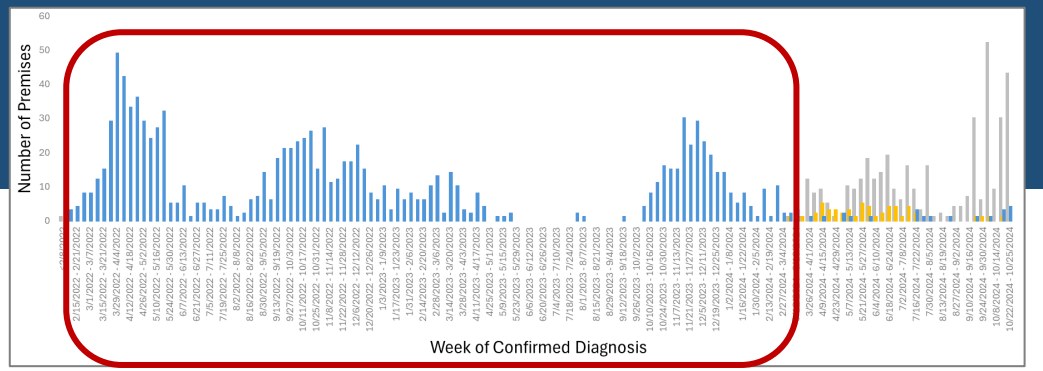
472 Commercial

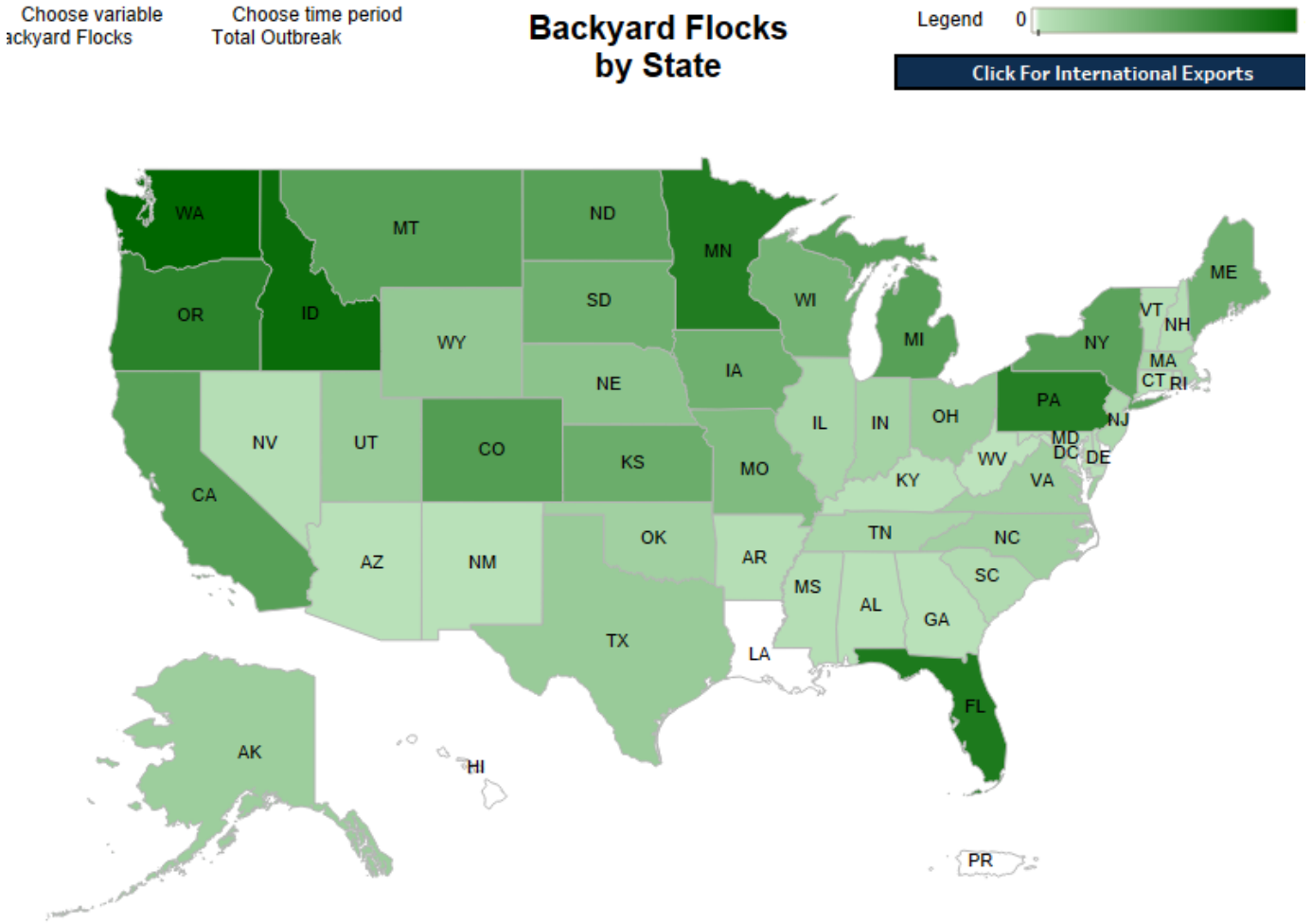
480 Backyard Non-Poultry

156 Backyard Poultry

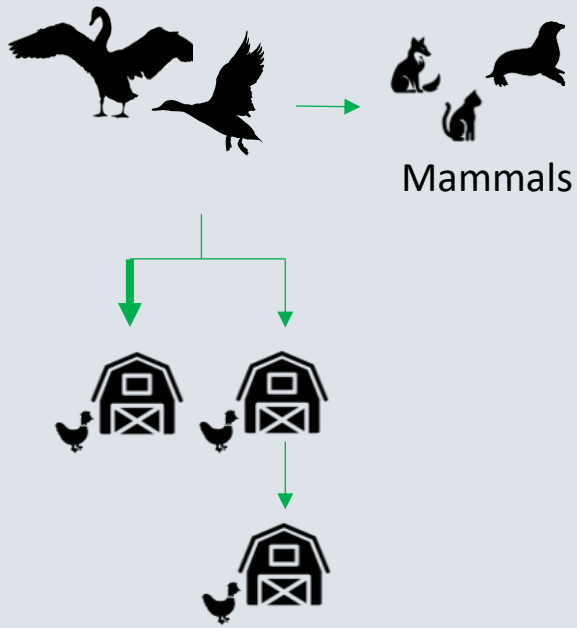
1,108 Confirmed Premises in **48** States

HPAI Poultry: Disease Spread

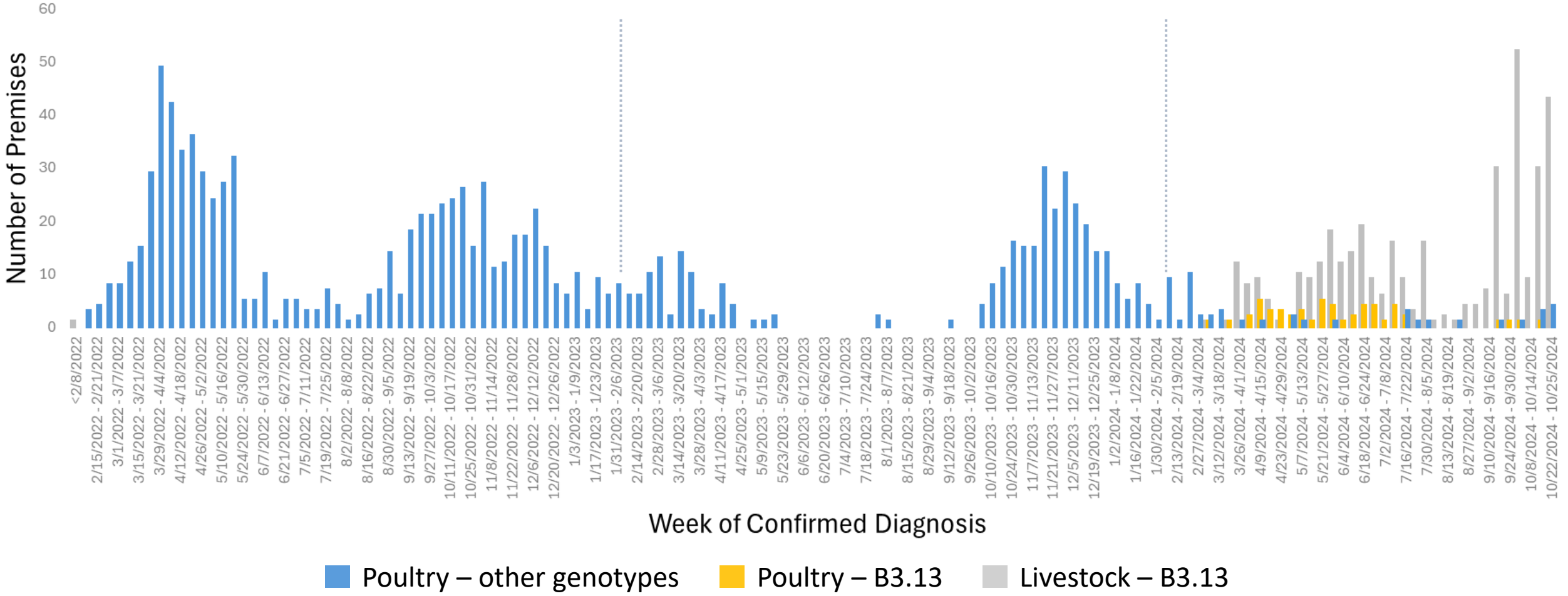


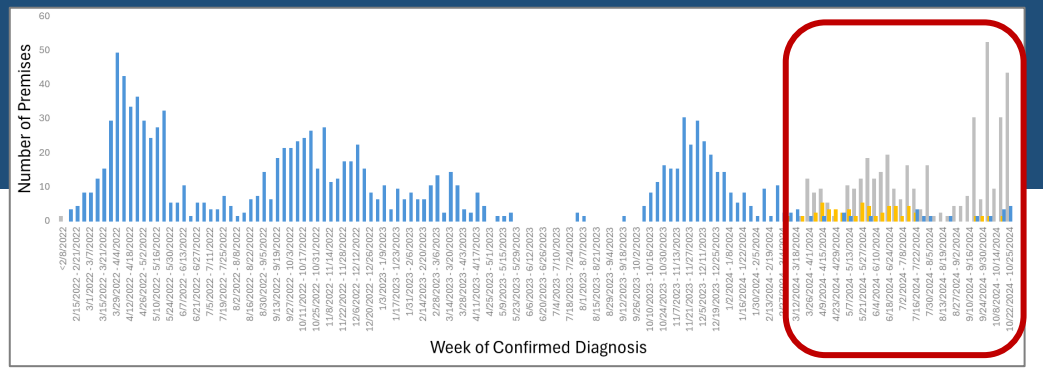


HPAI Disease Spread Patterns



2022 – 2024
HPAI in Poultry & Livestock

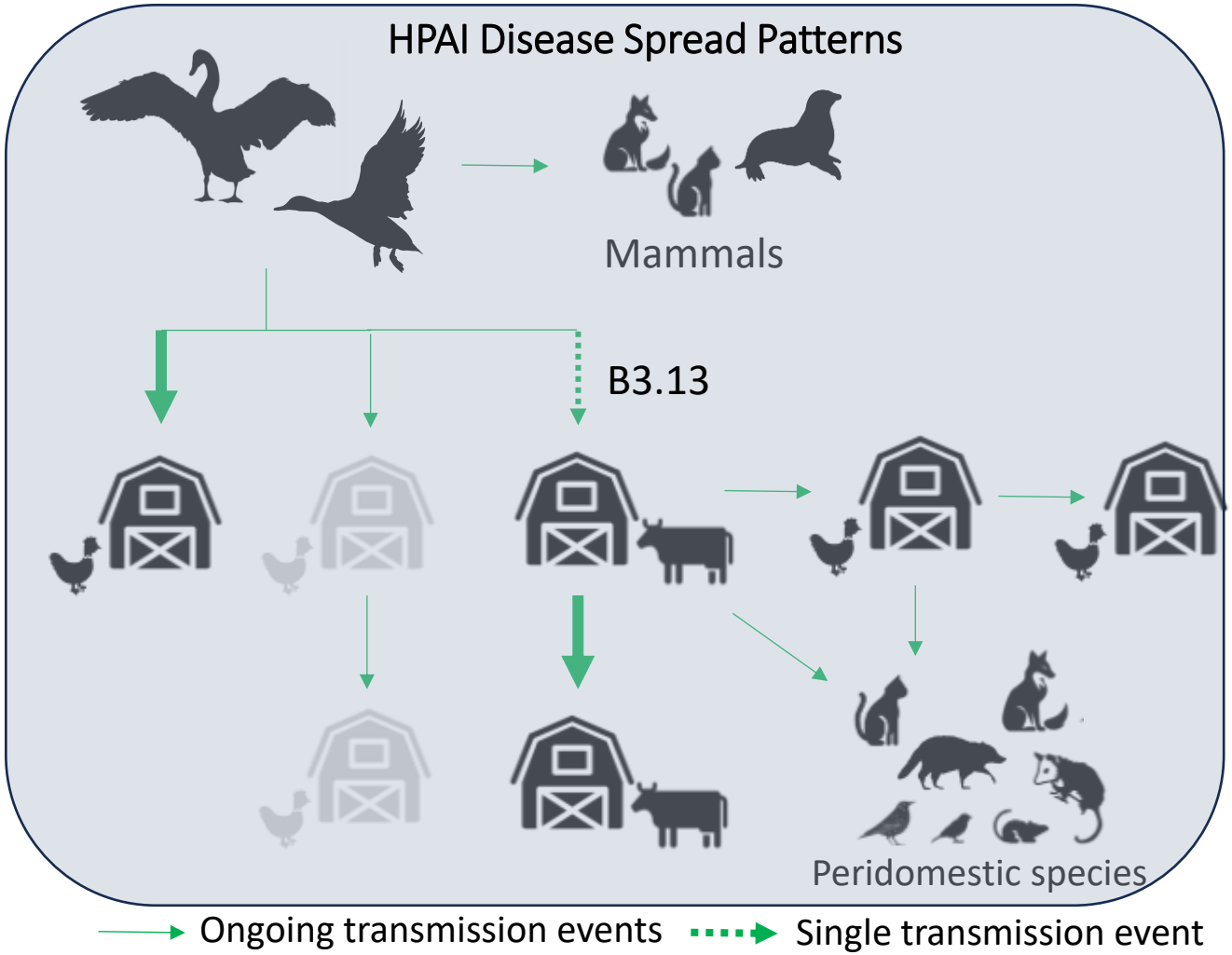




HPAI Dairy & Poultry Disease Spread: March 2024 – Present

Key Messages

- Spread of H5N1 between states is linked to cattle movements (*versus independent wild bird introduction*) with further local spread between dairy farms and dairy/poultry farms in some states
- Disease spread between dairy cattle farms is likely multi-factorial (direct and indirect transmission routes)
- Biosecurity is key to mitigate the risk of disease spread



SUMMARY OF FIELD ACTIVITIES

Administering Epidemiology Questionnaires

- HPAI dairy questionnaire developed and deployed to all States
- Livestock questions added to HPAI poultry questionnaire

On-Farm Field Research

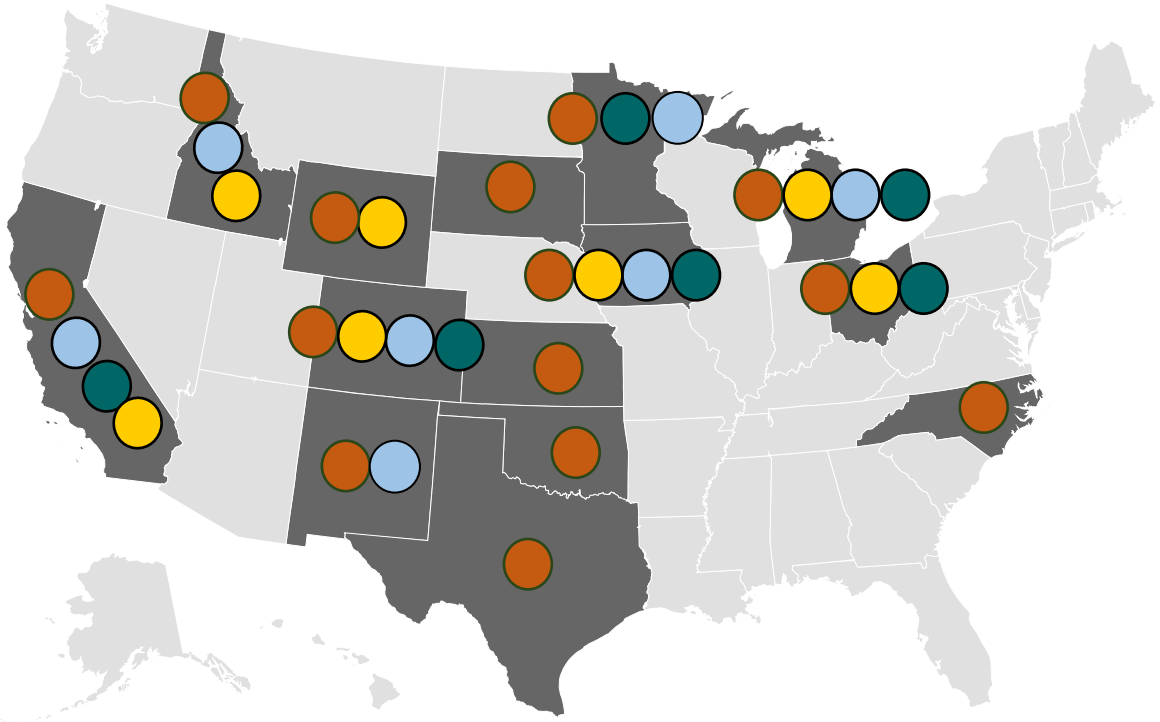
- Priority topics in affected states
- Voluntary participation, ongoing in multiple states

Wildlife and peri-domestic species sampling

- Sampling conducted by USDA APHIS Wildlife Services
- Sampling conducted on dairy and poultry premises

Epidemiology Support (Strike) Team

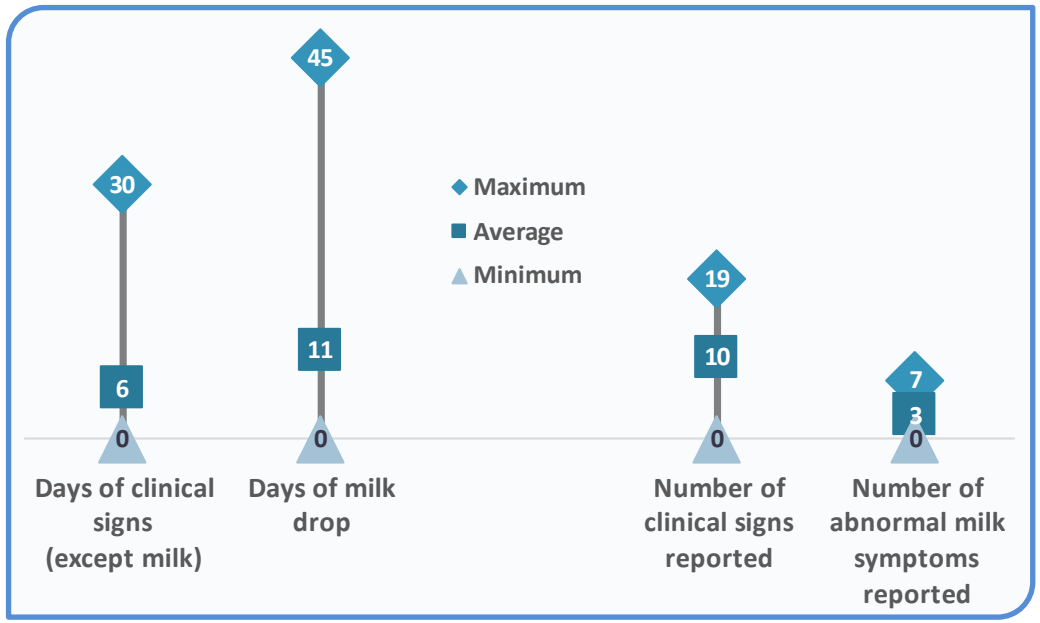
- Support field epidemiology investigation
- Support rapid data collection and analysis

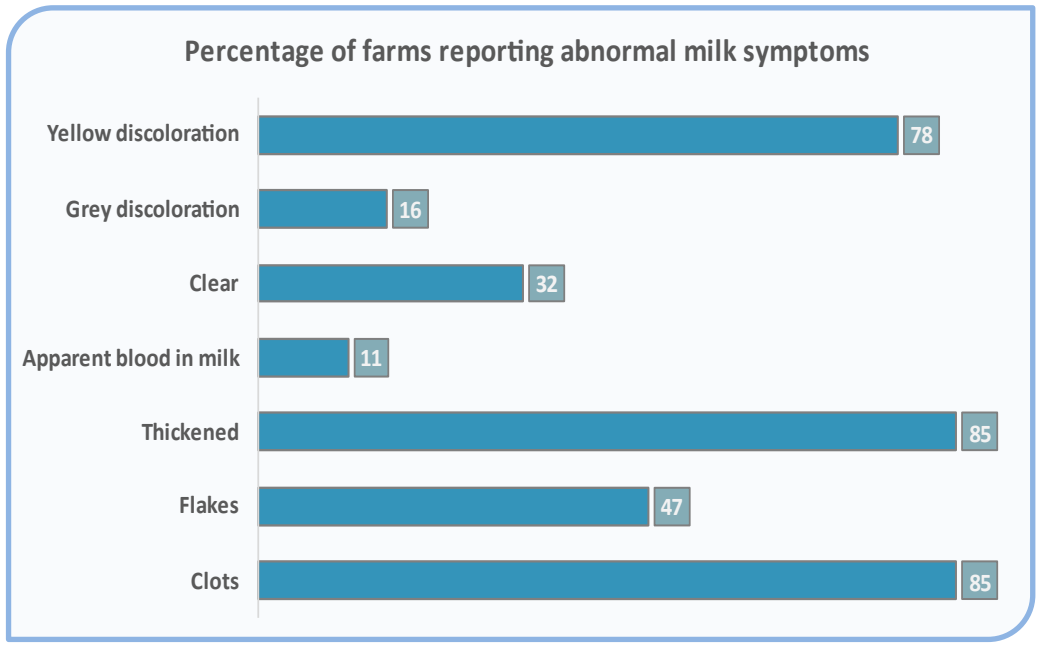


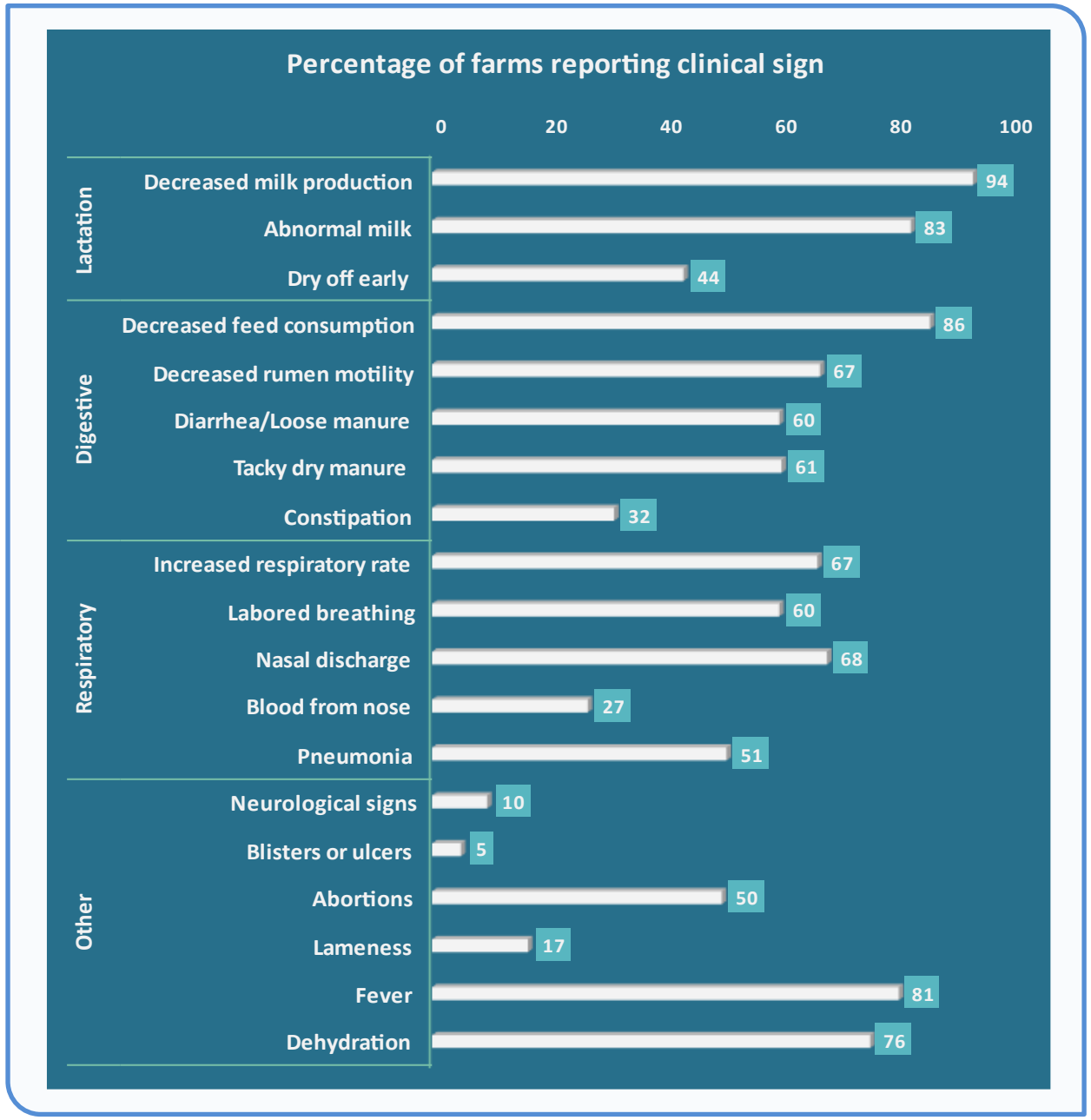
Data analyses

- Epidemiology questionnaires – continuous analyses as data are received with regular updates
- On-farm sampling recruitment/coordination, summary of results coordination
- Production and movement data analyses (e.g., Dairy Comp)

The clinical picture



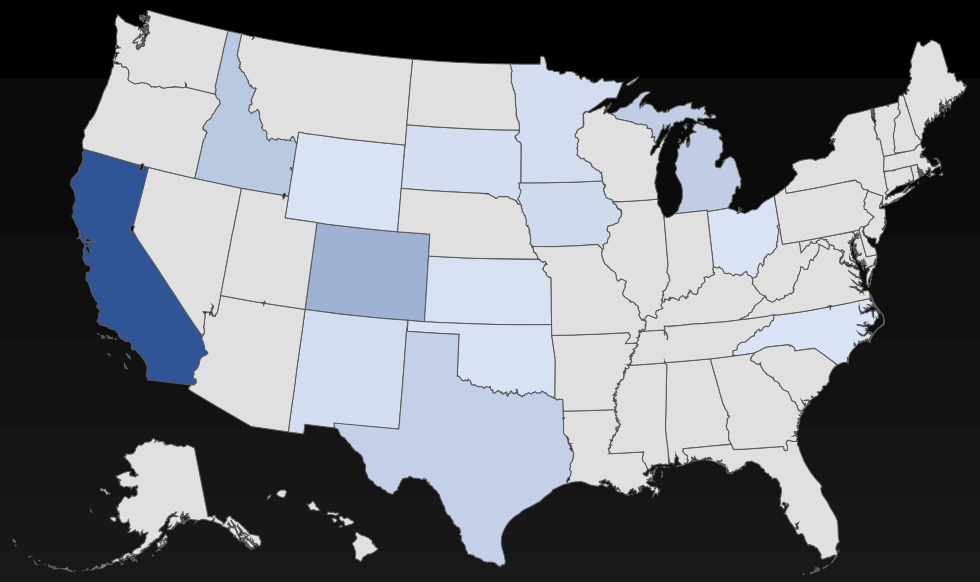


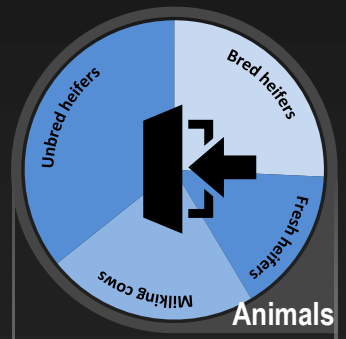


Data as of 10/28/24 0900 MDT; analysis is ongoing and updated as new information received

H5N1 IN DAIRY CATTLE - 2024

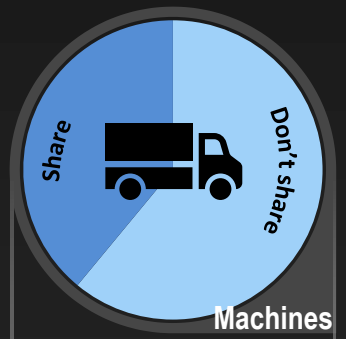
386 herds in 14 states





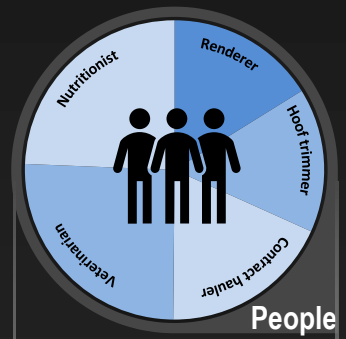
60%

Received *any* cattle within 30 days of clinical signs



38%

Moved cattle using trucks or trailers shared with other farms



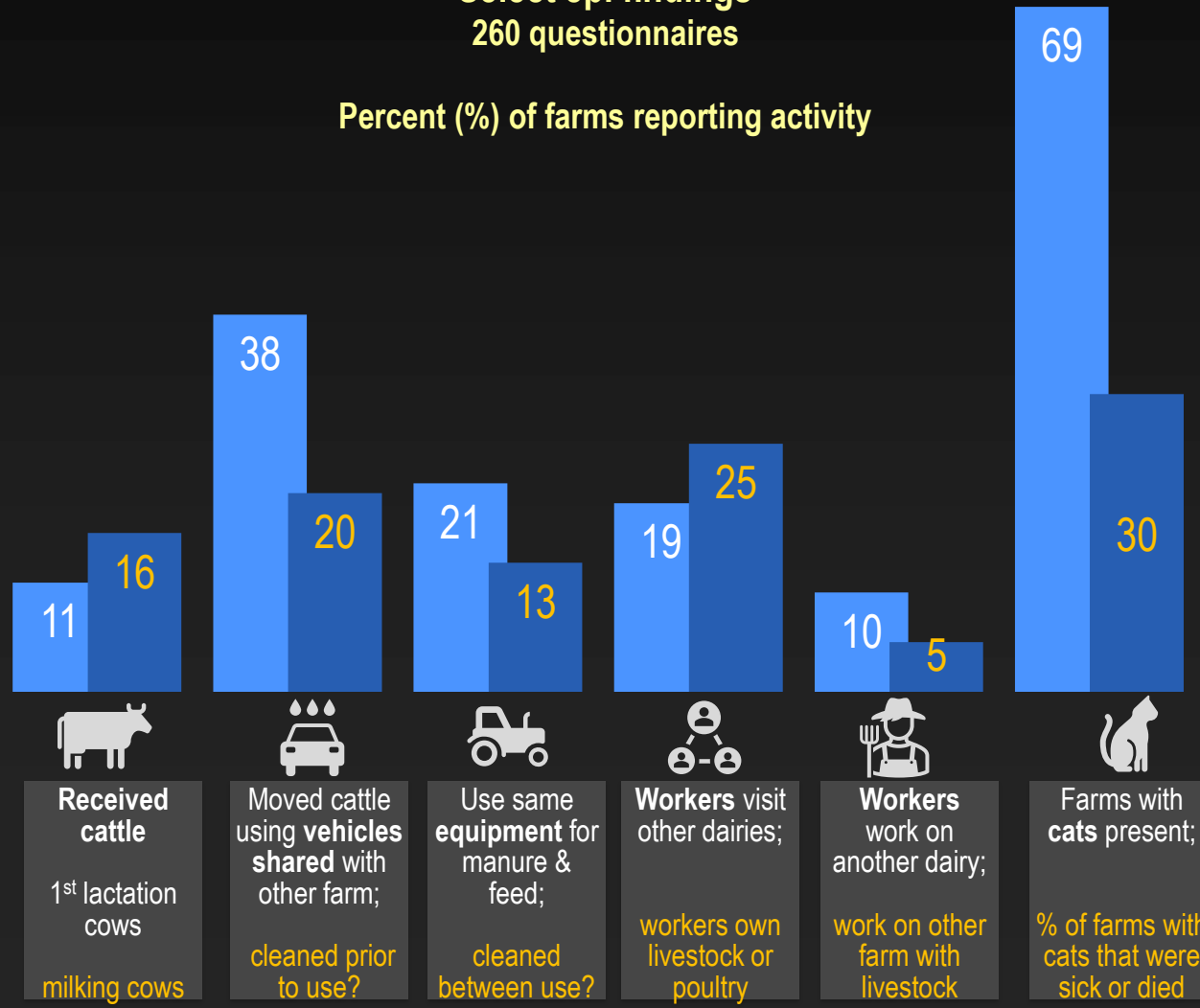
>50%

Had frequent visitors who had contact with cattle

Data as of 10/28/24 0900 MDT; analysis is ongoing and updated as new information received

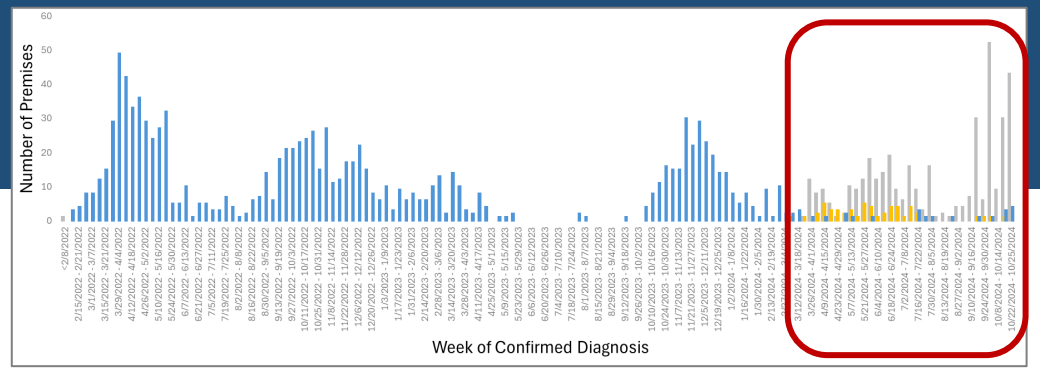
Select epi findings
260 questionnaires

Percent (%) of farms reporting activity



USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

HPAI Poultry B3.13 Detections since March 1, 2024

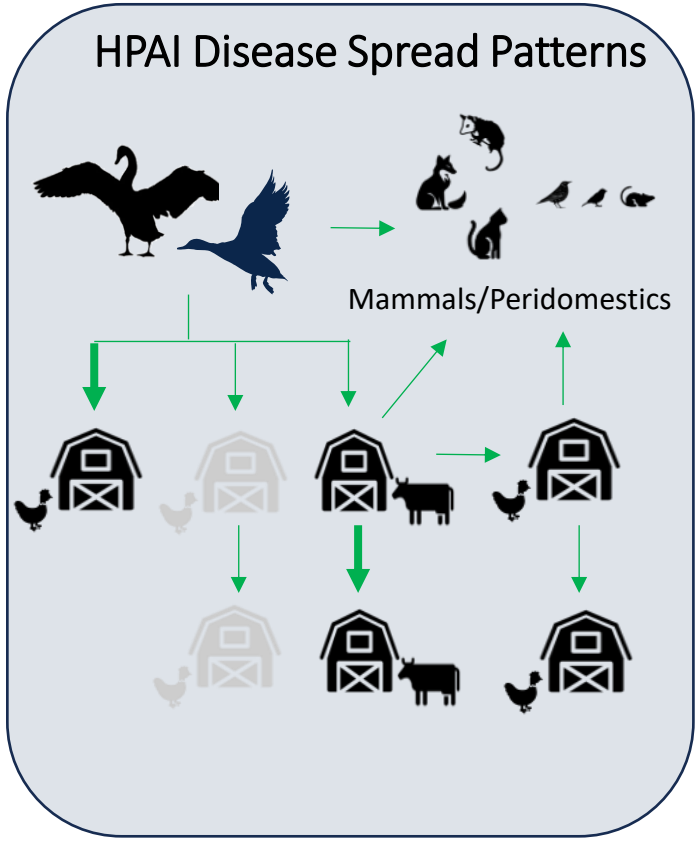


52/78 (66.7%) domestic poultry detections are B3.13

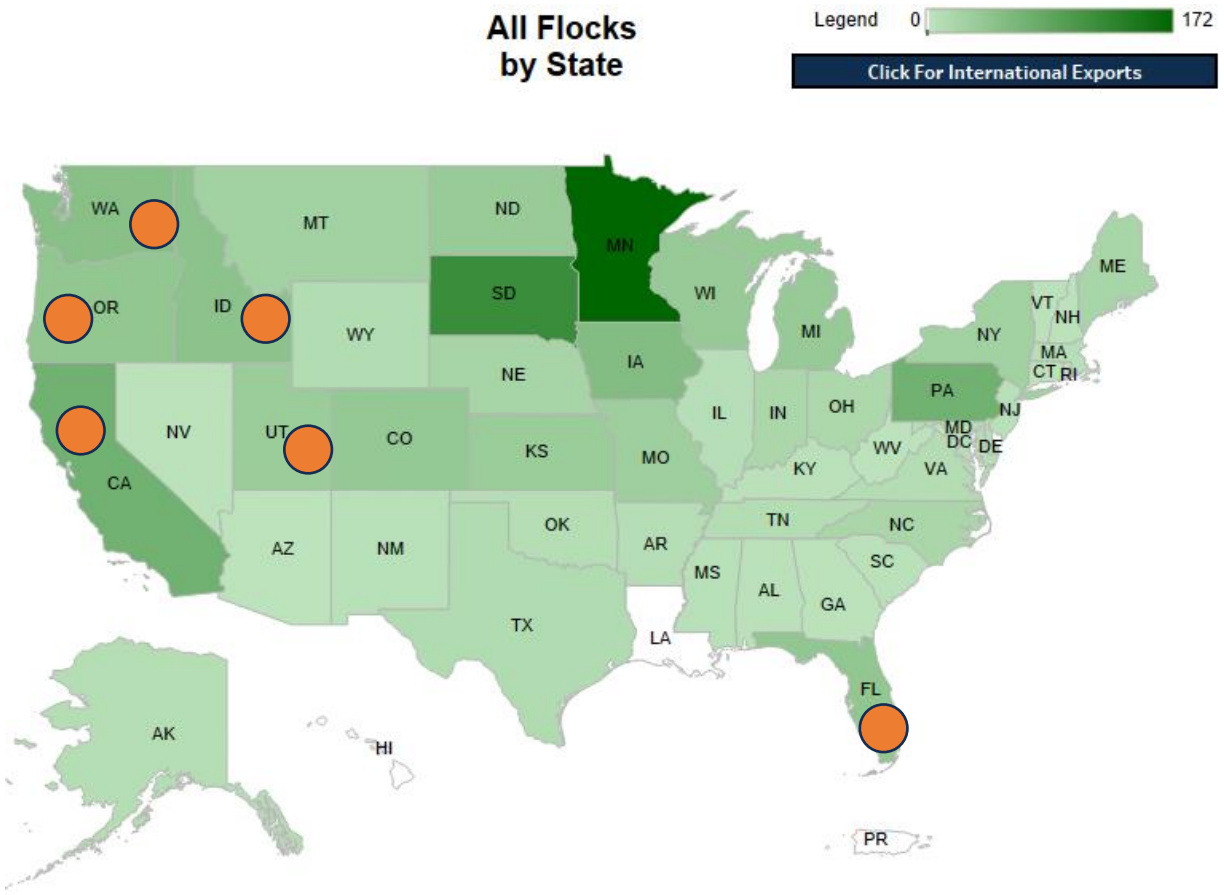
- 16 backyard flocks
- 36 commercial poultry flocks: 13 layer/pullet, 23 turkey

Livestock/Poultry Links

- Proximity between dairy/poultry
- Shared service providers
- Shared workers or housing
- Wildlife, rodent presence
- Shared equipment
- Located on dairy farms

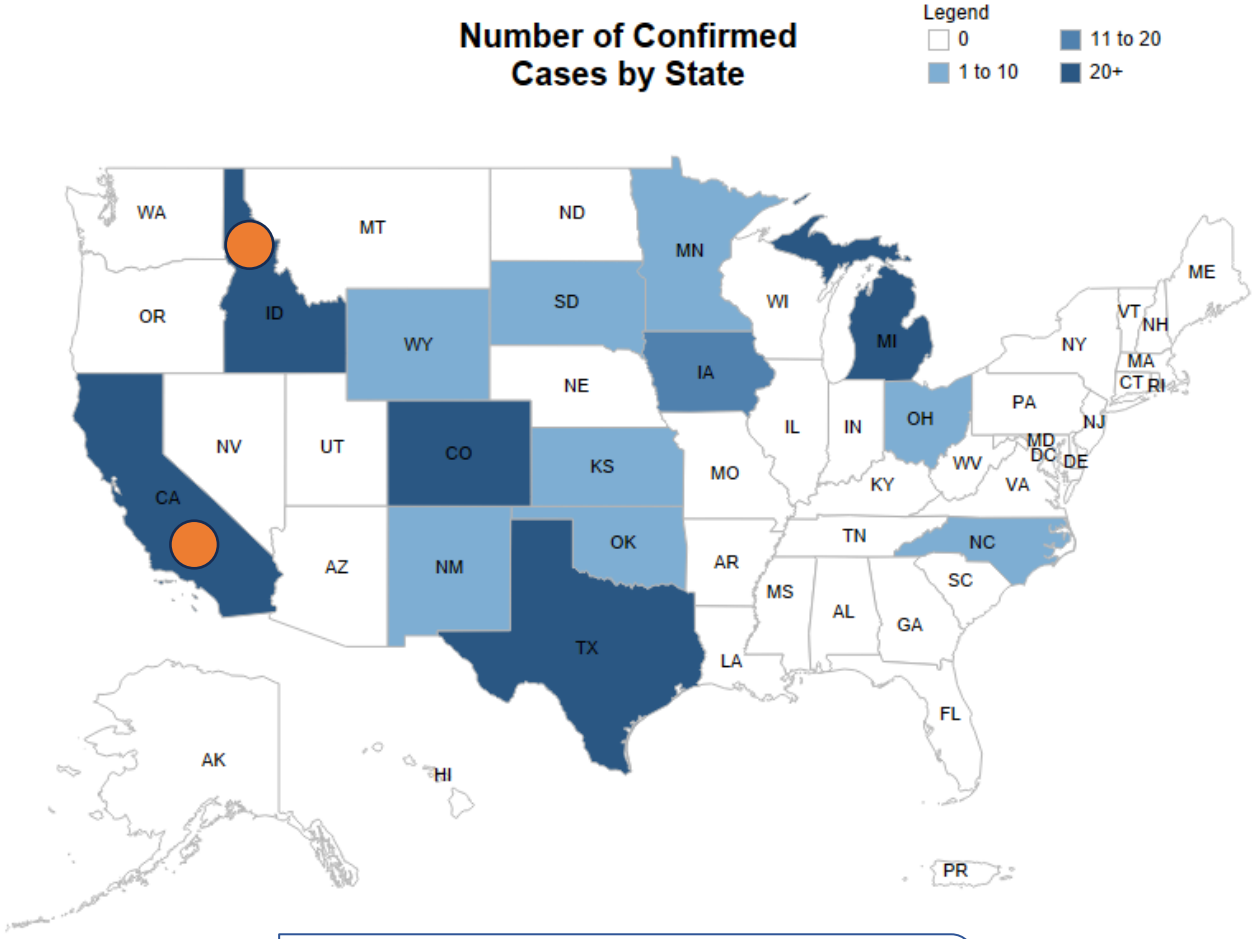


Poultry Detections



1,209 poultry farms in 48 states
- 525 commercial, 684 backyard

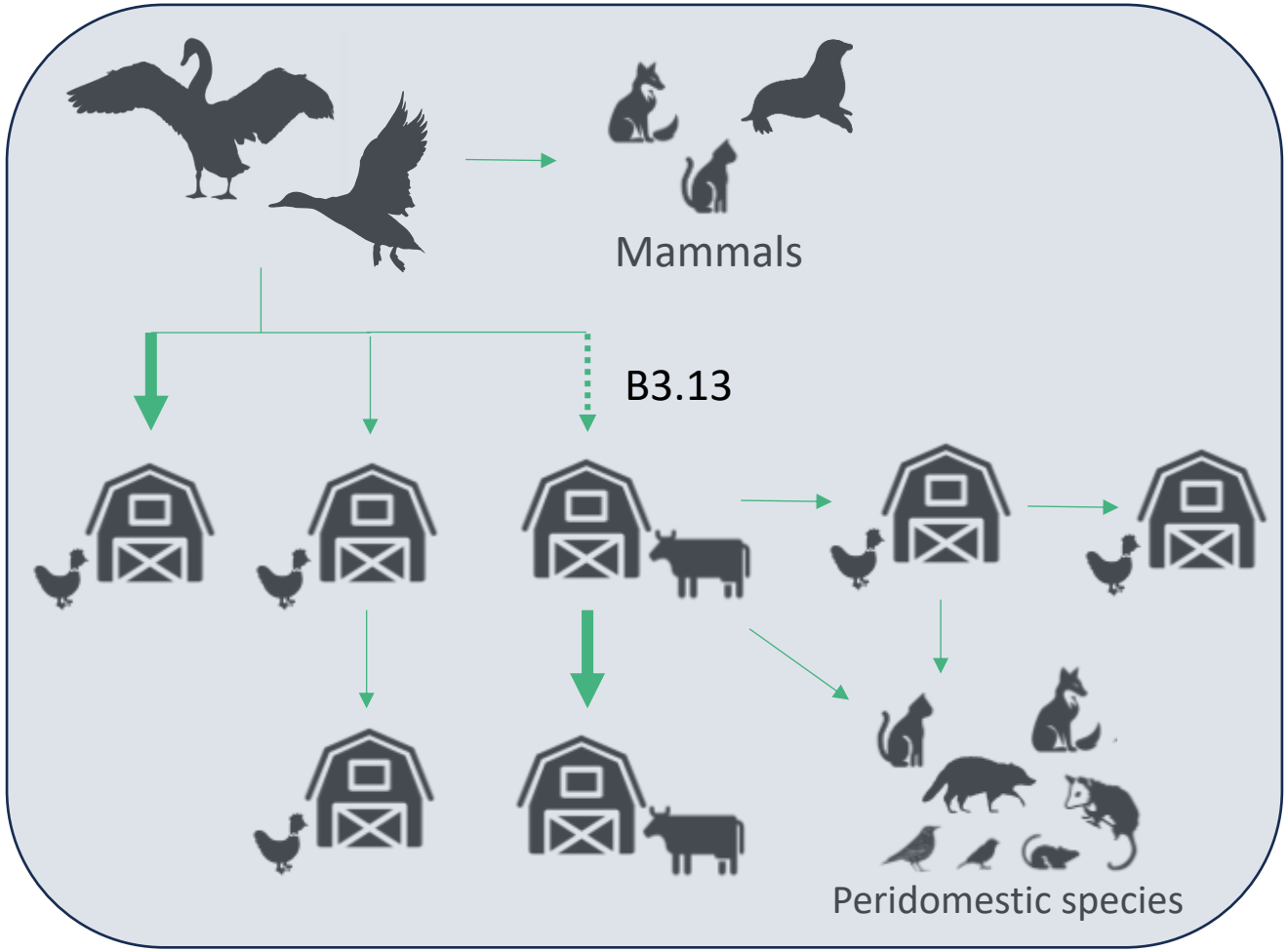
Livestock Detections



380 livestock farms in 14 states
- 379 dairy farms, 1 alpaca farm

QUESTIONS?

HPAI Disease Spread Patterns



Economic Impacts – as of 8/16/2024

- Layers: 77.6M depopulations, 1220.8M dozens decrease in table eggs supply, 19.1 percent increase in price per month on average
- Broilers: 6.1M depopulations, 26.2M lbs decrease in broiler meat supply, 0.02 percent increase in price per month on average
- Turkeys: 14.6M depopulations, 326.1M lbs decrease in turkey meat supply, 0.9 percent increase in price per month on average

Estimates are based on cumulative data since the beginning of the outbreak in February 2022 (Source: PPD-EPAS Economists).

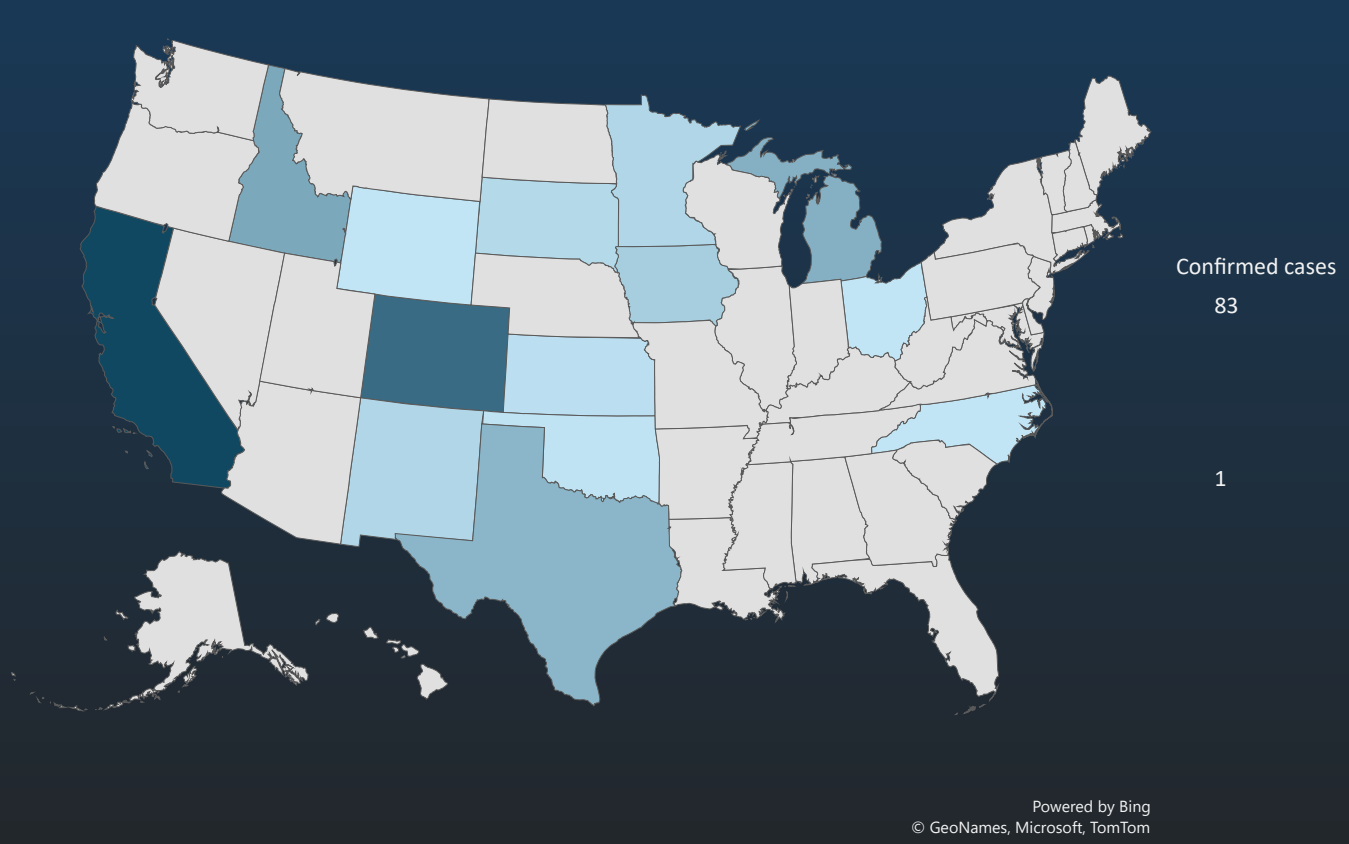
USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Highly Pathogenic Avian Influenza (HPAI) H5N1 in Dairy Herds - 2024

Summary of epidemiologic questionnaire data

October, 2024

Veterinary Services Epi Cell



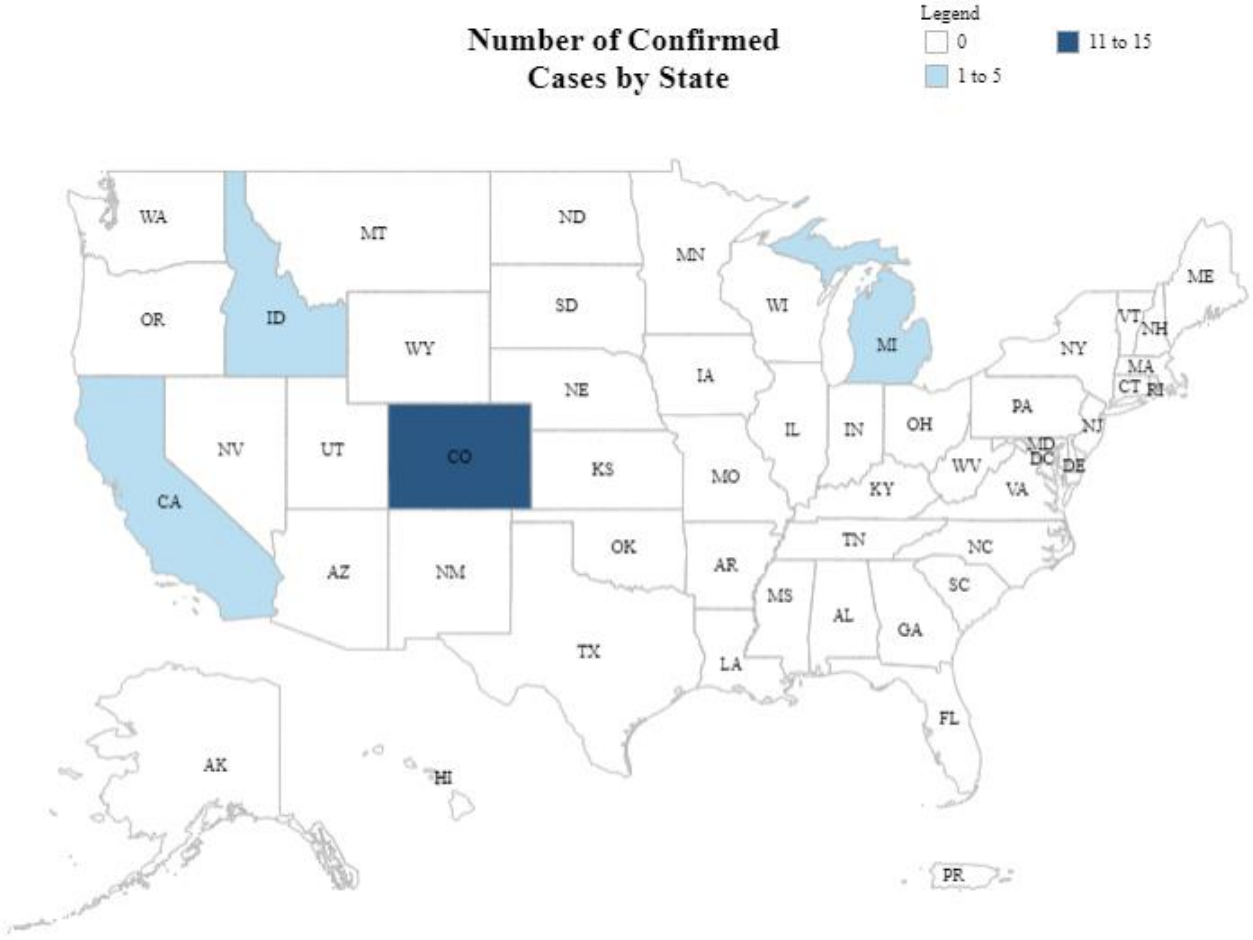
Data as of 10/04/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

National Summary Overview of HPAI H5N1 in Domestic Livestock: 30-day overview

On **March 25, 2024**, the USDA National Veterinary Services Laboratory confirmed the first detection of HPAI H5N1 clade 2.3.4.4b, genotype B3.13, in a Texas dairy herd. Phylogenetic analysis and epidemiology support a single introduction into this novel host followed by onward transmission.

As of **September 9, 2024**, the total confirmed detections for the domestic livestock incident includes 197 premises in 14 states.

In the **last 30 days**, there were **6** confirmed cases in **4** states.



SUMMARY OF FIELD ACTIVITIES

Administering Epidemiology Questionnaires

- HPAI dairy questionnaire developed and deployed to all States
- Voluntary participation before the USDA Federal Order

On-Farm Field Research

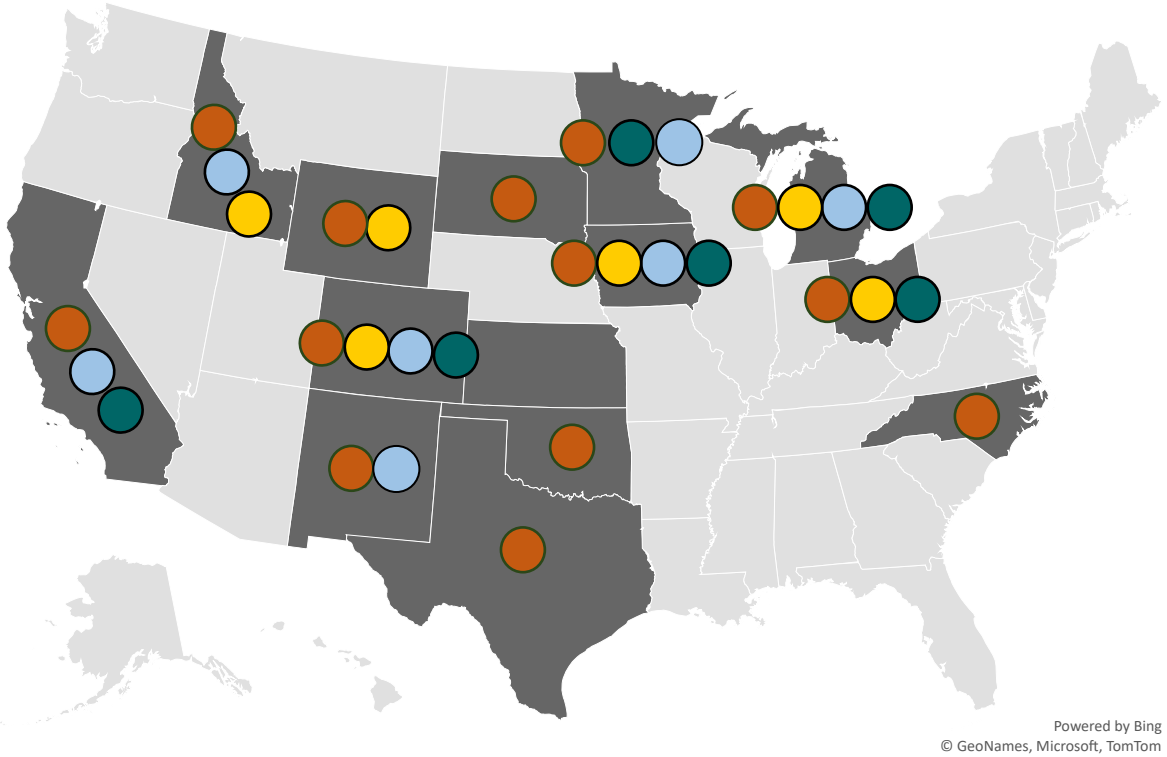
- Priority topics in affected states
- Voluntary participation, ongoing in multiple states

Wildlife and peri-domestic species sampling

- Sampling conducted by USDA APHIS Wildlife Services
- Sampling completed or in progress on or near dairy premises

Epidemiology Support (Strike) Team

- Support field epidemiology investigation
- Support rapid data collection and analysis



Data analyses

- Epidemiology questionnaires – continuous analyses as data are received with regular updates
- On-farm sampling recruitment/coordination, summary of results coordination
- Production and movement data analyses (e.g., Dairy Comp)

Data as of 10/04/24 1200 MDT

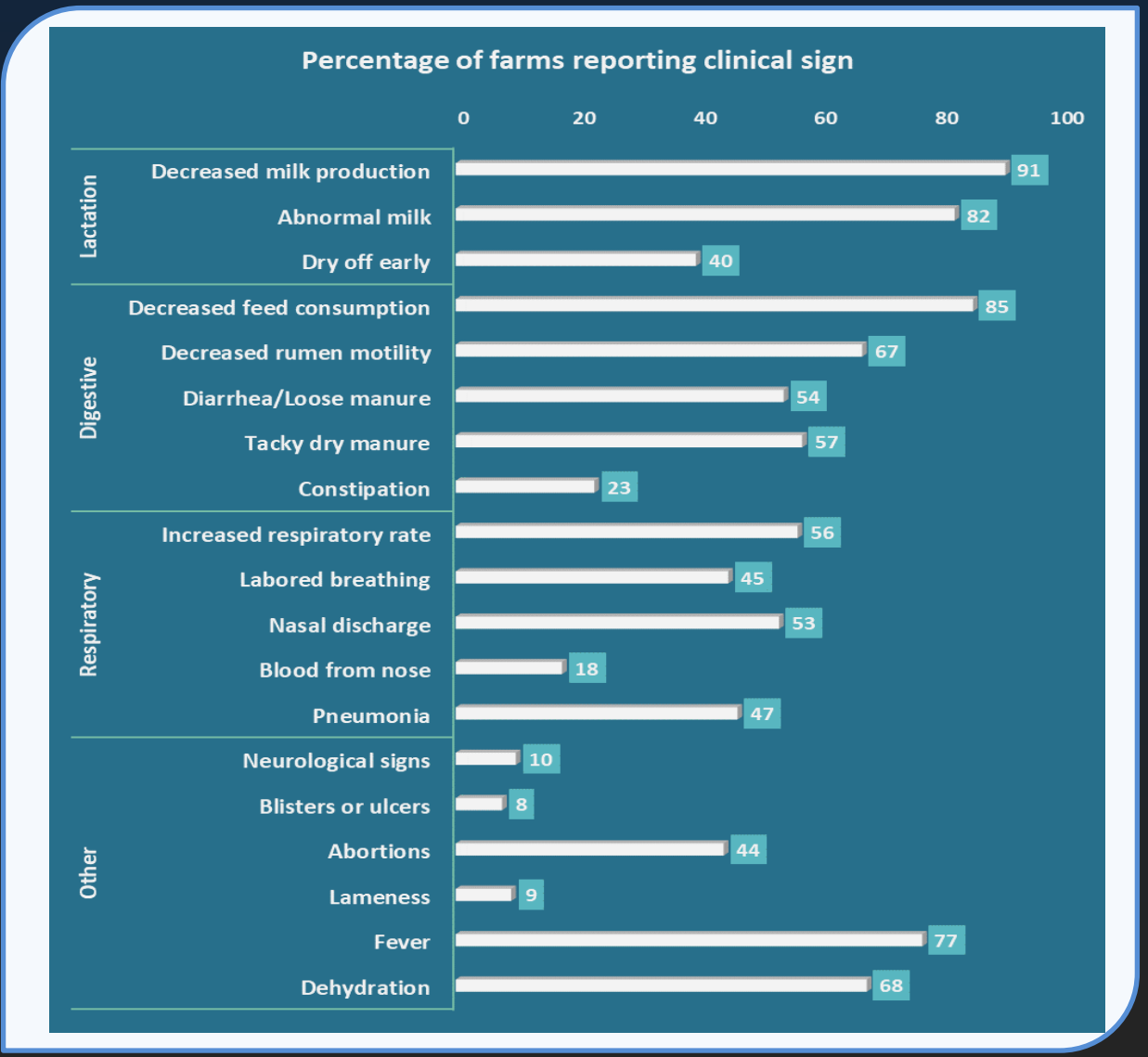
H5N1 B3.13 in dairies

- 282 confirmed cases in 14 states
  - 1st detection March 25, 2024
- Viral genomic analysis and epidemiologic data indicate a single wild bird-to-cattle transmission episode
- Spread of H5N1 between states is linked to movements of apparently healthy cattle
  - Versus independent wild bird introductions
- Further spread between dairy farms and from dairy farms to poultry farms is likely due to multiple factors
  - Direct and indirect transmission

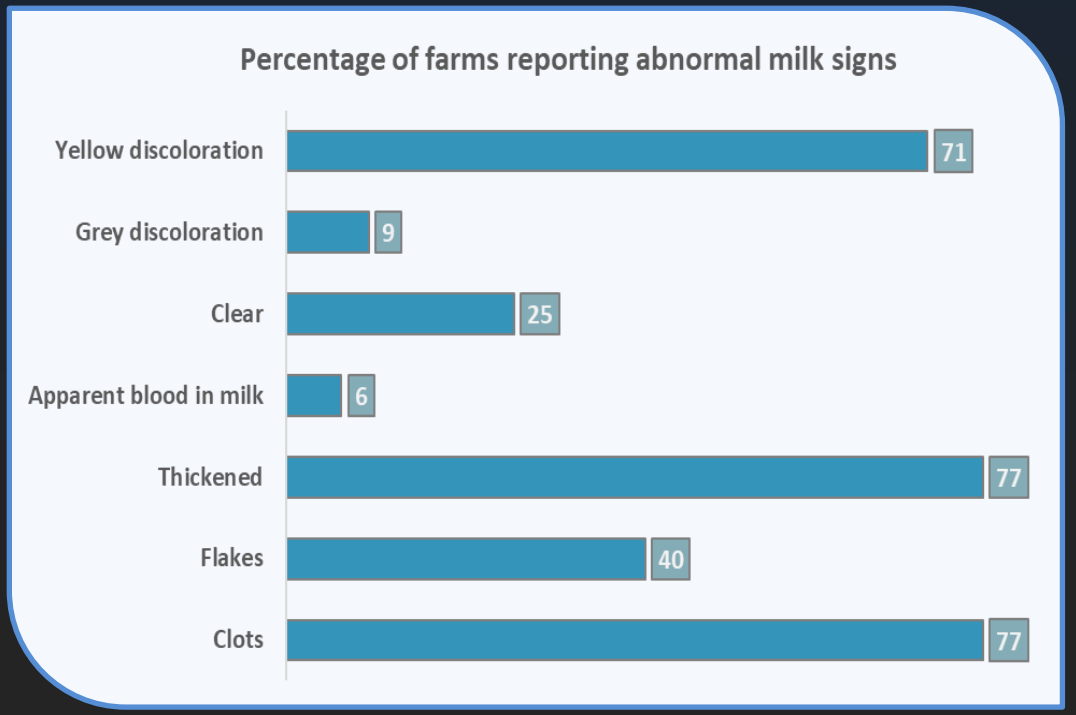
Read details here!

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

The clinical picture



- 19 clinical signs and 7 abnormal milk signs
  - Respondent asked to check all that were observed
- >80% of farms report abnormal lactation and decreased feed consumption
- >75% of farms reported thickened or clotted milk



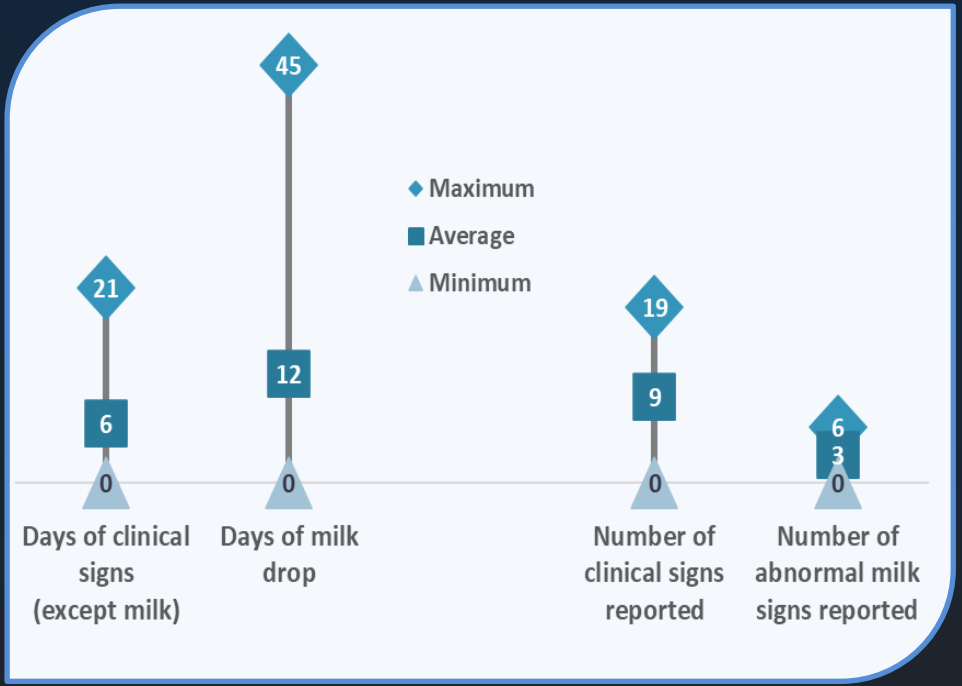
Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Morbidity & mortality overview

- **Impact varies significantly between farms**
  - Asymptomatic to high number of signs over extended period
  - This clinical picture is based on data gathered soon after diagnosis or clinical onset, which may underestimate these findings

- **Lactating cows are most highly affected**
- **Morbidity ≤20% on average and most recover**
- **Mortality is 5% or less on average**



Cattle class	Percent of farms reporting animals exhibited clinical signs	Percent of animals that exhibited clinical signs (average)	Percent of ill animals that recovered (average)	Percent of ill animals that died (average)
1st lactation dairy cows	86	11	67	1
2nd lactation dairy cows	93	17	64	4
3rd or high lactation dairy cows	94	21	58	5

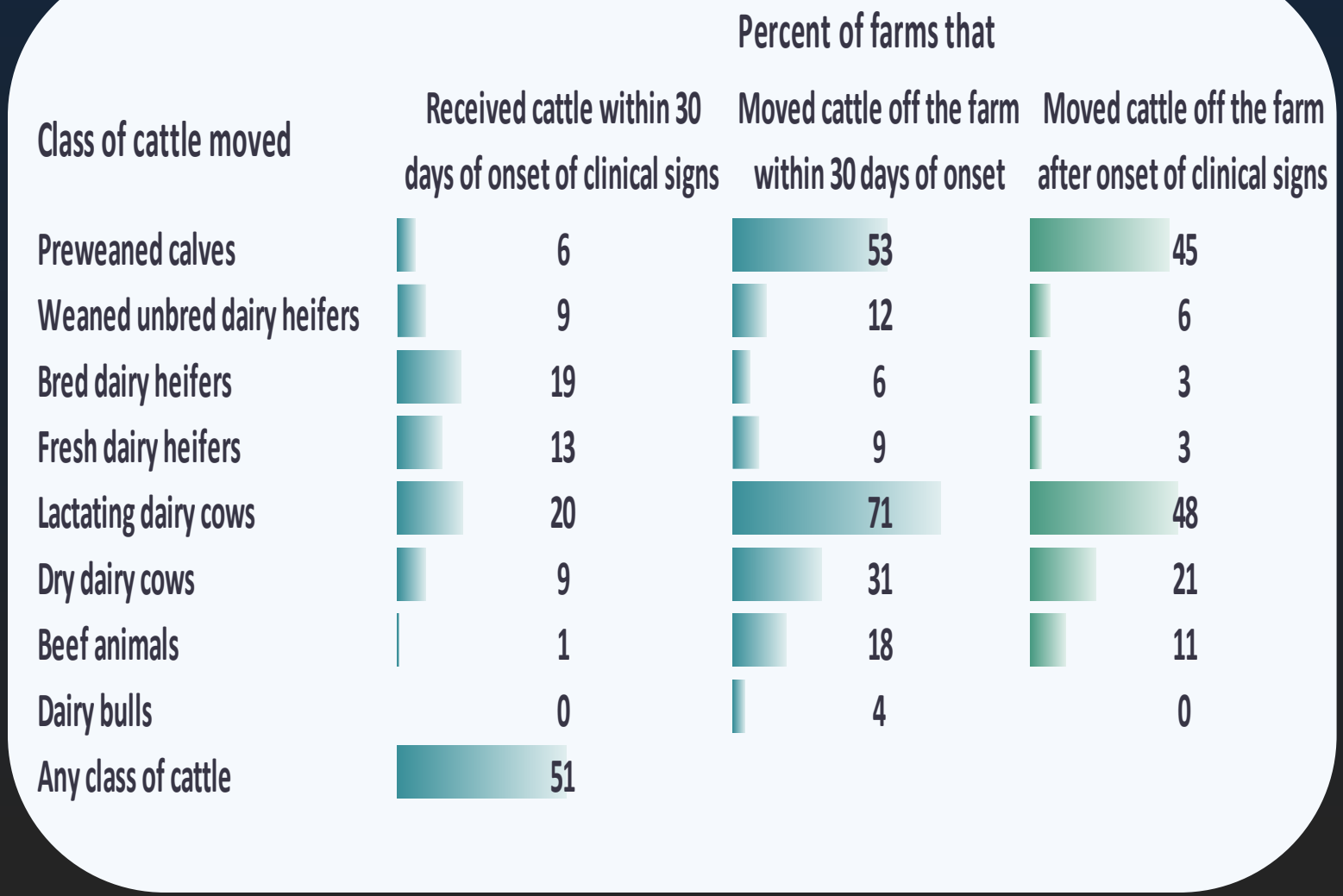
Information is pre-decisional; analyses are ongoing and updated as new information received

Data as of 08/23/24 1200 MDT

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Potential transmission links
Animal movement

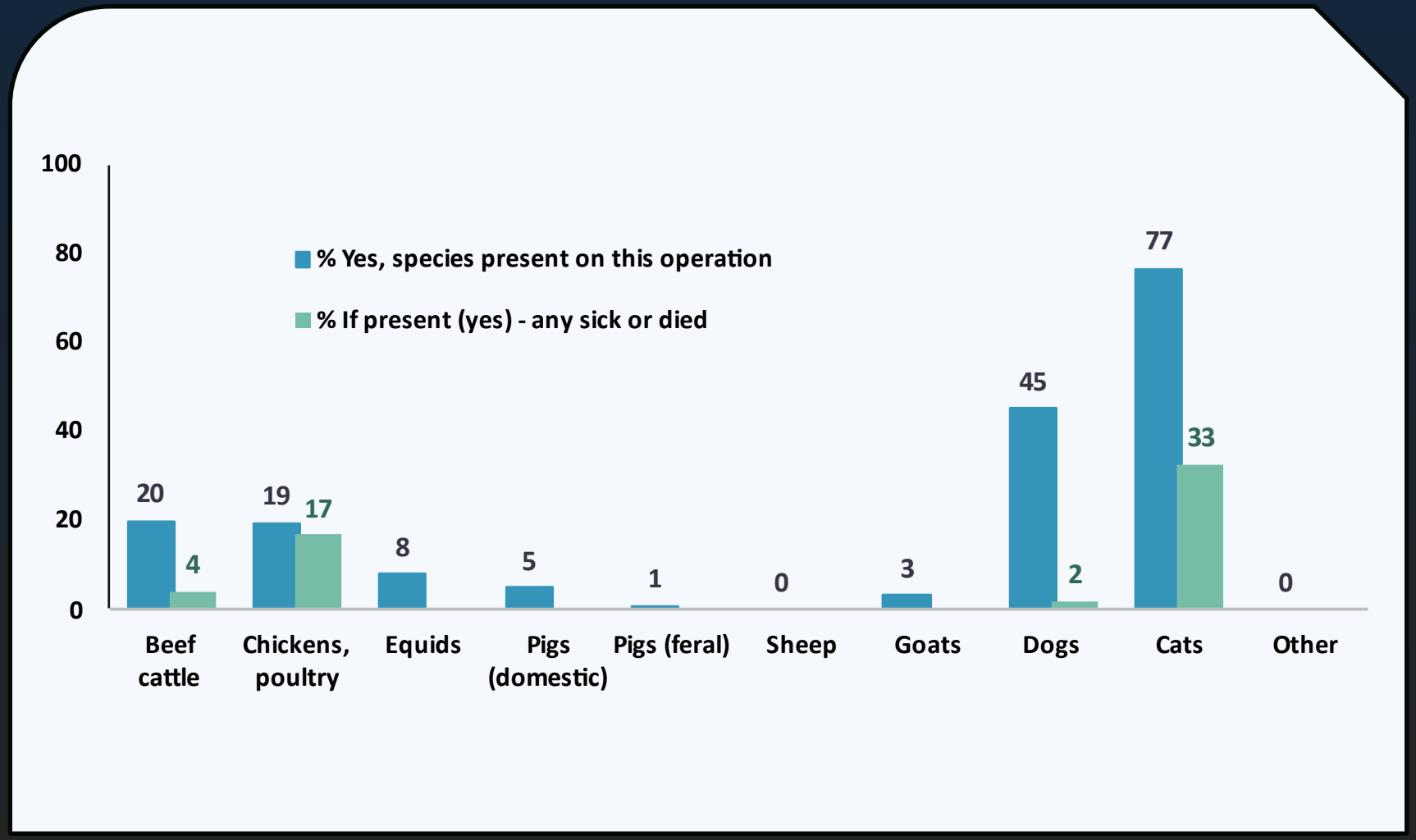
- >50% of farms received cattle within 30 days of clinical signs
  - Lactating animals most frequently received
- ≥45% of affected farms continue to move animals off the farm after onset of clinical signs
  - **Calves to be raised off-site**
  - **Cull cows to market**
    - **Neces**sary movements
    - Allowed by Federal Order
- Animal movement is a recognized risk for disease transmission



Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

Potential transmission links
Other species present

- >75% of farms have cats present
  - 33% of farms with cats observed sick or dead cats
- 19% of farms have chickens or poultry present
  - 17% of farms with poultry observed sick or dead poultry
- Other species on a farm can become infected and potentially serve as a fomite or indicate disease status

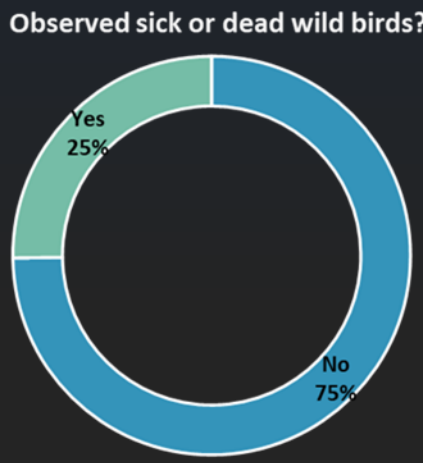


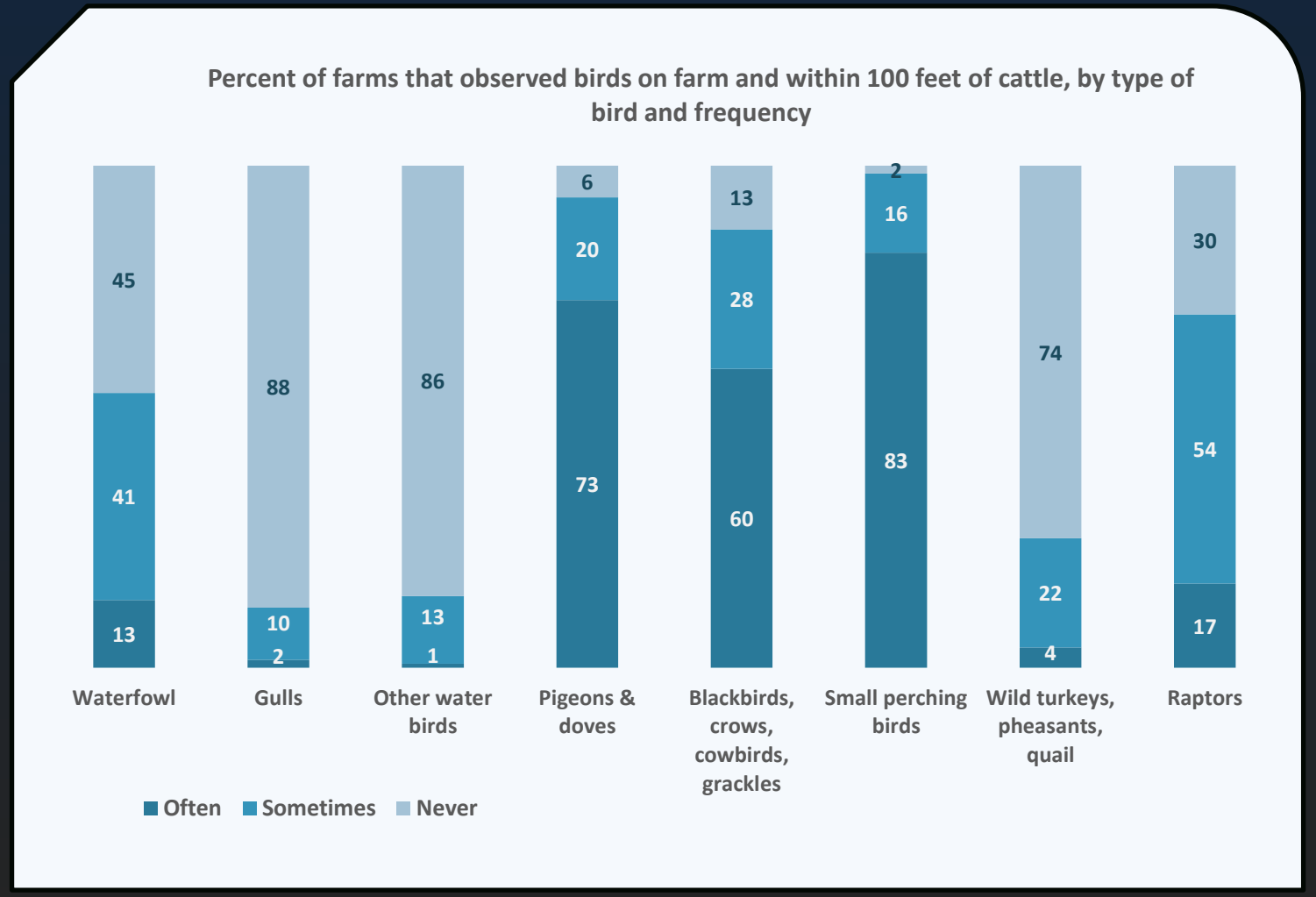
Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Potential transmission links
Wild birds

- All farms observe some type of wild birds near cattle
- 25% of farms observed sick or dead wild birds within 30 days prior to onset of clinical signs
- Peridomestic birds can become infected
- Currently, there is no genomic or epidemiologic evidence that wild or peridomestic birds are introducing H5N1 to cattle herds

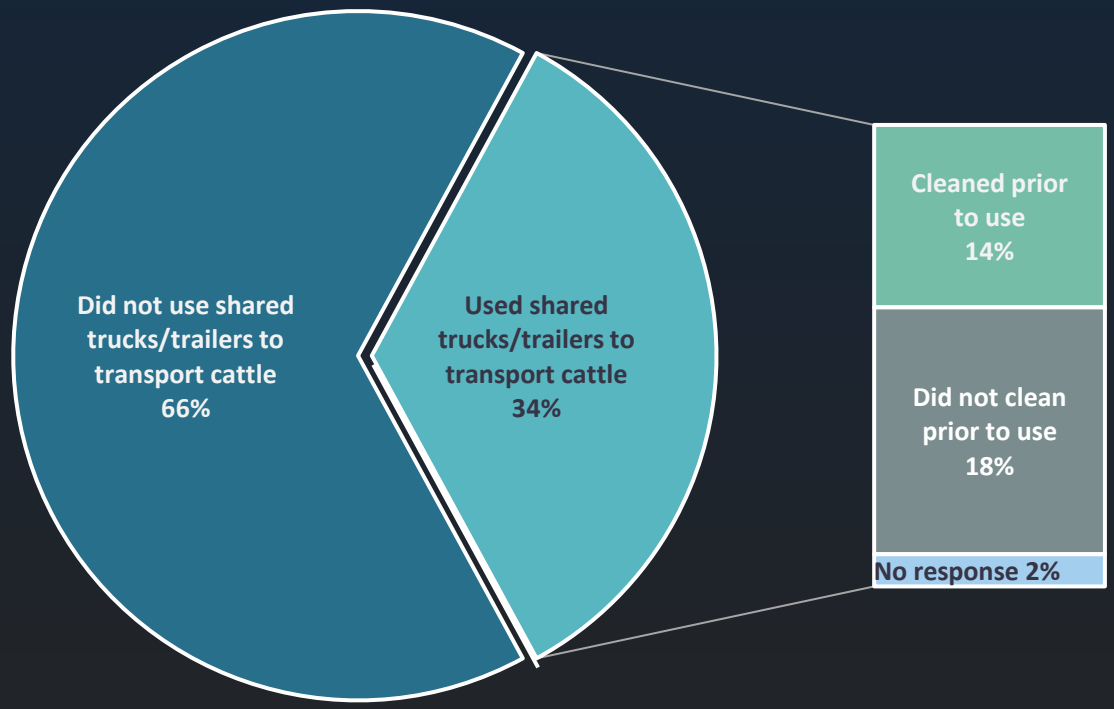




Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

Potential transmission links
Shared transportation vehicles

- 34% of farms used trucks and trailers that are shared with other farms to transport livestock within 30 days prior to onset of clinical signs
- >50% of farms that used shared vehicles do not clean vehicles prior to use
- Shared equipment that is not cleaned between farms is a recognized risk for disease transmission

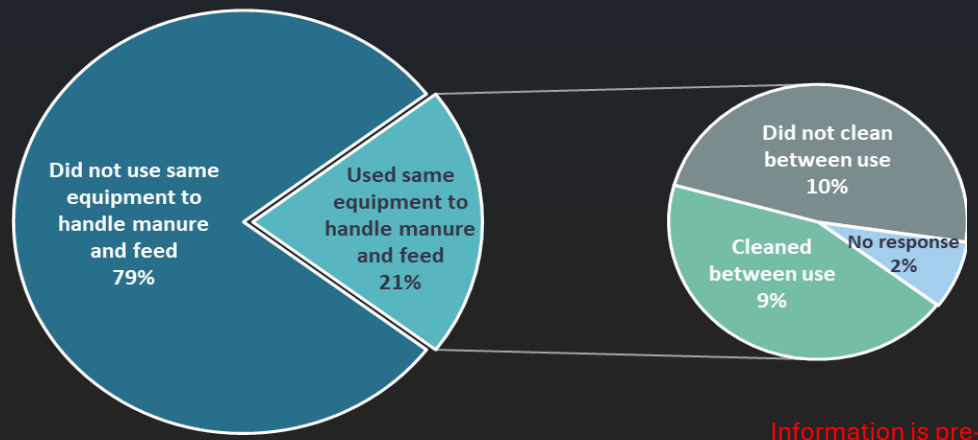


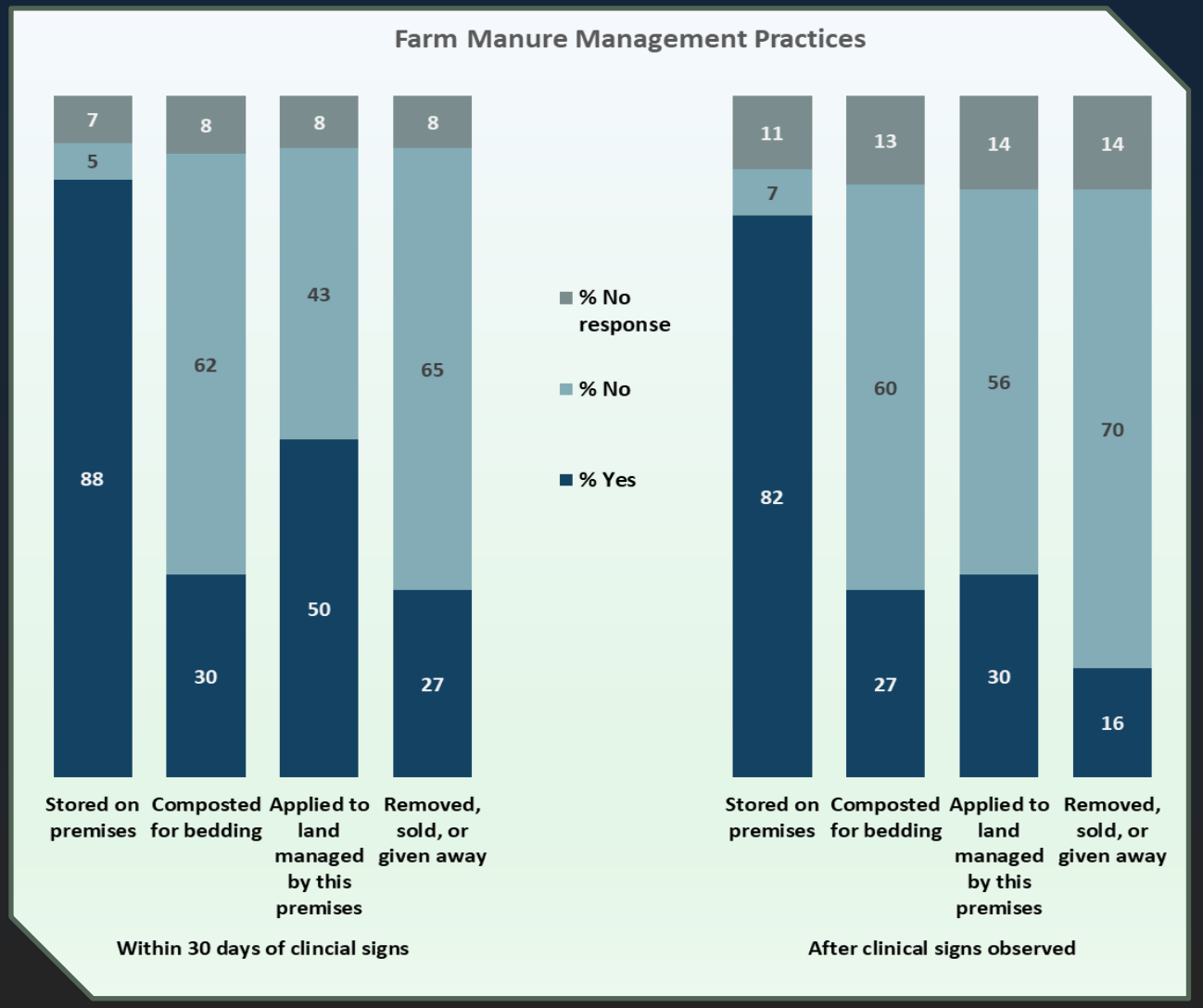
Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Potential transmission links
Manure, handling equipment

- **>80% of farms store manure on the premises**
  - Half of farms applied manure to land managed by the premises prior to onset of clinical signs
  - Proportion decreased after onset of clinical signs
- **21% of farms use the same equipment to handle manure and animal feed**
  - ~50% that use equipment for both do not clean in between use
- **Research shows risk from manure appears low based on individual cow manure samples; following best waste management practices is recommended**
- **Contaminated equipment is a recognized risk for disease transmission**



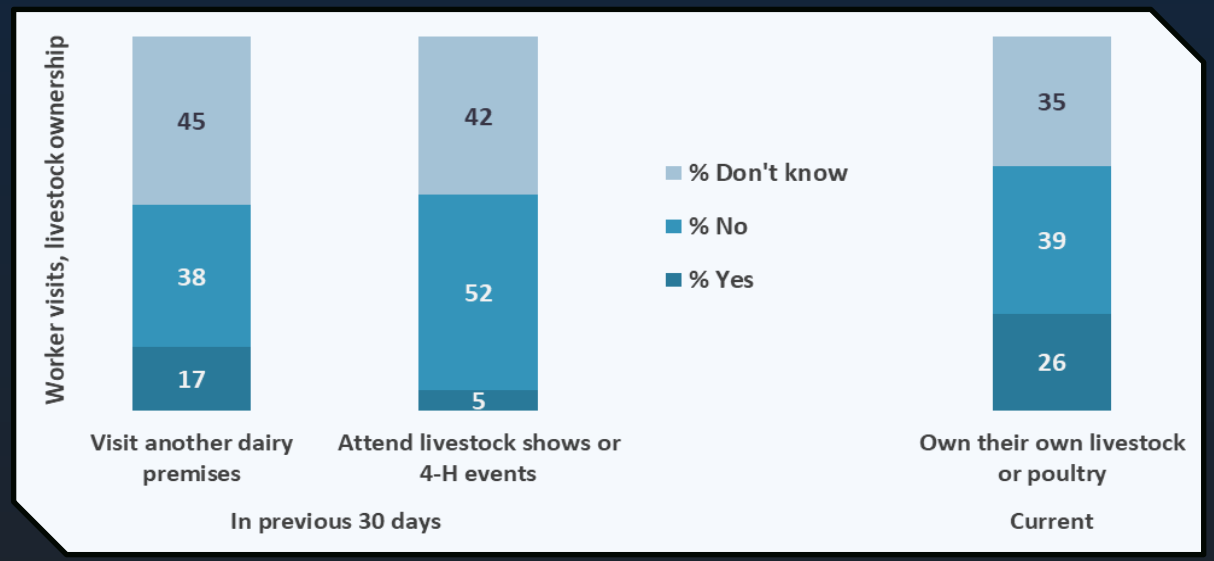


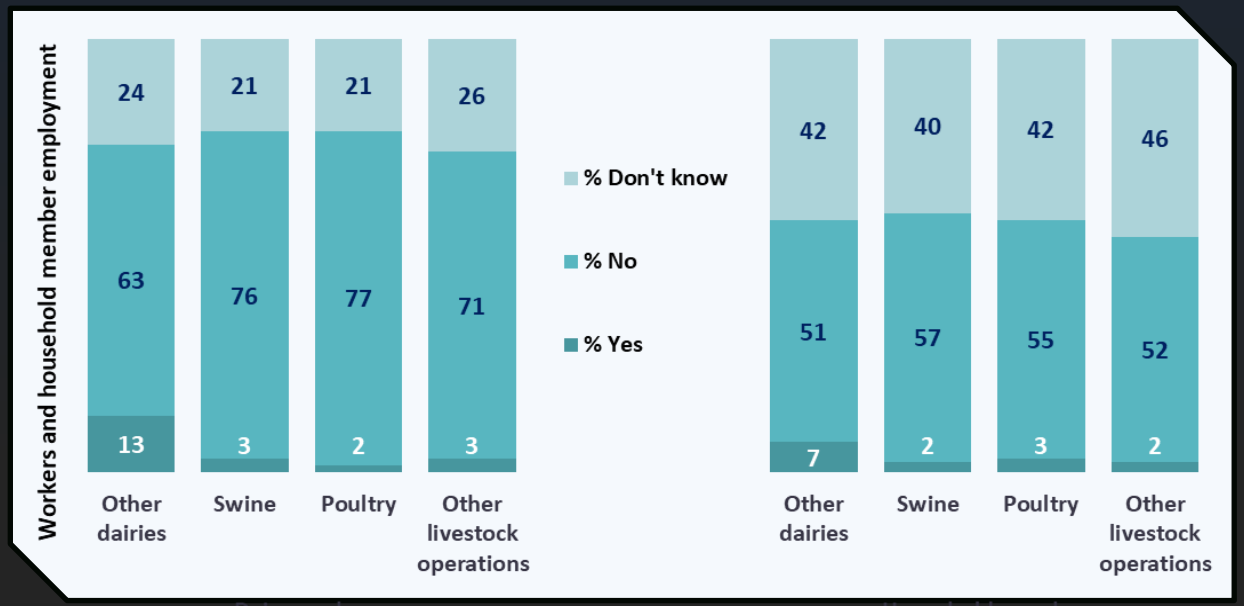
Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Potential transmission links
People: shared personnel

- 17% of dairies' employees visited other dairies within 30 days of clinical signs
- >25% of dairies' employees own livestock or poultry at their personal residence
- 21% of dairies' employees work at another farm with livestock
  - Most work on another dairy
- 14% of dairies' employees have household members who work on another farm with livestock
- **Shared personnel are a recognized risk for disease transmission**

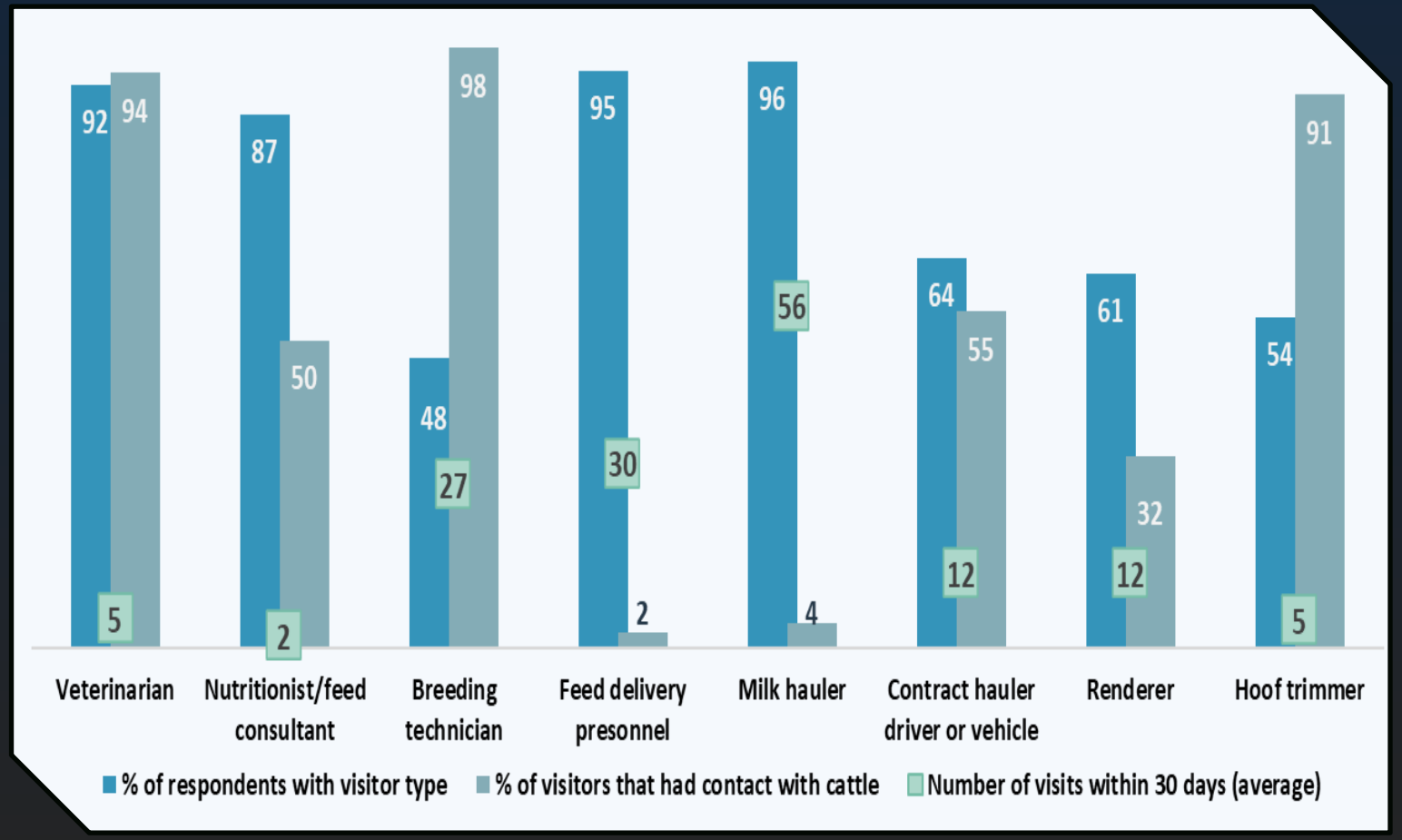




Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

Potential transmission links
People: support services

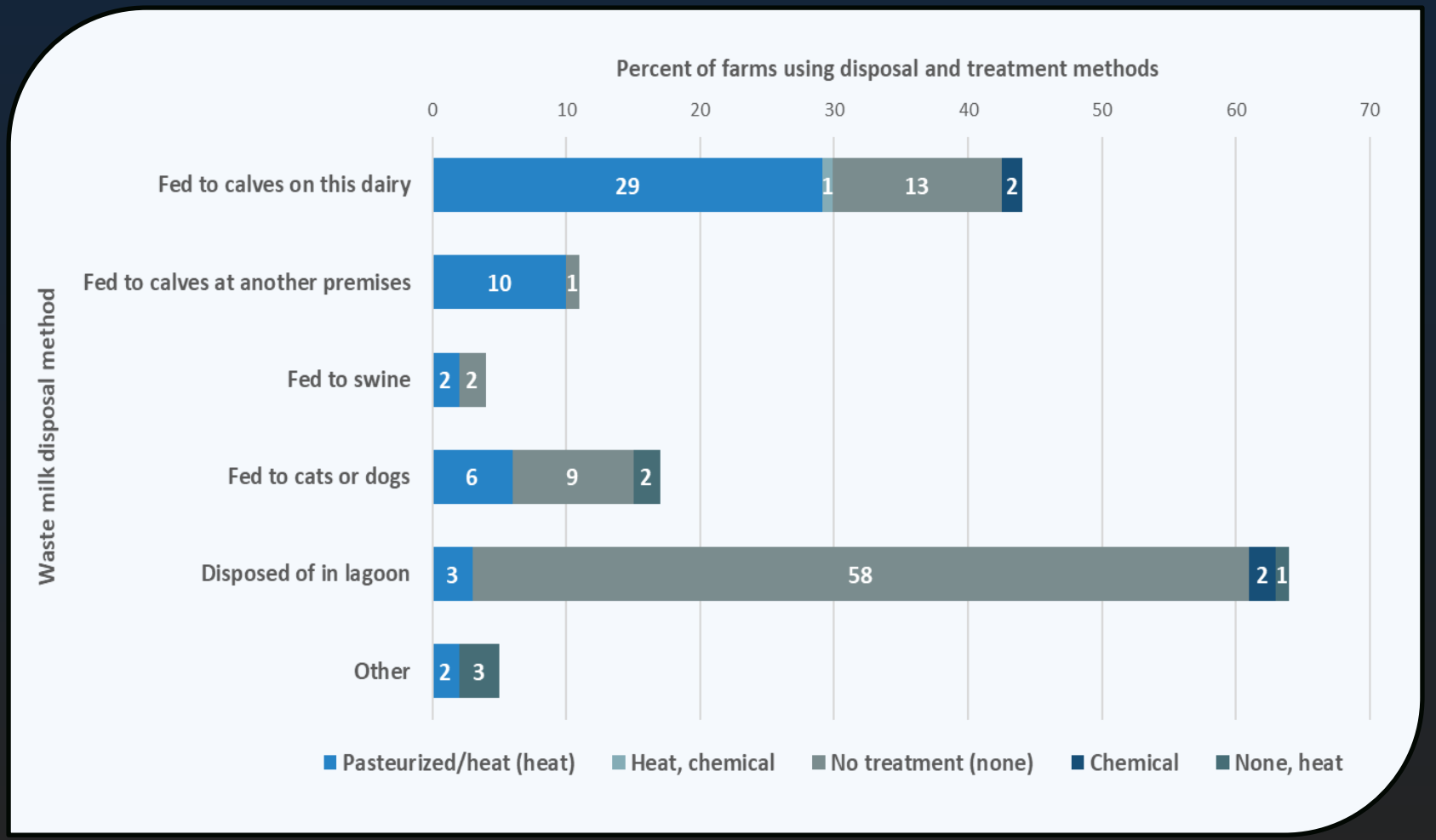
- **Most affected farms have regular visitors who have contact with cattle**
  - Veterinarians
  - Nutritionists/feed consultants
  - Contract haulers
  - Hoof trimmers
- **Many farms use renderers and breeding technicians**
  - Frequent visitors
  - Most have contact with cattle
- **Frequent visitors with access to animals is a recognized risk for disease transmission**



Data as of 08/23/24 0900 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

Management practices
Waste milk disposal

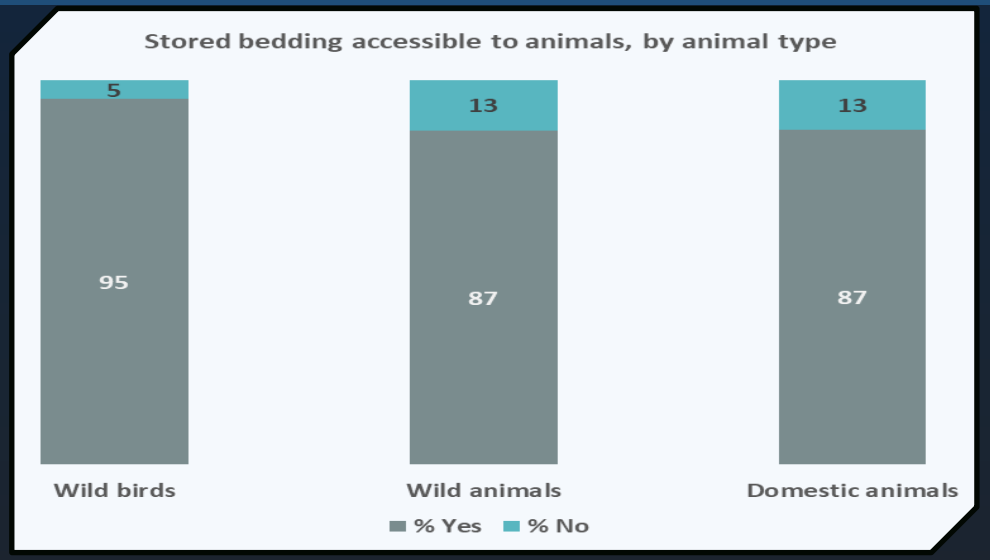
- 64% of farms dispose of waste milk in the lagoon
  - Most is not treated prior to disposal
- Some farms feed untreated waste milk to calves, dogs and cats, and swine
- Proper treatment of raw waste milk prior to feeding to calves or other species is recommended
- The role of waste milk disposal in disease transmission is unknown and needs further study

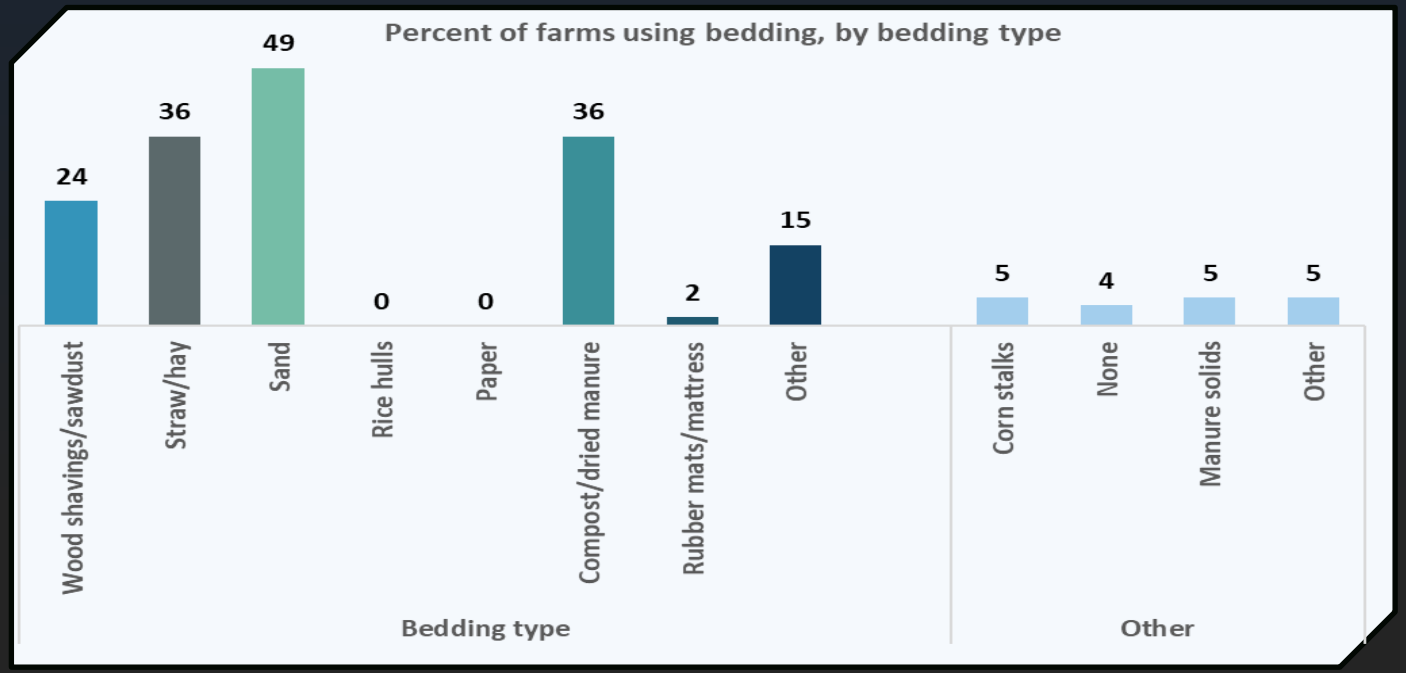


Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

Management practices
Bedding and bedding storage

- Most farms reported that fresh bedding is accessible to other animals prior to use
- Sand is most frequently used bedding
  - Straw and composted manure are also commonly used
- Bedding can be contaminated by vectors
- Storage of bedding should prevent attraction of wildlife or other potential fomites

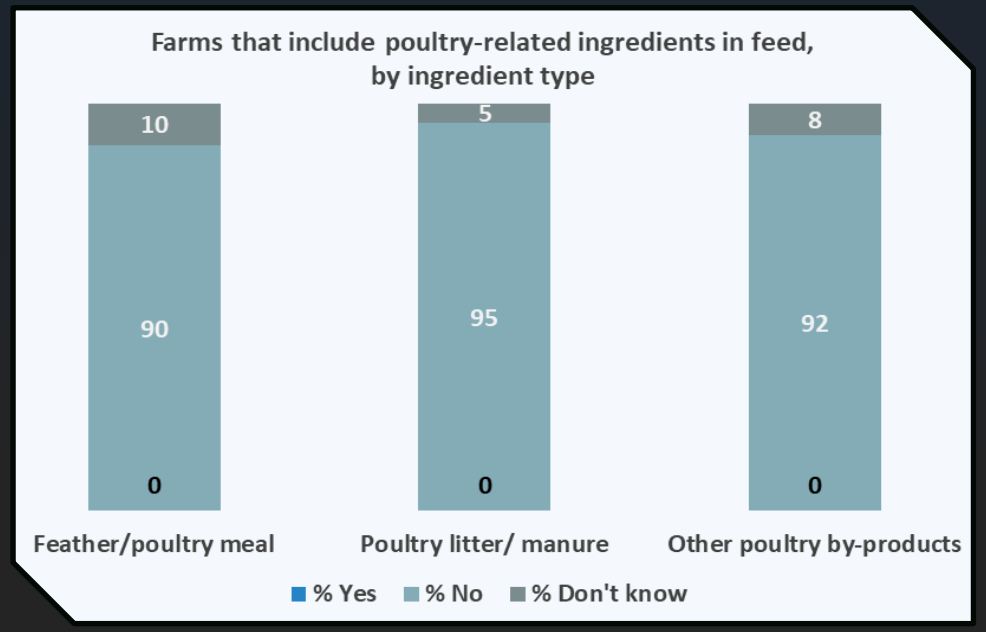


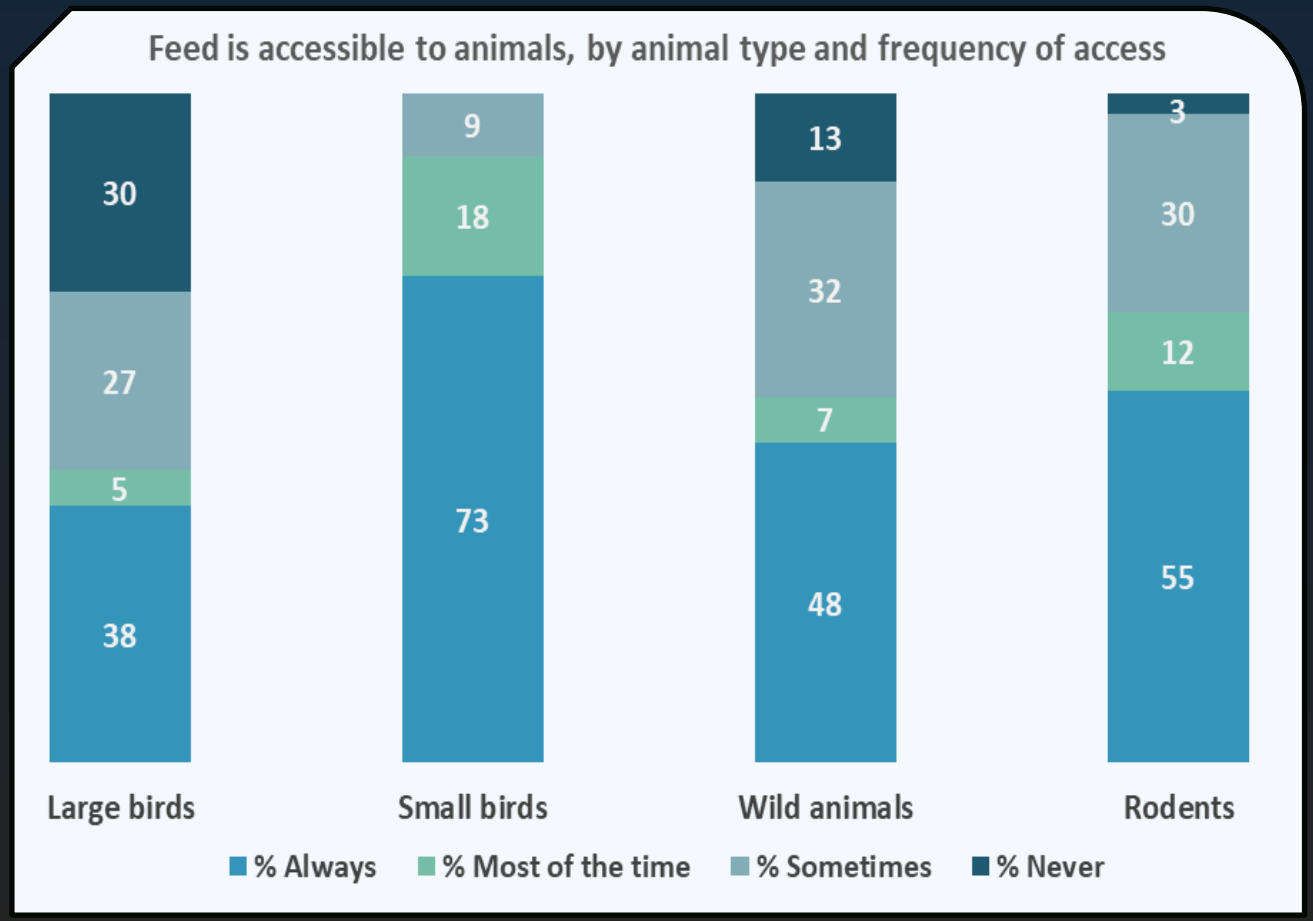


Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

Management practices
Feed and feed storage

- No farms used poultry-based components in their dairy rations
- All farms reported that large birds, small birds, wild animals, and rodents have frequent access to cattle feed or feed ingredients
- Control measures to minimize contamination and avoid attracting wildlife are key components of a biosecurity plan





Data as of 08/23/24 1200 MDT
Information is pre-decisional; analyses are ongoing and updated as new information received

Questions?