

# Swine-to-Turkey IAV 1A, 1B & 3.1990.4.1 IAV in US Turkey Breeders Hens 2015 to 2023

- Marie Culhane, DVM, PhD
- Professor of Veterinary Population Medicine
- College of Veterinary Medicine
- University of Minnesota (MN), Saint Paul, MN
- USA

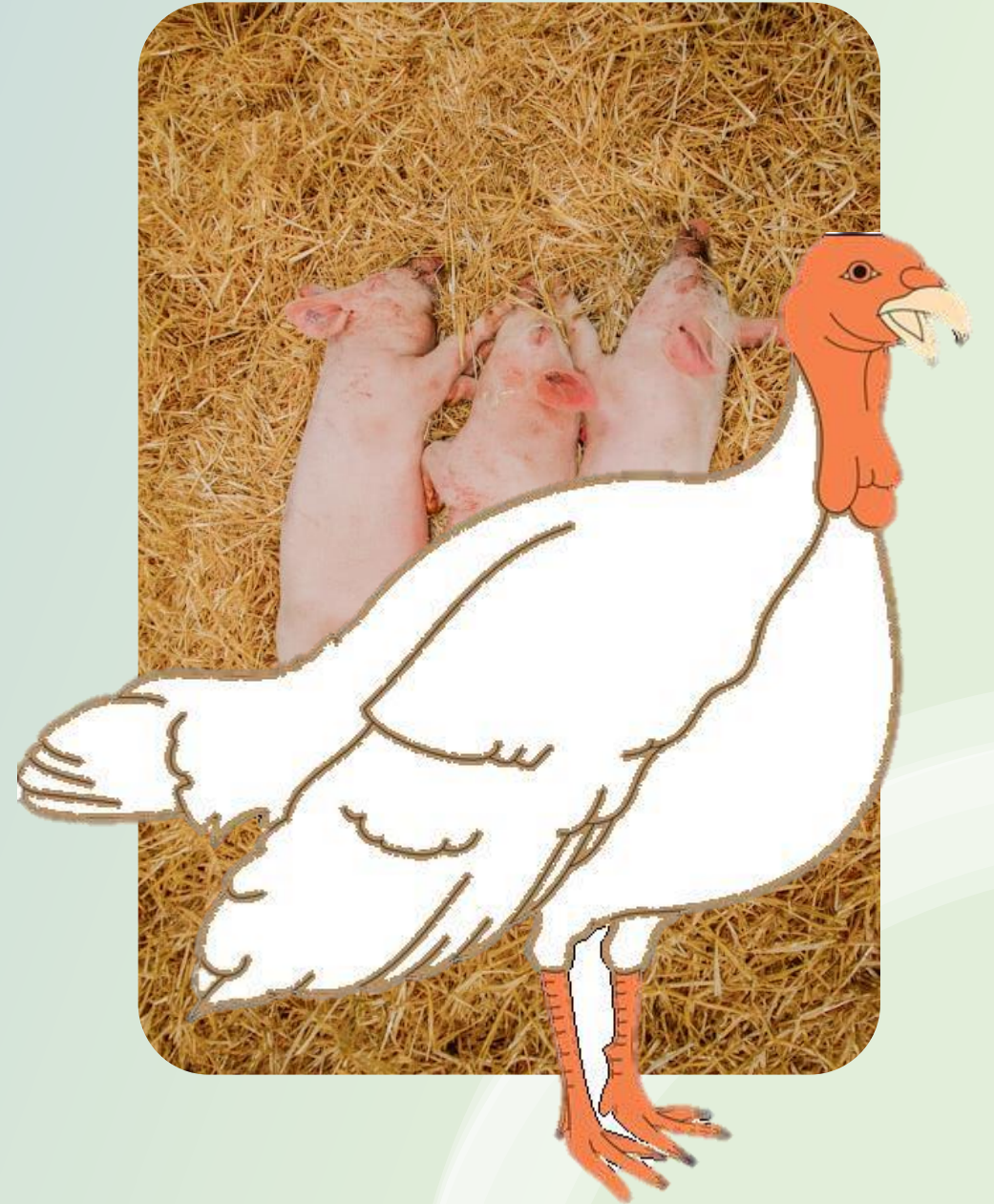


3 - 4 April 2024

# Index

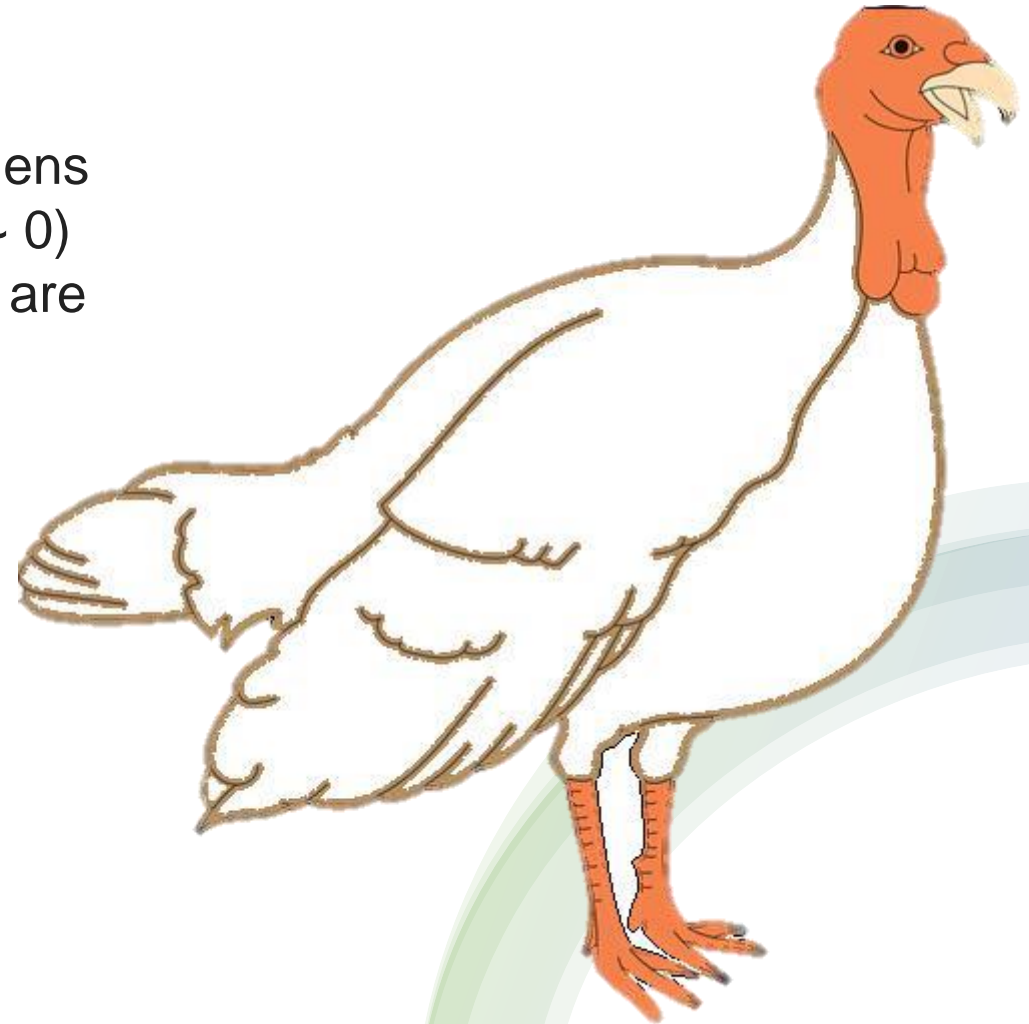
1. General Statement regarding low path IAV clinical signs in turkey breeders
2. 3.1990.4a H3 in 2015
3. 1A.3.3.2 H1 in 2016
4. 1B.2.1 H1 in 2020
5. 1A.1.1.3 in 2023

# Section 1



# What happens?

With every IAV introduction, turkey breeder hens experience egg drop (eggs laid reduced to ~ 0)  
Vax decreases egg drop severity when hens are next exposed to IAV



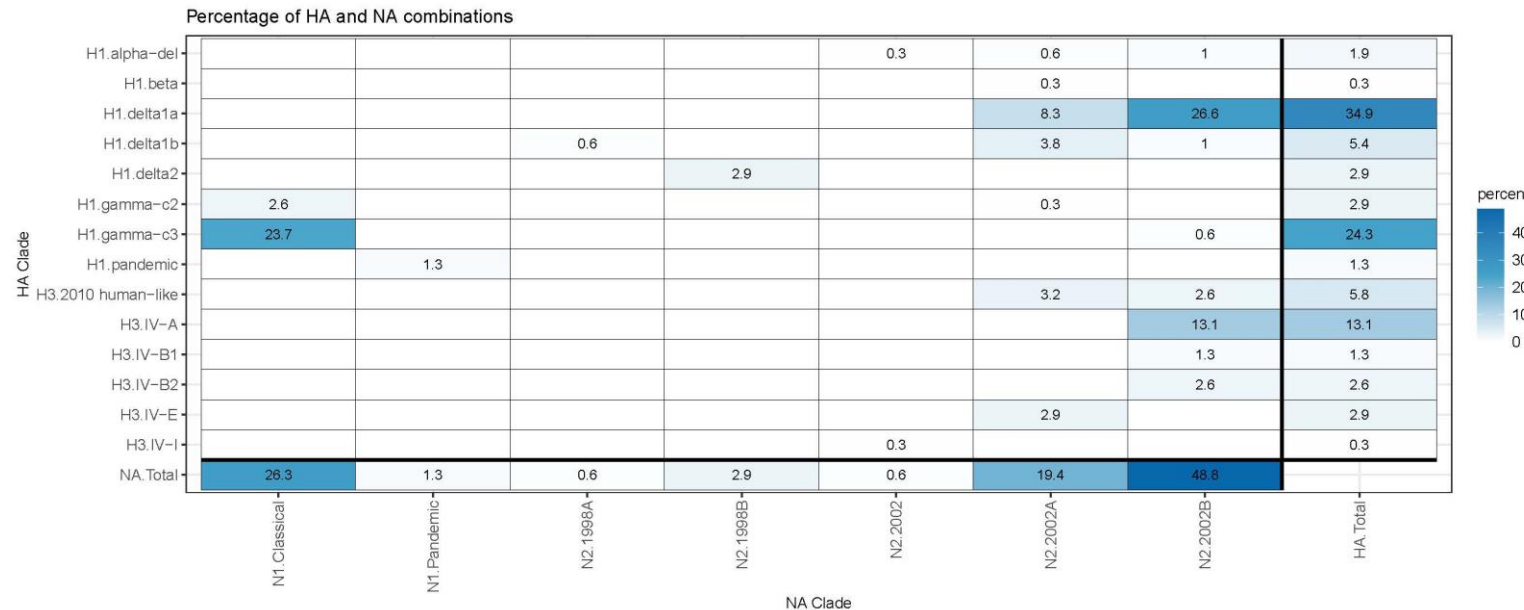
November 2015  
A Cluster IVA H3 of clade  
3.1990.4.a was isolated from  
breeder hen turkeys in Illinois



# November 2015

## Cluster IVA H3 of clade 3.1990.4.a

Cluster IVA H3 most commonly detected H3 in  
Midwestern USA swine Jun to Dec 2015  
(*OctoFLUShow*)



# November 2015

## Cluster IVA H3 of clade 3.1990.4.a

Nearest pigs <0.5 KM away

Pigs confirmed 3.1990.4.1 positive.

**An autogenous killed monovalent H3 vaccine was made and given to all turkey breeders in the company**

# May 2016

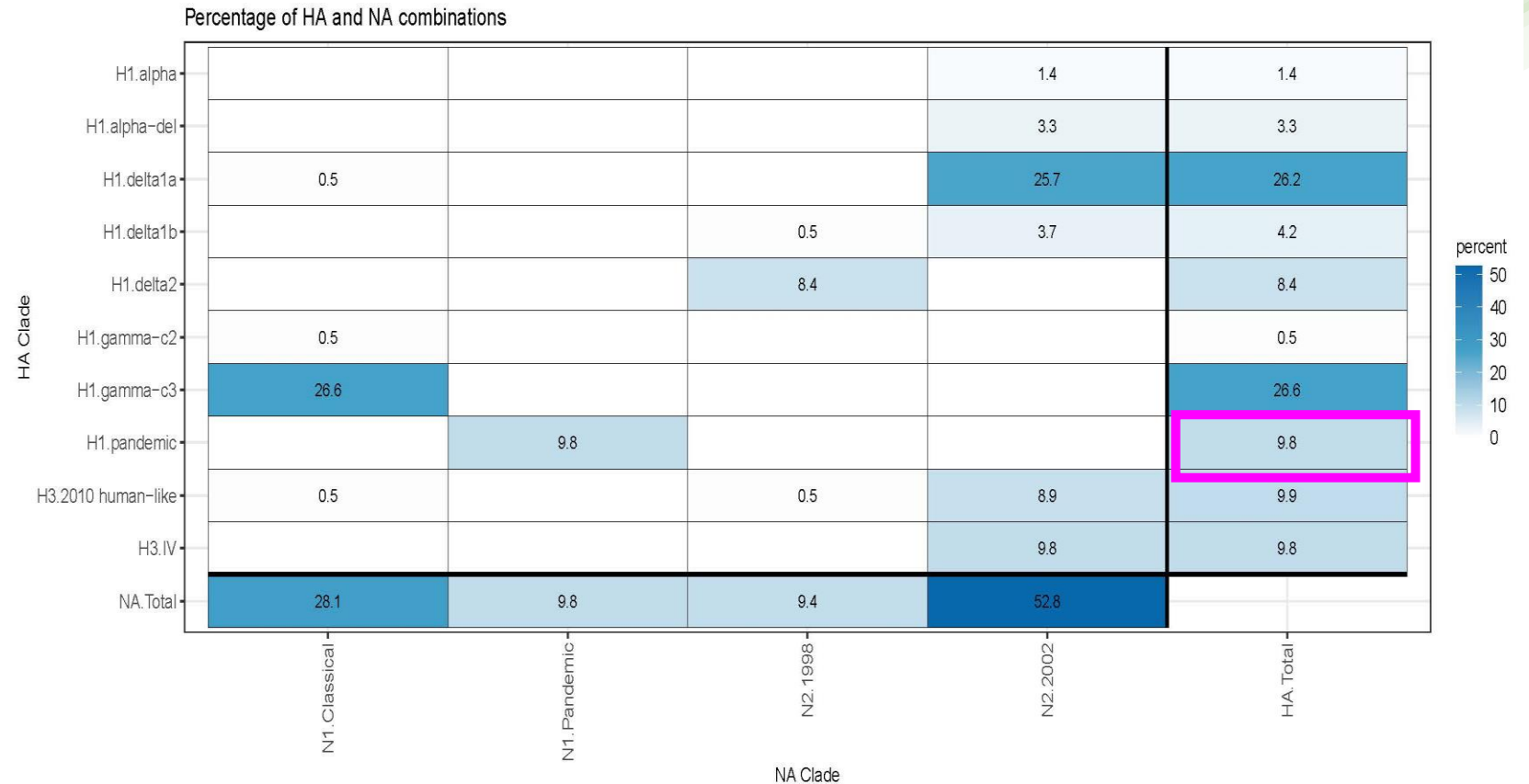
pandemic H1 of clade 1A.3.3.2





# May 2016 pandemic H1 of clade 1A.3.3.2

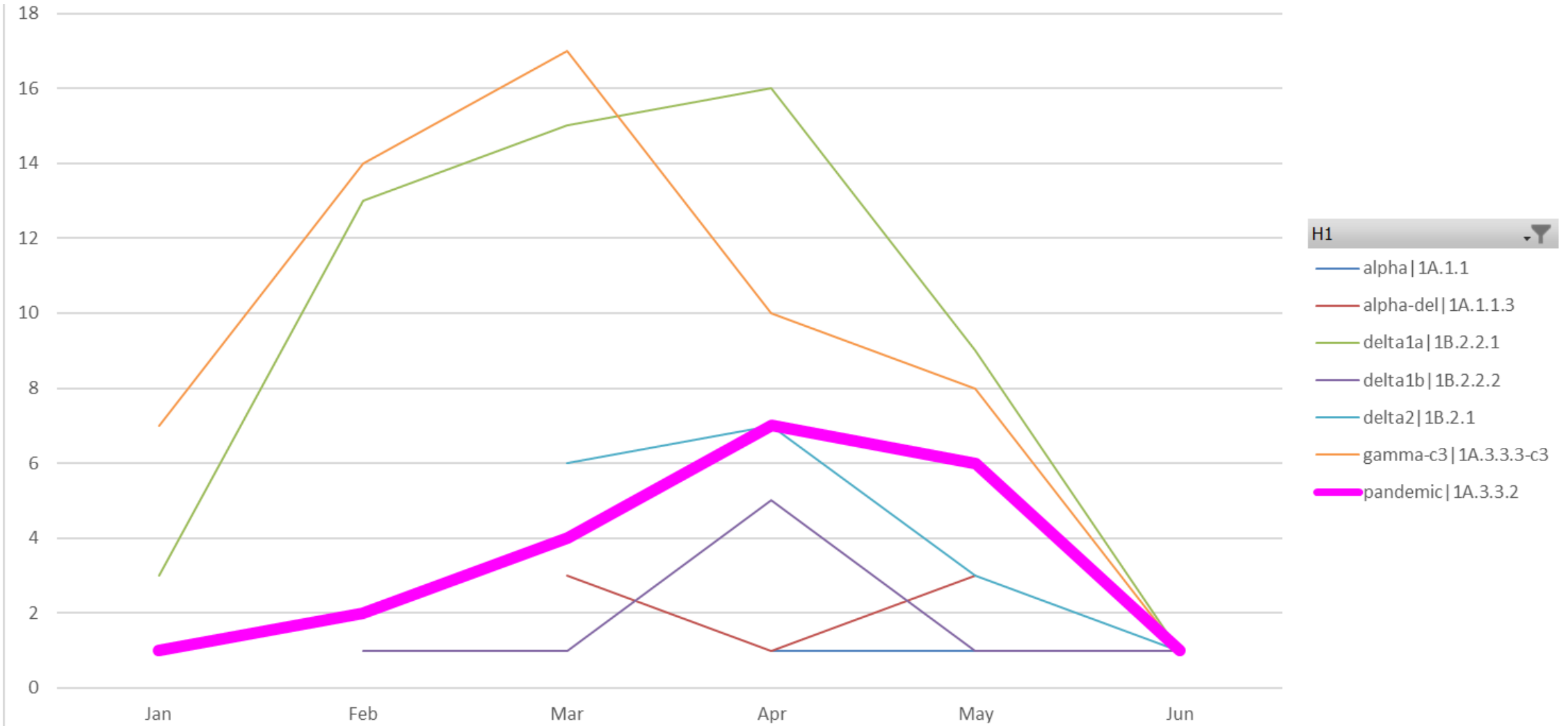
- A pandemic H1 of clade 1A.3.3.2 was isolated from breeder hen turkeys in Minnesota experiencing egg-drop
- Pdm H1 commonly detected in Midwest swine in the same time period ([OctoFLUshow](#))





# May 2016

## Pdm H1 commonly detected in Midwest swine



# May 2016 pandemic H1 of clade 1A.3.3.2

**The autogenous vaccine was updated to a bivalent  
containing pdm H1 and H3**

# December 2020

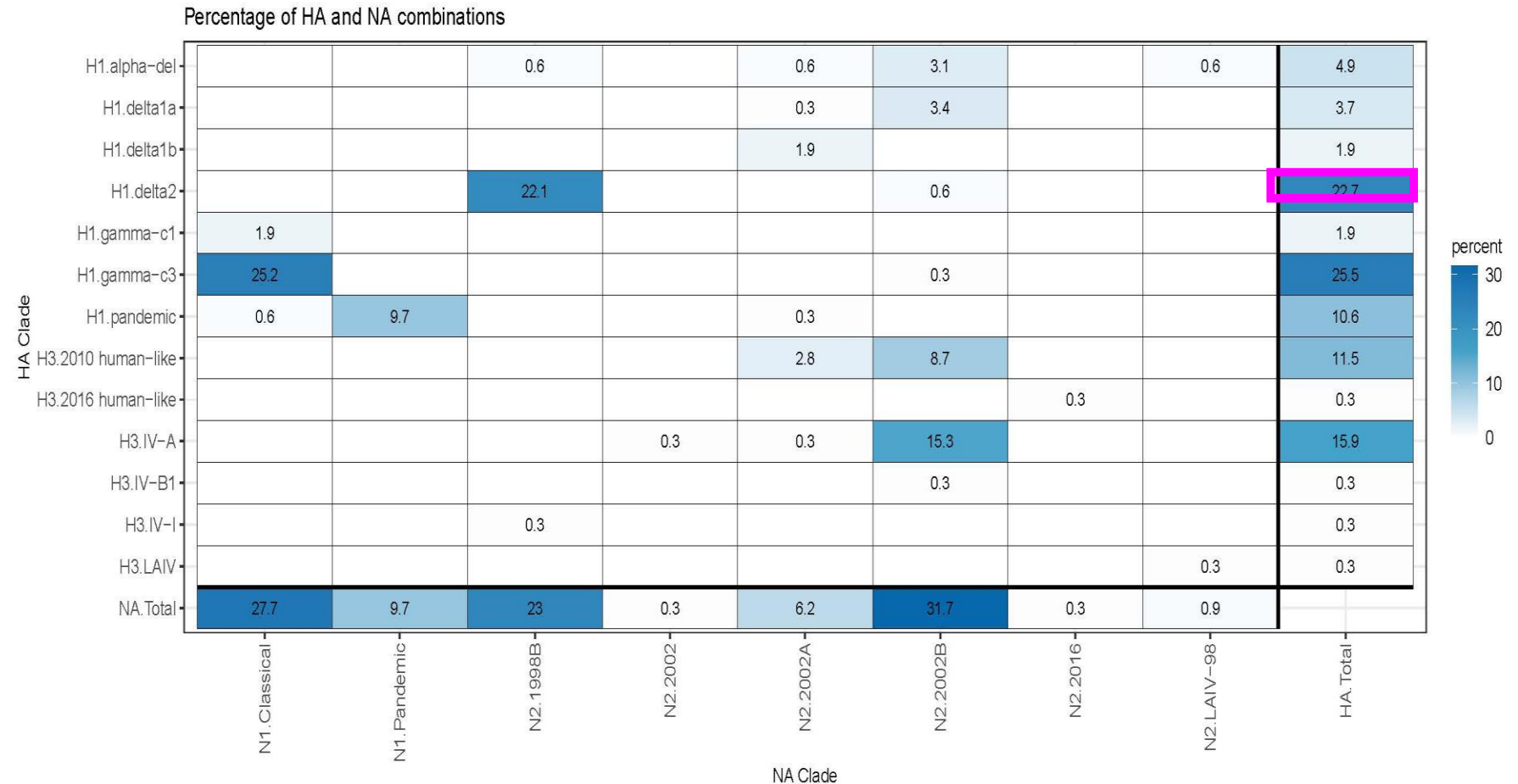
## H1N2 clade 1B.2.1 delta2 H1



# December 2020

## H1N2 clade 1B.2.1 delta2 H1

- 2020-080470\_478340 H1N2 was a clade 1B.2.1 delta2 H1 isolated from turkey breeder hens experiencing egg-drop.
- Clade 1B.2.1 Delta 2 H1s were the most common flu detected in pigs fall/winter 2020-2021 (octoFLUshow)



# December 2020

## H1N2 clade 1B.2.1 delta2 H1

- Nearest pigs to the flock were >2 km away
  - However, the barn that broke on this farm is about 150 ft on the one end off the highway
  - Suspect aerosol transmission from drive-by?
    - Not much for hogs around that area and that highway corridor doesn't have a lot of pigs traveling by. T
  - There was manure spread on the field just to the east of the farm the week the farm broke.
    - Source of manure unknown

**The autogenous vaccine was updated to exchange the pdmH1 with the delta H1 and still keeping the H3**

# December 2023

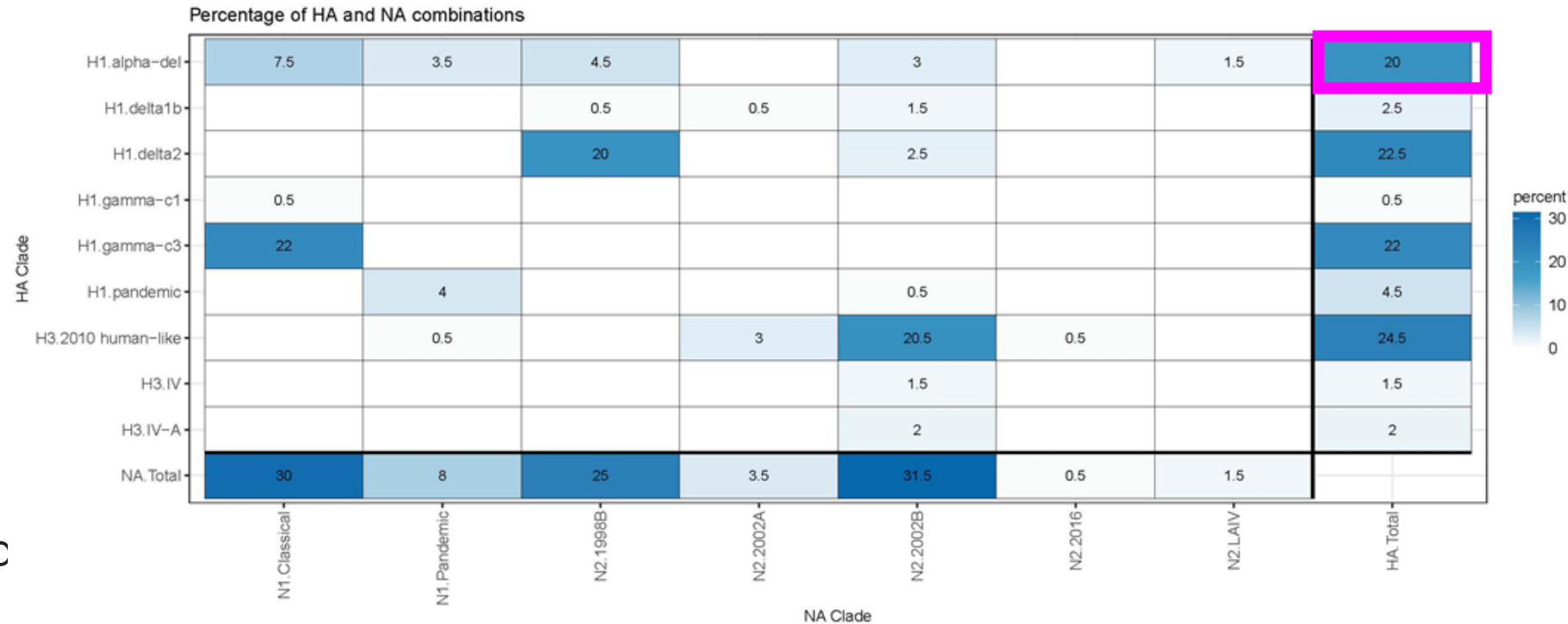
clade 1A.1.1.3 alpha-del H1



# December 2023

## H1N2 of clade 1A.1.1.3 alpha-del H1

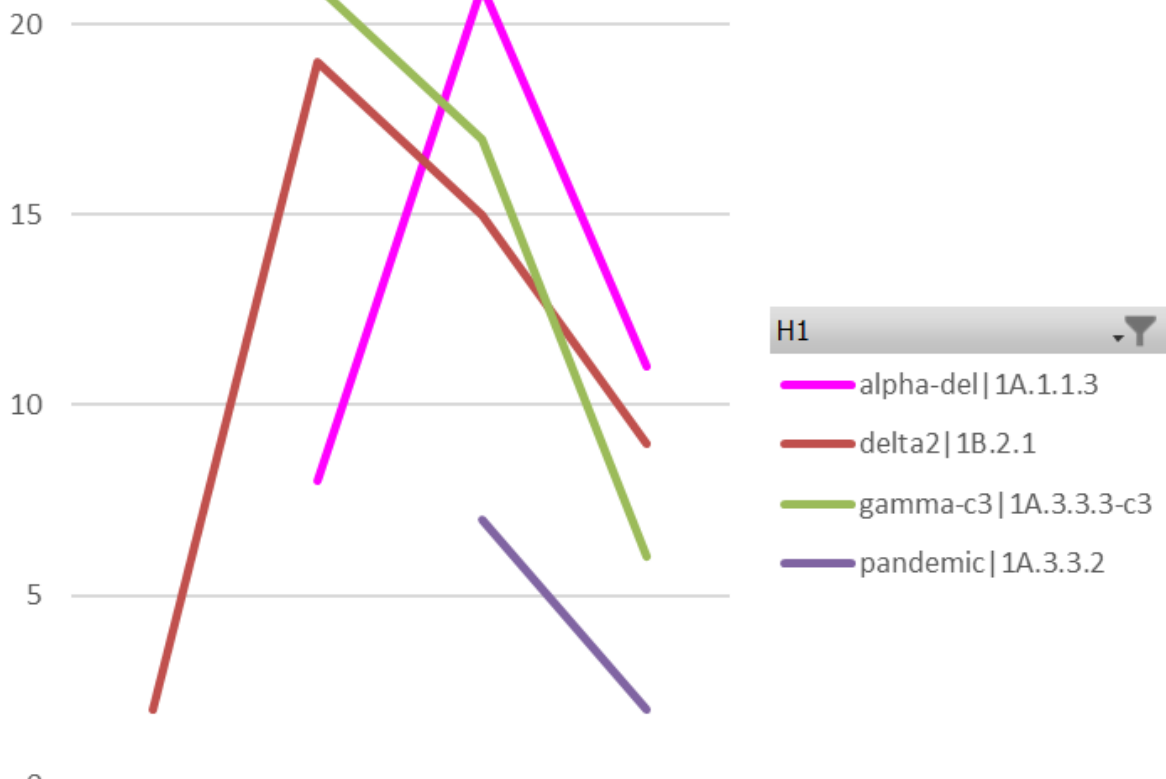
- A/Turkey/Illinois/A02800282/H1N2 a clade 1A.1.1.3 alpha-del H1 isolated from infected turkeys. It shares >98% HA similarity to many swine H1s in the Midwest.
- Alpha-del very commonly detected H1 in Midwestern US pigs ([octoFLUshow](#))





# December 2023

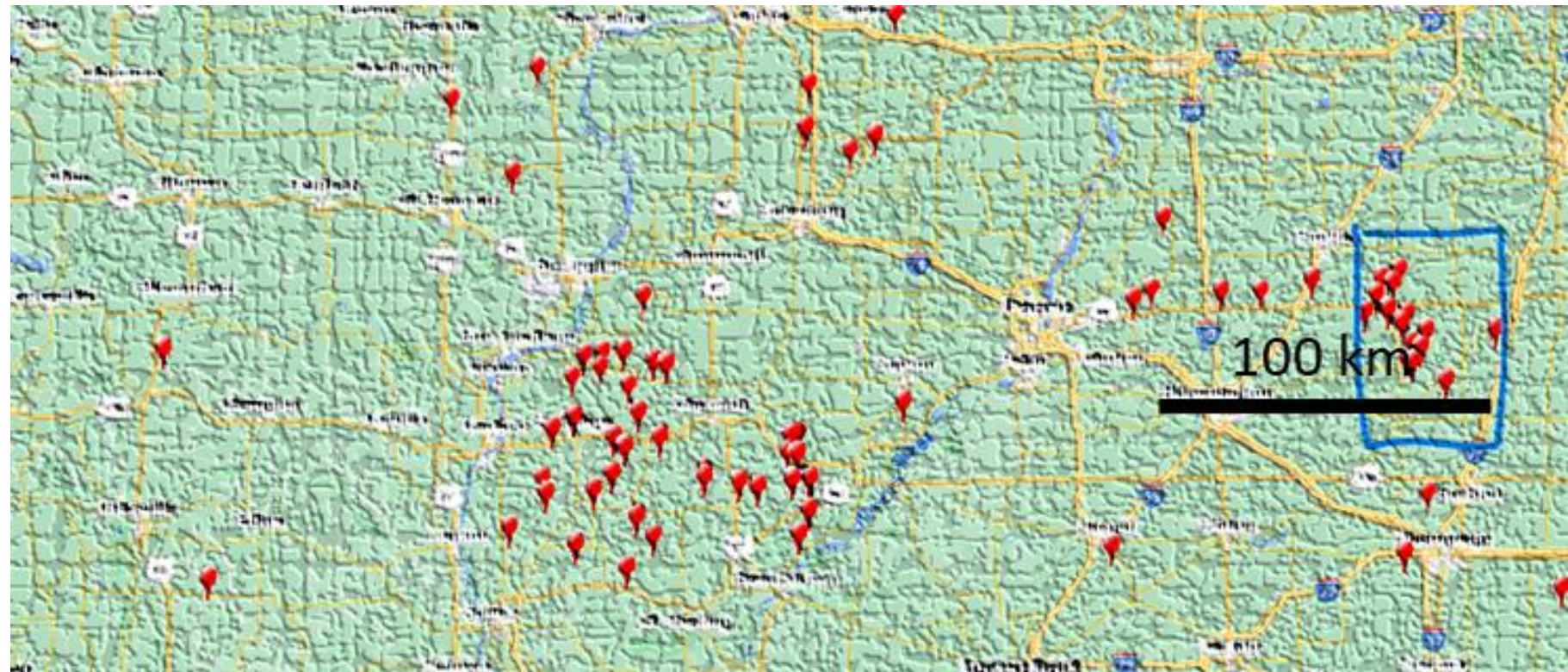
## Alpha-del very commonly detected H1 in Midwestern US pigs

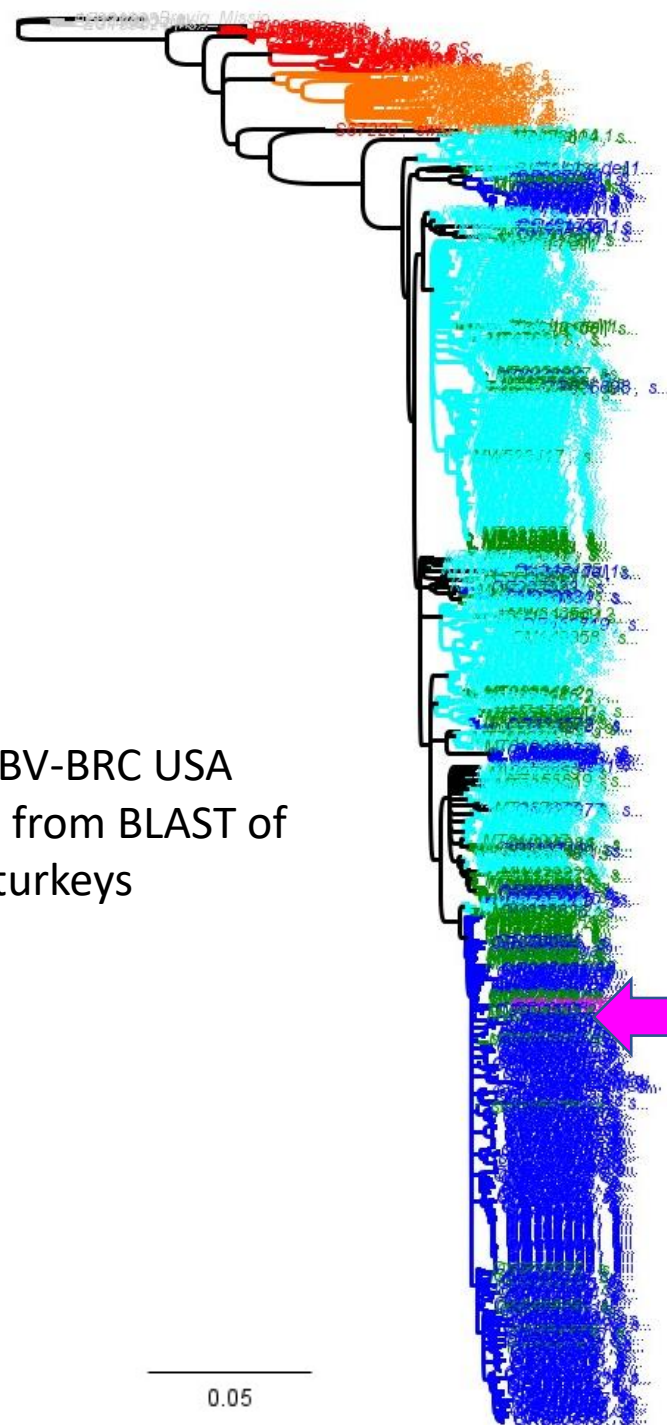


	Oct	Nov 2023	Dec	Jan 2024
alpha-del 1A.1.1.3		8	21	11
delta2 1B.2.1	2	19	15	9
gamma-c3 1A.3.3.3-c3		21	17	6
pandemic 1A.3.3.2			7	2

# December 2023 H1N2 of clade 1A.1.1.3 alpha-del H1

- Several pig farms near the flock
- Pig farms = orange markers
- Turkey farm = center of blue rectangle





**855 sequences:**

- 3 turkey H1s
- 771 alphas from BV-BRC USA
- 81 closest alphas from BLAST of H1s from turkeys

**December 2023**

A/Turkey/Illinois/A02800282/H1N2 a clade 1A.1.1.3 alpha-del H1 was isolated from infected turkeys. It shares >98% HA similarity to many swine H1s in the Midwest.

**1A.1 Alpha H1 Tree LEGEND**

**Grey** 1A ancestor strains

**Red** 1990s swine

**Orange** 2000s swine

**Cyan** 2010s swine

**Green** 2020s swine

**Blue** 2022/2023 swine

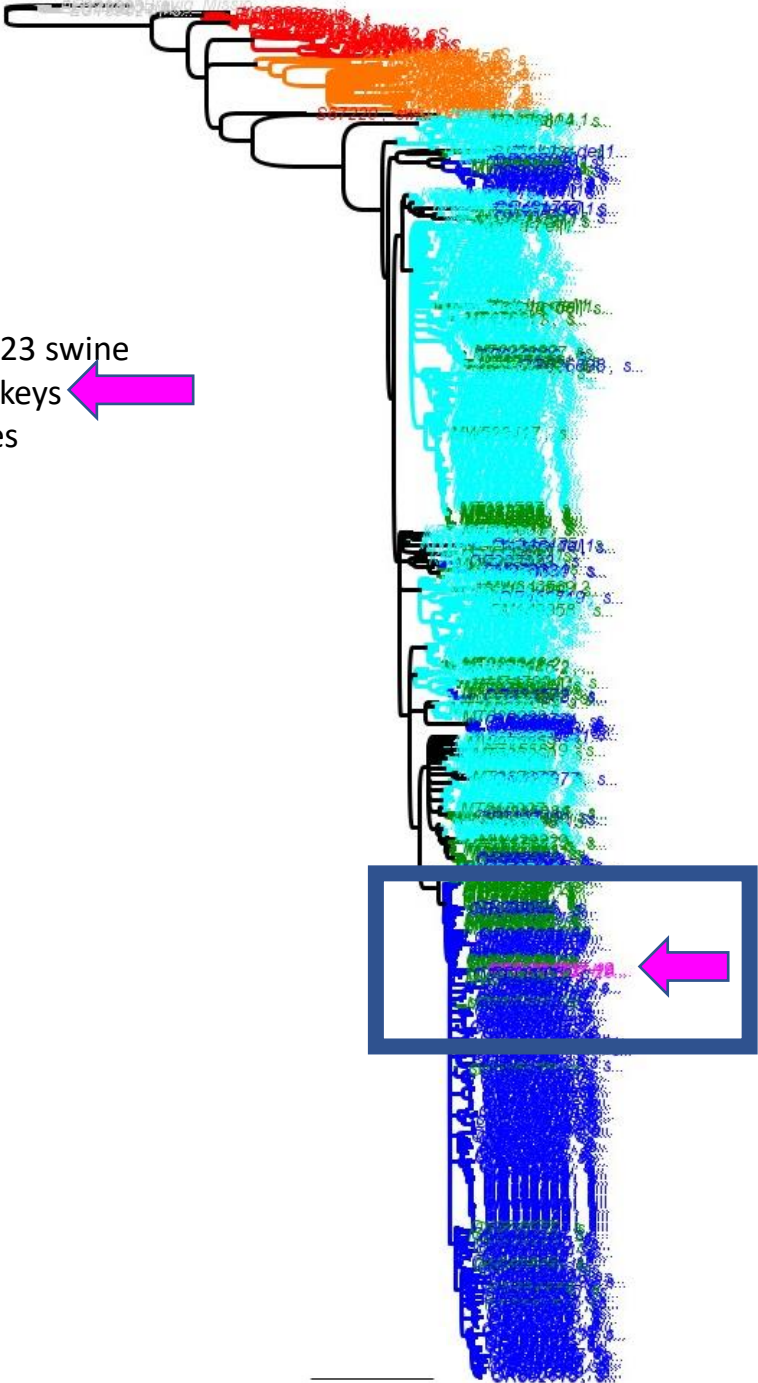
**Pink** 2023 turkeys

All are USA strains

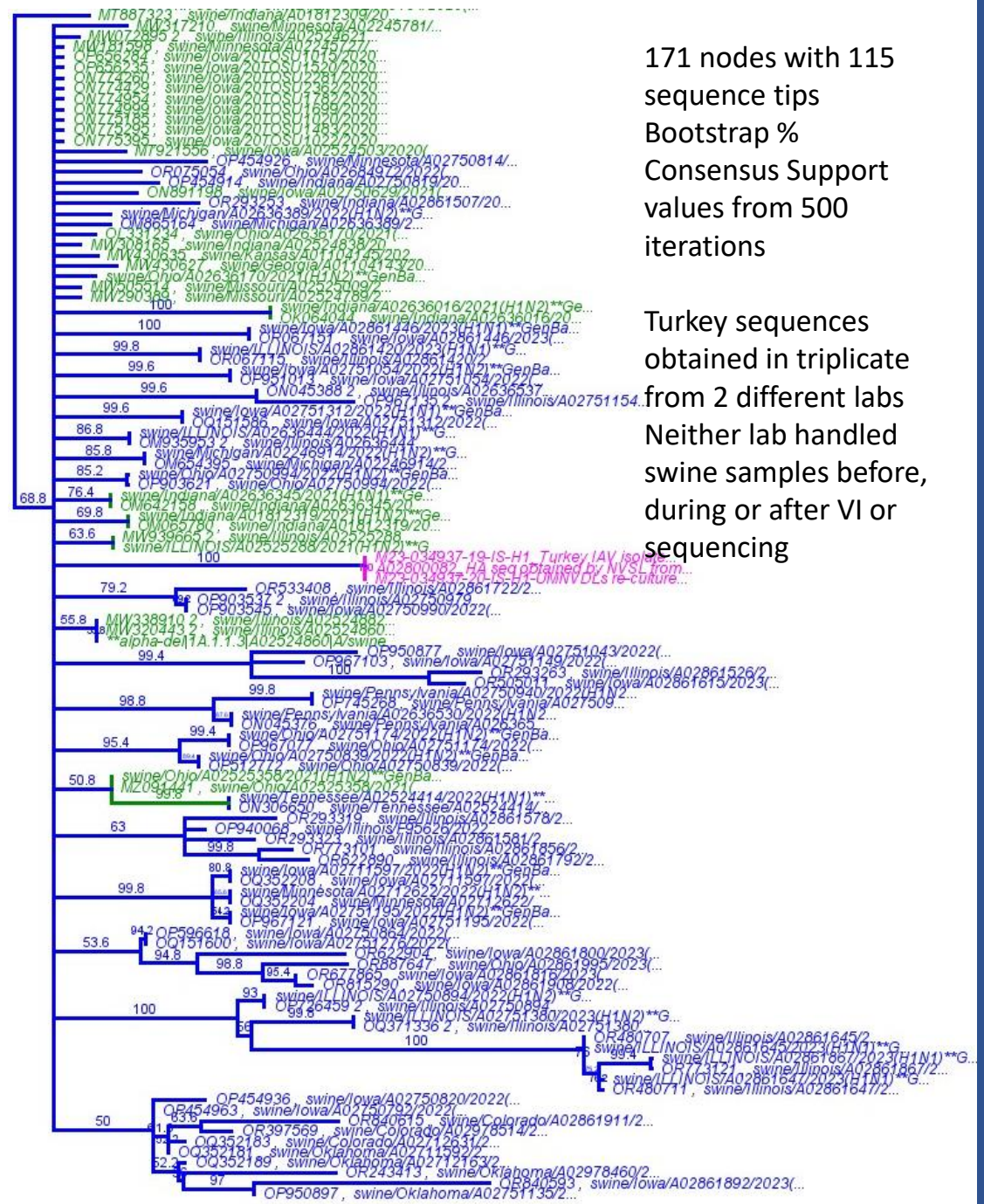
Neighbor-Joining consensus tree

Rooted to A/BrevigMission/1918

**Zooming in:**  
**Blue** 2022/2023 swine  
**Pink** 2023 turkeys  
115 sequences



0.05



171 nodes with 115  
sequence tips  
Bootstrap %  
Consensus Support  
values from 500  
iterations

Turkey sequences  
obtained in triplicate  
from 2 different labs  
Neither lab handled  
swine samples before,  
during or after VI or  
sequencing

# Conclusions

Swine – to – Turkey IAV infections occur regularly in the USA

Vaccinations to control IAV in turkeys are used and updated based on swine IAV information and analysis of the turkey IAV sequences



Thank you