

Avian metapneumovirus in chickens clinical experiences and case studies

Dr László Kőrösi

BVPA 2026 Spring Meeting
Harrogate



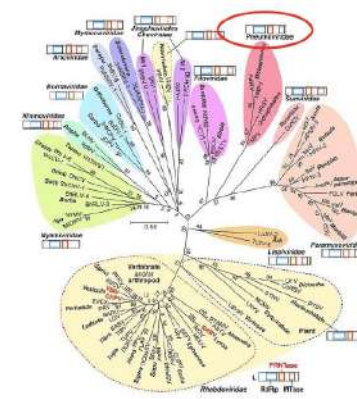
“Live as if you were to die tomorrow. Learn as if you were to live forever.”

Mahatma Gandhi

aMPV history

- 1979-80 in South Africa turkey - TRT
- 1980-as Europe, Near East- SHS
- 1986-88 Virus description – pneumovirus - ART
- 1990-es Live vaccines, in South America
- Recognition of subgroups A and B - APV
- 1996 C subtype in USA (turkey)
- C subtype in France (duck)
- 1986 D isolation (turkey) later determination (~ 1990)
- 1998 Virus classified into Metapneumovirus genus (Pringle, 1998) and grouped into four subtype (A, B, C & D) based on nucleotide sequence differences - aMPV

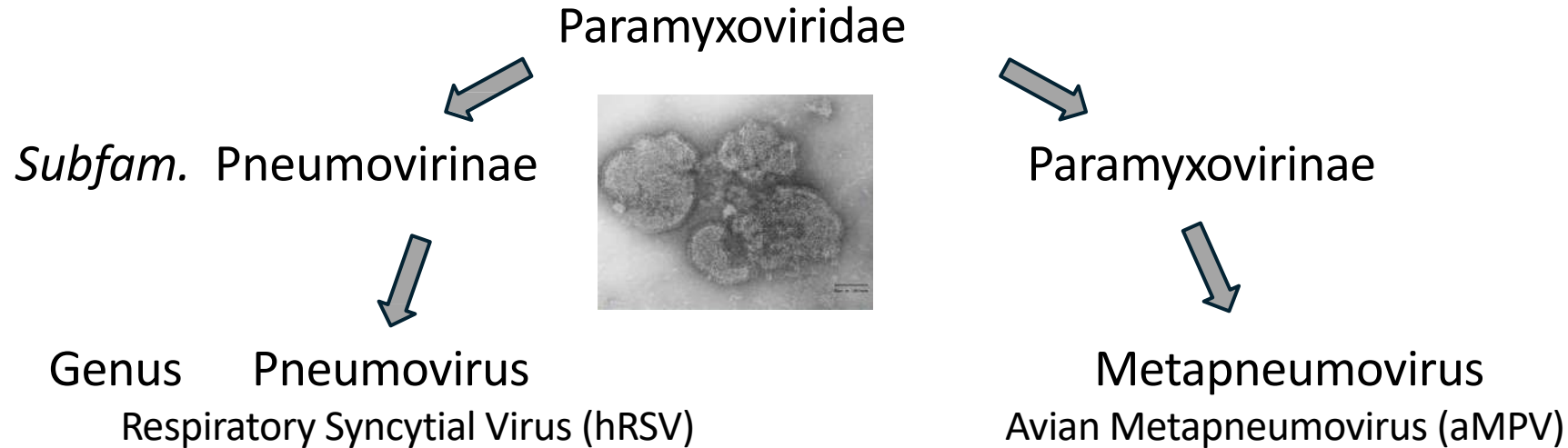
Virus with many names causing clinical symptoms in different species in time from 1979 – till now



- Order Mononegavirales
- Family Pneumoviridae
- Genus Metapneumovirus
- Species Avian Metapneumovirus



Avian Metapneumovirus (aMPV)



3'-N-P-M-F-M2-SH-G-L-5'

**8 genes encode
9 structural proteins**

Group1

Surface glycoprotein - G

Fusion - F

Hydrophobic - SH

Group2

Nucleocapsid protein - N

Phosphoprotein - P

RNA polymerase - L

Group3

Matrix - M, M1 & M2

Enveloped, pleomorphic, -ssRNA

sensitive to disinfectants, lipid solvents, heat,

stable at pH 3-9

G envelop protein

Suitable for sub-group assay

Monitor genetic changes

New variants ?

aMPV disease pathogenesis

Viral drip infection



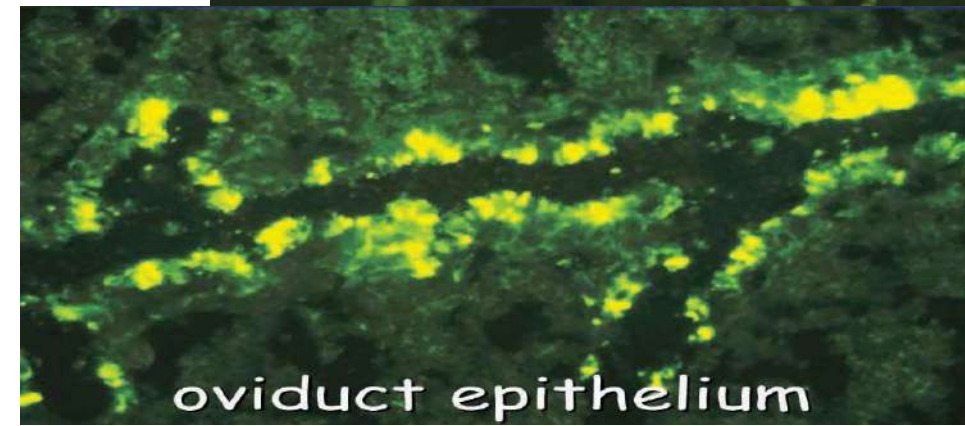
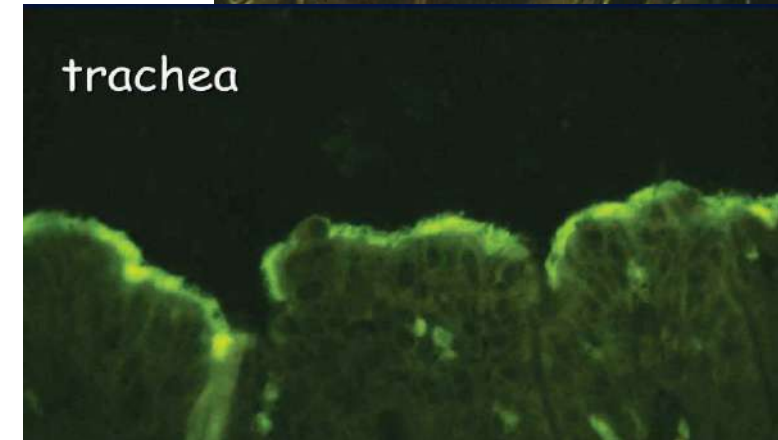
Nasal cavity, trachea (lung?) mucosa (ciliostasis)



Bloodstream



Oviduct (virus multiplication 7-10 days)



General clinical picture

Young animals

Respiratory disease

lacrimation, nasal discharge, cough, sneezing, sinusitis

some case no clinical symptoms

co-infection complication – E. coli, MG, ORT and others – mortality

Parent stock

respiratory symptoms,

oviduct damage egg production dropping,

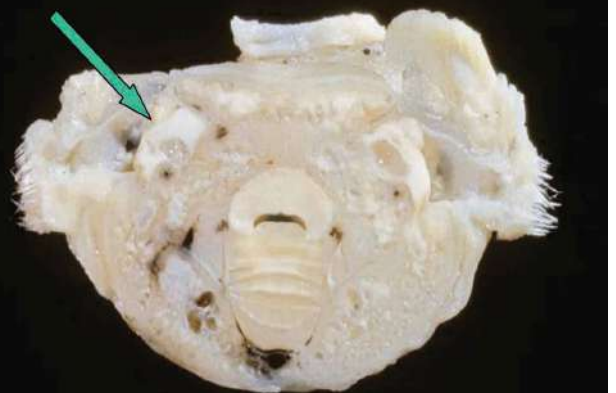
egg quality - eggshell issues, peritonitis

hatchability and DO quality issues

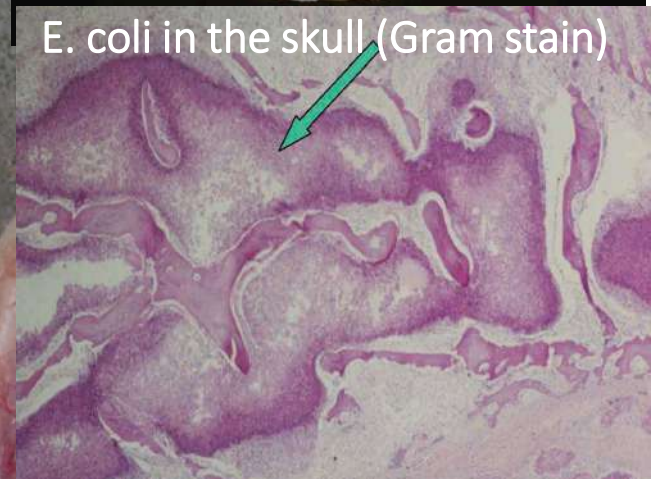




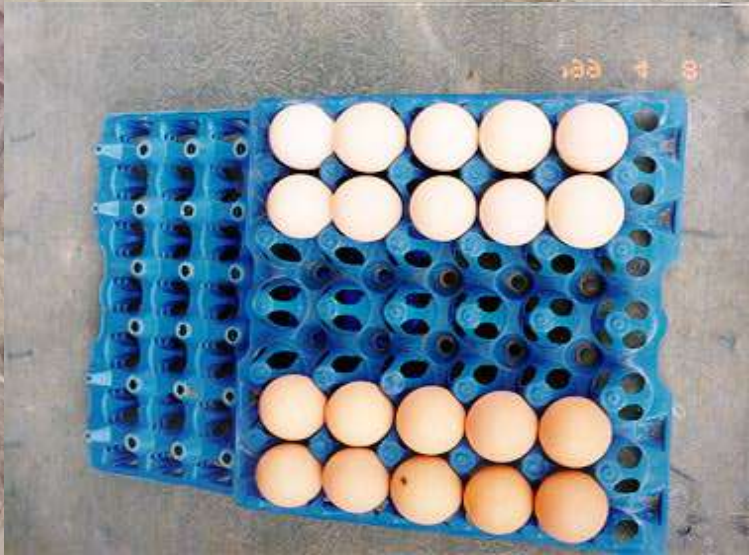
Purulent in the skull



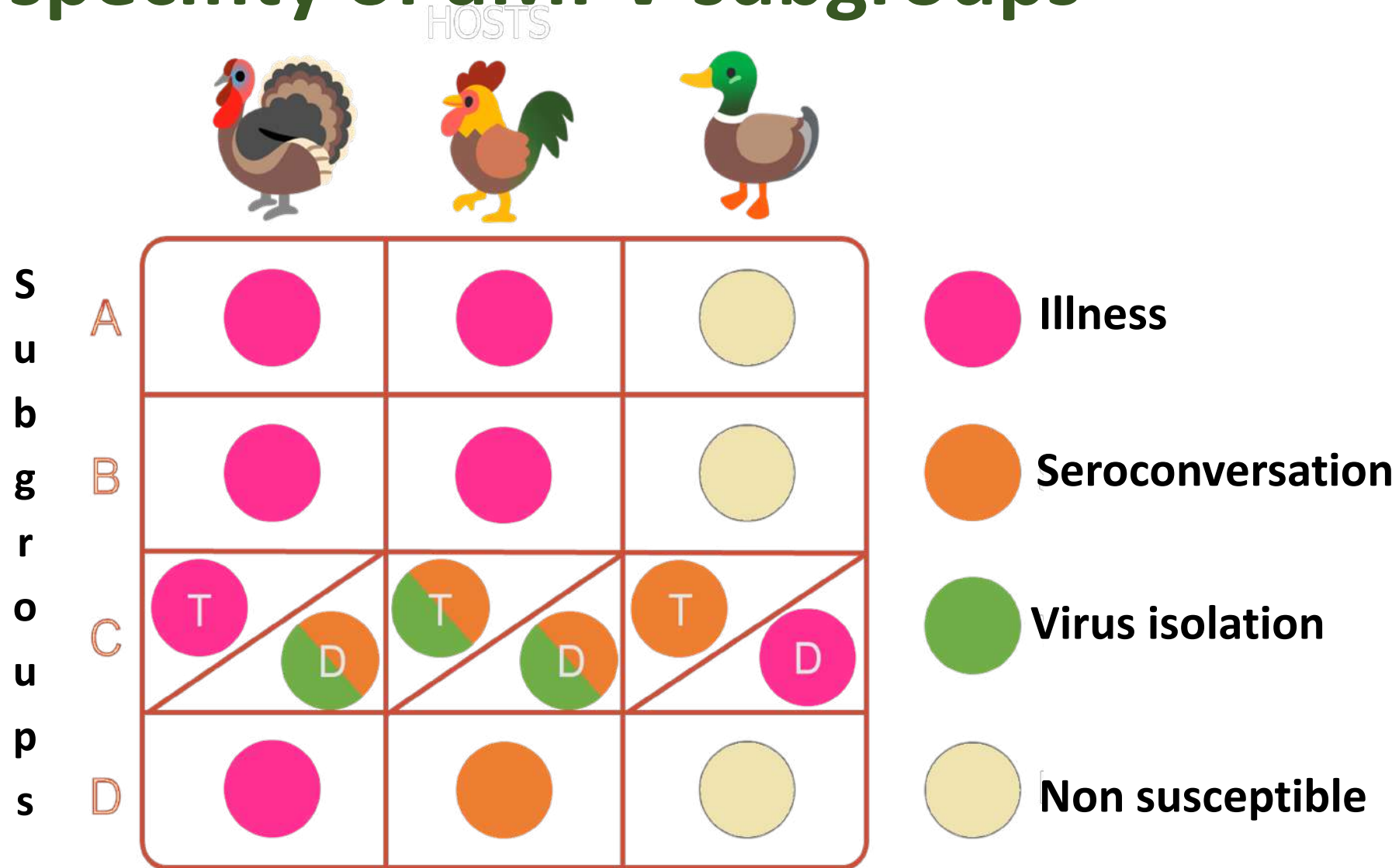
E. coli in the skull (Gram stain)



PS



Host specificity of aMPV subgroups

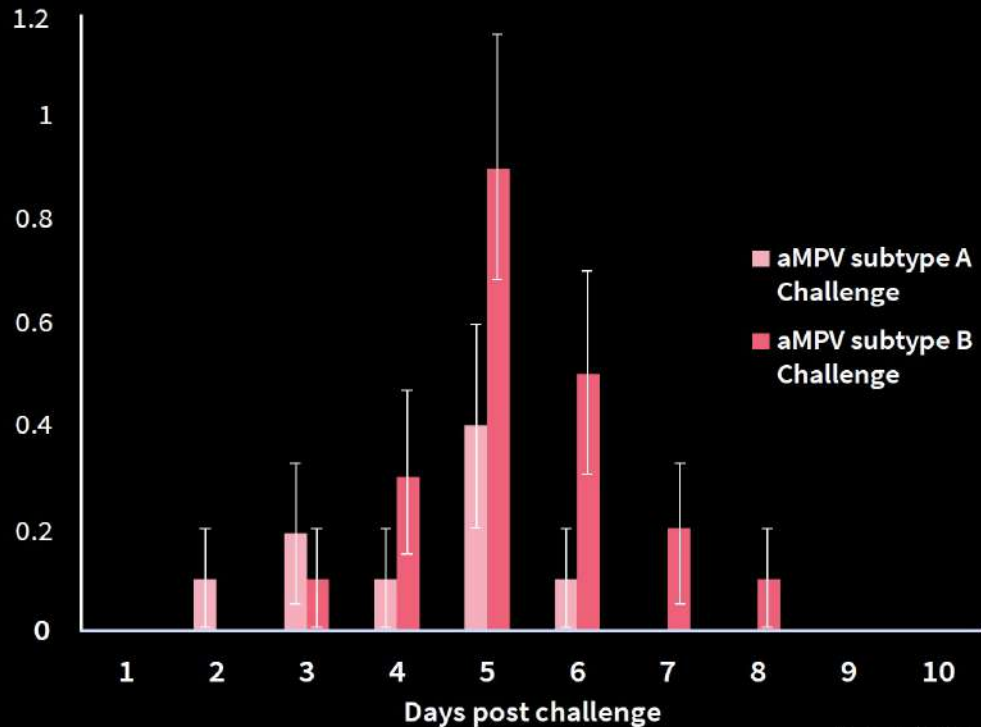


Recently two unclassified subtypes identified
 Monk parakeet & Great black gull

Brown, P. A., Allée, C., Courtyllon, C., Szerman, N., Lemaitre, E., Toquin, D., & Eterradossi, N. (2019). Host specificity of avian metapneumoviruses. *Avian Pathology*, 48(4), 311-318.

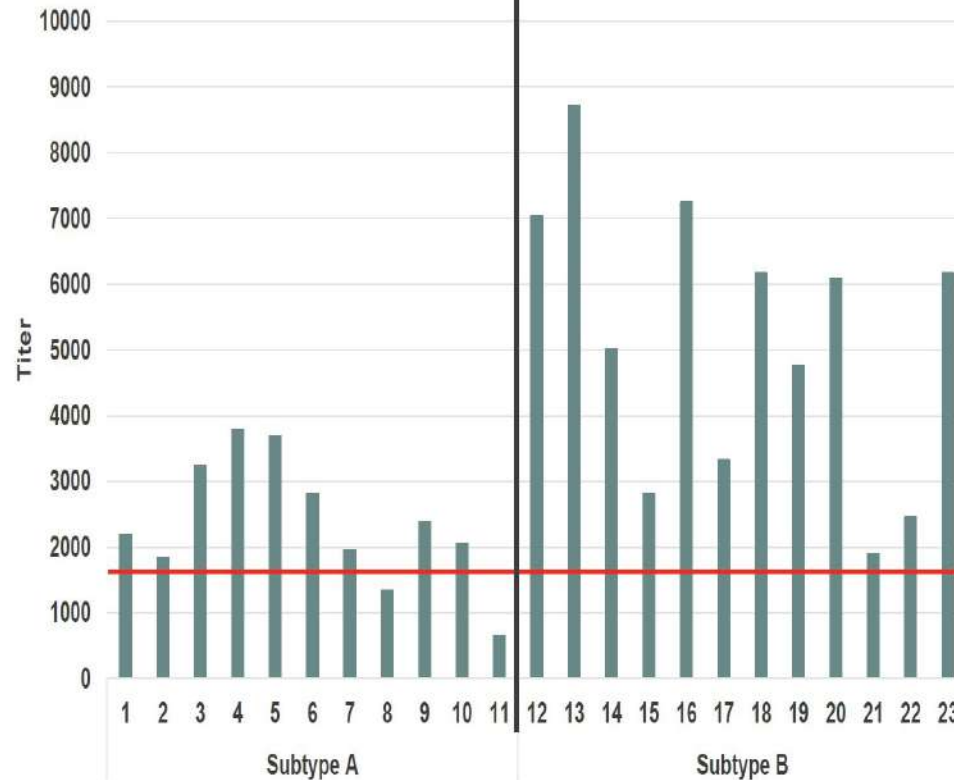
aMPV subtype A & B clinical scores & titres

Average score
(10 birds)



Ball et al. 2022

Sensitivity
aMPV Titers - Live Vaccination

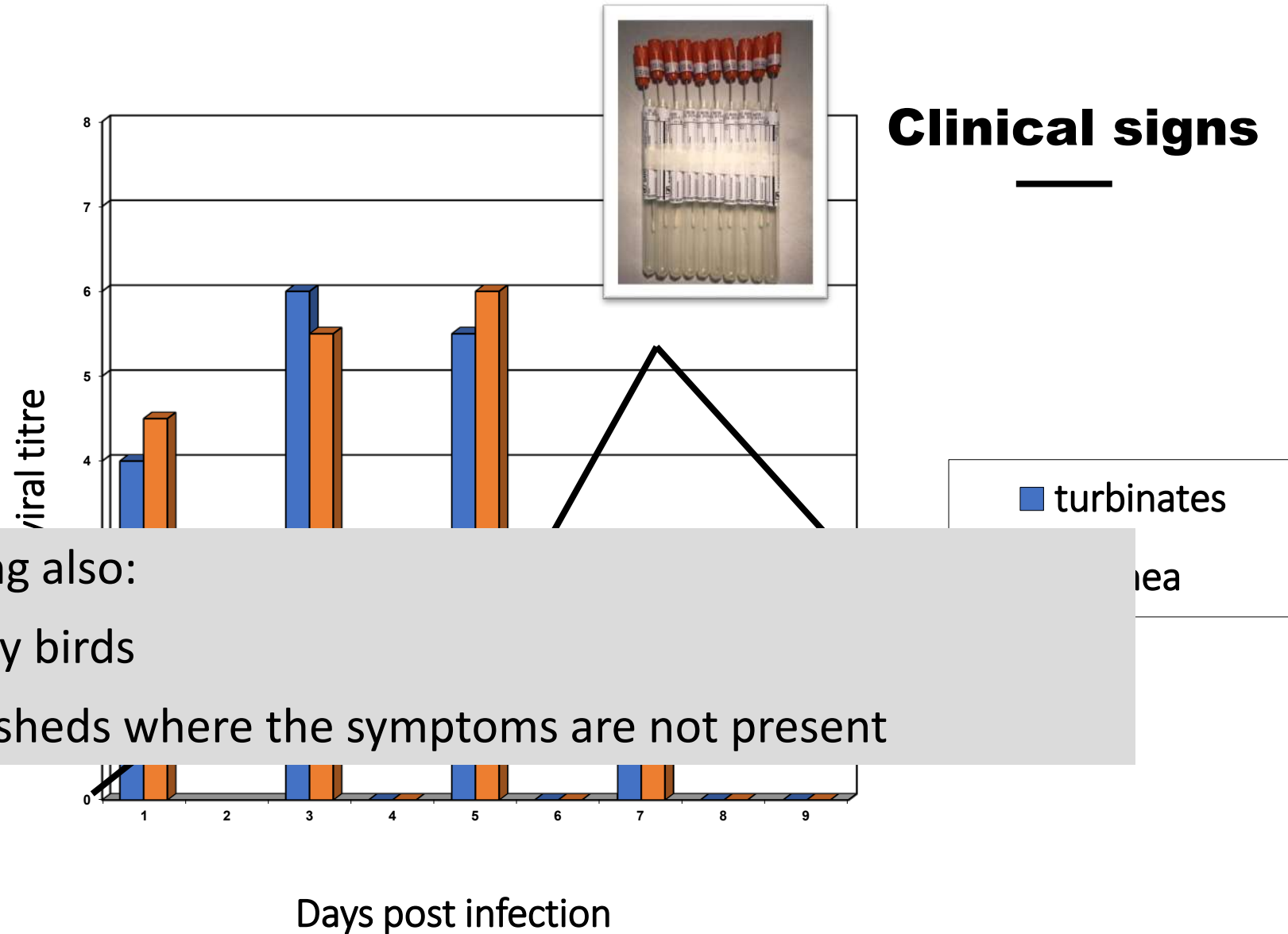


Vaccination trial

- Chickens → 2 groups
- One group vaccinated with a live A vaccine (1-11), the other group with a live B vaccine (12-23)
- Samples collected 14 days post-vaccination
- Antibodies can be detected 14 days post-vaccination

Diagnosis - PCR

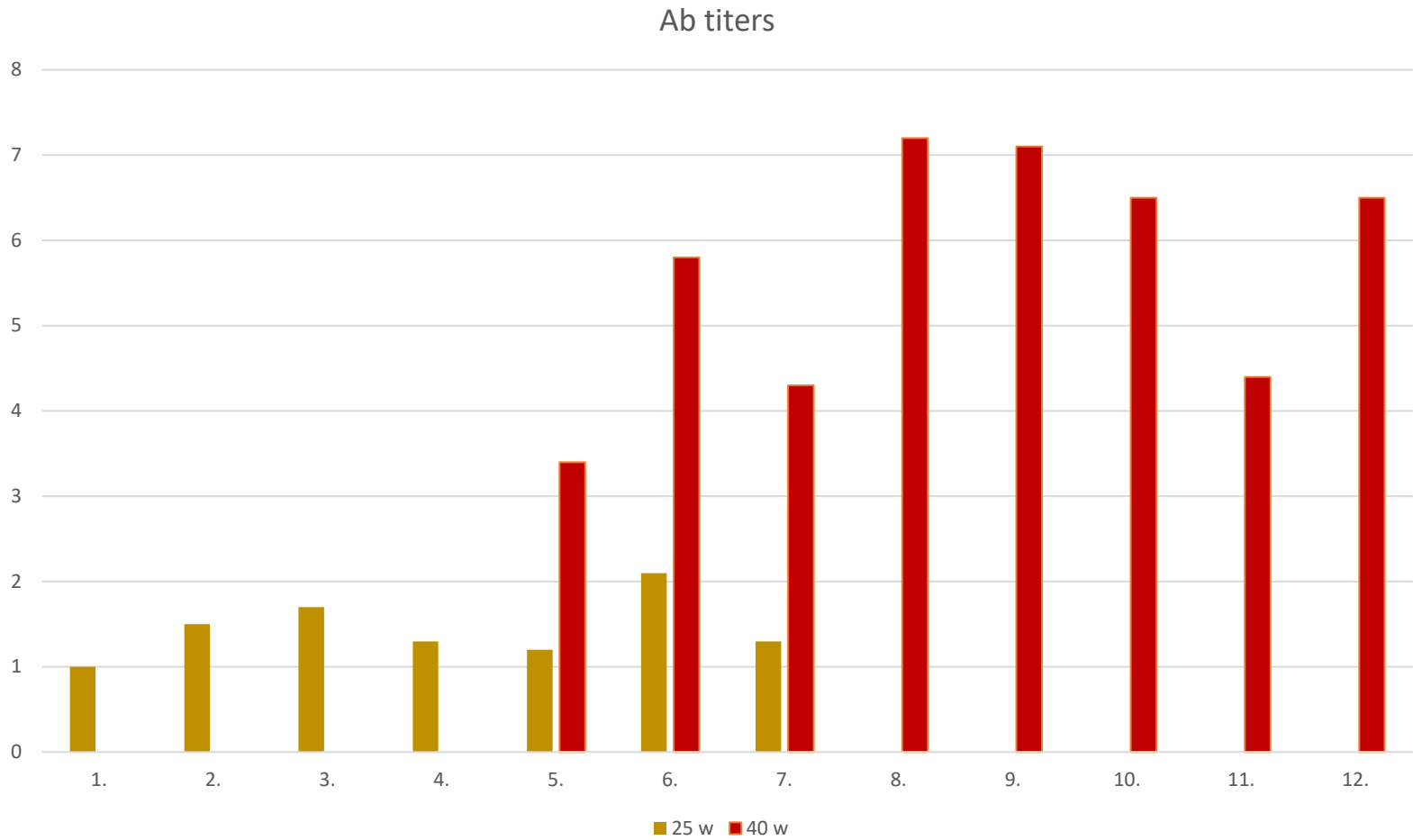
aMPV viral titres in
turbinates
and trachea
&
score of clinical signs



Sampling also:
- healthy birds
- other sheds where the symptoms are not present

Diagnosis - serology

Mean titers:	30 737
Min-Max titer:	8139-52733
GMT:	27961
CV%:	31



Neg. for Mg, IBV including IB80

PCR for aMPV negative at 36 weeks

ELISA for types A and B and C

Protection against aMPV Vaccination

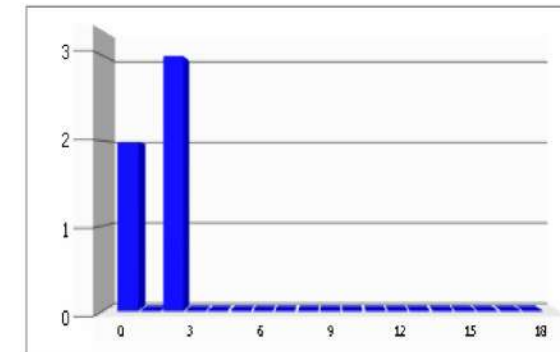
Live vaccines

- Attenuált - A és B subtype (*MDA not provide protection*)
spray or dw during rearing
and recently during production live vaccine in dw

The local immunity playing important protection (IgA and lesser extent Ig G - virus neutralizing)

- Killed vaccines
before production, but only after live vaccination, monovalent or combined vaccines

House number : 3
Reason :



Assay:	ART	Lot number:	FS9211
Bleeding date:	11/07/2023	Test date:	04/08/2023
Mean Titer:	2061	No. Samples:	5
Min-Max Titer:	1159 - 2828	Neg/Sus/Pos:	2/0/3
GMT:	1942		
%CV:	36		
Target Titer:	-		
Target %CV:			
VI Index:	57		
Target Range VI:			
Interpretation VI:			

Titer Range Ref.Controls	CR100 (RF19) (3000-6500), CR300 (RS10) (600-2400)
Meantiter Ref.Controls	CR100 (RF19) (4055) CR300 (RS10) (2284)

A and B vaccines provide some protection against C subtype infection

Problems of the live aMPV vaccines

Due to poor vaccinations

- Wild virus cause disease
- Vaccine virus can revert virulence*
 - In trial animal-to-animal passage (4-10x animal), the vaccine virus revert virulence * (both A & B)
 - there is a much greater possibility of passage in a farm condition
- Immunity after vaccination is effective, even if the measurable immune response (antibody) is low

**Every birds should receives a full dose of the vaccine
on the same time**

Duck aMPV(?) Case study

- Appearance of a new viral disease in Hungary



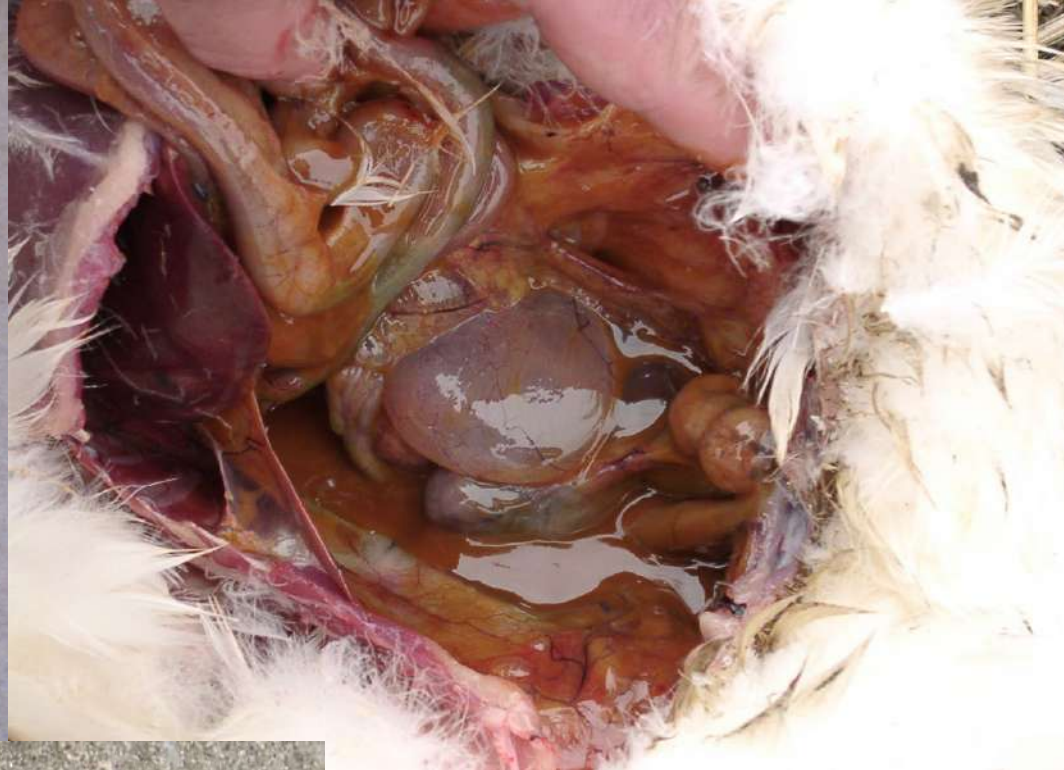
- Mild respiratory symptoms in young ducks, (runny nose, tearing, sneezing for 3-6 days)
 - Quickly recovery under good conditions
 - Poor housing conditions (overcrowding, muddy runway, etc.), adverse feeding conditions (toxin) develop complications

Duck aMPV(?) Case study

Decreased egg production & hatchability, deterioration of eggshell quality and occurrence of weaker DO ducks

- The egg production dropping were different by flocks (10-30%)
- Eggshell strength decreases (from normal 1-2% to 2-5%)
- Hatchability decreased by 5-6%- due to the early and late embryo deaths
- DO ducklings first week mortality increased (doubles)

The mortality of the females is increasing - without classical clinical symptoms




Hatchability and DO quality issues

Duck aMPV (?) Case study

Vaccination trial in duck PS

18 days Aviffa RTI
42 days Nemovac
60 days Nemovac
160 days Killed ND+IB+EDS+ART



<i>Flocks</i>	<i>Trial*</i>	<i>Control</i>
<i>Number of birds</i>	♀ 2100 ♂ 449	♀ 3810 ♂ 914
♀ <i>mortality % (4 months)</i>	5.6 %	11,2 %
<i>Egg production/hh</i>	89,26	60.08
<i>DO ducklings/hh</i>	60,38	33,28
<i>Deformed eggs</i>	3,1 %	5,2 %
<i>Hatchability %</i>	69,4 %	58 %

*The two flocks were on the same farm, management and feeding conditions

Duck aMPV (?) Case study

Production parameters of the ducklings originated from the trial

<i>Flocks</i>	<i>Trial*</i>	<i>Control</i>
<i>Number of placement DO</i>	<i>172 050</i>	<i>96 380</i>
<i>Mortality till 10 days</i>	<i>1 899; 1,1%</i>	<i>3841; 3,9%</i>
<i>Mortality till 50 days</i>	<i>8 944; 5,1%</i>	<i>7 954; 8,2%</i>
<i>Average weight (kg)</i>	<i>3,16</i>	<i>3,08</i>
<i>FCR (kg/kg)</i>	<i>3,02</i>	<i>3,11</i>
<i>Slaughterhouse rating (%)</i>	<i>91,2</i>	<i>90,8</i>

Conclusions

The vaccination against the diagnostically unspecified viral disease was effective

aMPV in broiler breeder PS case study

aMPV PS case study

Case study history

- Rearing farm (8 sheds) - placement ~ 53 000 DO Ross308 birds
- Vaccination against aMPV at 10 weeks with Poulvac TRT, by Ulvavac
- Moving at 19 w ~ 44 823 ♀ & 4 509 ♂
- Vaccination with killed vaccine (RT, ND, IBD,IBV) at moving
- Production farm has 5 sheds





aMPV PS case study

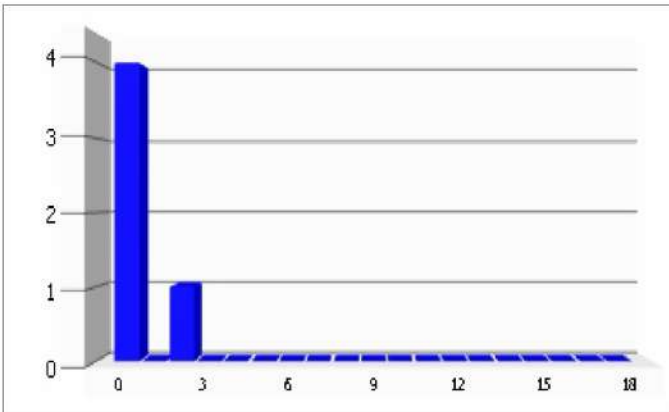
- 25 w 50% production
- 28 w ~ 90% production
- 30 w aMPV clinical symptoms (mortality till this age 1,72 % ♀ & 8,1 % ♂)

Disease course

Shed 4 11.07-22.07	239 birds	
Shed 5 16.07-29.07	116	
Shed 2 17.07-30.07	197	Egg production dropping 10-20%
Shed 1 21.07-31.07	184	
Shed 3 22.07-01.08	148	
Total losses	884 birds ~ 2%	

aMPV PS case study

House number : 5
Reason :



Assay:	ART	Lot number:	FS9211
Bleeding date:	11/07/2023	Test date:	04/08/2023
Mean Titer:	1457	No. Samples:	5
Min-Max Titer:	927 - 2169	Neg/Sus/Pos:	4/0/1
GMT:	1400		
%CV:	32		
Target Titer:	-		
Target %CV:			
VI Index:	45		
Target Range VI:			
Interpretation VI:			

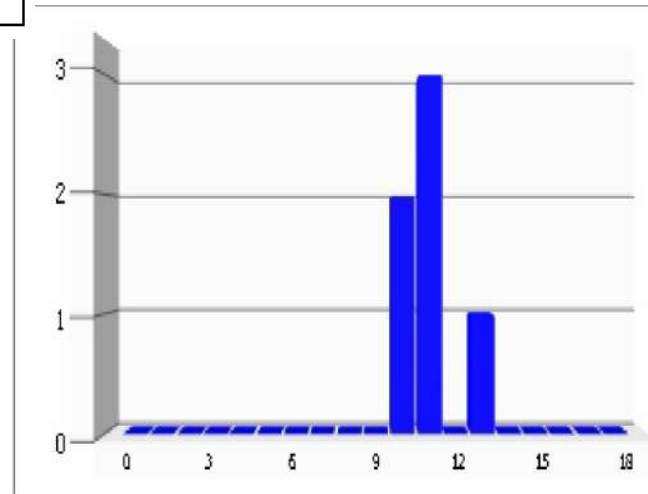
Shed 5
blood sampling on 11.07

Titer Range Ref.Controls	CR100 (RF19) (3000-6500), CR300 (RS10) (600-2400)
Meantiter Ref.Controls	CR100 (RF19) (4055) CR300 (RS10) (2284)

Clinical symptoms, disease 16.07-29.07

Shed 5
blood sampling on 31.07

House number : 5
Reason :

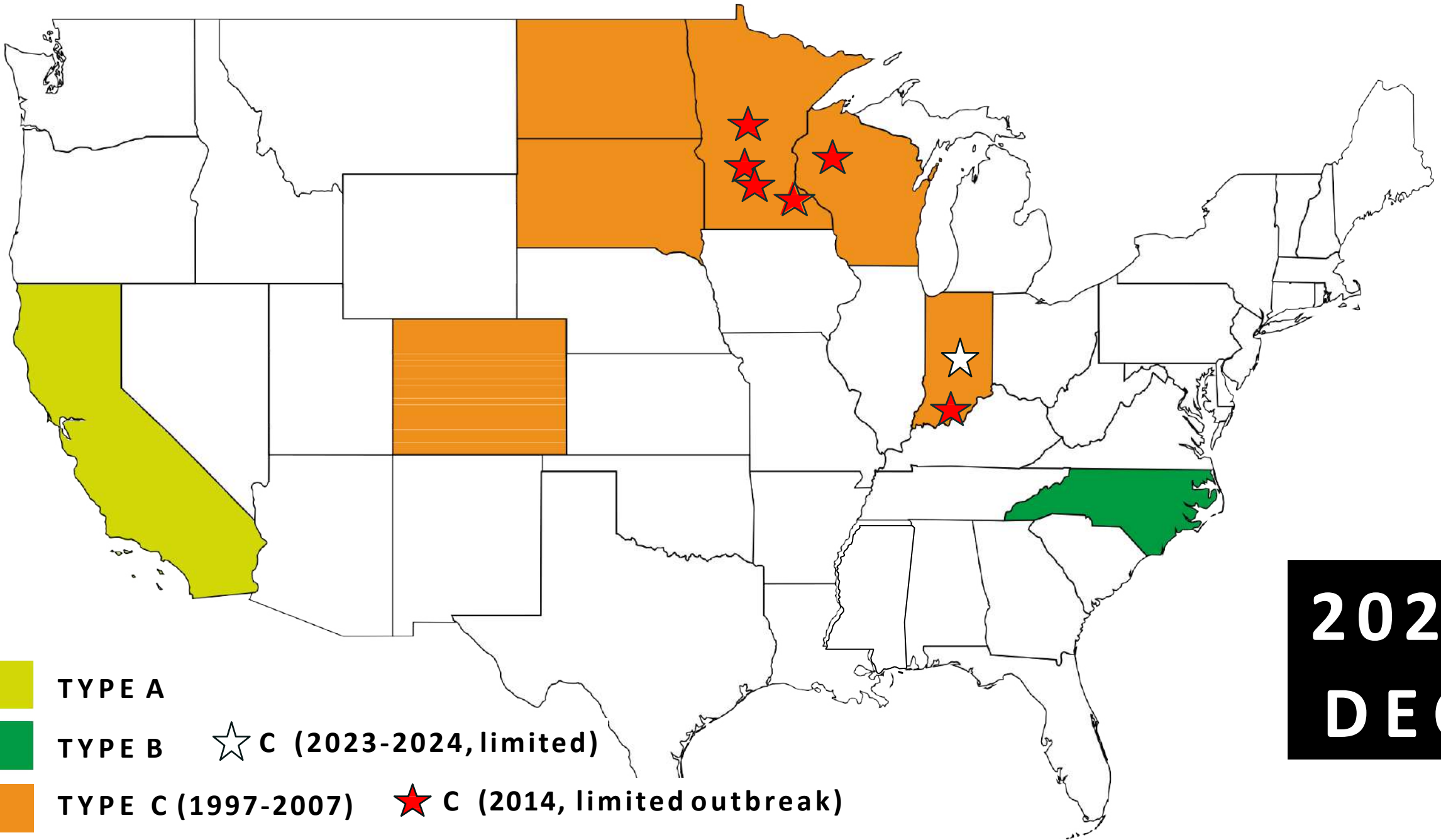







Assay:	ART	Lot number:	FS9211
Bleeding date:	31/07/2023	Test date:	04/08/2023
Mean Titer:	18796	No. Samples:	6
Min-Max Titer:	16212 - 24192	Neg/Sus/Pos:	0/0/6
GMT:	18629		
%CV:	15		
Target Titer:	-		
Target %CV:			
VI Index:	1253		
Target Range VI:			
Interpretation VI:			

Titer Range Ref.Controls	CR100 (RF19) (3000-6500), CR300 (RS10) (600-2400)
Meantiter Ref.Controls	CR100 (RF19) (4061) CR300 (RS10) (2192)

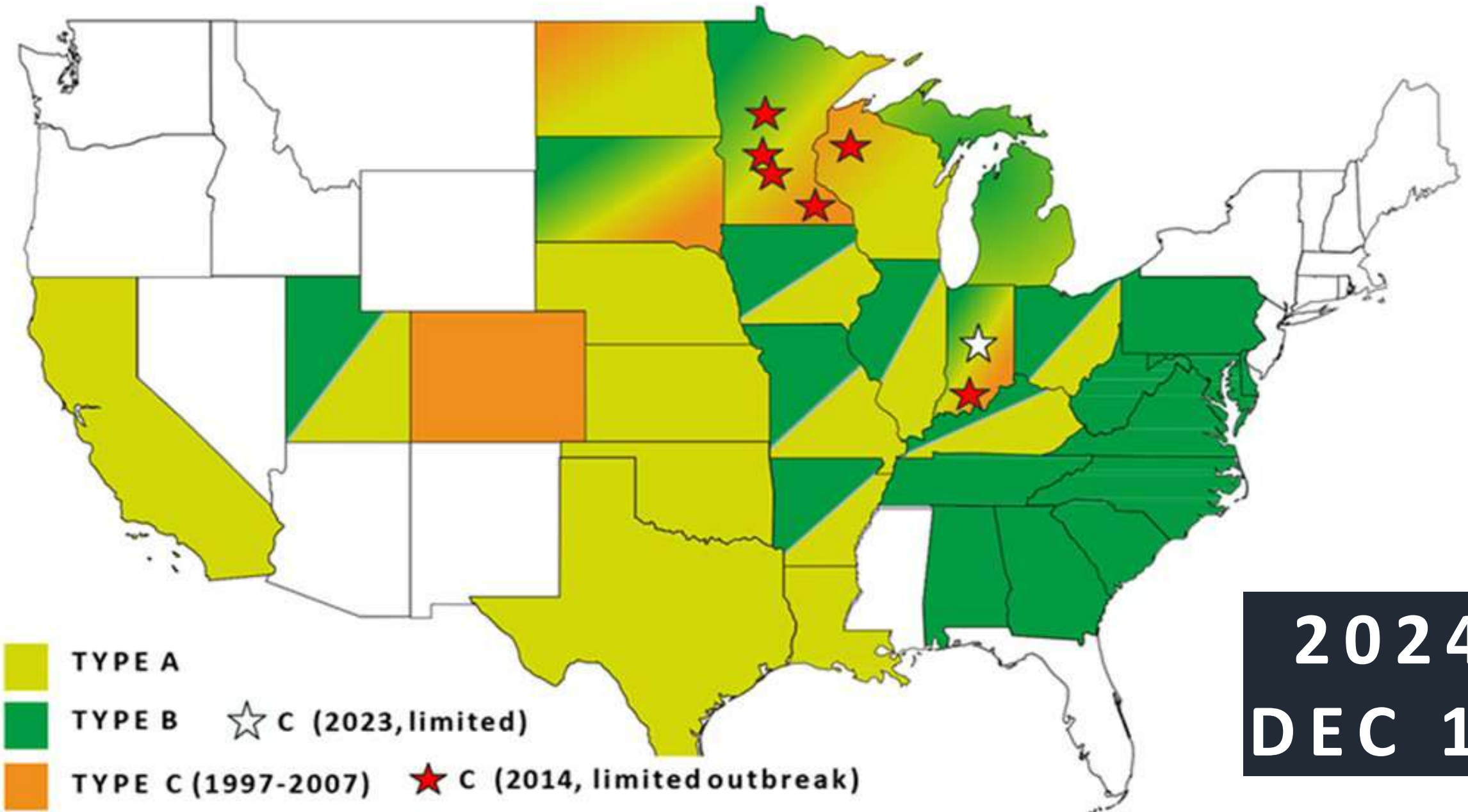
aMPV experiences in US

With the help of publicatio
of Prof. Holly Sellers University of Georgia
&
Dan Domingo Vaxxinova US



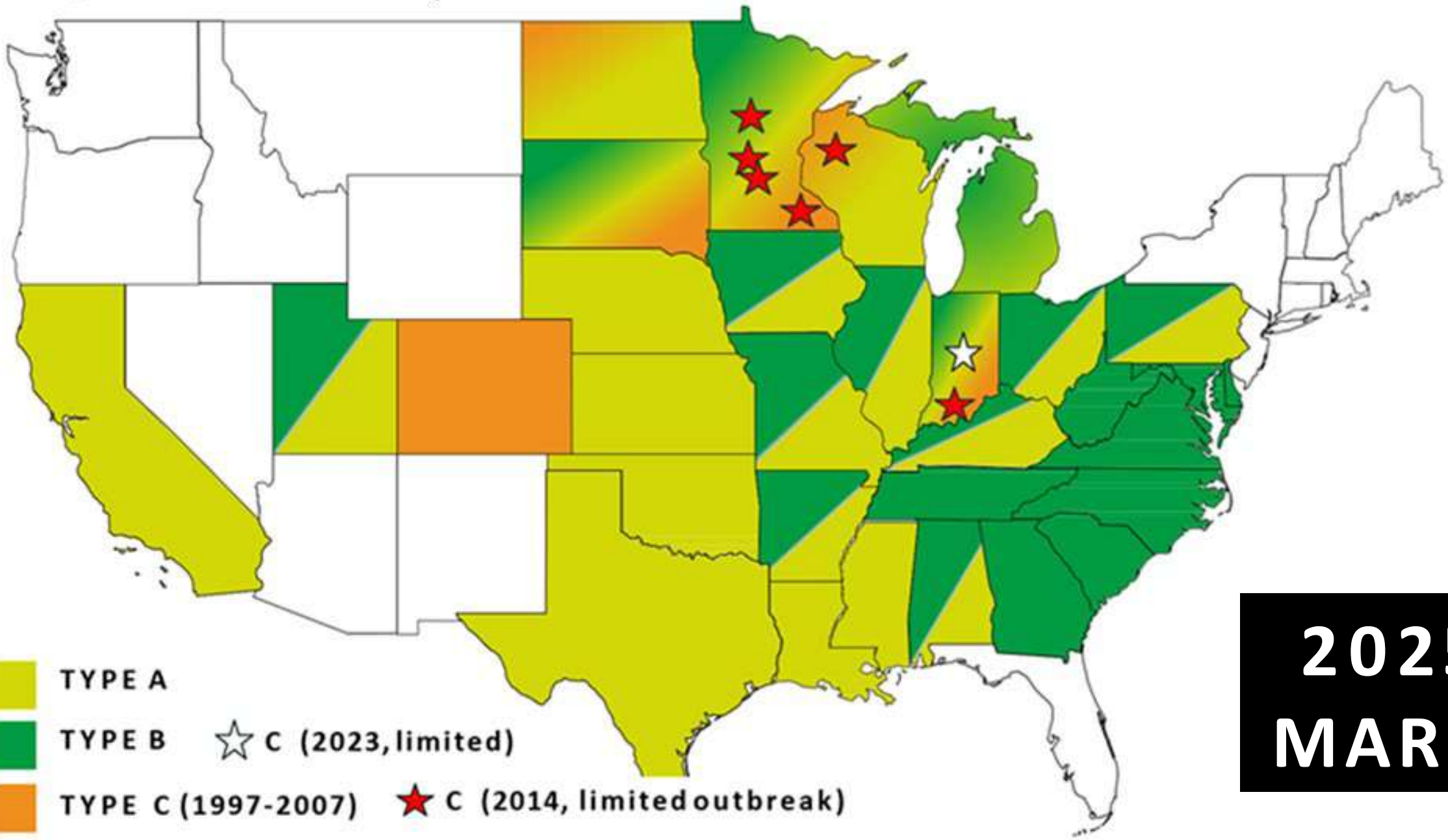
 TYPE A
 TYPE B  C (2023-2024, limited)
 TYPE C (1997-2007)  C (2014, limited outbreak)

2023
DEC



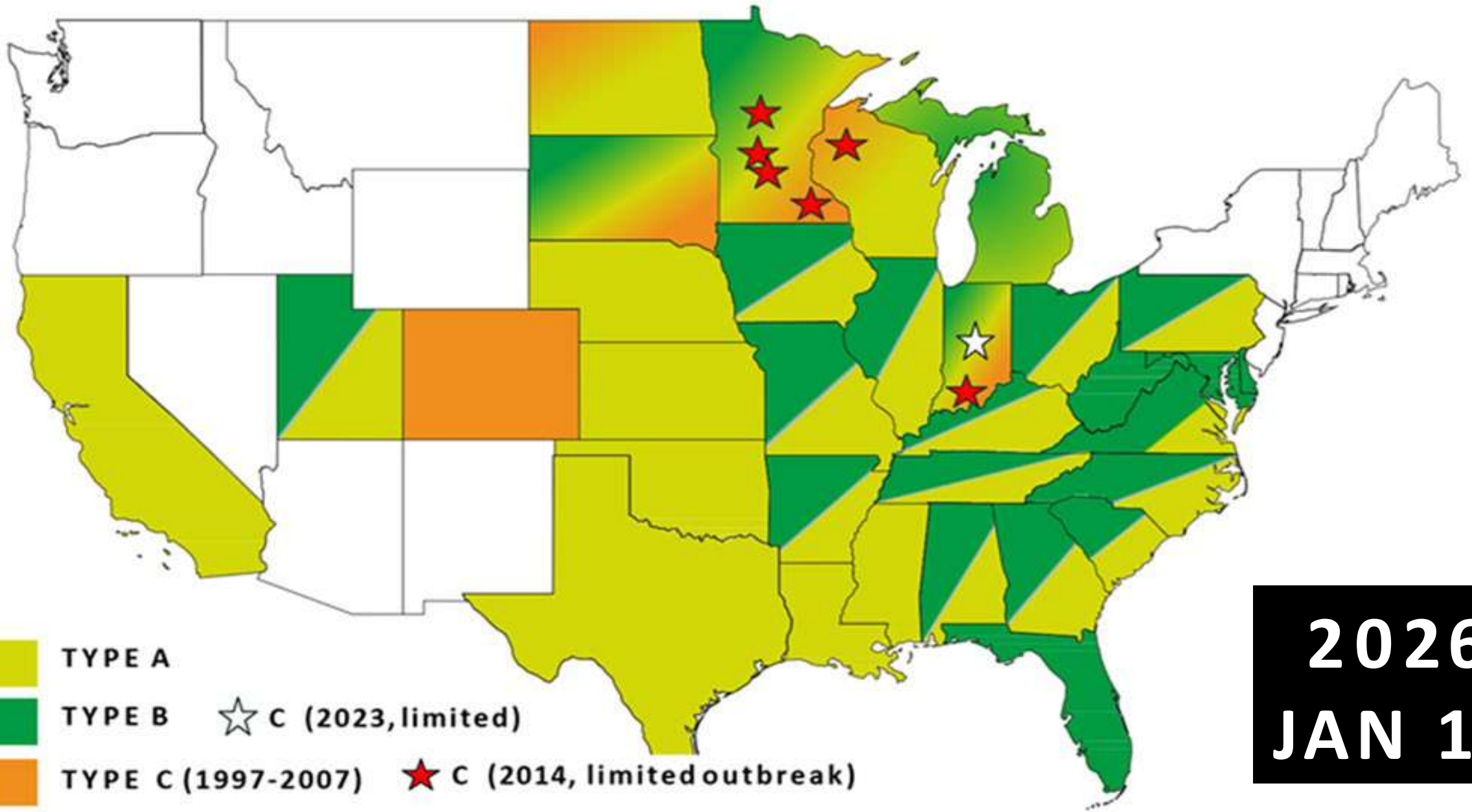
TYPE A
TYPE B ☆ C (2023, limited)
TYPE C (1997-2007) ★ C (2014, limited outbreak)

2024
DEC 19



TYPE A
TYPE B ☆ C (2023, limited)
TYPE C (1997-2007) ★ C (2014, limited outbreak)

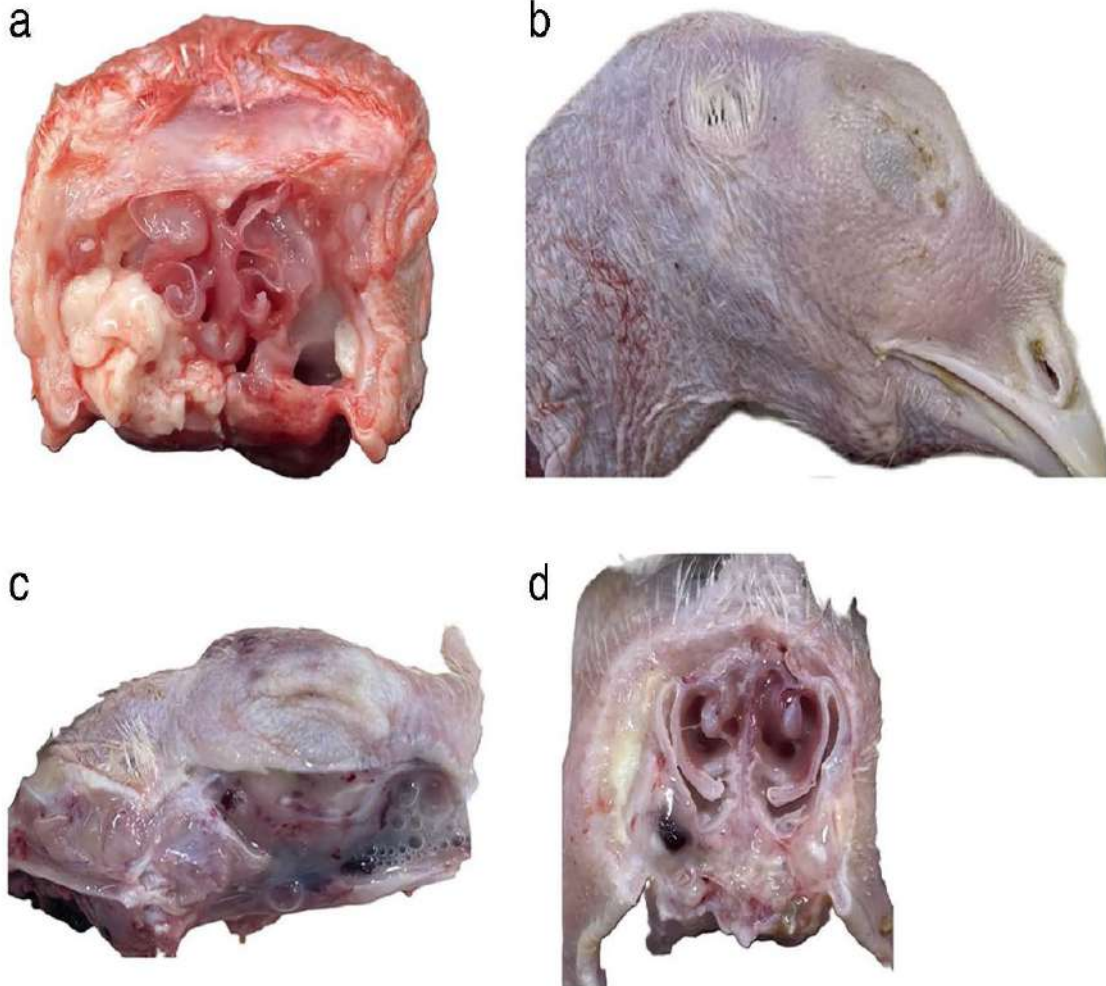
2025
MAR 5



**2026
JAN 16**

Gross lesions of aMPV-A–infected turkeys

Pathogenicity of North American avian metapneumovirus



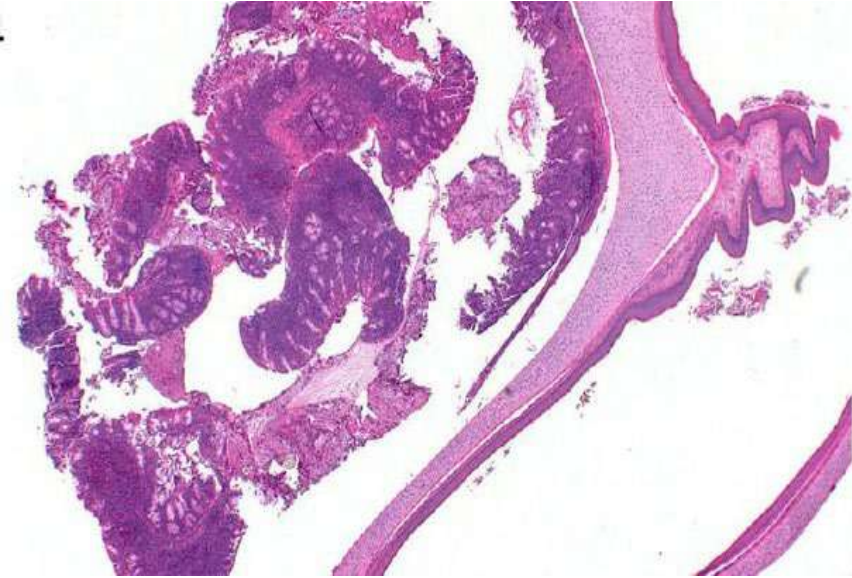
(a) Infraorbital sinuses are full of caseous exudate. There is mucoid exudate in the nasal turbinate (aMPV-A, 3 wks old turkey)

(b) Swollen infraorbital sinus and crusts on the eyelids (aMPV-A, 5 wks old turkey)

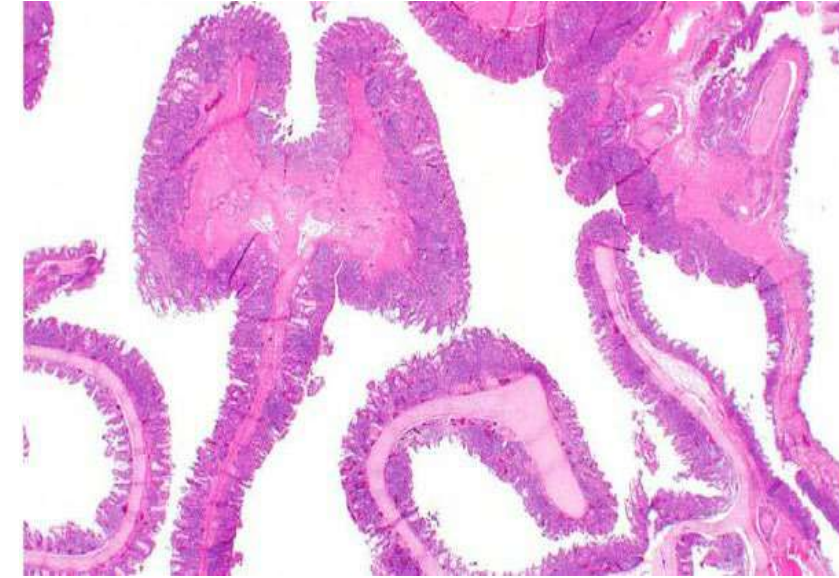
(c) Infraorbital sinus is full of mucoid turbid exudate (aMPV-A, 5 wks old turkey)

(d) Subcutaneous edema and infraorbital sinus contain caseous and bloody exudate. Nasal turbinate contains mucoid turbid exudate (aMPV-A, 9 wks old turkey)

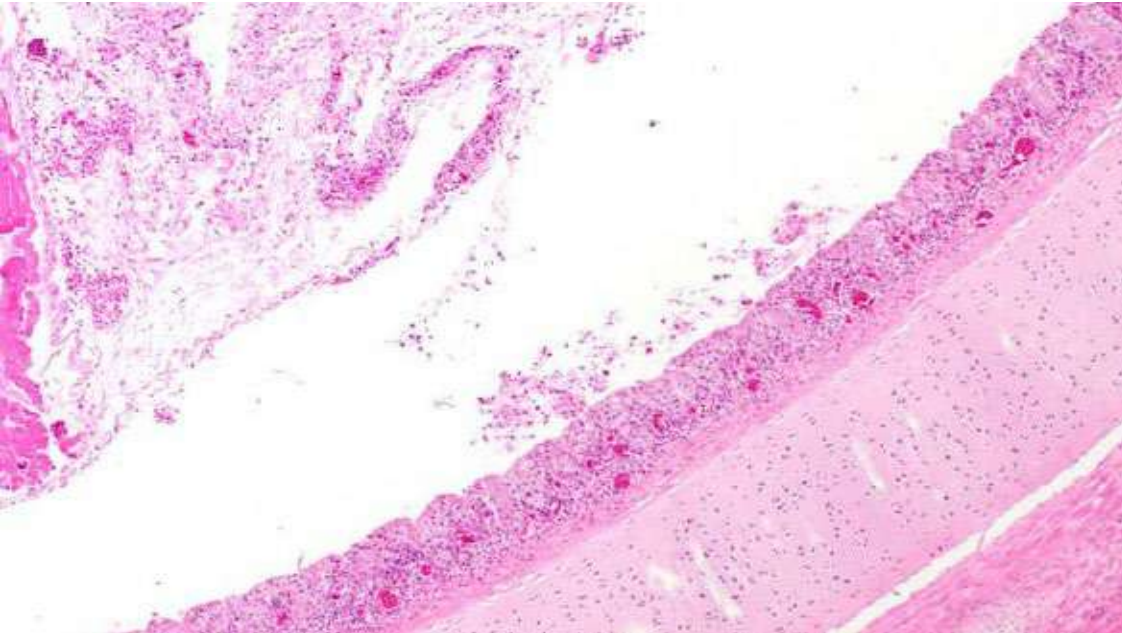
Microscopic lesions of aMPV-B–infected turkeys



Nasal respiratory mucosa with multifocal infiltrations of a large number of lymphocytes



Trachea with mucosal deciliation, hyperplasia, and infiltration of lymphocytes in the submucosa



aMPV experiences in US

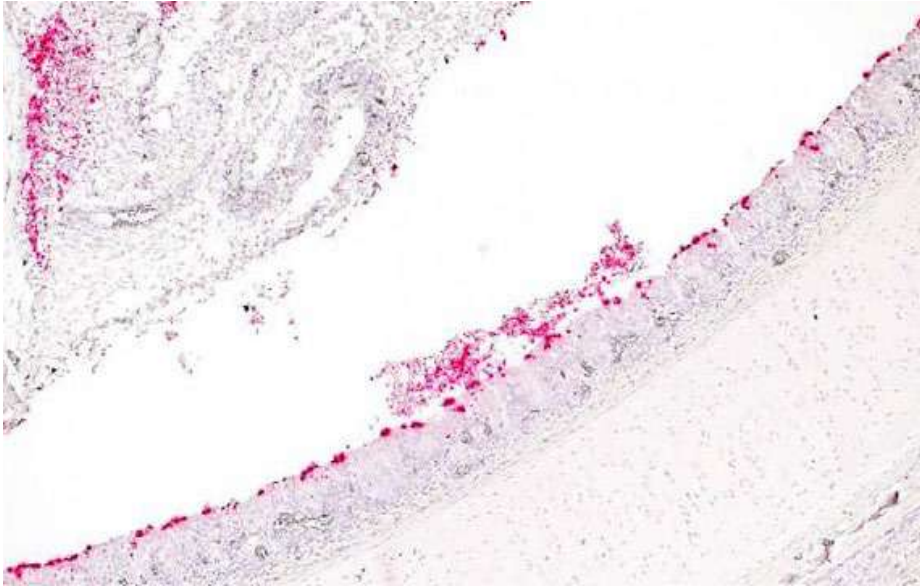
- Subtypes C emerged from 1996
- 2023-2024 subtypes A and B appeared also
- Turkey more susceptible
- Scientific publication's suggest subtype B likely arrived with wild birds (98% identity of EU & Brazilian B strains), while subtype A possible come from Mexico (97-99% identity) – WGSs and G genes based analysis
- Infections of the A & B due to no pre-existing immunity provided by subtype C impacted the birds local defence against secondary pathogens
- In conclusion, North American aMPV-A and -B induced a significant respiratory disease, characterized by increased morbidity and mortality

In situ Hybridization to Study the Pathogenicity of North American Avian Metapneumovirus Subtypes A and B in Turkeys

In-situ hybridization (ISH) molecular tool that localises specific nucleic acid sequences within cells or tissues, ISH probes were designed to target the highly conserved N-gene of aMPV A & B

**Khaled A. et al.
Avian Disease 2025**

The ISH localizing the nucleic acid of aMPV at the cellular level in the respiratory tract



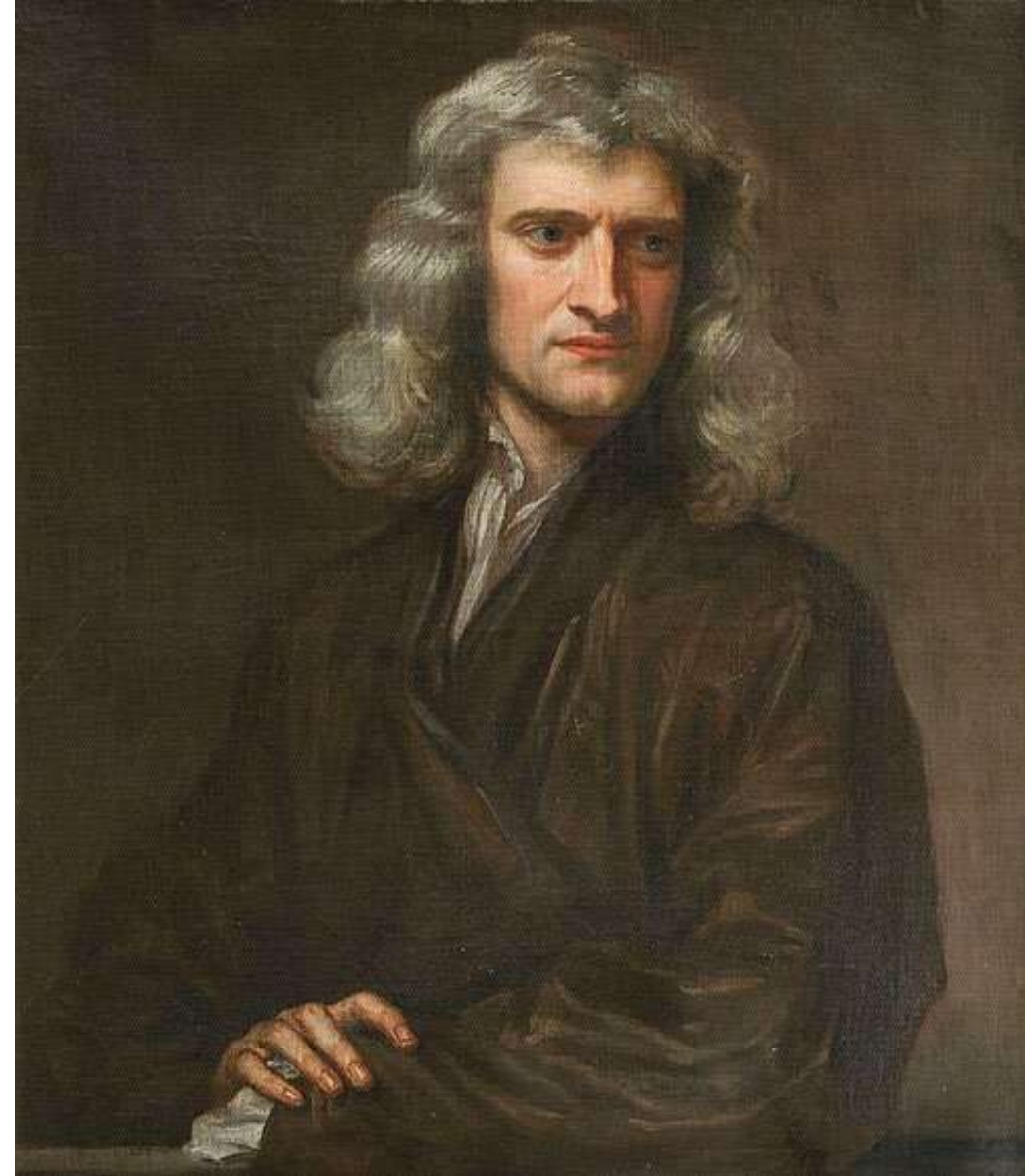
Positive red signal (aMPV-B) in the entire tracheal mucosa and in the lumen



Nasal sinus mucosa showing positive brown signal for RNA scope targeting the N gene of aMPV-A subgroup

ISH could detect the viral distribution, using the assay in future experimental research will help visualize the distribution of viral tissue at different stages of infection essential for pathogenicity and vaccine studies

**What we know
is a drop,
what we don't know
is an ocean**



Issac Newton (1643-1727)
physicist, matemathician – polymath



Thanks !