

Avian influenza, why a One Health approach?

Cornelia Adlhoch, ECDC

EFSA summer school, 9 June 2020

What is influenza?

Type

Influenza virus types: A, B, C and D

NP and M1 genes determine the virus type

Subtype

Surface antigens

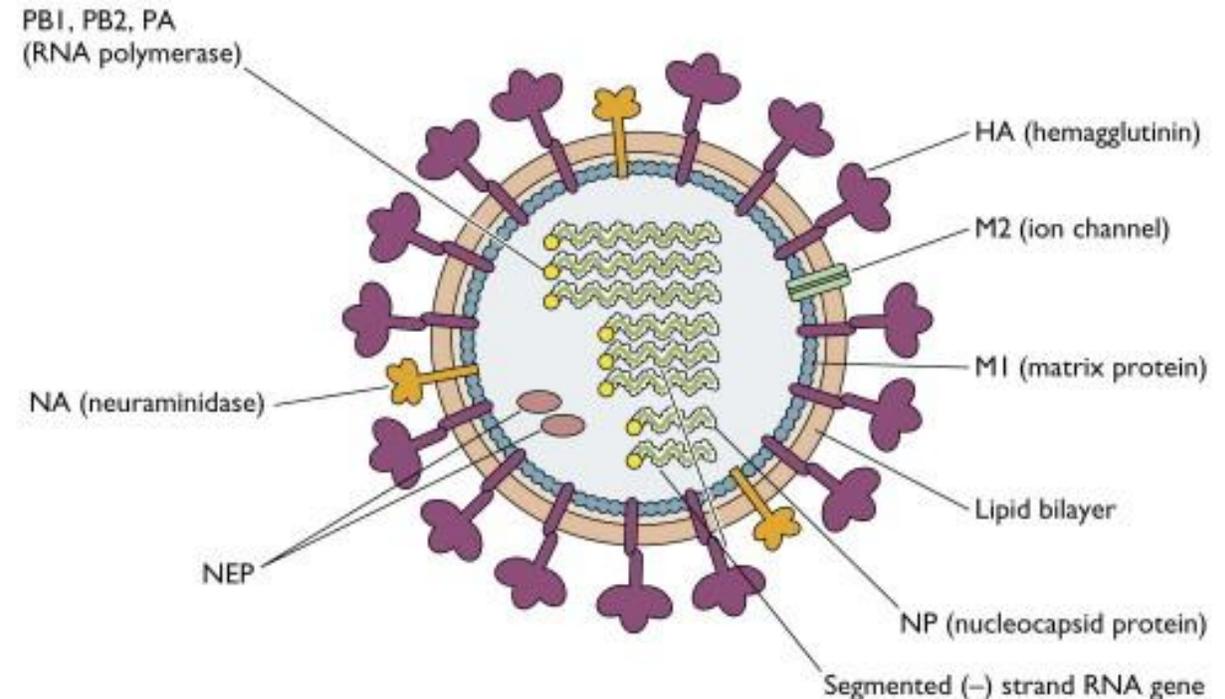
hemagglutinin (HA) and **neuraminidase (NA)**
determine subtype of influenza A viruses:

18 HA (HA1 to HA18)

11 NA (NA1 to NA11)

E.g., virus with HA7 & NA9 --> A(H7N9)

-> 11 HA and 9 NA in viruses from birds



Why we need to monitor avian influenza viruses?



- Impact animal health and decrease production of egg and meat

Low pathogenic (LPAI) strains cause few or no clinical signs in poultry, and may go undetected due to the lack of symptoms in some species of birds.

- Cause wild bird die off and large outbreaks in poultry farms, high impact on different production sectors

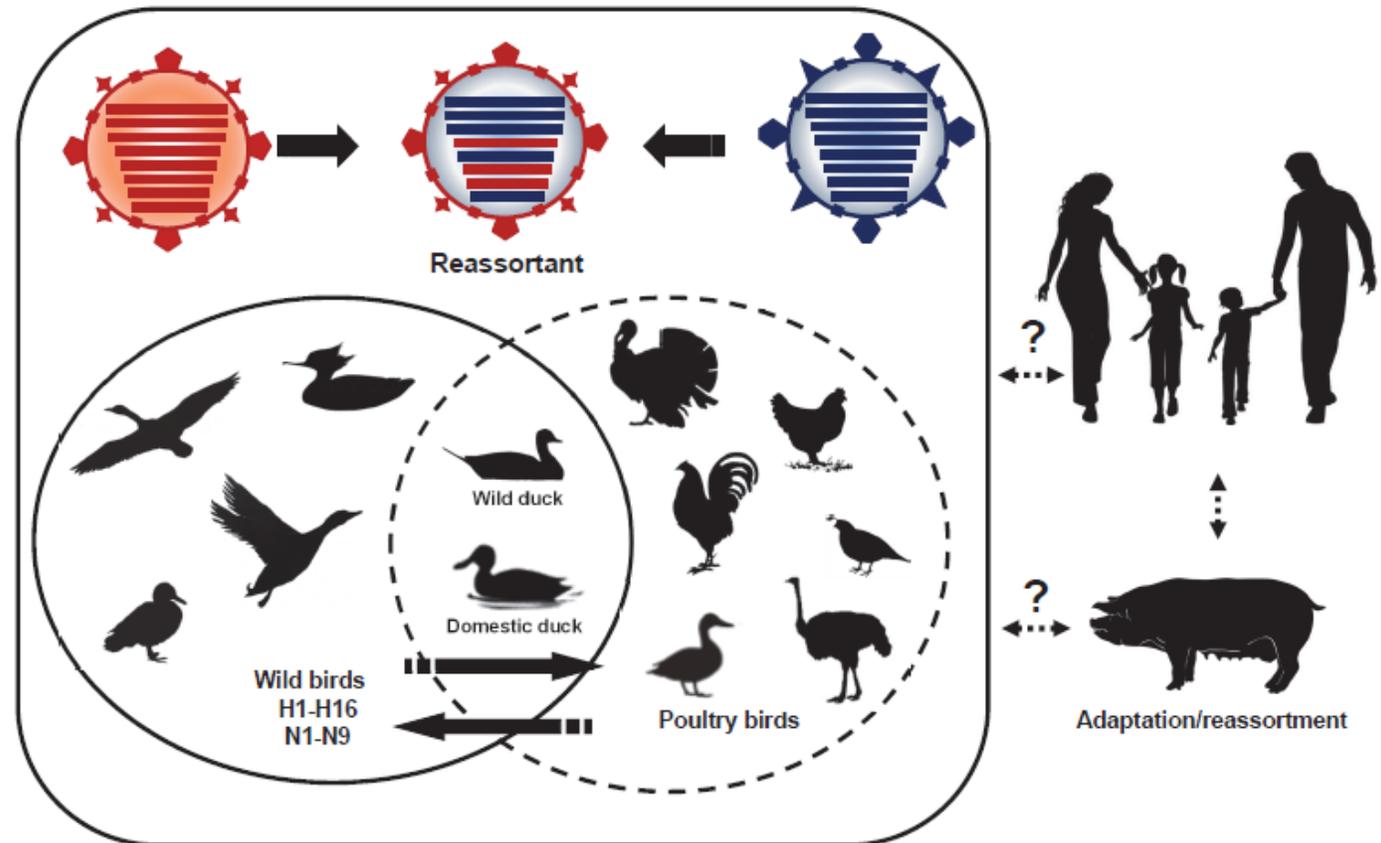
Highly pathogenic (HPAI) strains are highly infectious for several bird species, including poultry and cause severe clinical signs with potentially high mortality rates among poultry.

- Zoonotic transmission causing severe human infections
- Pandemic potential

Evolution of influenza viruses

Genetic or antigenic drift:
Mutations within the genome

Antigenic shift:
Reassortment, exchange of
viral segments

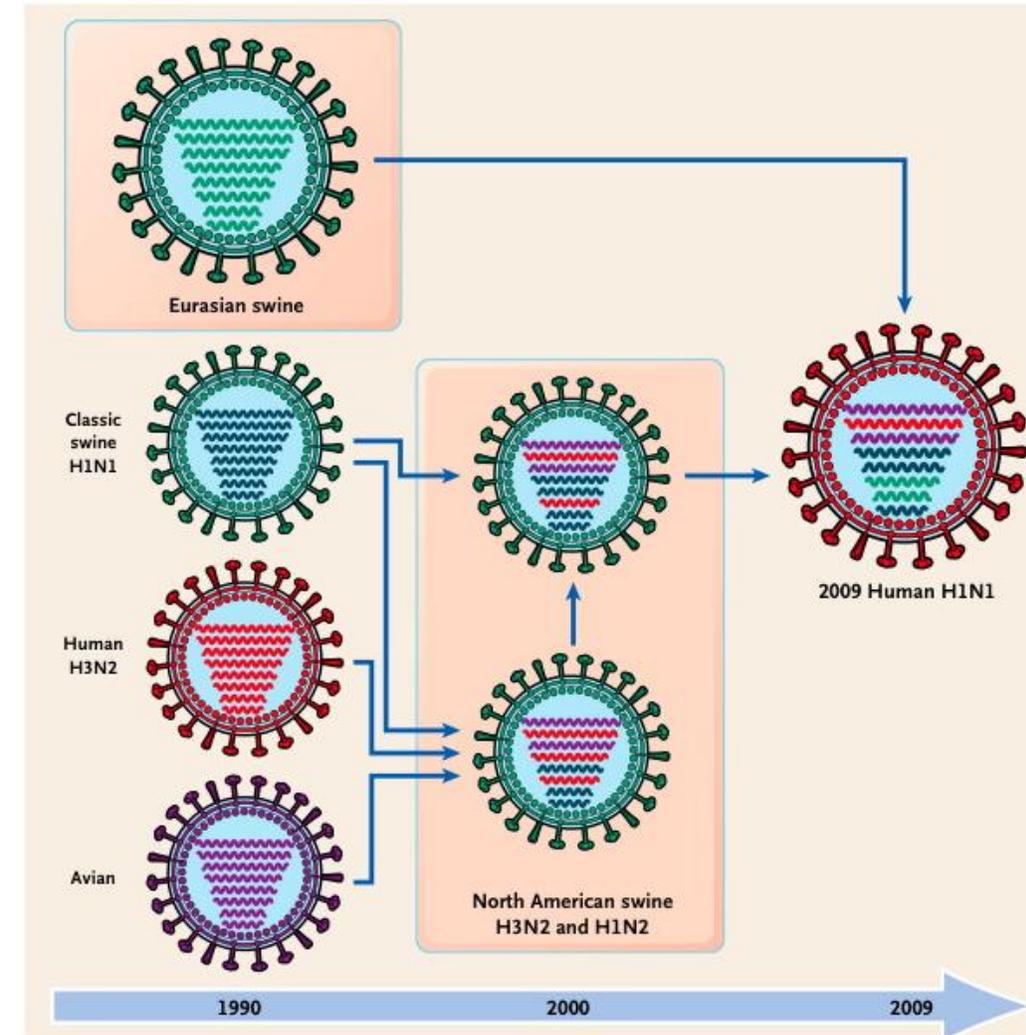


Pandemic risk of influenza viruses

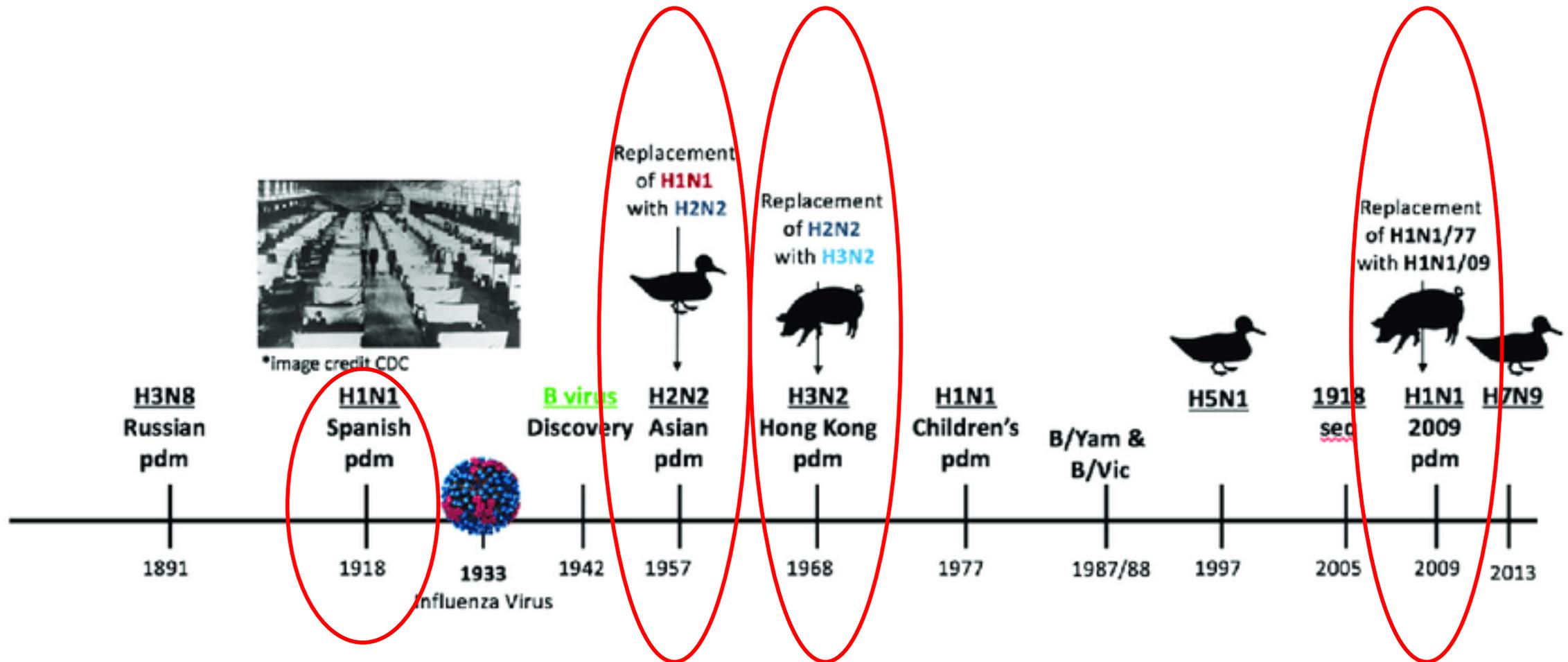
Reassortment between different viruses of the same type, but from different species

Pandemic 2009:

avian, human and swine reassorted virus
A(H1N1)pdm09

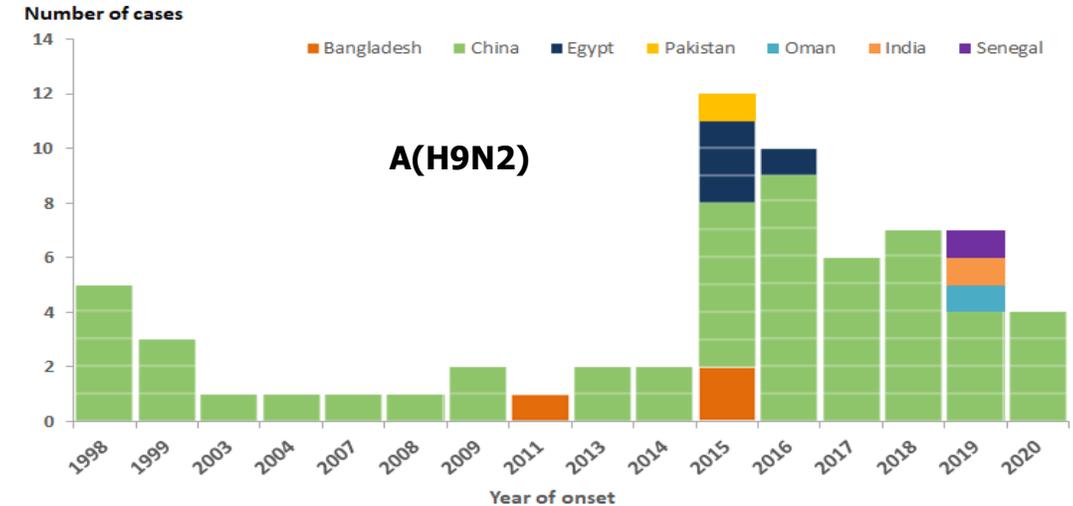


History of reassorted viruses and pandemics



Overview on avian influenza viruses in humans

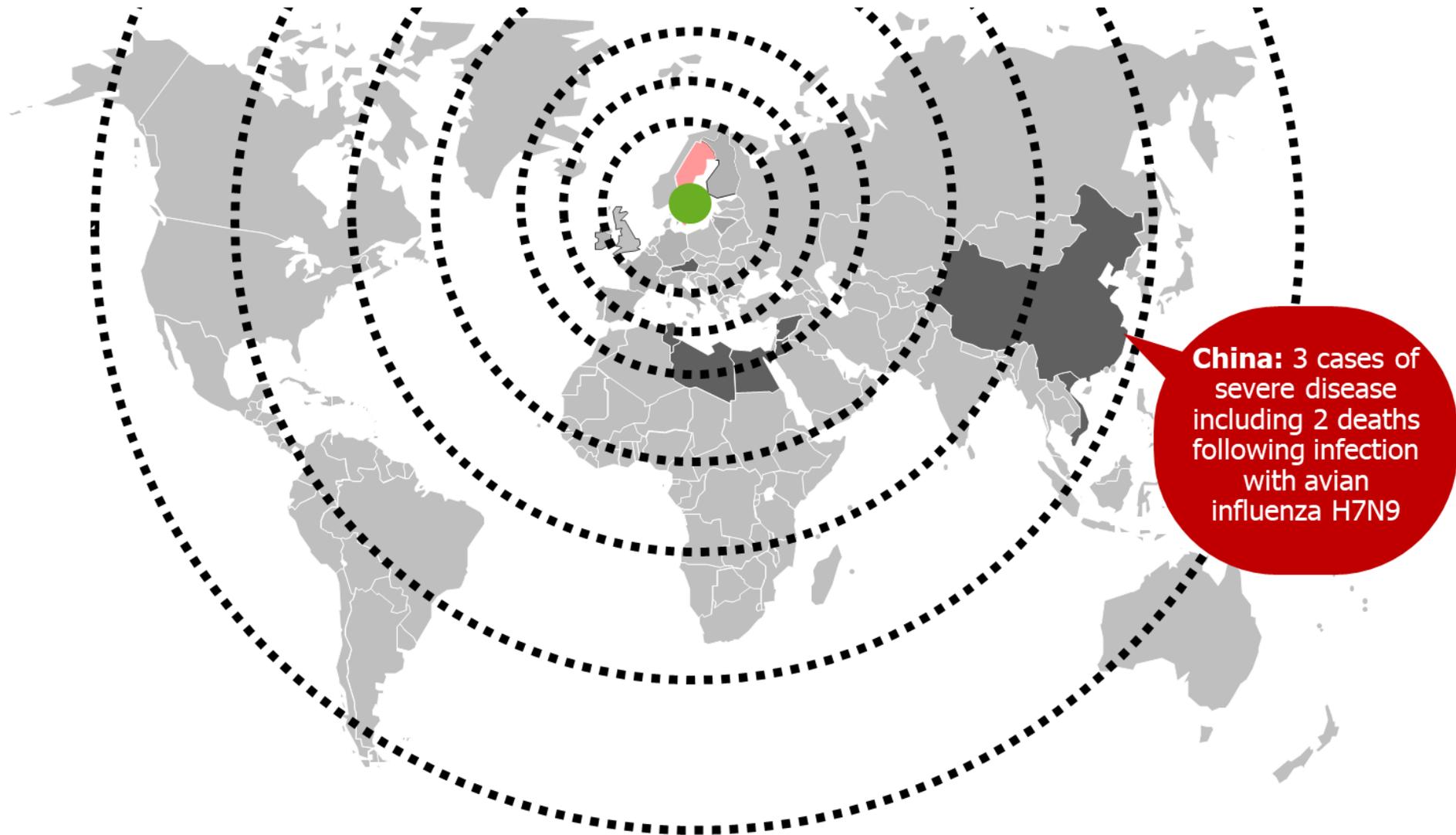
- **A(H5N1) – 861 cases incl. 455 deaths**
- **A(H5N6) – 25 cases incl. 15 deaths**
- A(H6N1) – one case
- A(H6N2) – one case
- A(H7N2) – <10 cases
- A(H7N3) – one case
- A(H7N4) – one case
- **A(H7N7) – 89 confirmed but likely >1000 cases*, 1 death**
- **A(H7N9) – 1 568 cases incl. 615 deaths**
- A(H9N2) – 65 cases
- A(H10N7) – two cases
- A(H10N8) – three cases



* Bosman A, Meijer A, Koopmans M (6 January 2005). "Final analysis of Netherlands avian influenza outbreaks reveals much higher levels of transmission to humans than previously thought". *Eurosurveillance*. **10** (12): 2616. Retrieved 25 May 2015

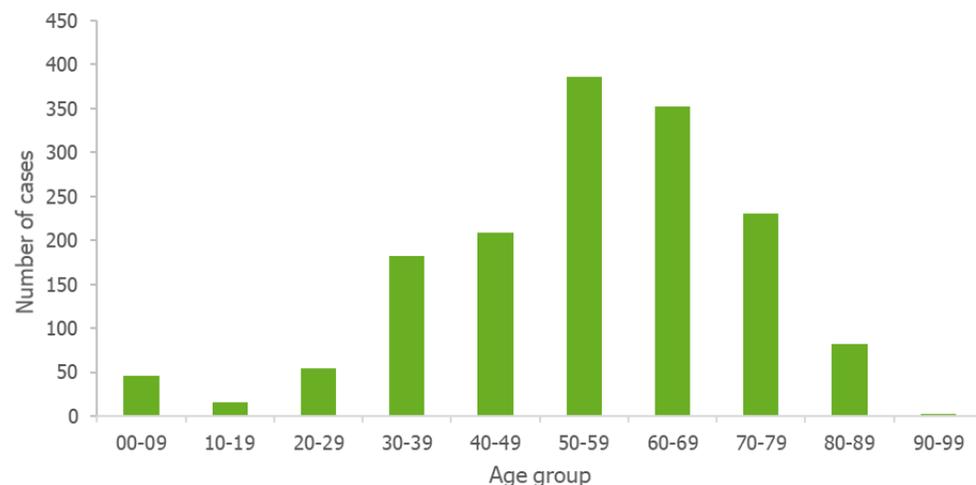
ECDC epidemic intelligence

Sunday, 31 March 2013



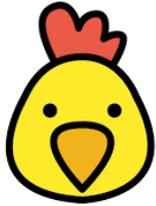
Number of reported cases and fatalities due to A(H7N9) infection

- **1 568** human A(H7N9) cases since March 2013, incl. **615** deaths (CFR 36%)
- Latest case in **March 2019**
- 36 cases due to highly pathogenic avian influenza A(H7N9)
- All cases reported as infected in China, including two travel-related cases from Canada (2015) and one case from Malaysia (2014)
- No sustained human-to-human transmission

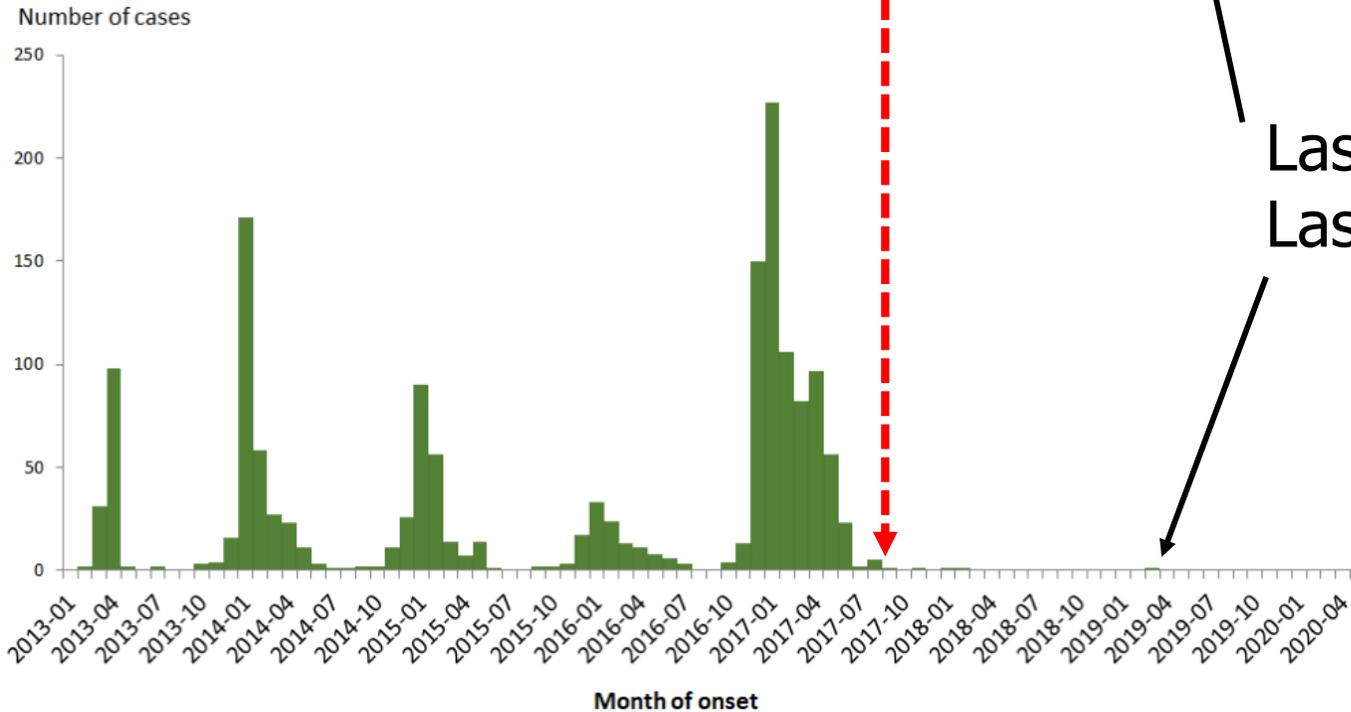
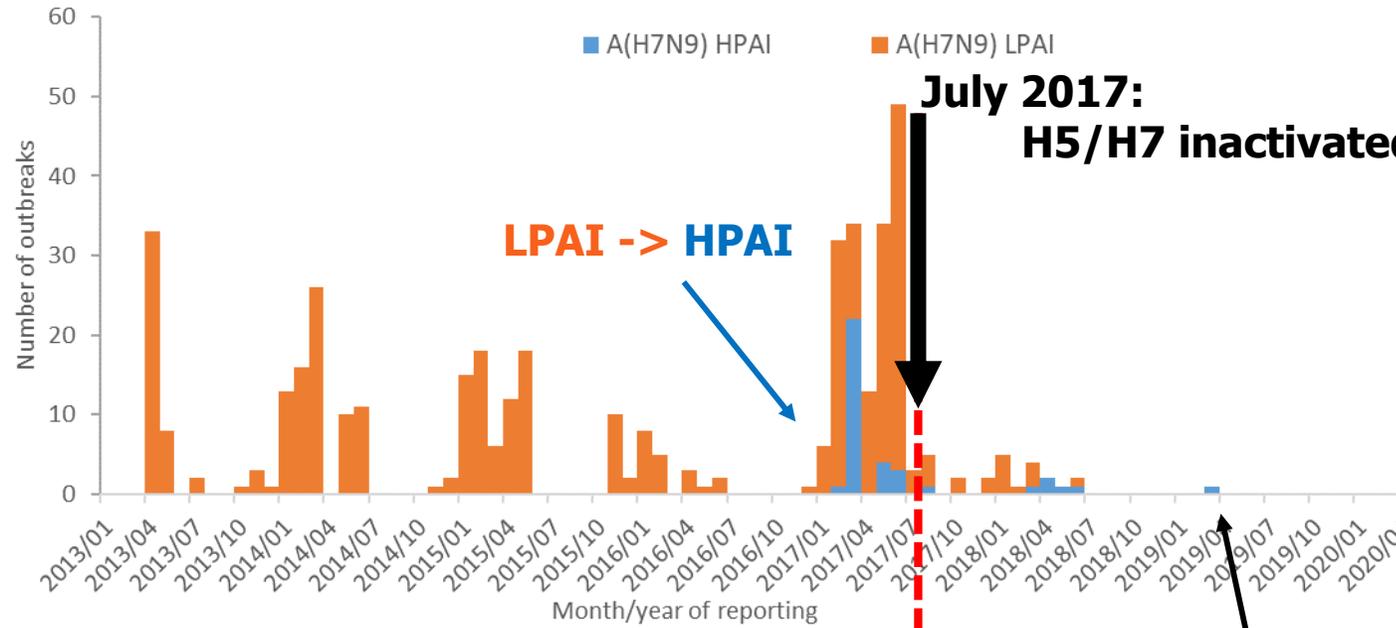


N=1 562

A(H7N9)



One Health approach needed!



Quarterly joint EFSA/ECDC avian influenza scientific reports



The first joint report September 2017...



APPROVED: 29 September 2017

doi: 10.2903/j.efsa.2017.5018

Avian influenza overview October 2016–August 2017

European Food Safety Authority,
European Centre for Disease Prevention and Control,
European Union Reference Laboratory for Avian influenza,
Ian Brown, Paolo Mulatti, Krzysztof Smietanka, Christoph Staubach, Preben Willeberg,
Cornelia Adlhoch, Denise Candiani, Chiara Fabris, Gabriele Zancanaro, Joana Morgado and
Frank Verdonck

The latest joint report March 2020...



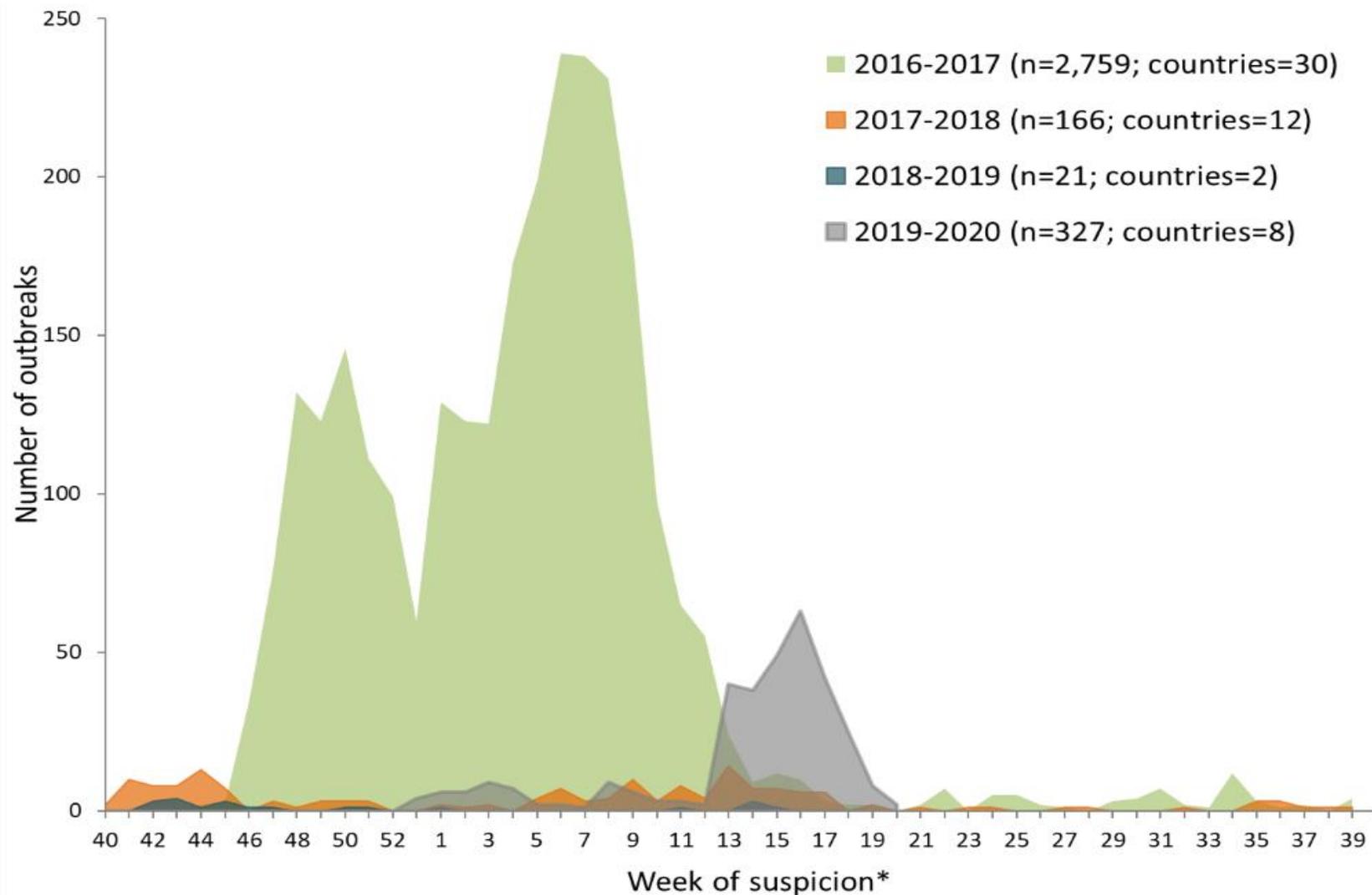
APPROVED: 27 March 2020

doi:10.2903/j.efsa.2020.6096

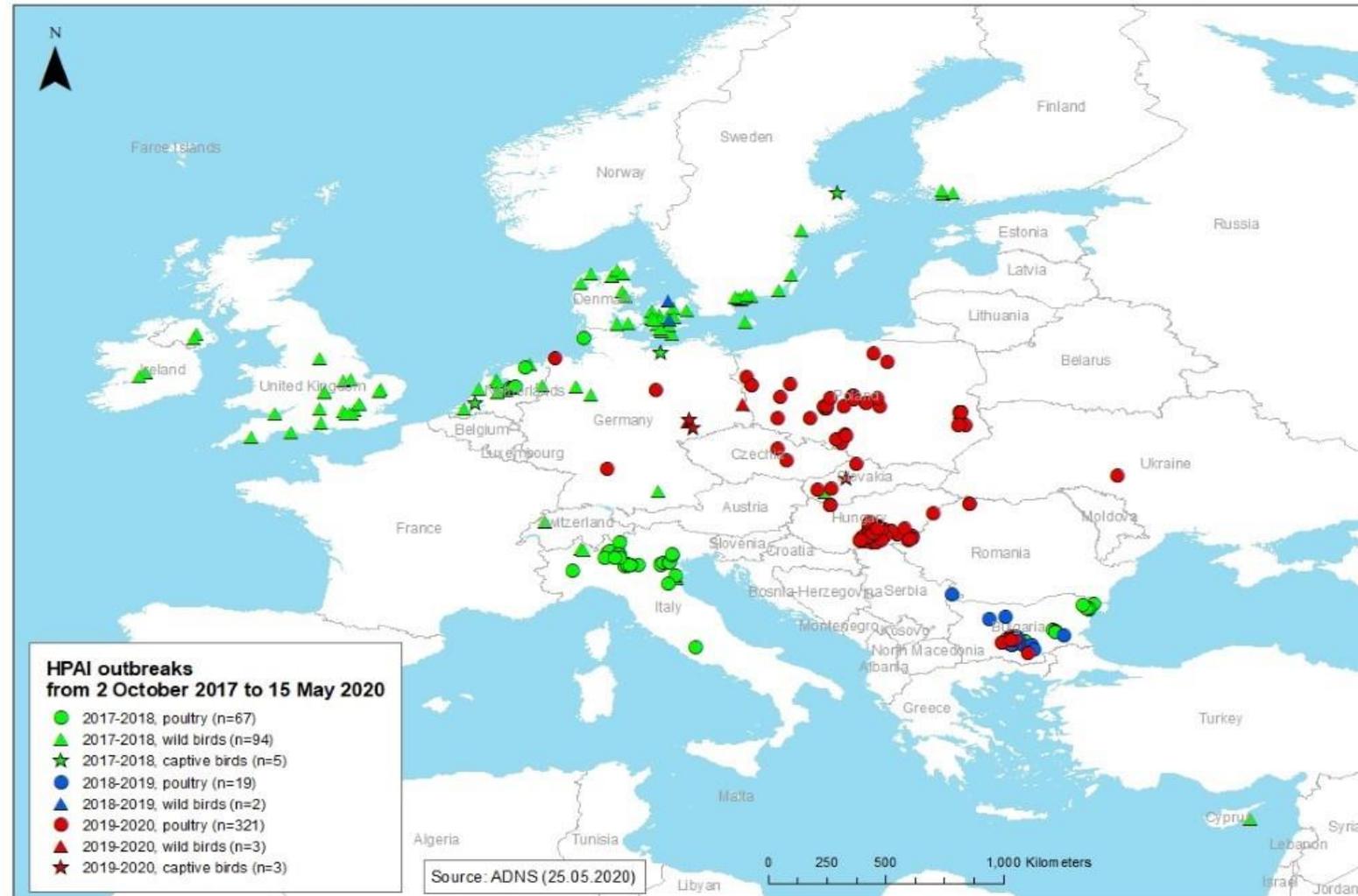
Avian influenza overview November 2019 – February 2020

European Food Safety Authority,
European Centre for Disease Prevention and Control and
European Union Reference Laboratory for Avian Influenza
Cornelia Adlhoch, Alice Fusaro, Thijs Kuiken, Éric Niqueux, Christoph Staubach, Calogero
Terregino, Irene Muñoz Guajardo and Francesca Baldinelli

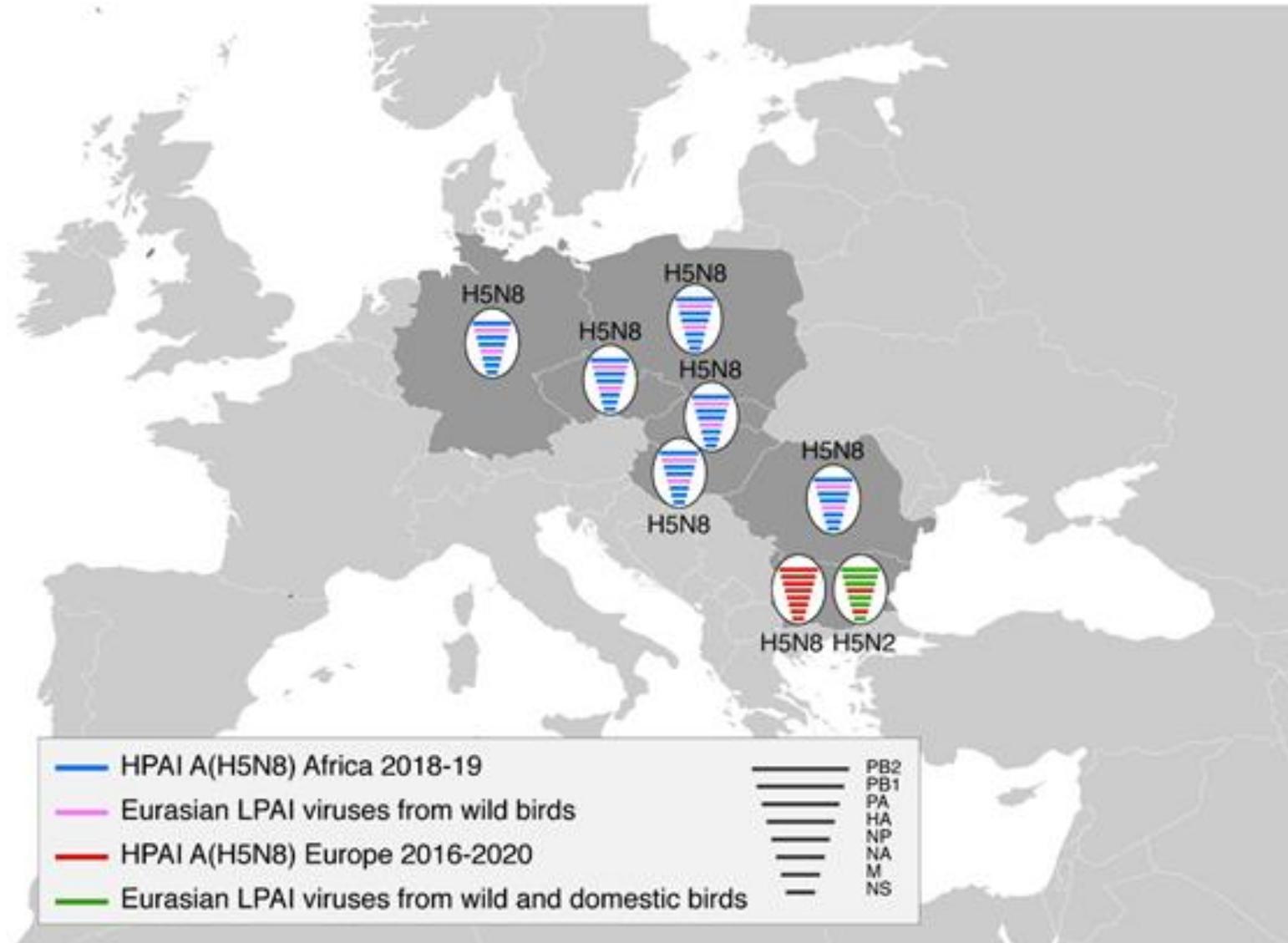
Distribution of total number of HPAI outbreaks in Europe, 2016/17-2019/20 (n=3 273)



Geographical distribution of HPAI outbreaks in Europe in poultry, wild birds and captive birds, by season 2017/18-2019/20 (n=224)



Distribution of the three distinct viral genotypes in Europe



Overall conclusions

- Zoonotic and pandemic potential of avian influenza viruses
- Current avian influenza viruses remain poorly adapted to humans
- Transmission from birds to humans infrequent
- Transmission to humans can cause severe disease
- No sustained human-to-human transmission
- Use of personal protective measures minimises remaining risk
- Timely sharing of information crucial
- Cooperation between animal and public health on all levels important

Acknowledgement



EFSA: Francesca Baldinelli and Frank Verdonck

EFSA working group members: Alice Fusaro, Adam Brouwer, Paolo Mulatti, Thijs Kuiken, Isabella Monne, Krzysztof Smietanka, Christoph Staubach,...

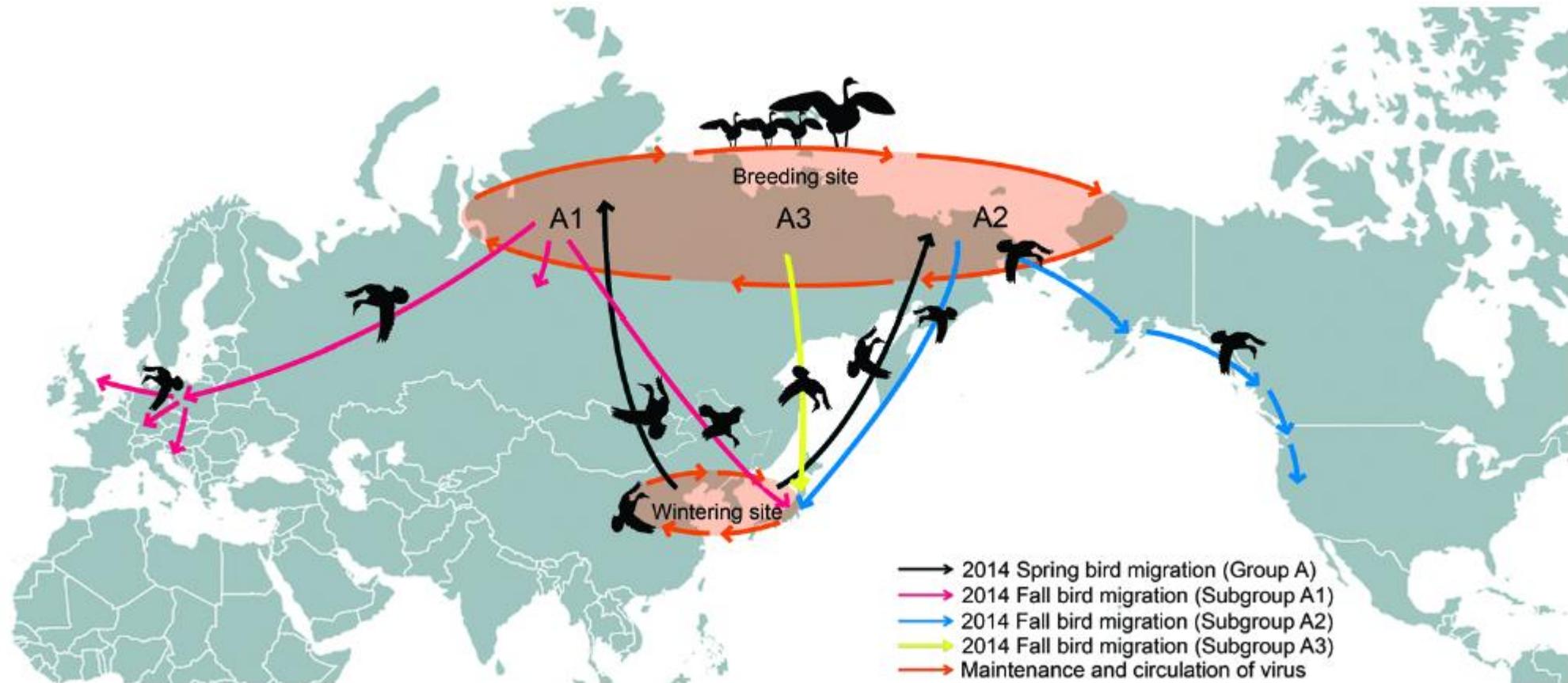
European Avian Influenza Reference Labs (previous and current)

Experts in the Member States

ECDC Epidemic Intelligence team (Grazina Mirinaviciute, Thomas Mollet)

Additional slides

Intercontinental spread of HPAI H5N8 viruses



Outbreak management

- Risk assessment:
 - Grading of exposure
 - Assessment of risk
 - Vaccination and/or pre-/postexposure prophylaxis
- Surveillance:
 - Active or passive syndromic surveillance
 - Target group: occupationally exposed persons, persons in proximity,...
 - Time frame of follow-up
 - Testing guidelines
- Communication
 - Information of public/practitioners
 - Information of exposed persons



Cross-border issues in affected populations



Epidemic/pandemic potential	<ul style="list-style-type: none">• Assessment of severity and transmission
Local community	<ul style="list-style-type: none">• Coherent public messages
Contacts of human cases	<ul style="list-style-type: none">• Migrant workers/ language
Farm workers, hunters, wildlife staff	<ul style="list-style-type: none">• Migrant workers tracing/ language• Exposure to wild birds
Laboratory and veterinary staff	<ul style="list-style-type: none">• Risk assessment