AI-NDV SUBCOMMITTEE REPORT

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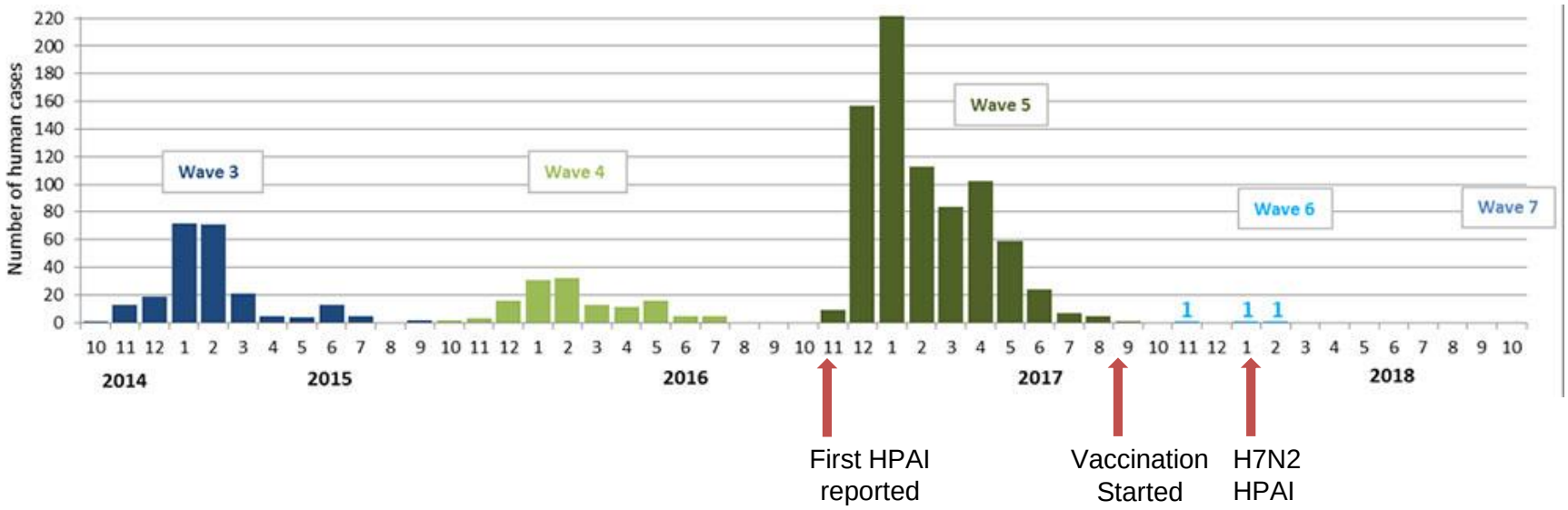
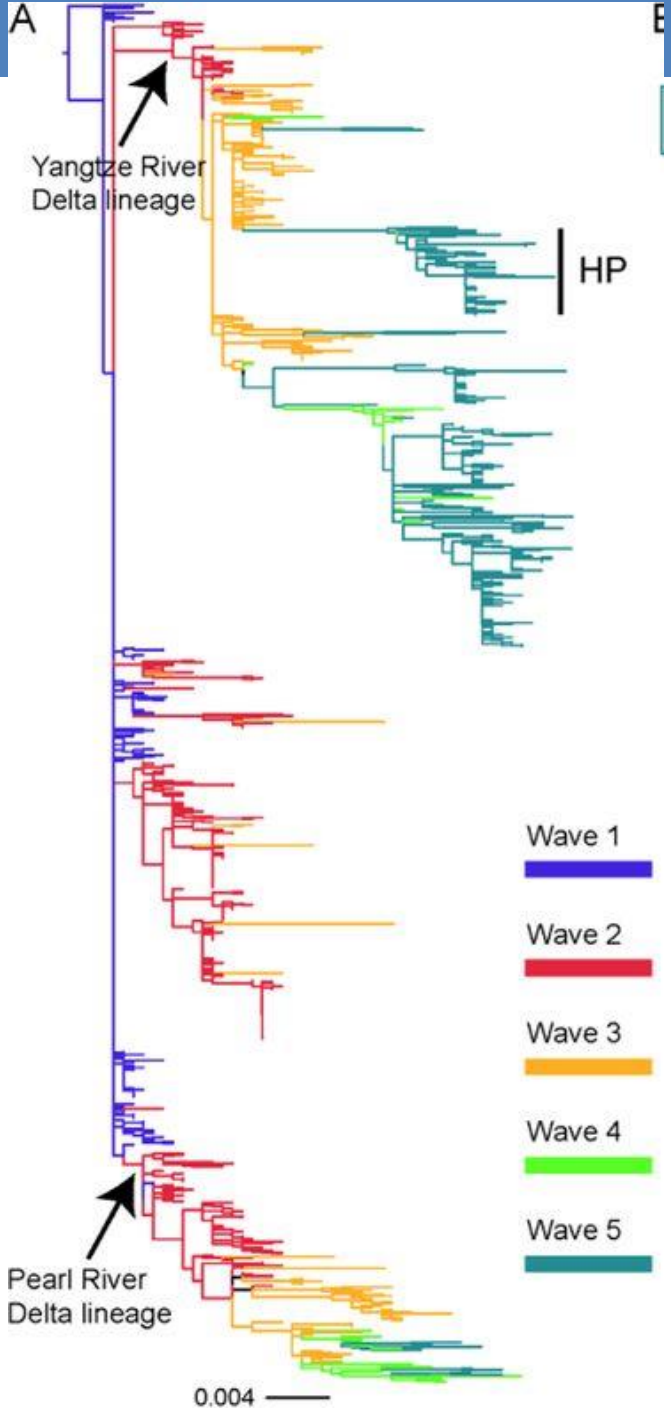
Report is based on OIE, FAO, WHO, ProMed, published manuscripts and personal research

H7N9 Human Cases



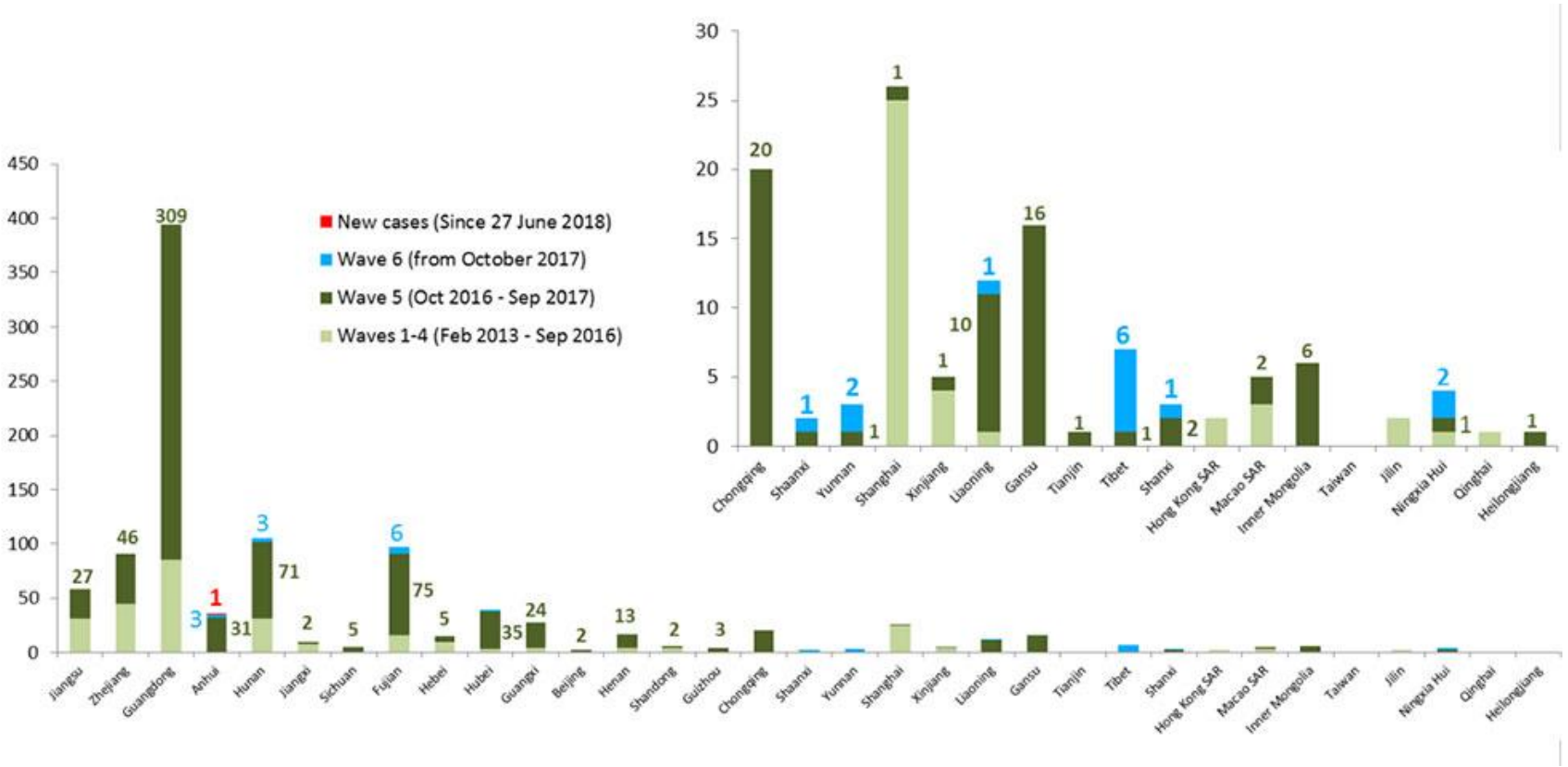
H7N9 Phylogenetic Tree

- Two divergent lineages emerged from initial outbreak in 2014 (Yangtze and Pearl River)
- All H7N9 viruses were low pathogenic until late 2016 with emergence of Highly Pathogenic Avian Influenza (HPAI)
- The HPAI emergence was in Yangtze River lineage by 4 aa insert at cleavage site
- LPAI cleavage site `PKG----R/G`
- HPAI cleavage site `PKRKRTAR/G`
- Some reassortant viruses have been detected (H7N6, H7N2, internal genes)



Phylogenetic Tree-Guan, C. et al. 2018. New Threats from H7N9 influenza virus: Spread and evolution of high-and low-pathogenicity variants with high genomic diversity in wave 5. Journal of Virology 92:e00301-18.

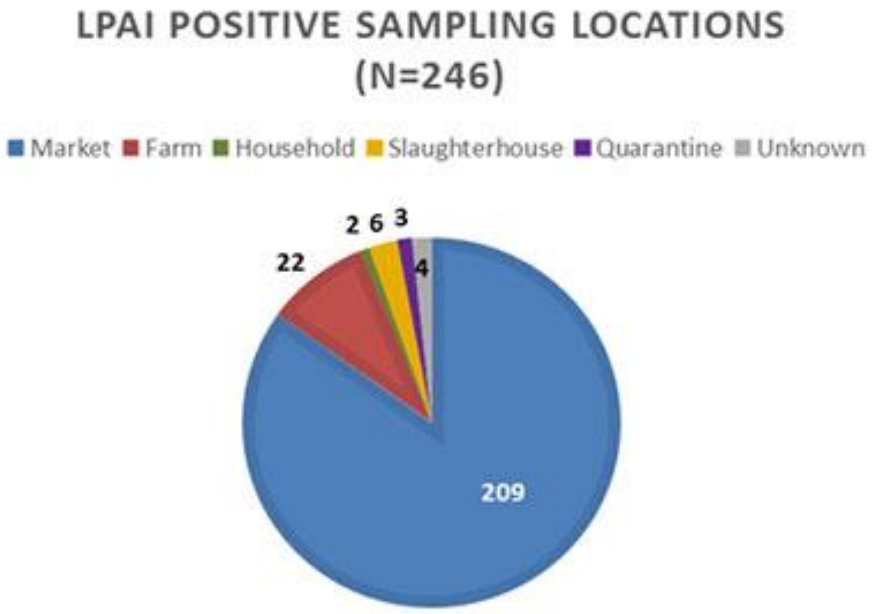
Positive Poultry Samples by Chinese Province

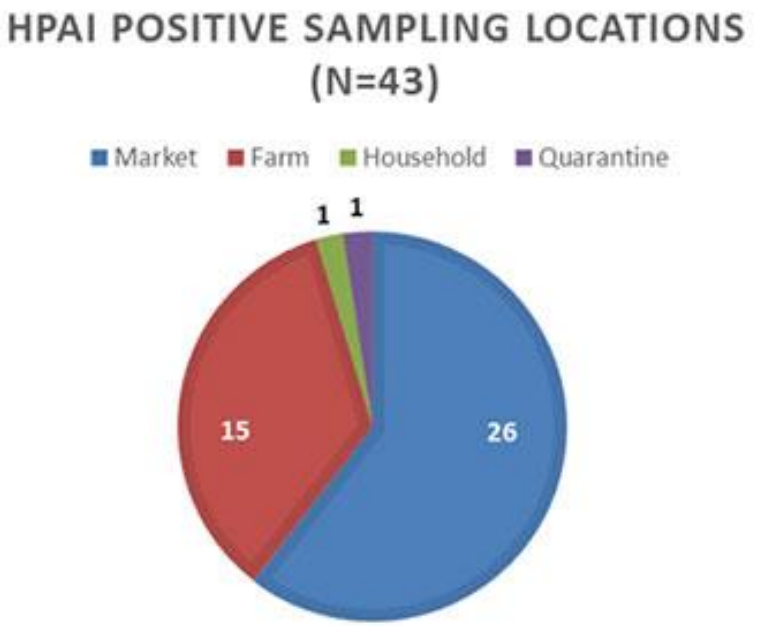


Data through July 25, 2018

FAO H7N9 Situational Update Updated August 7, 2018

Location of Positive Samples

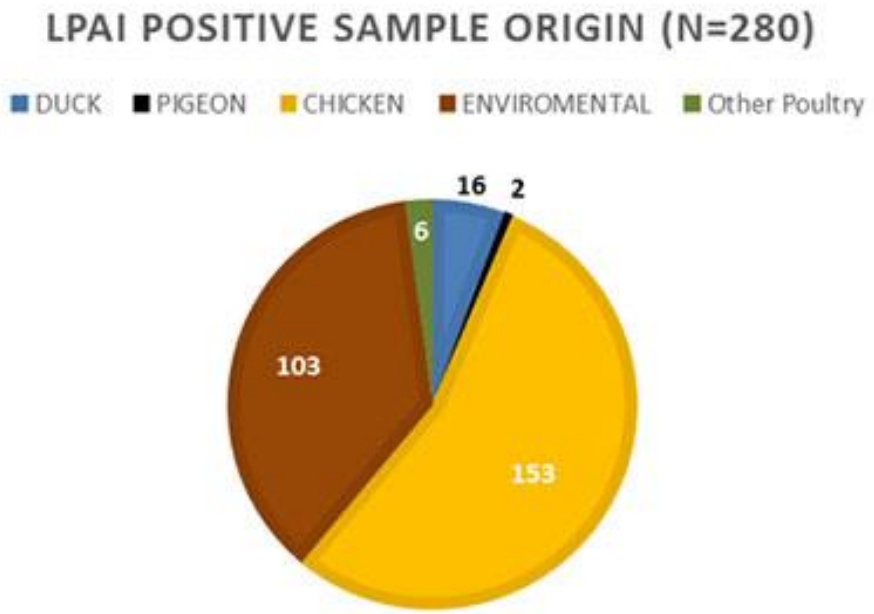


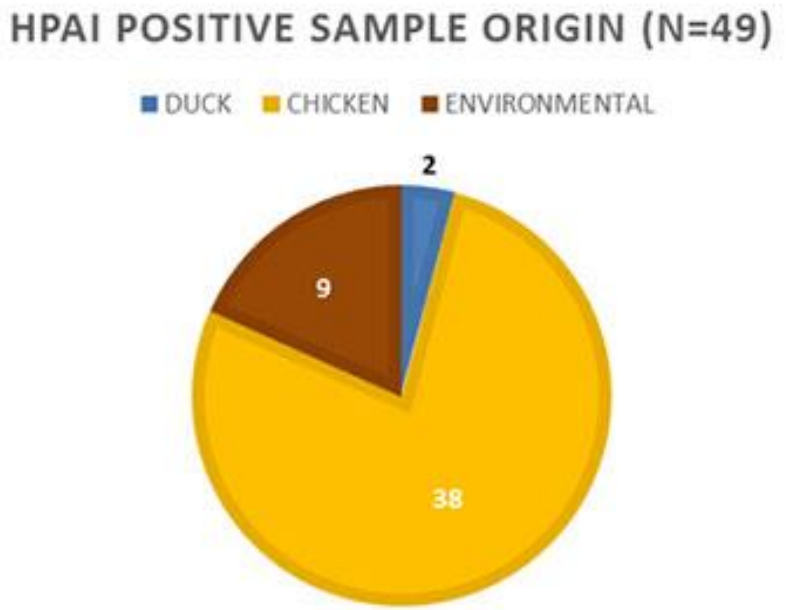


October 2016 and 25 July 2018

FAO H7N9 Situational Update Updated August 7, 2018

Poultry Sample Origin





October 2016 and 25 July 2018

Chinese Broiler Farmers Control Measures

	Out of 331 surveys	Percentage
Adoption of HPAI vaccination	286	86.4%
Adoption of antiviral medication	296	89.4%
Adoption of farm cleaning	280	84.6%
Adoption of farm disinfection	289	87.3%
Adoption of all 4 practices	193	58.3%

- Farmers surveyed in 3 Northern and 3 Southern provinces
- Conducted June-August 2015
- Farm experience positively correlated with preventive measures
- 28.4% of respondents refused to use government designated vaccines

Huang et al. Factors affecting Chinese broiler farmers' main preventive practices in response to highly pathogenic avian influenza. 2016. Preventive Veterinary Medicine 134:153-159

Biosecurity Practices of Poultry Farmers of Jiangsu Province

Biosecurity Preventive Behaviors	Percentage of 297 respondents
Check for dead or sick chickens daily	99%
Prevented contact neighbor's poultry	94.9%
Conducted all in and all out method	93.6%
Pay attention to the nutrition balance of poultry	87.5%
Quarantined new purchase of poultry	85.9%
Closed doors and windows all the time in winter	77.1%
Prevented poultry contact wild poultry	66.3%
Disinfected staff, vehicles, and goods entering the poultry house	39.1%
Continuously disinfected with chickens in cage 2-3 times weekly	7.1%
Frequently cleaning floors and chicken cages	1.7%

Cui, B. and Z.P. Liu. 2016 Determinants of Knowledge and Biosecurity preventive behaviors for highly pathogenic avian influenza risk among Chinese poultry farmers Avian Diseases 60:480-486.

Control Measures for H7N9

- Closure of LPMs was credited for reduction in human cases
- LPM system is slowly being replaced with centralized slaughter facilities (infrastructure more developed in Northern China)
- Some large cities permanently banned LPMs
- Principals of Biosecurity are well known, but often poorly applied
- Because of the spike in human cases and the mutation from LPAI to HPAI, vaccination became the government mandated option

Vaccine for H7N9

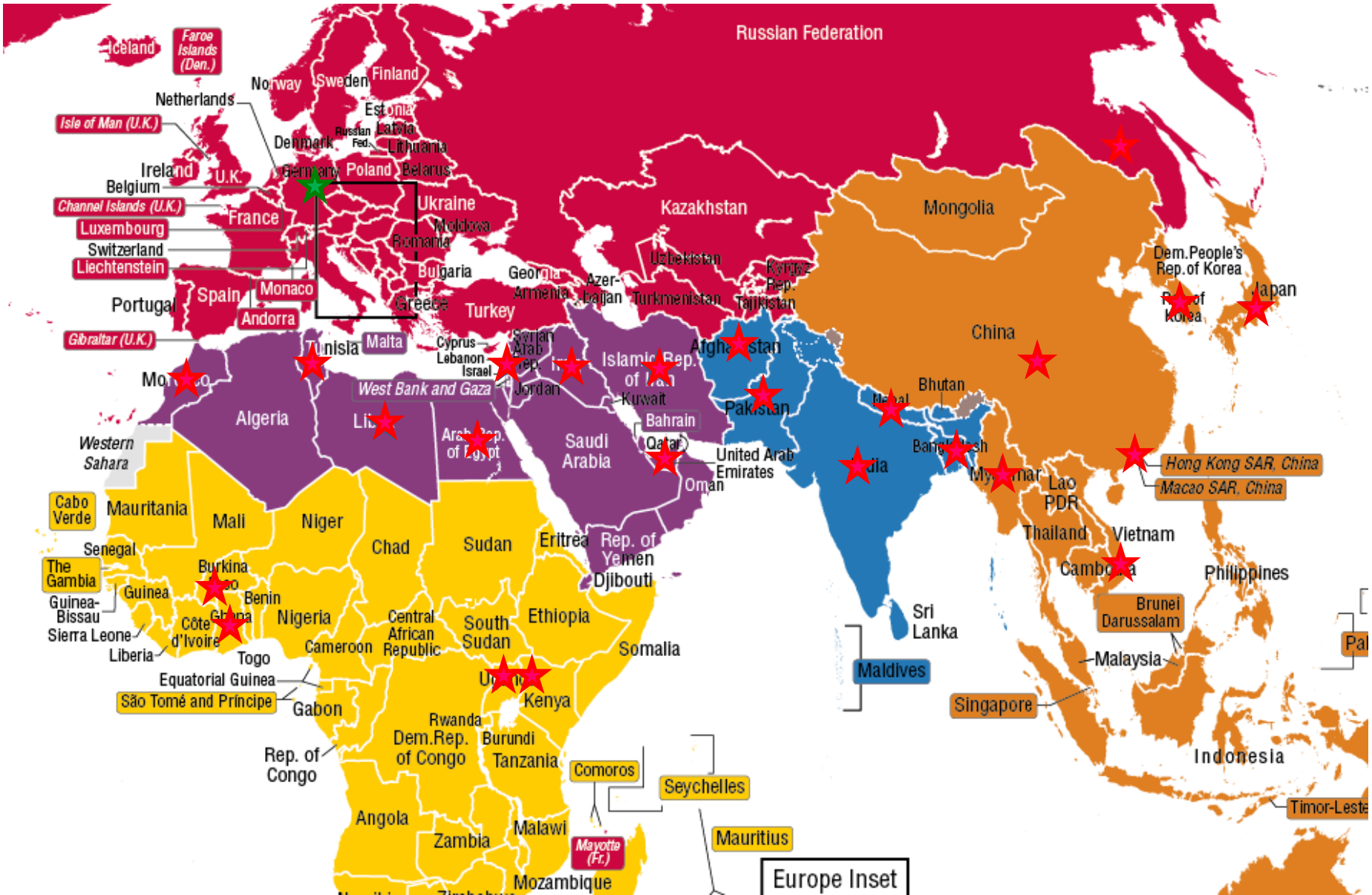
- Vaccine was made by reverse genetics with the H7 gene from 2013 virus and the PR8 internal gene cassette
- Killed vaccine with adjuvant-A/pigeon/Shanghai/1069/2013
- Laboratory and clinical trials reported as having good results
- 2 doses of vaccine needed to stimulate immunity in ducks and geese
- Vaccine was made as bi-valent vaccine to include the re-8 H5 vaccine
- Government provides the vaccine for free
- Mass vaccination program started in September 2017
- Targeted to layers and slow growing chickens with high use of vaccine (73%)
- Vaccine credited with reducing both human and poultry cases

Hualan Chen, Animal Influenza Laboratory of the Ministry of Agriculture and National Key Laboratory of Veterinary Biotechnology, Harbin Veterinary Research Institute

Conclusion

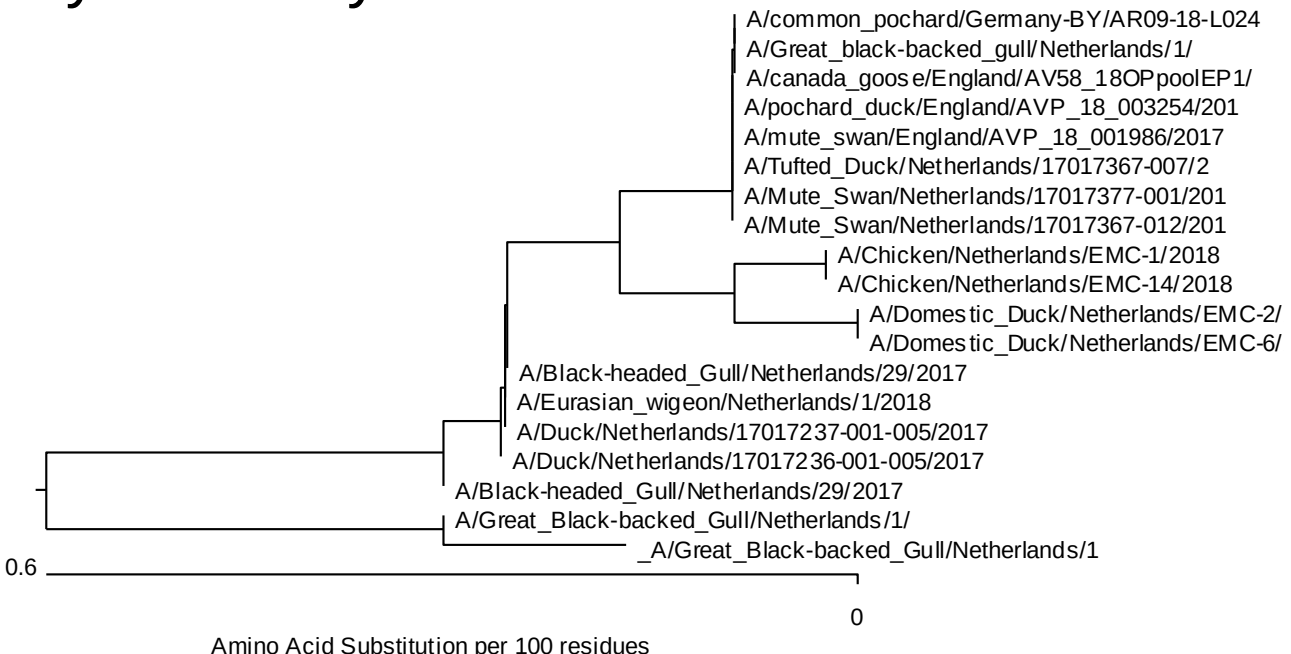
- Virus continues to circulate with two unique antigenic lineages, with the Yangtze lineage having both LP and HP variants
- No evidence of wild bird involvement in spread of the virus
- China remains an epicenter for emerging avian influenza viruses
- Vaccination has provided a marked reduction in reported human and animal cases
- Because of large LPM system and questionable biosecurity practices, eradication of H7N9 is unlikely

Countries with poultry adapted H9N2 (2012-2018)



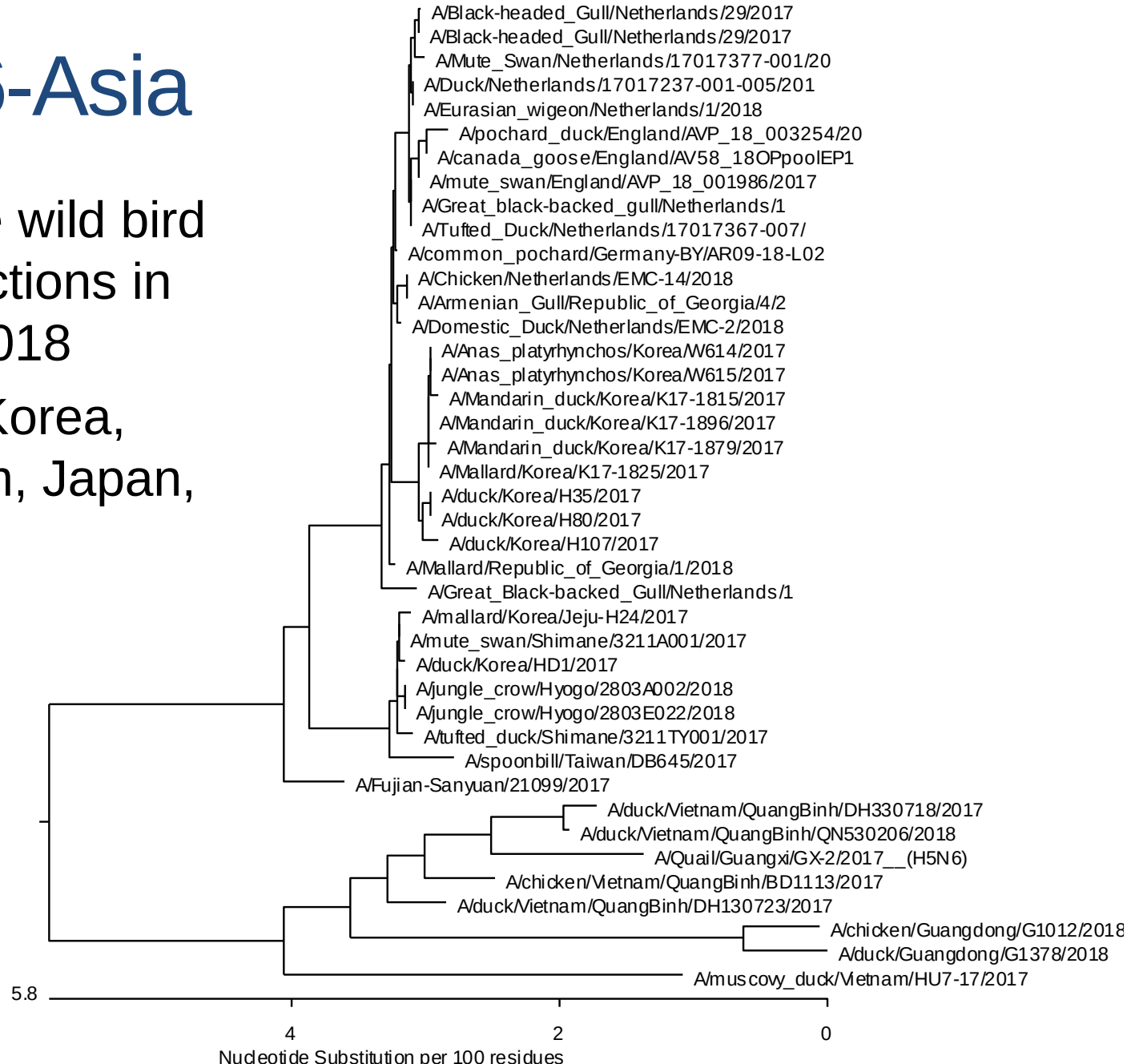
H5N6-Europe

- Multiple wild bird introductions in late 2017-2018 in Netherlands, England, Denmark, Sweden, Finland, Ireland, Switzerland
- Clade 2.3.4.4b
- Commercial outbreaks in Netherlands in ducks and chickens and backyard poultry Germany

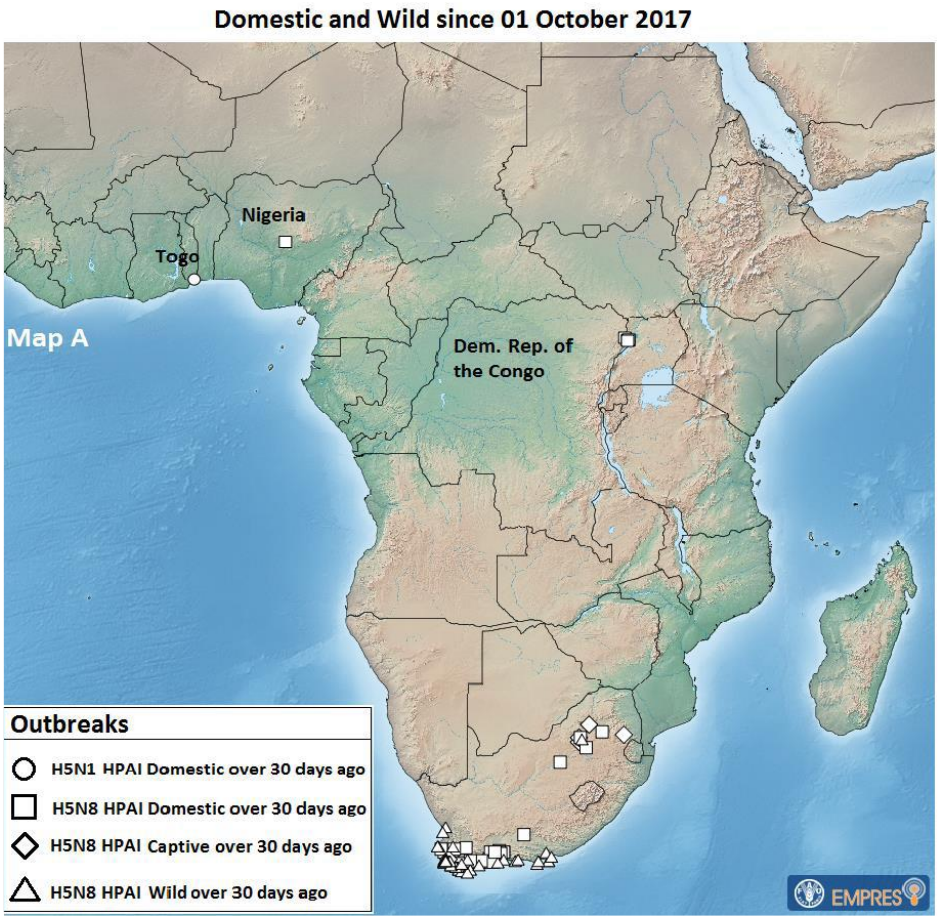


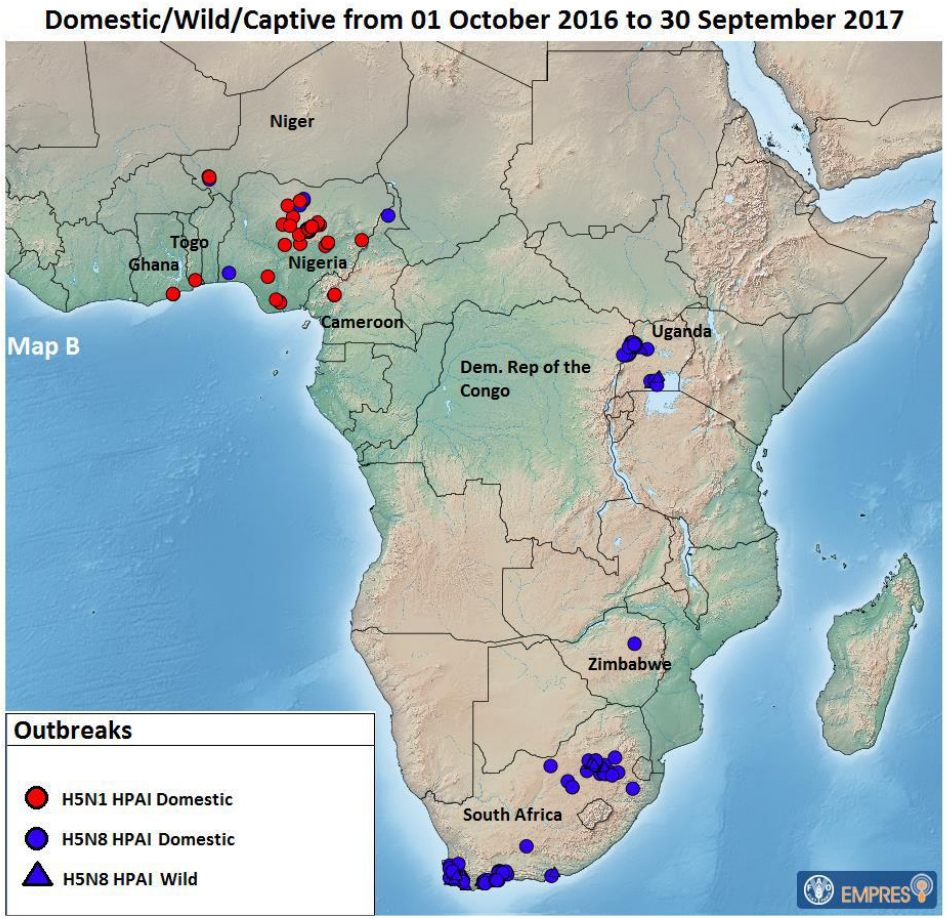
H5N6-Asia

- Multiple wild bird introductions in 2017-2018
- South Korea, Vietnam, Japan, China



FAO Sub-Saharan Africa HPAI situation update (Oct 10, 2018)





H5N1 reports from 2018
Togo

H5N8 reports from 2018
Nigeria, Democratic Republic of Congo, and South Africa