



WOAH Regional Capacity Training on Priority Animal Disease Control and Prevention in Asia and the Pacific

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Transboundary Avian Diseases: Global Status, Diagnostic Techniques, Prevention and Control Strategies

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Outline

- *WOAH-listed Avian Diseases in 2026*
- *Global Situation of HPAI and ND*
- *WOAH Recommended Diagnostic Techniques*
- *Prevention and Control Strategies*

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WOAH-listed Avian Diseases in 2026

1. *Avian chlamydiosis*
2. *Avian infectious bronchitis*
3. *Avian infectious laryngotracheitis*
4. *Duck virus hepatitis*
5. *Fowl typhoid*
6. *Infection with high pathogenicity avian influenza viruses*
7. *Infection of birds other than poultry, including wild birds, with influenza A viruses of high pathogenicity*
8. *Infection of domestic and captive wild birds with low pathogenicity avian influenza viruses having proven natural transmission to humans associated with severe consequences*
9. *Infection with Mycoplasma gallisepticum (Avian mycoplasmosis)*
10. *Infection with Mycoplasma synoviae (Avian mycoplasmosis)*
11. *Infection with Newcastle disease virus*
12. *Infectious bursal disease (Gumboro disease)*
13. *Pullorum disease*
14. *Turkey rhinotracheitis*

Terrestrial Animal Health Code (2026)

Chapter 1.3: Diseases, infections and infestations listed by WOA

Article 1.3.3

Terrestrial Animal Health Code

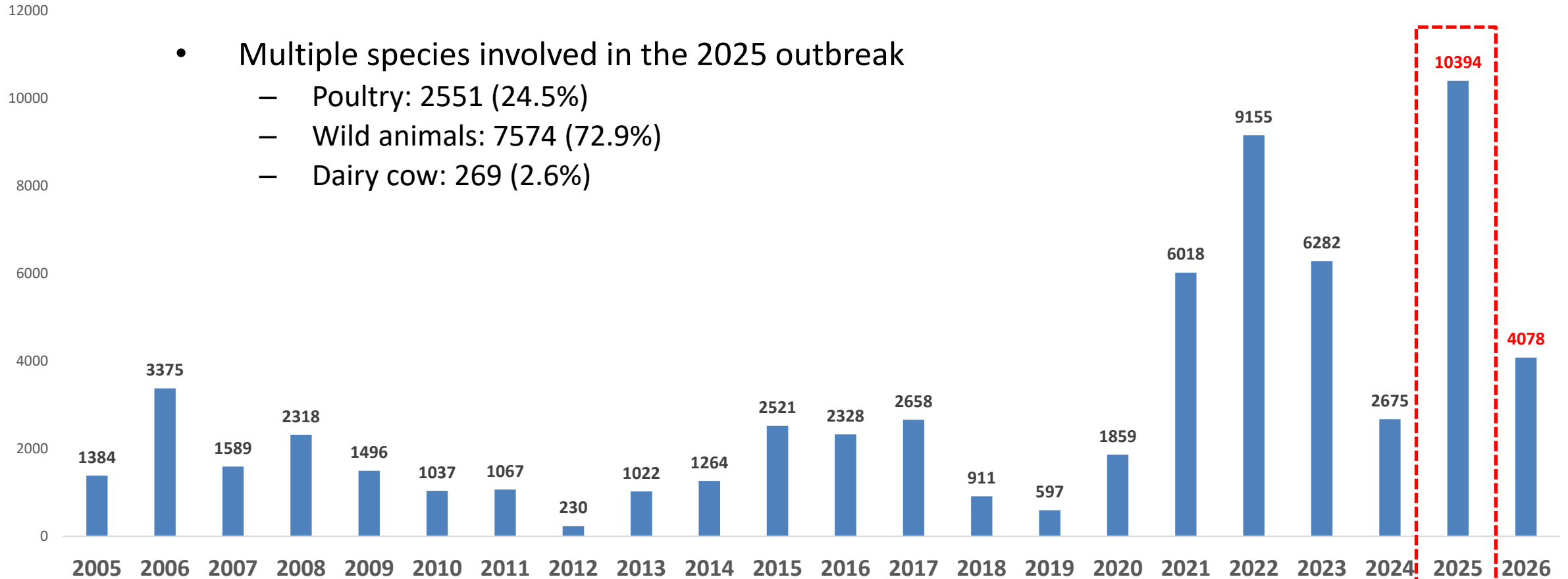
Chapter 1.1: Notification of diseases and provision of epidemiological information

Article 1.1.5 : Although Members are only required to notify **listed diseases** and **emerging diseases**, they are encouraged to provide WOA with **other important animal health information**.

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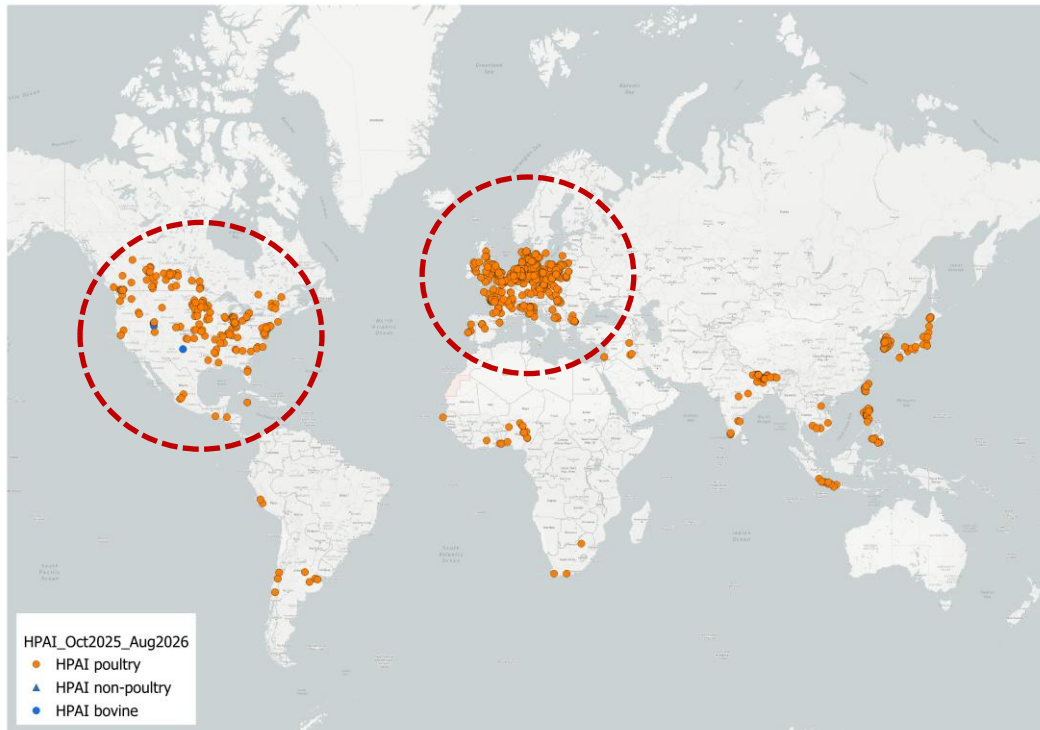
Distribution of HPAI outbreaks since 2005



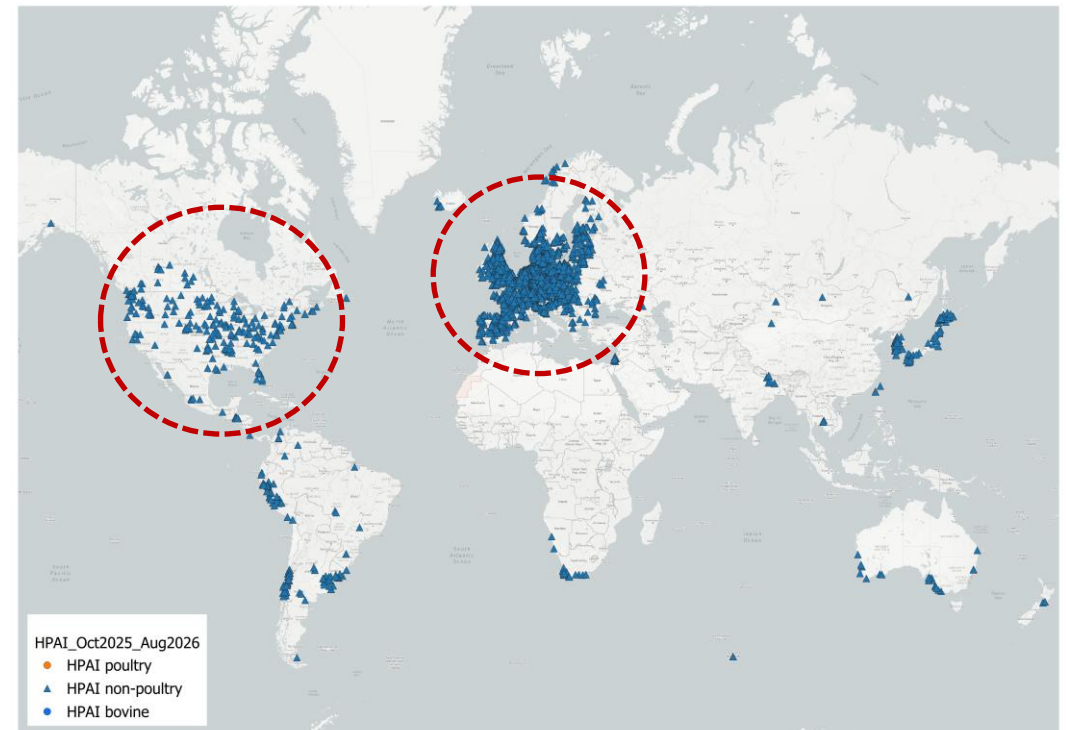
- Multiple species involved in the 2025 outbreak
 - Poultry: 2551 (24.5%)
 - Wild animals: 7574 (72.9%)
 - Dairy cow: 269 (2.6%)

The current HPAI outbreak seems to be larger than before

Current HPAI outbreak since 2025



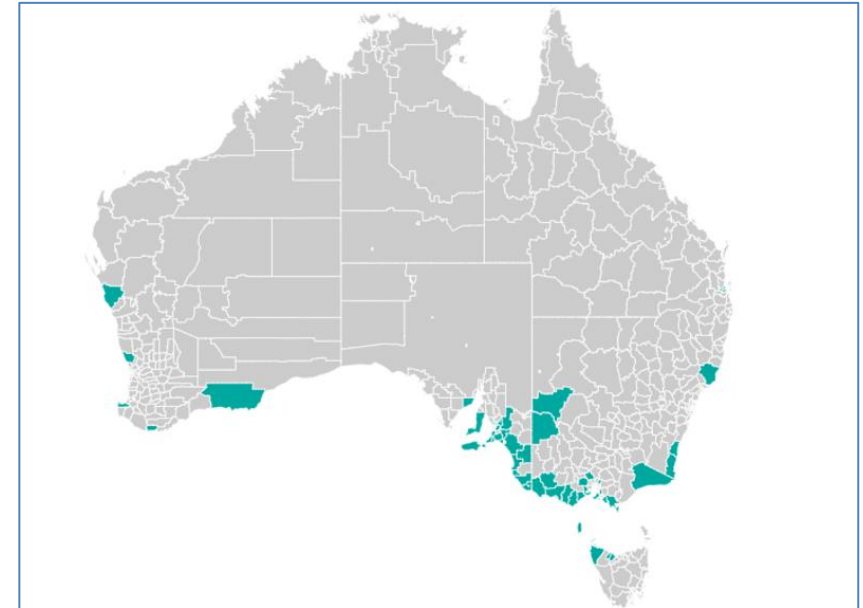
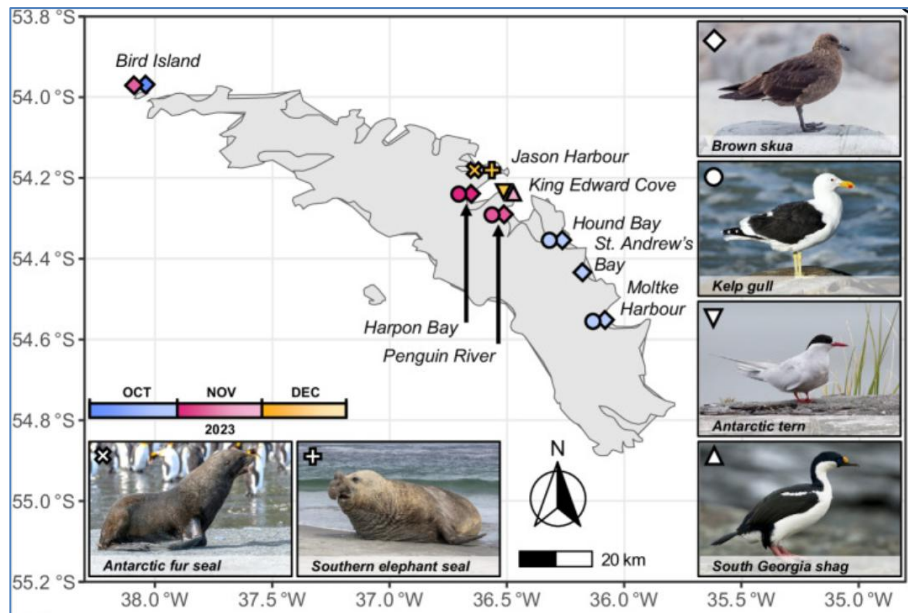
Outbreak in poultry



Outbreak in non-poultry

Europe and North-America reporting most of the outbreaks

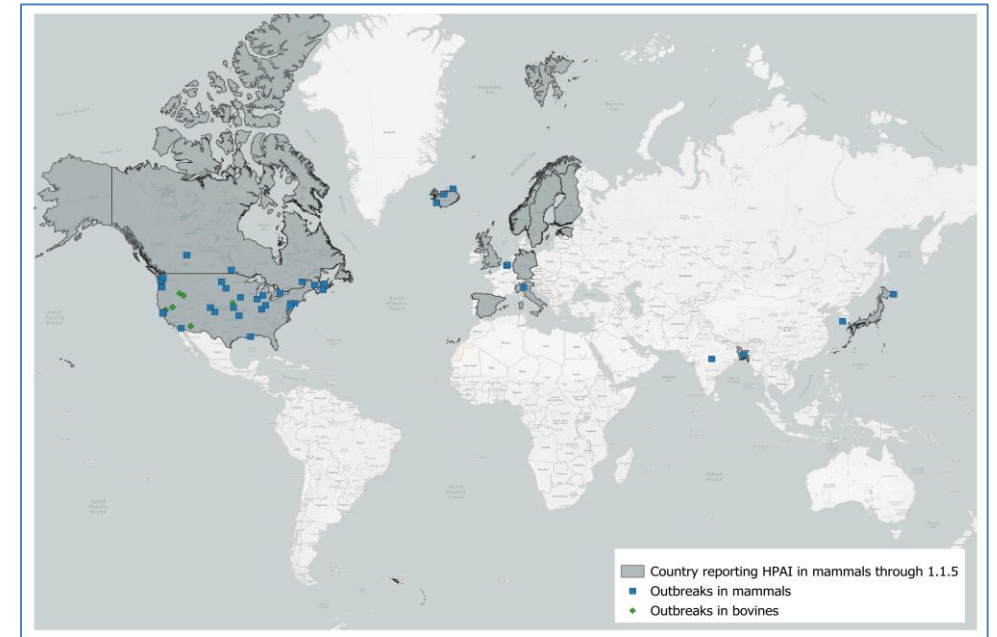
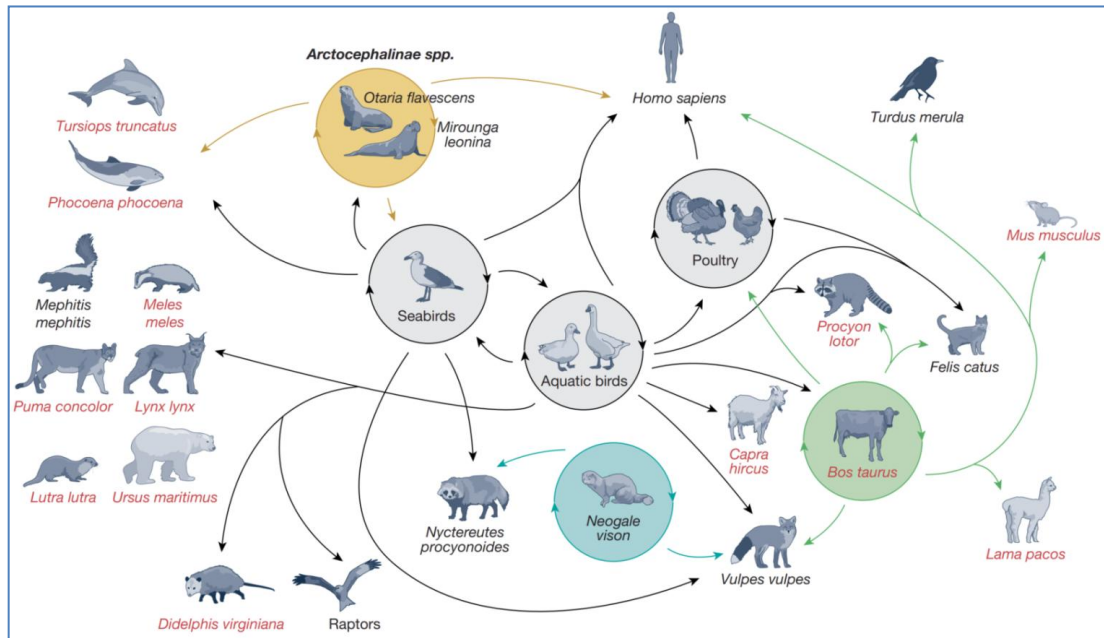
HPAI keep spreading into more regions



First H5N1 detection in the **Antarctic Region** in October 2023

First H5N1 detections in **Australia** on 20 June 2026

More Mammals were reported in recent years



Multi-host ecology of H5N1 clade 2.3.4.4b since 2020

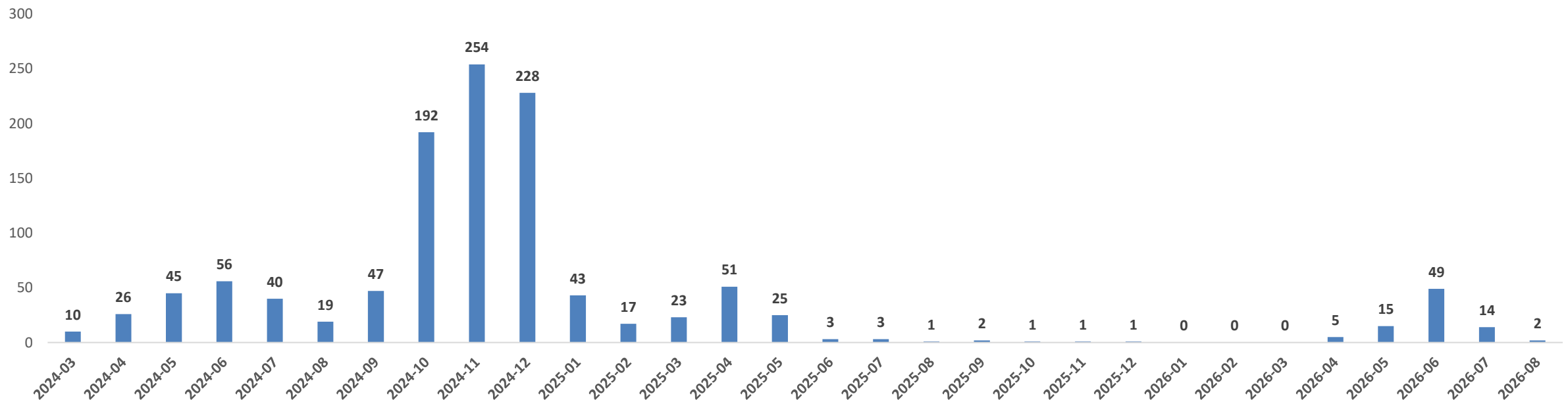
Nature, 2025, 637: 304-313

In 2025

- **92** outbreaks in **14 mammalian species** reported through WAHIS
- **14** members reported HPAI in over **40 different species** via Article 1.1.5
- The United States of America reported **143 outbreaks in bovines**

Current situation of H5N1 infection in Dairy Cows in the USA

- The first infection of H5N1 in dairy cows was confirmed in March 2024.
- Up to now a total of 1173 outbreaks located in 19 states were reported.
- The outbreaks still keep spreading.
- The outbreak in swine and Alpaca has been reported in 2024.



Epidemic Curve of H5N1 infection in Dairy Cows in the USA

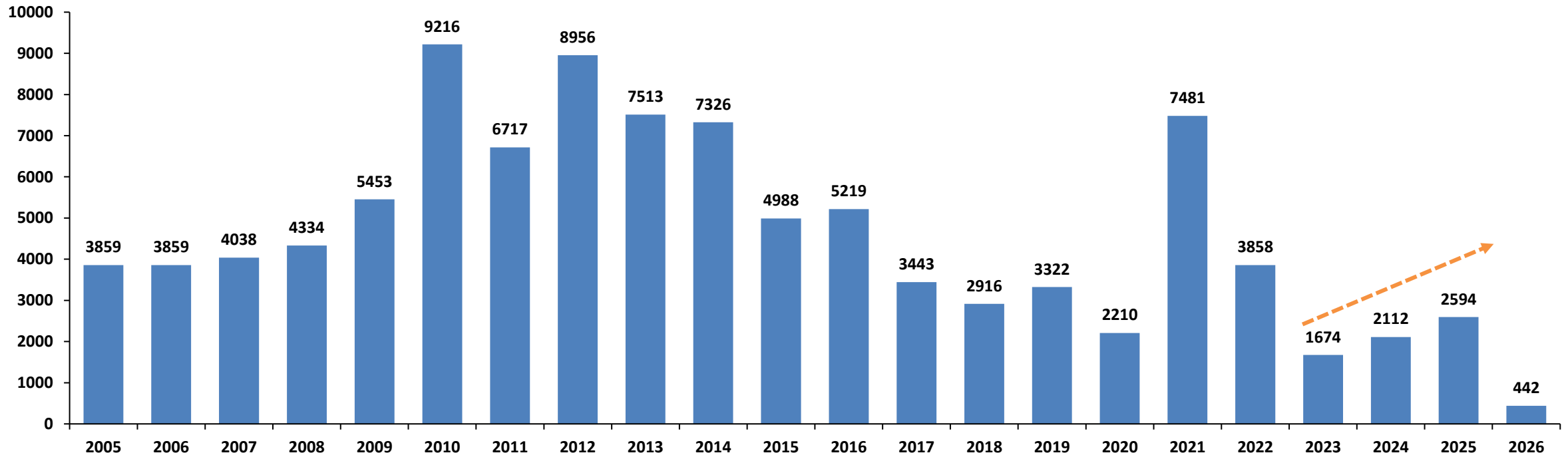
Data source: WOA-H-WAHIS

Summary: Key figures on the current HPAI epidemic

- The current HPAI outbreak appears to be larger than before in terms of the number of reported outbreaks.
- New outbreaks reported in **unusual hosts** reported through article 1.1.5.
- More mammals, including dairy cows and wild animals, were reported.
- Europe reporting most of the outbreaks
 - **52%** of outbreaks reported in poultry (followed by the Americas **28%**) (Asia **18%**)
 - **92%** of outbreaks reported in non-poultry (Asia **3.5%**)
- H5N1 is reported in **98%** of the events (H5N6, H7N3, etc.)
- 2.3.4.4b is the dominant H5 strains (2.3.3.1, 2.3.4.4h, etc)
- More recombinant strains emerging.

Distribution of ND outbreaks since 2005

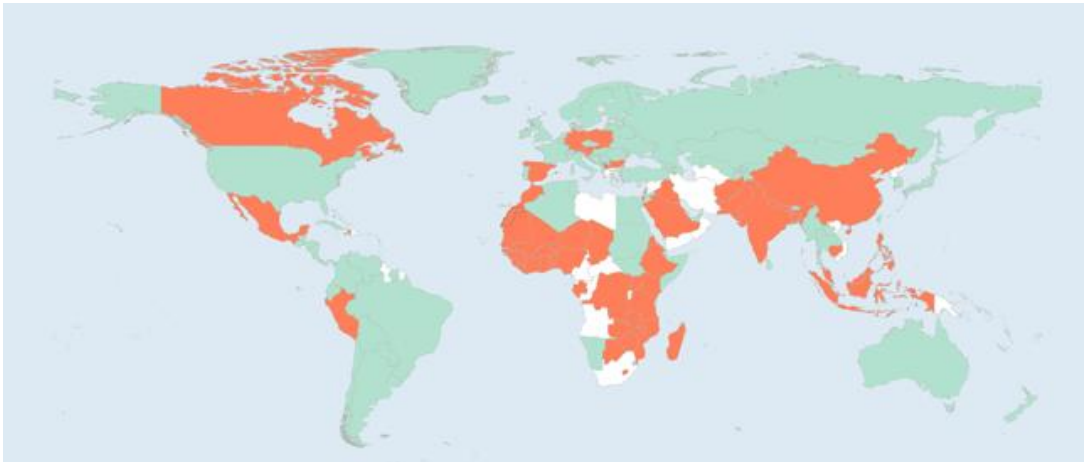
- The disease has been endemic for several decades in most developing countries.
- The outbreaks of ND has a tendency to be larger than since 2023, especially in Asia region.



Epidemic Curve of ND outbreak since 2025

Current situation of Newcastle Disease

- Most of the outbreaks were reported in Africa (48%) and Asia (40%), followed by Europe (9.4%) and Americas (2.6%).
- Out of 162 members **63 reported ND as Present or Suspected (39%)**, and 99 reported as Absent.
- Out of 40 members in Asia **17 reported ND (43%)**, and 22 reported as Absent.
- So ND is an important disease, more attention and priorities need to be paid in place.

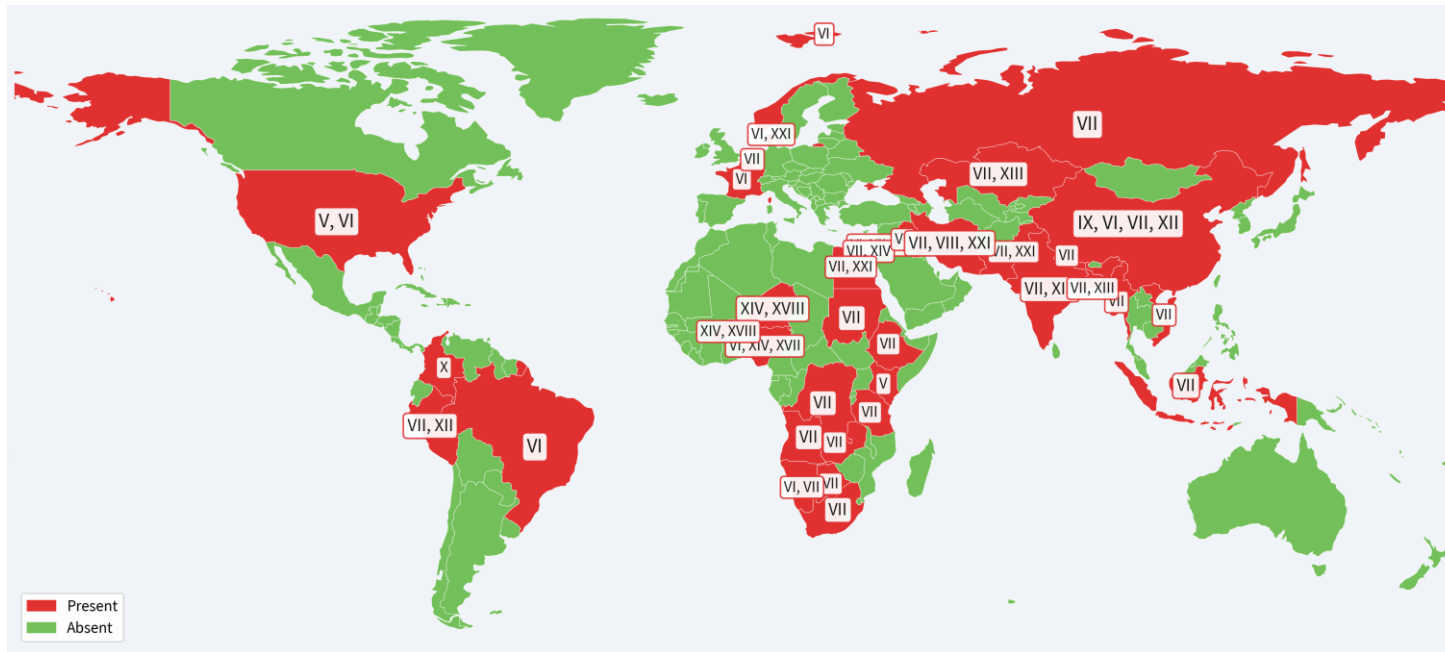


Countries by disease status category and region — ND virus (Inf. with)

Region	Present/Suspected	Absent	No information	Total
Africa	33	12	0	45
Americas	4	26	0	30
Asia	17	22	1	40
Europe	9	32	0	41
Oceania	0	6	0	6

The Prevalent NDV had the genetics diversities

- *Currently 13 genotypes of virulent NDV has been identified in recent years.*
- *The genotype VII is the predominant pathogen responsible for most of outbreaks.*
- *The genotype VI in Pigeons need to be concerned.*



Global Distribution of Prevalent NDV Genotype

Summary: Key figures on the current ND epidemic

- The outbreaks of ND has a tendency to be larger than 2023, especially in Asia region.
- Africa region reporting most of the outbreaks, followed by Asia region.
 - **48%** of outbreaks reported in Africa
 - **40%** of outbreaks reported in Asia
 - 9.4% of outbreaks reported in Europe
 - 2.6% of outbreaks reported in Americas
- **Genotype VII** is the predominant NDV worldwide.
- More outbreaks were caused by **genotype VII.2** in Southeast Asia since 2025.
- China's experience has proven that the **genotype-matched vaccines (VII)** are needed for prevention and control of the disease.

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WOAH recommended diagnostic methodology

- Test methods should be validated according to WOAH guidelines
 - Terrestrial Manual: Section 2.2 Validation of Diagnostic tests
 - Reference Materials should be used in the diagnostic tests
- The methods should be selected based on the purpose
 - Confirmation of suspected outbreaks
 - Freedom from infection
 - Surveillance for prevalence of infection
 -
- Resources should be considered for the diagnosis
 - Human resources
 - Facilities
 - Budget
 -

WOAH recommended detection methods for HAPI

Method	Purpose					
	Population freedom from infection	Individual animal freedom from infection prior to movement	Contribute to eradication policies	Confirmation of clinical cases	Prevalence of infection – surveillance	Immune status in individual animals or populations post-vaccination
Detection of the agent						
<i>Virus isolation</i>	+	++	+	+++	+	–
<i>Antigen detection</i>	+	+	+	+	+	–
<i>Conventional PCR and sequencing</i>	+	+	+	++	+	–
<i>Real-time RT-PCR</i>	+++	+++	+++	+++	+++	–
Detection of immune response						
<i>AGID</i>	+	+	++	+	++	++
<i>HI</i>	+++	++	+++	++	+++	+++
<i>ELISA</i>	+++	+	++	+	+++	++

Key: +++ = recommended for this purpose; ++ recommended but has limitations; + = suitable in very limited circumstances; – = not appropriate for this purpose; RT-PCR = reverse-transcription polymerase chain reaction; AGID = agar gel immunodiffusion; ELISA = enzyme-linked immunosorbent assay; HI = haemagglutination inhibition.

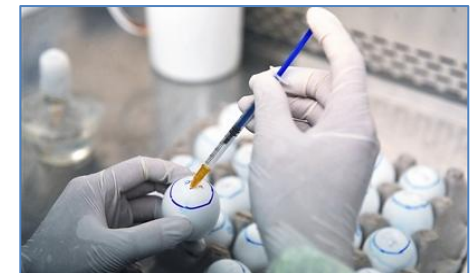
WOAH recommended detection methods for ND

Method	Purpose					
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Detection of the agent						
Virus isolation	–	+++	+	+++	+	–
Conventional PCR and sequencing	+	++	+	+++	+	–
Real-time RT-PCR	++	+++ ¹	++	+++ ^(a)	+	–
Detection of immune response						
ELISA	+	+	++	–	++	++
HI	–	–	+	–	++	+++

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Virus isolation: Golden standard

- ***Samples collection***
 - ***Organs or cloacal swabs and oropharyngeal swabs***
- ***Isolation SPF embryonated chicken eggs***
 - ***Incubate at 35–37 °C for 2–7 days.***
- ***Virus identification***
 - ***Collect the allantoic fluids tested for HA or RT-PCR or RT-qPCR***
 - ***Negative samples should be passed on for another generation***
- ***BSL-3 facilities are needed***



RT-PCR and sequencing: Useful for molecular epidemiology

RT-PCR:

- **Advantages:** low-cost equipment, no special probes
- **Disadvantages:** contamination risk (open tubes), lower sensitivity

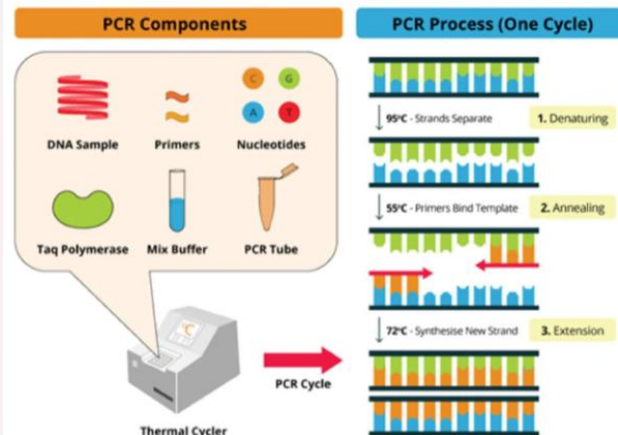
RNA extraction

Viral RNA extraction Kit

TRIzol

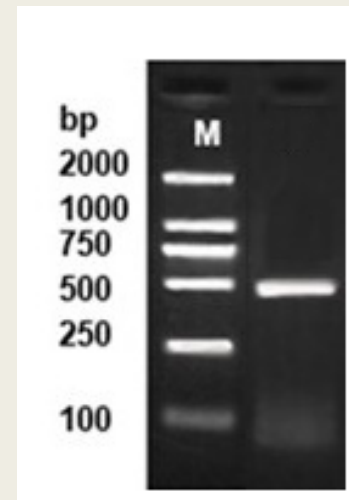
One-step RT-PCR

cDNA synthesis
Denaturing
Annealing
Extension

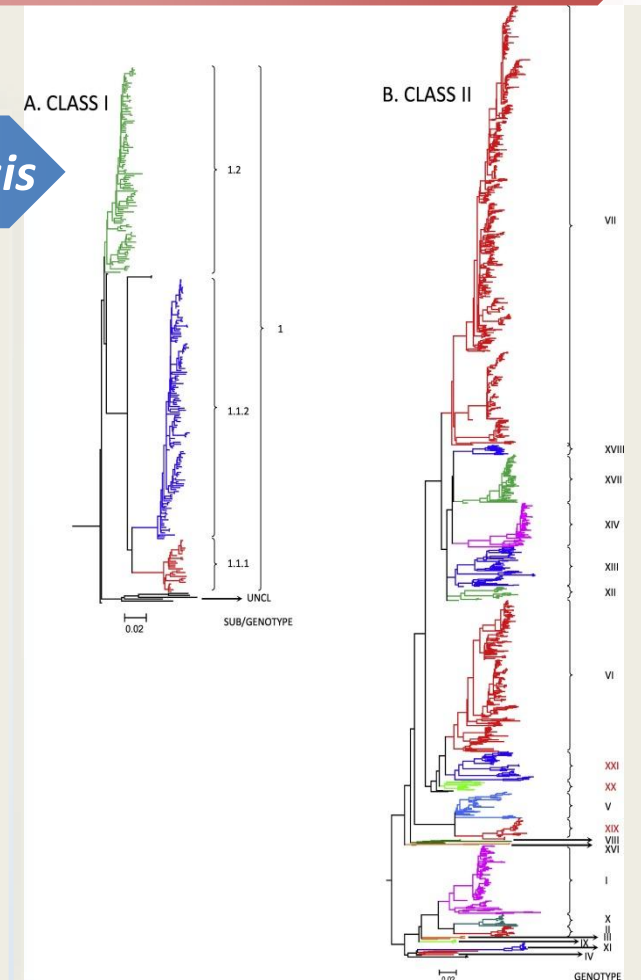


1% agarose gel electrophoresis

compare the size of
the PCR bands



Sequencing and Phylogenetic



Real-time RT-PCR: Differentiate from virus with low virulence

- **Advantages:** quantitative (Ct values), high sensitivity, less contamination, faster than RT-PCR
- **Disadvantages:** expensive instruments, complex primer/probe design, more data analysis

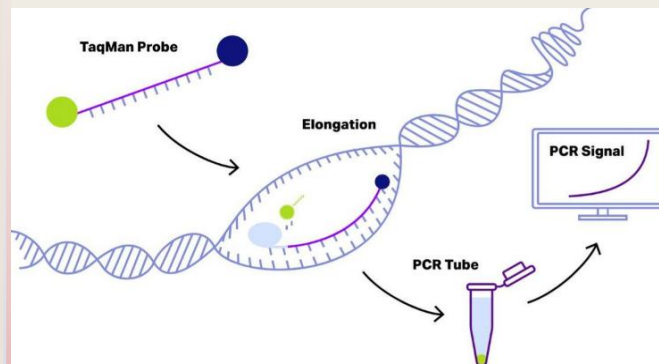
RNA extraction

Viral RNA extraction Kit

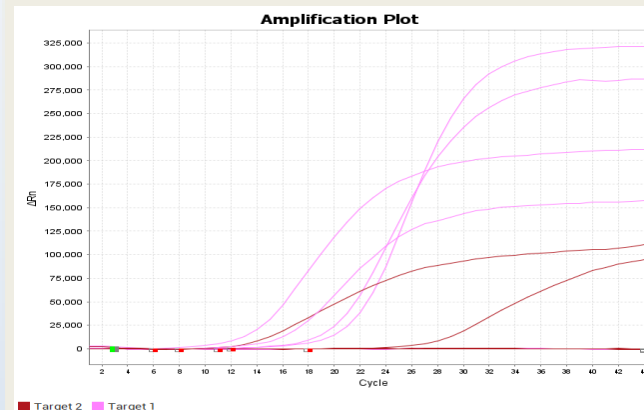
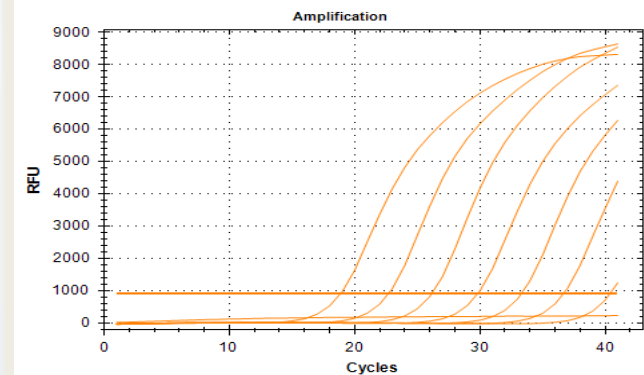
TRIzol

One-step RT-qPCR

cDNA synthesis
Denaturing
Primers and probes Annealing
Extension



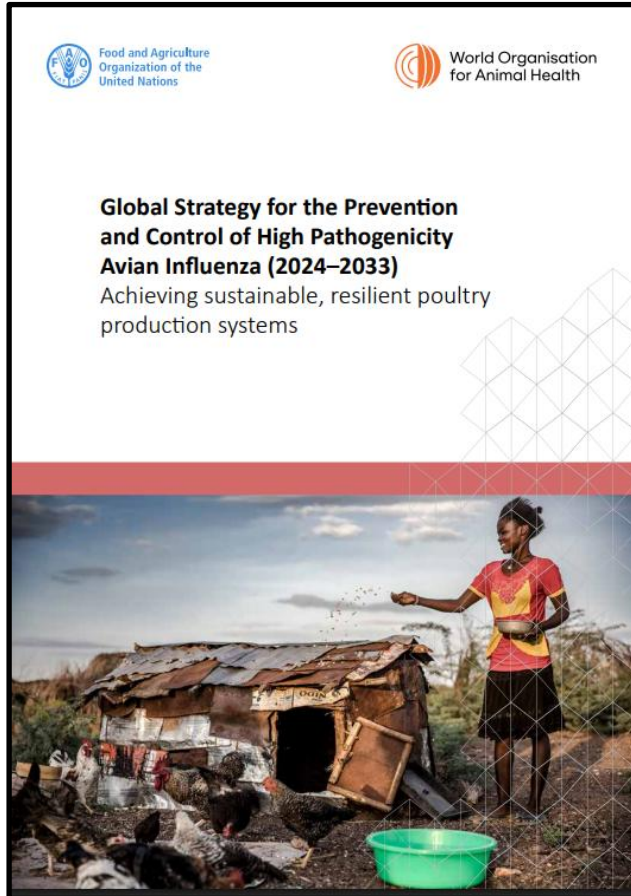
Data analysis



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Key actions for Prevention and control of HPAI



Pillars of the Global Strategy: Prevent, Protect, Transform

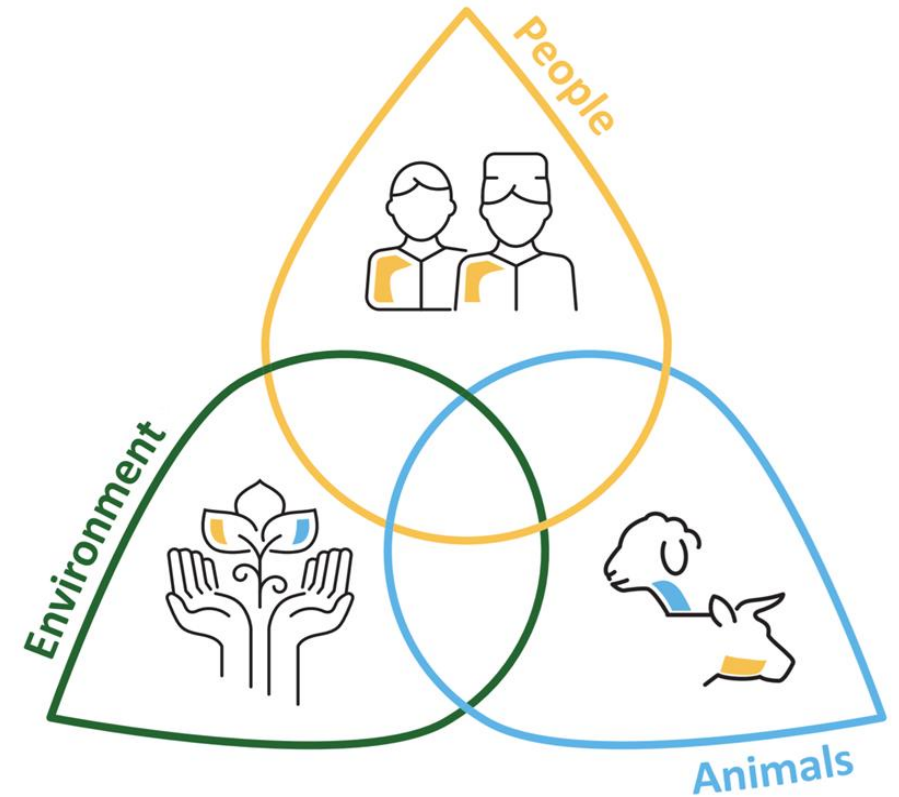
- Laboratory capacity
- Surveillance and reporting
- Biosecurity in value chains
- Uptake of vaccination
- Outbreak response and emergency support
- Preparedness planning and business continuity
- Awareness and advocacy
- Regional and International Cooperation

In February 2025 WOAH Released the **New Global Strategy**
for the Prevention and Control of HPAI (2024-2033)

No country nor sector can face HPAI alone!

We need to take the collective action to:

- Capacity building by Hands-on training (Diagnosis)
- Experience sharing (Vaccine and vaccination)
- Enhance integrated surveillance (Trans-boundary)
- Information and data sharing (Early warning)
- Implement national & cross-border strategic actions



Key role of WOAHA and other partners to support countries in HPAI prevention and control



中国动物卫生与流行病学中心
China Animal Health And Epidemiology Center



Thank you!

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