Field experiences on Avian Influenza surveillance in vaccinated broiler breeder populations - Indonesia

Teguh Yodiantara Prajitno

22 October 2024

Outline

- Indonesia poultry industry / Maintenance of AIV in commercial poultry / public-private HPAI control programs / vaccination against HPAI

- Demonstration of HPAI-freedom and continuation of international trade / Japfa: Surveillance and monitoring practice / Biosecurity and compartmentalization in breeding farms

Indonesia poultry production system (FAO, 2004)

Sector 1

industrial and integrated production system

Sector 2

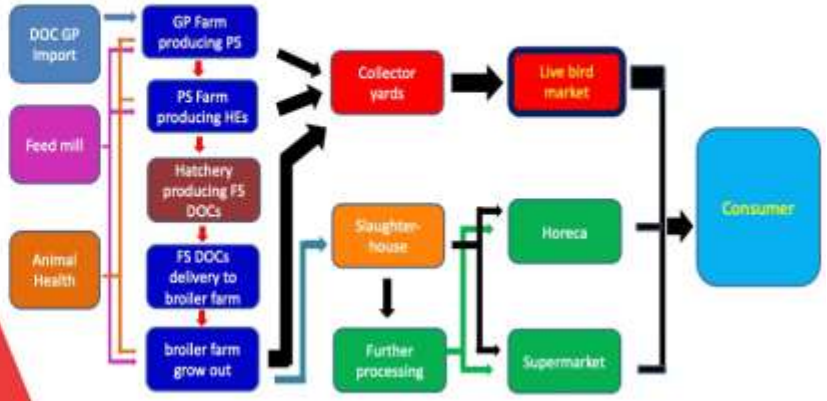
Commercial poultry production – moderate high biosecurity

Sector 3

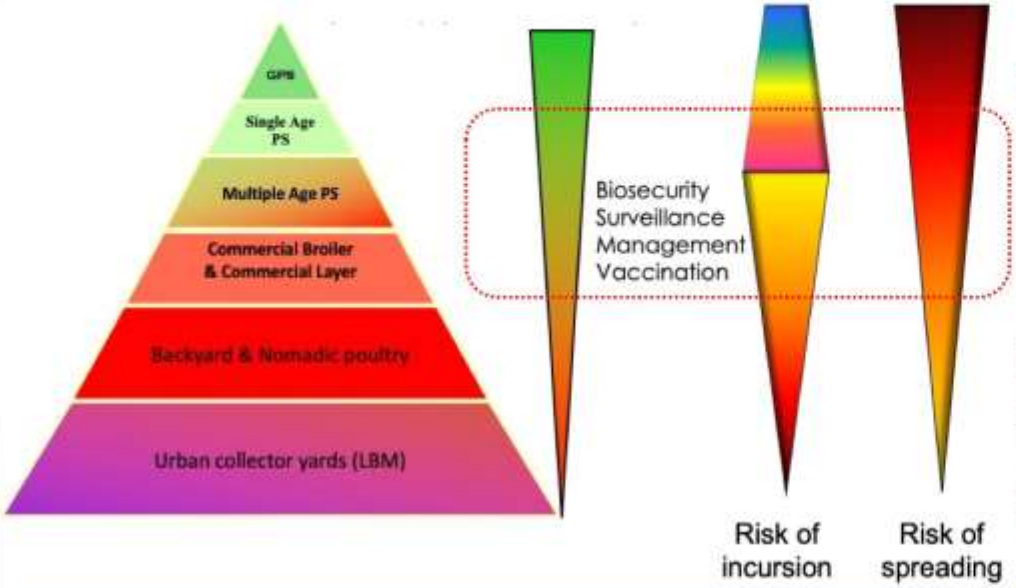
Commercial poultry production – low biosecurity

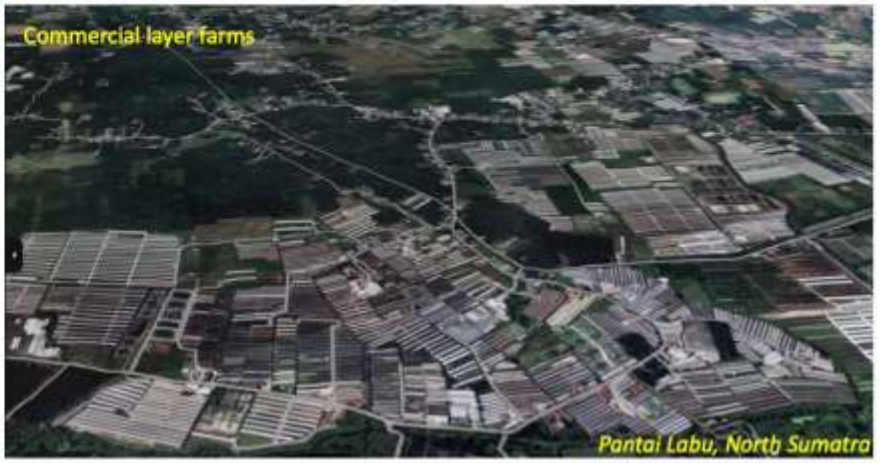
Sector 4

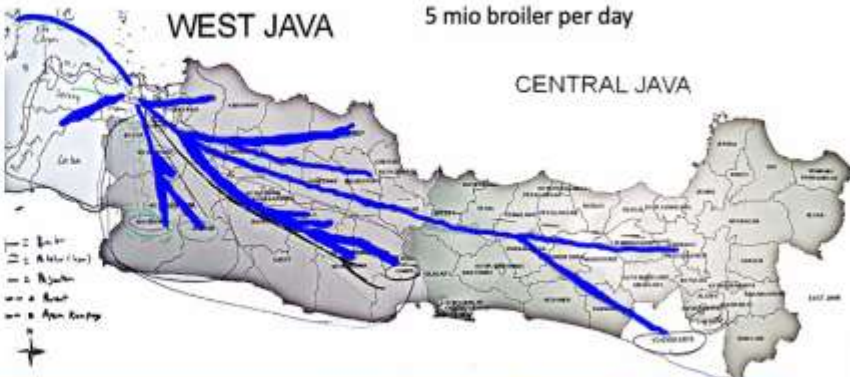
village or backyard poultry producers – no biosecurity



Indonesia poultry production system (T. Prajitno, 2008)







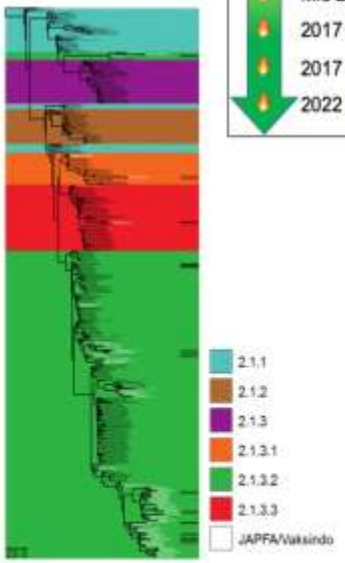
Indonesia - Strategy HPAI control on poultry

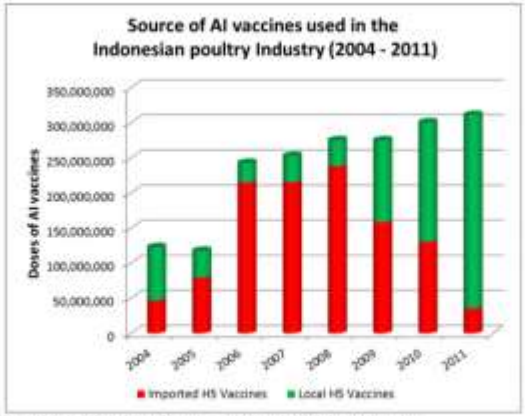
Main strategies

1) Detection, report and rapid Response
2) **Biosecurity**
3) **Vaccination**
4) Structuring the poultry market chain
5) **Compartmentalization and zoning**
6) **Surveillance and monitoring**
7) Control movement

Mid 2003 – First introduction of **HPAI H5N1 clade 2.1** virus to Indonesia; Central Java and North Sumatra
2004 – First DIVA vaccine roll out (Ck/Mex/94 (H5N2); Tk/N-28/73 (H5N2); Tk/Wi/68 (H5N9)
2004 – 2005 Spread of HPAI H5N1 virus to 30/33 provinces
Mid 2005 **vaccine failures in breeders and layers**, spread to broilers
Mid 2005 first human case of H5N1
2005 – 2007 H5N1 clade 2.1 → diversification to 2.1.1; 2.1.2; 2.1.3 / generation of outlier strains
2007 – 2010 H5N1 clade 2.1.3 → diversification to 2.1.3.1; 2.1.3.2; 2.1.3.3 / generation of outlier strains
2010 – 2012 H5N1 clade 2.1.3.2 →diversification to 2.1.3.2a and 2.1.3.2b
Mid 2012 **Introduction of clade 2.3.2.1c** by wild birds into domestic ducks in Central Java
2013 spread into domestic chickens
2016 **Clade 2.1.3.2a extinct in Indonesia**
Mid 2016 **Introduction of H9N2 clade 9.4.2.5** in layer farms in South Sulawesi
2017 spread to poultry industry throughout Indonesia
2017 – now co-circulation of H5N1 (clade 2.3.2.1c) and H9N2 (clade 9.4.2.5)
2022 – **introduction of H5N1 clade 2.3.4.4b (still limited)**

Source: MOA DGLSAH





Source: Directorate of Animal Health and Indonesian Breeder Association GAPPI (modified)

Implementation of the AI-free compartments through the Minister of Agriculture Decree No. 28/ Permentan/OT.140/5/2008 (Compartmentalization and Zoning) starting in 2008.

1. Clear physical barrier that separates from the surrounding environment. Fenced and one way personnel movement system, visitor matrix.

2. Free of Avian Influenza virus infection (HPAI ad LPAI) during the previous 12 months in susceptible poultry populations (vaccinated and unvaccinated).

3. Implement **Good Farming Practices/Good Breeding Practices** as general procedures

4. Employees receive **training** and updates in the application of poultry health management, especially biosecurity.

5. Implement **strict biosecurity measures** (isolation, movement control, and cleaning-disinfection) with complete documentation /records.

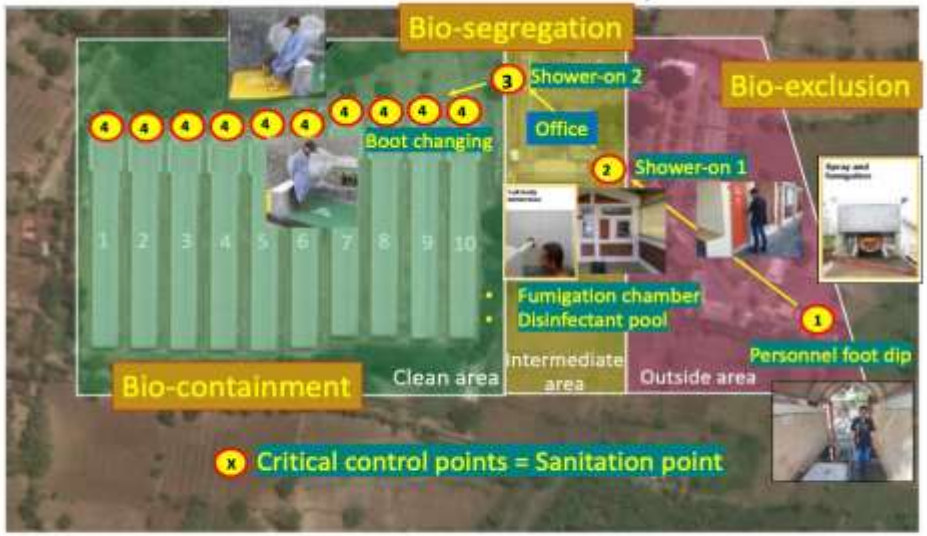
6. Perform **routine independent surveillance/monitoring** of poultry disease clinical signs

8. Used of **licensed AI vaccines** in the vaccination program. Vaccine titre and antibody uniformity are monitored periodically and well documented.

9. Control of pests, wild animals, rodents, and vegetation around the unit of compartment.

10. Laboratory tests if sick birds are found or if there is an increase in suspect cases and report them to the veterinary authorities if AI is suspected.

HPAI-free compartmentalization of breeding farms

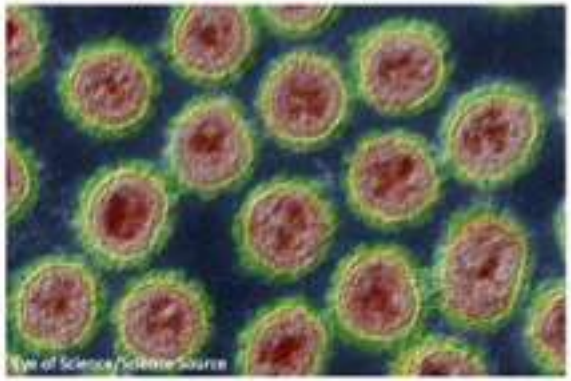


From/to	GP Farm	GP Hatchery	PS Farm	PS Hatchery	Commercial farm	Laboratory	Breeding Farm with disease
GP Farm	Overnight	Same day	Overnight	Same day	Same day	Same day	Overnight
GP Hatchery	Overnight	Same day	Overnight	Same day	Same day	Same day	Overnight
PS Farm	2 days	1 day	Overnight (young flock → Old flock	Same day	Same day	Same day	Overnight
PS Hatchery	2 days	1 day	Overnight	Overnight	Same day	Same day	Overnight
Commercial Farm	5 days	4 days	4 days	3 days	Same day	Same day	5 days
Laboratory	5 days	5 days	5 days	1 day	Overnight	Same day	5 days
External visitor & services	3 days supervised quarantine	3 days supervised quarantine	3 days supervised quarantine	2 days supervised quarantine	1 day	Same day	3 days supervised quarantine
Breeding Farm with Diseases	5 days	5 days	5 days	3 days	3 days	Same day	5 days

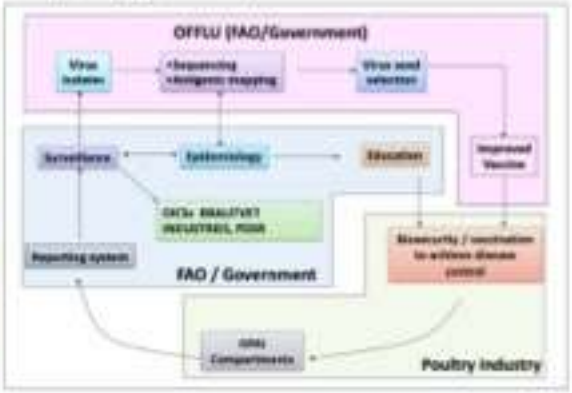
- Realtime
- Centralized data capturing
- Integrated
- Reporting every even of disease
- Notify district and provincial government
- Compulsory for poultry companies to obtain AI free compartment status

Public and private HPAI surveillance programs – Indonesia (2007 – now)

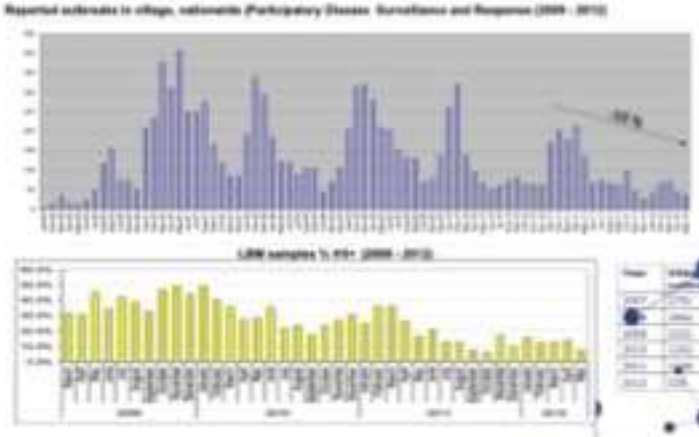
Poultry industry (sector 1 & 2):
HPAI free compartment / biosecurity / AI vaccination & serology / PCR (freedom) / reporting system: **iSIKHNAS (all sector)**



Government / FAO:
Participatory Disease Surveillance & Response (Disease surveillance and reporting: sector 4)



Government / FAO:
Collector yard & live bird market surveillance



Government / FAO/ Vaccine Industry:
Vaccine matching: **IVM Online**

Japfa – Poultry health network

Breeder lab (2x)

Grandparent stock (GP)
Parent stock (PS)

Vaksindo

Commercial Broiler and layer

Agrilab (4x)

Poultry Health & Laboratory services

Vaksindo diagnostic and vaccine laboratory

Vaksindo diagnostic and vaccine laboratory

Commercial laboratories (1 central lab & 4 satellite labs

Agrinusa Technical Service

Rapid Test → Real time PCR

Necropsy & sampling → Serology

Virus isolation → Real time PCR

Vaccine efficacy test (challenge) → Antigenic cartography

Necropsy & sampling → Serology

Rapid Test → Real time PCR

interpretation

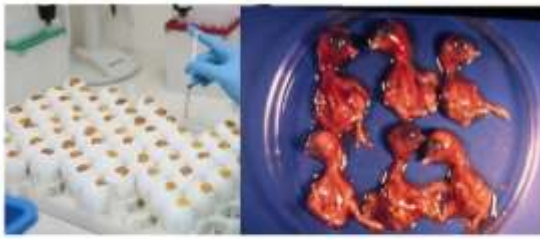
confirmation

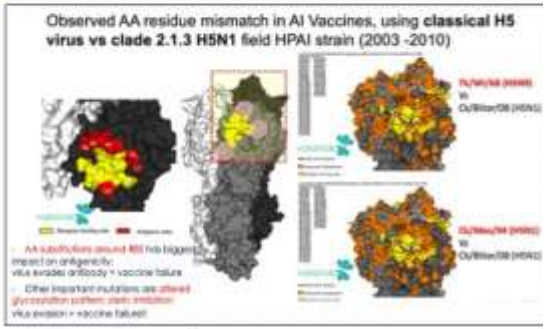
DNA Sequencing & Phylogenic analysis

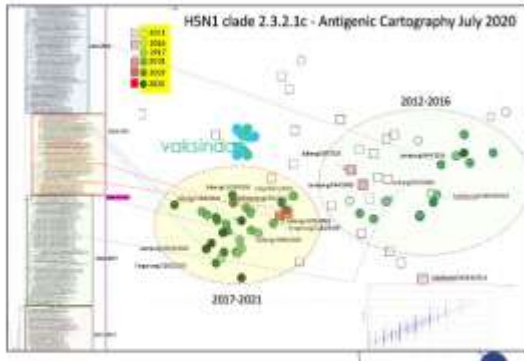
In silico crystallography

confirmation

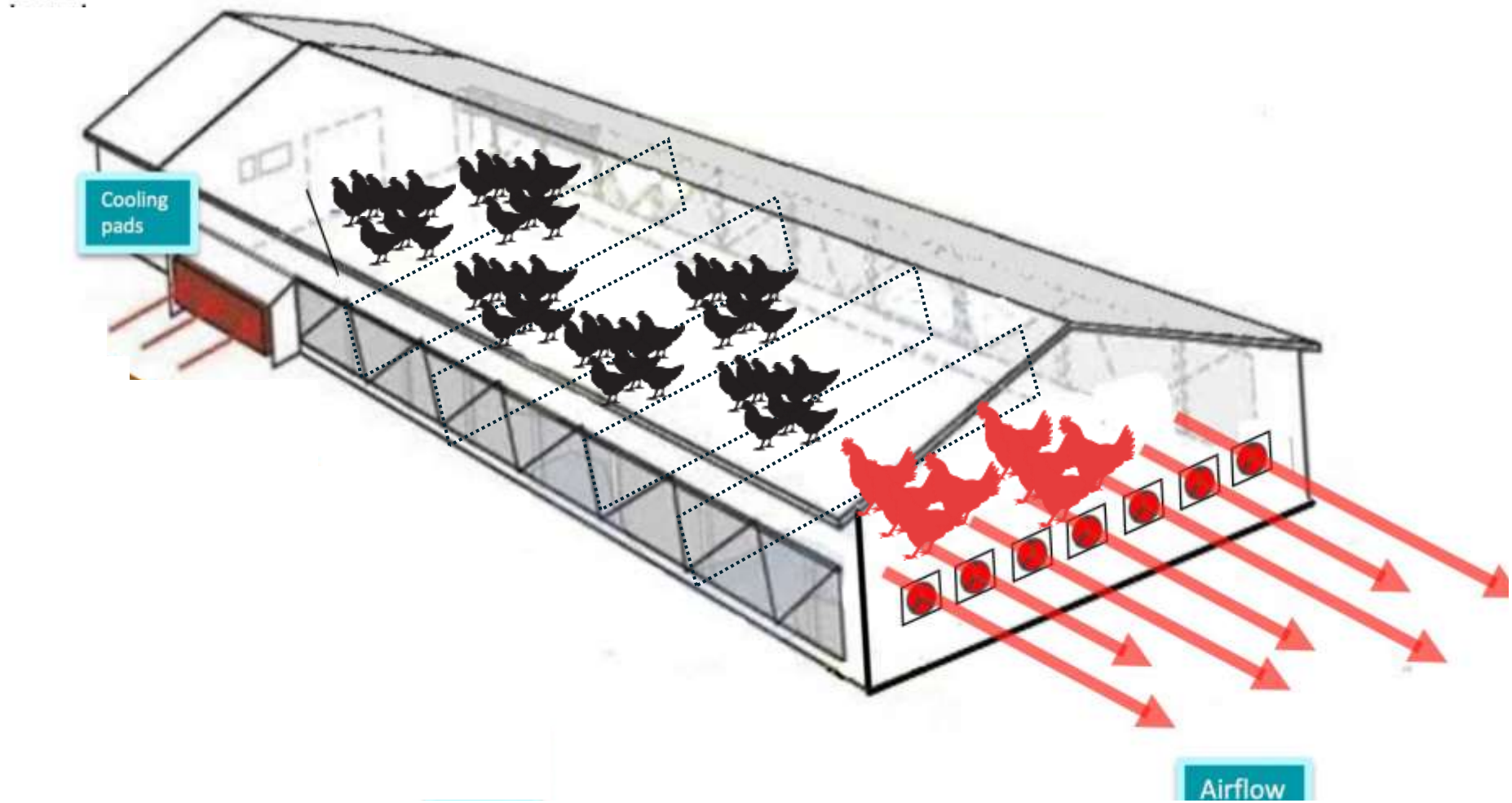
interpretation







Sentinel birds posses danger of virus



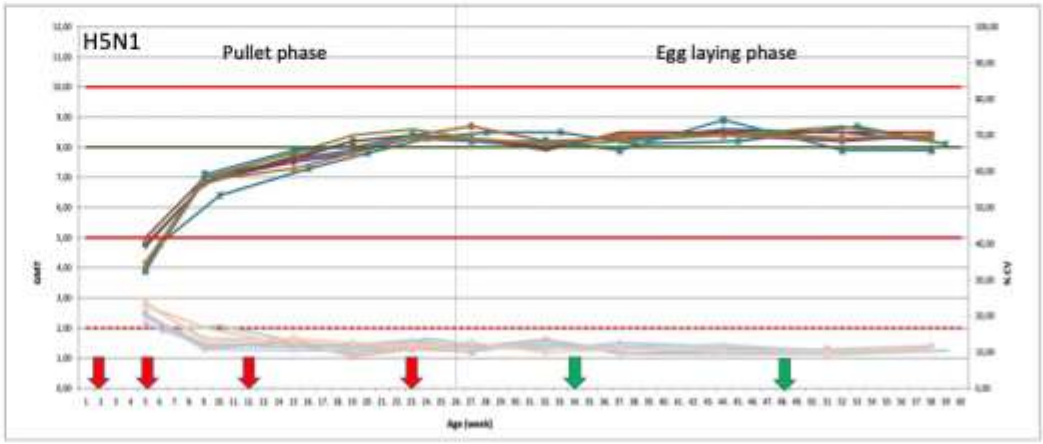
Measures to maintain HPAI and virulent ND freedom in breeding farms

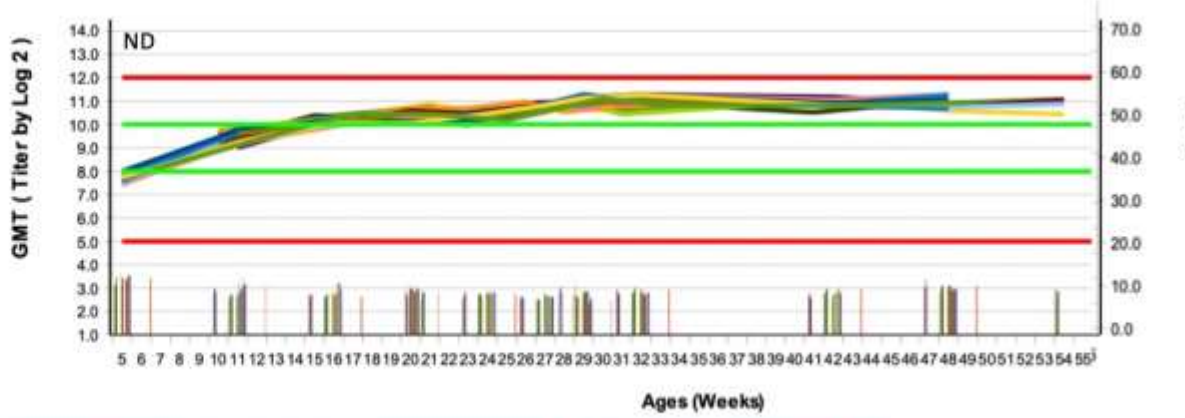
Active surveillance:

HI Test every 5 weeks

Sample size 30 birds per house (8,000 birds)

VACCINATION PROGRAM FOR PS BROILER		
Ages	Vaccine	Type
7 Days	ND Ban/AF	Live
14 Days	AI multi H5-H9	Killed
21 Days	ND Clone 30 + IB Ma5 ND L multi IB Plus	Live Killed
35 Days	AI multi H5-H9	Killed
7 Weeks	ND Ban/AF ND L multi IB Plus	Live Killed
12 Weeks	ND Clone + IB H 120 ND L multi IB Plus EDS AI multi H5-H9	Live Killed Killed
18 Weeks	ND Ban/AF IB ND L multi IB Plus	Live Killed
23 Weeks	ND Ban/AF IB AI multi H5-H9	Live Killed
		Killed Killed
34 Weeks	ND L - AImulti H5+H9	Killed
48 Weeks	ND L - AImulti H5+H9	Killed





Measures to maintain HPAI and virulent ND freedom in breeding farms

Active surveillance:

PCR every 5 weeks

Sample size 30 birds per house (8,000 birds)

VACCINATION PROGRAM FOR PS BROILER		
Ages	Vaccine	Type
7 Days	ND Ban/AF	Live
14 Days	AI multi H5-H9	Killed
21 Days	ND Clone 30 + IB Ma5 ND L multi IB Plus	Live Killed
35 Days	AI multi H5-H9	Killed
7 Weeks	ND Ban/AF ND L multi IB Plus	Live Killed
12 Weeks	ND Clone + IB H 120 ND L multi IB Plus EDS AI multi H5-H9	Live Killed Killed
18 Weeks	ND Ban/AF IB ND L multi IB Plus	Live Killed
23 Weeks	ND Ban/AF IB AI multi H5-H9	Live Killed
		Killed Killed
34 Weeks	ND L - AImulti H5+H9	Killed
48 Weeks	ND L - AImulti H5+H9	Killed

JAPFA

PT. JAPFA COMFEED INDONESIA Tbk.
POULTRY BREEDING DIVISION
Standard Operating Procedures (SOP)
Prosedur : Pengambilan sample serology & PCR test

Form No. : 12/SOP-PH/02/2022 | Status revisi : 13 | Tanggal berlaku : 14-02-2022

1.1 Jadwal sample serology & PCR test untuk GP & PS broiler :
Serology & PCR schedule for GP & PS Broiler

AGES	ELISA TEST								HI TEST		PCR TEST
	MG	MS	CAV	FAdV	AE	IB	IBD	Reo	AI	ND	AI
1d	GP	GP	GP	GP			GP		V	GP	
18d							V				
5w	GP	GP							V	V	V
10w	V	V				V			V	V	V
16w	GP	GP	V	V	V	V			V	V	V
20w	V	V				V			V	V	V
24w	V	V		V		V	V	V	V	V	V
28w	GP	GP				V			V	V	V
32w	V	V				V			V	V	V
38w	GP	GP					V	V	V	V	V
42w	V	V				V			V	V	V
48w	GP	GP							V	V	V
52w	V	GP							V	V	V
56w	GP	GP							V	V	V

1.2 Jadwal sample serology & PCR test untuk GP & PS layer :
Serology & PCR schedule for GP & PS Layer

AGES	ELISA TEST								HI TEST		PCR TEST
	MG	MS	AI	FAdV	AE	IB	IBD	REO	AI	ND	AI
1d	GP	GP	GP				GP		V	GP	
18d							V				
5w	GP	GP							V	V	V
12w	V	V		V		V			V	V	V
16w	GP	GP	V		V	V	V	V	V	V	V
21w	V	V		V		V			V	V	V
27w	GP	GP				V			V	V	V
30w	V	V				V			V	V	
33w	GP	GP				V			V	V	V
39w	V	V					V	V	V	V	V
43w	GP	GP							V	V	V
49w	V	GP							V	V	V
53w	GP	GP							V	V	V
59w	GP	GP							V	V	V

1.3 Jumlah sample :
- Parent Stock Broiler & Layer : Test ELISA MG, MS, CAV, AE, IB, IBD, REO, Coryza HI sebanyak 30 ekor pada 20% dari kendang ada di farm. Test AIHI dan NDHI dilakukan pada semua kandang.
- Grand Parent Stock Broiler & Layer : Test ELISA CAV, AE, REO, Fowl Adenovirus, MG, MS, IB, IBD, AIHI, NDHI dan Coryza HI dilakukan pada semua kandang.

Sample quantity:
- *Parent Stock Broiler & Layer : ELISA test for MG, MS, CAV, AE, IB, IBD, REO and HI test for Coryza HI – sampling size 30 birds per house, from 20 % of the houses on the farm should be tested. HI Test for ND and AI should be performed from every house on the farm.*
  Grand Parent Stock Broiler & Layer : Serology from all house performed by ELISA Test for CAV, AE, REO, Fowl Adenovirus, MG, MS, IB, IBD; HI test for AI, ND and Coryza.

2. Sanitasi micro-tube :
- Cuci micro-tube dengan air panas untuk membersihkan kotoran.
- Micro-tube dikeringkan dengan cara mengsook, kemudian ditiriskan diatas nampan plastic / alluminium.
- Setelah kering dimasukkan ke dalam kain dengan ukuran 20 x 40 cm.
- Micro-tube kemudian disterilisasi dengan menggunakan autoclave dengan suhu 196°C,dengan tekanan 150 psi selama 20 menit.
- Micro-tube setelah kering dimasukkan kedalam plastik dan sudah siap untuk dikirim.
- Bisa dikirim langsung ke farm atau dikirim ke tempat transit, apabila dikirim melalui transit. Untuk GP farm diharuskan memakai micro-tube baru.

Mircotube sanitation:
- Clean used microtube with hot and boiling water
- Dry microtube physically and drop remaining water by keeping the tubes upside down.
- Wrap microtube in cloth of 20-40 cm.
- Autoclave tubes at 196 °C,at a pressure of 150 psi for 20 minutes.
- Put tubes in plastic bags, ready to send to the farms.
- Microtubes can be sent directly to the farm or to the transit location. For GP farm it is compulsory to use new microtubes.

Jakarta, 14 Februari 2022

Dr. Tegah Y. Prajitno
Head of Poultry Health & QC

The calculated sample sizes for a population of 8,000 chickens with a prevalence rate of 1-3% at a 95% confidence level and a 5% margin of error are: 1% prevalence: 16 chickens; 2% prevalence: 31 chickens; 3% prevalence: 45 chickens

Measures to maintain HPAI and virulent ND freedom in breeding farms

Passive surveillance:

Breeder farm:

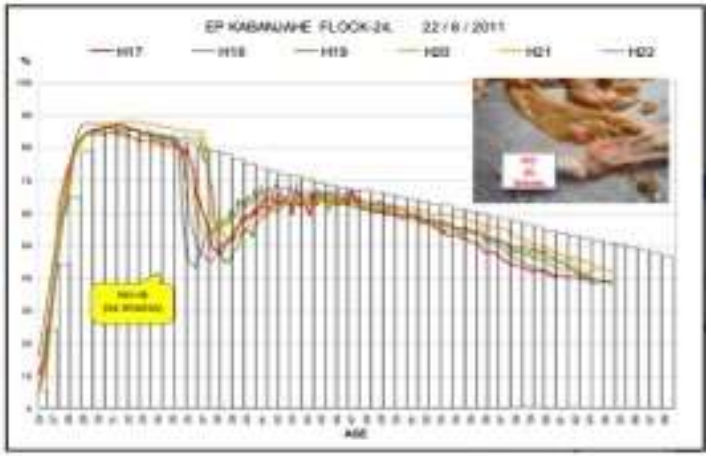
(on site) Necropsy, rapid test and real time PCR, if

Depletion rate: > 0,3% per day

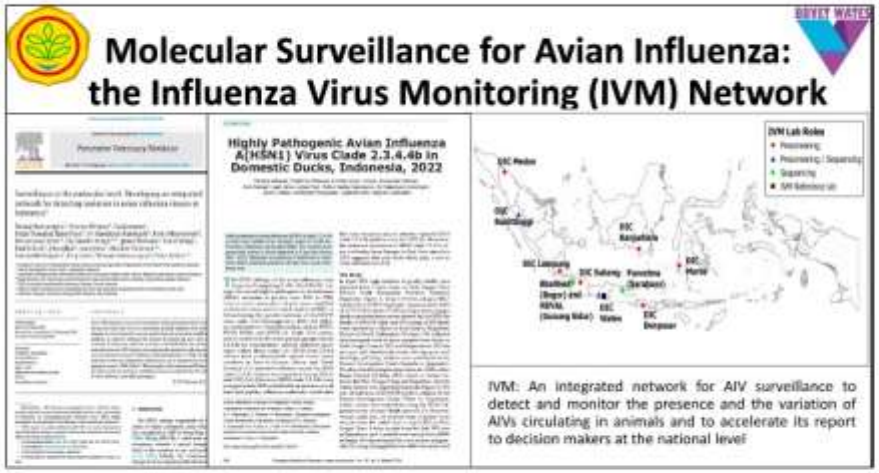
and/or production drop: > 3 consecutive days

Neighbouring village:

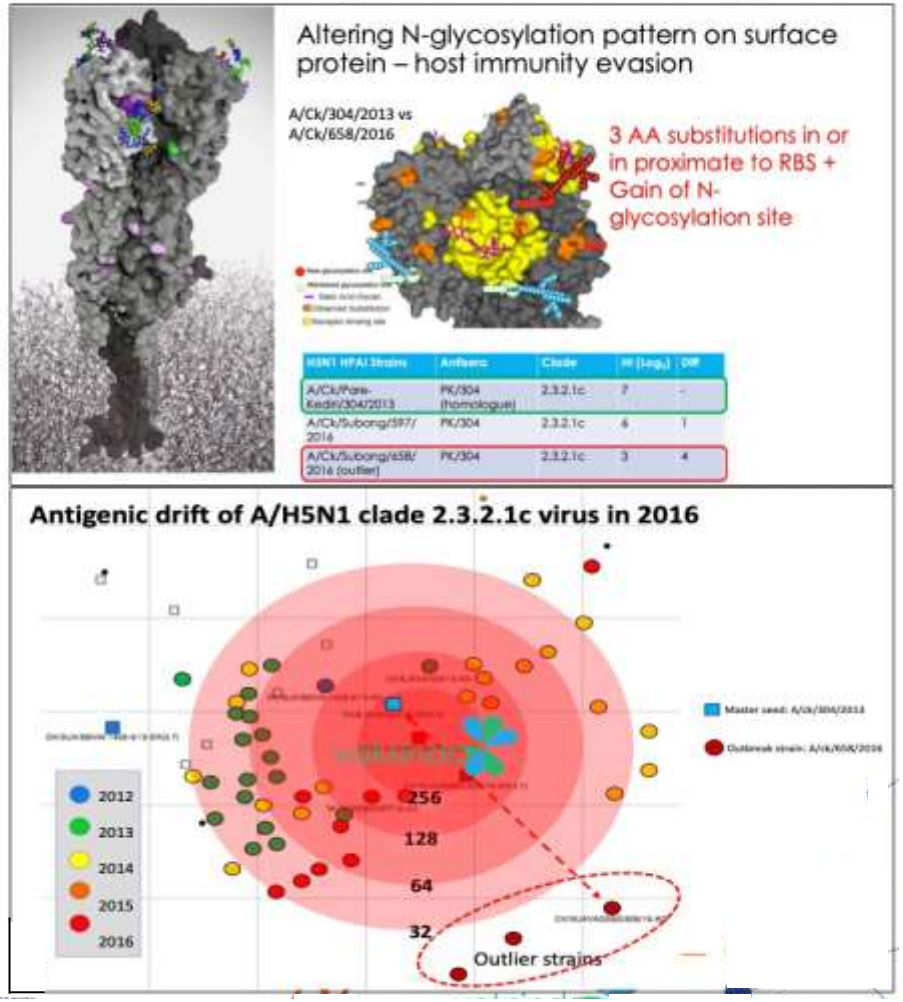
Mortalities in poultry



Antigenic cartography – visualization of changes in virus antigenicity



- DIC Wates – Yogyakarta, Indonesia
- Vaksindo Satwa Nusantara – Bogor, Indonesia



Key experiences made (1/2):

- Unvaccinated sentinel birds are used to **monitor disease presence or spread in a population**.

- If AIV is present in the environment, unvaccinated birds can become infected more easily than vaccinated ones, **serving as carriers or amplifiers of the disease.**

- →contribute to the **transmission of AIV within the flock, potentially overriding the immunity in vaccinated birds**, especially if vaccine coverage or effectiveness is incomplete.

Key experiences made (2/2):

- The presence of unvaccinated birds can put selective pressure on the AIV, encouraging the evolution of strains that can bypass the immunity provided by the vaccine. This can lead to a **potential "vaccine escape" situation**.

- Progeny from unvaccinated sentinel birds **do not have maternal** antibodies against AIV and poses a challenge for the broiler farms (which traditionally has **little biosecurity**; where diseased birds are culled and sold to the LBMs and may cause diseases in human.

- **Detection of AIV** in a broiler breeder flock should be regularly done by PCR (active surveillance) and monitoring of mortalities in the village poultry (passive immunity)

JAPFA

Feeding Emerging Asia

THANK YOU