

AVIAN INFLUENZA

A photograph of a duck, possibly a mallard, lying on its side on a grassy area. The duck has a white body with a dark brown head and neck. Its wings are partially spread, showing a mix of white and dark feathers. The background is a blurred green field.

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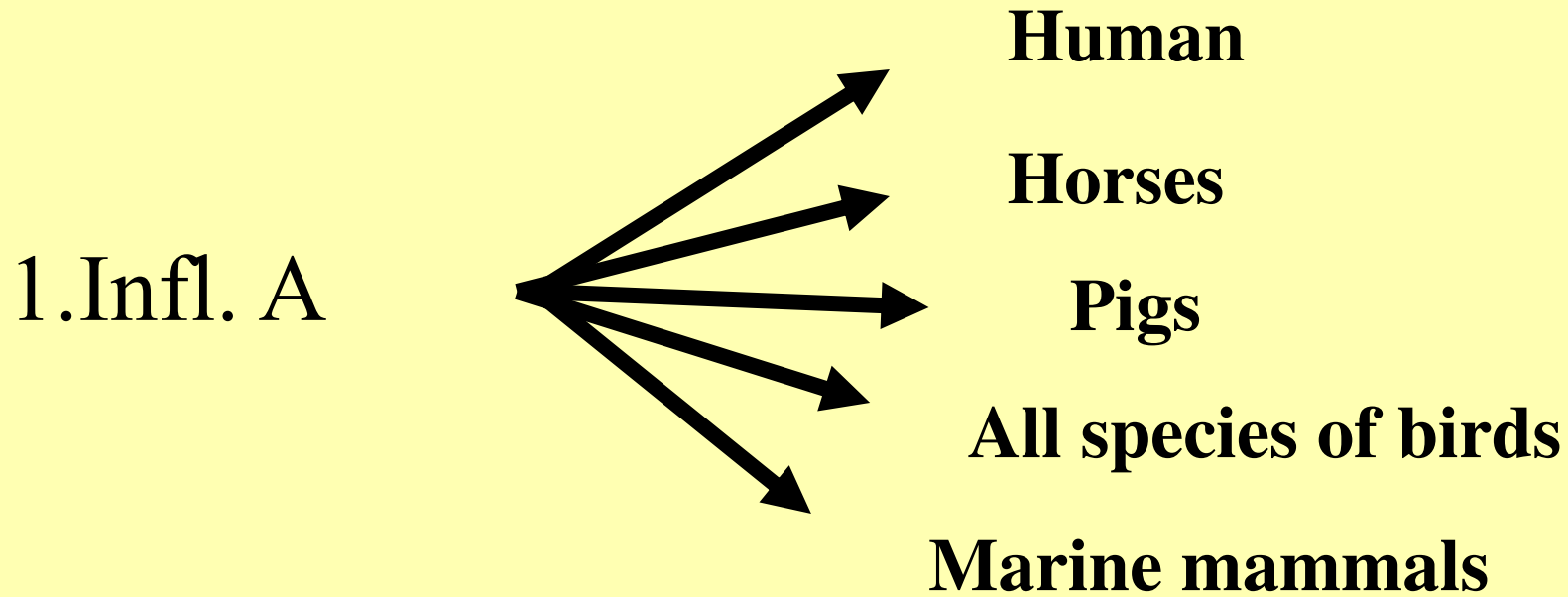
AVIAN INFLUENZA

It is an acute highly contagious septecemic disease affect many species of wild & domestic birds Ch. by: Septecimia, mortality with respiratory, enteric, nervous and drop in egg production. AI infection is ranging from ASYMPTOMATIC to Mild due to **LOW PATHOGENIC (LPAI) VIRUS** or ACUTE with sudden onset short course high mortality due to Infection with **HIGHLY PATHOGENIC (HPAI) virus (FOWL PLAQUE)**.

Economical IMPORTANC:

- High mortality.
- Drop in egg production.
- Zoonotic.
- High cost of prevention and control.

INFLUENZA VIRUS TYPES



2. Infl. B → Human

3. Infl. C

Two arrows originate from a single point on the left and point towards the right, one slightly above the other. The top arrow points towards 'Swine.' and the bottom arrow points towards 'Human'.

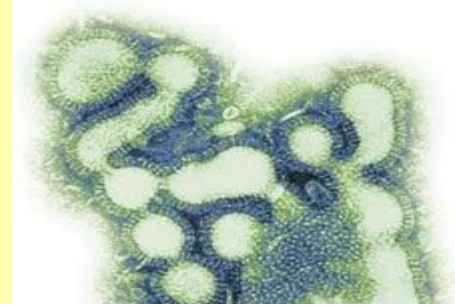
- Swine.
- Human

VIRUS

AI is Type A , orthomyxovirus,
enveloped, ether, heat sensitive, 8 segments,
Virus having 18 types of HA and
11 types of N antigens on its surface. .
Virus agglutinate chicken r.b.cs .

Subtypes of virus:

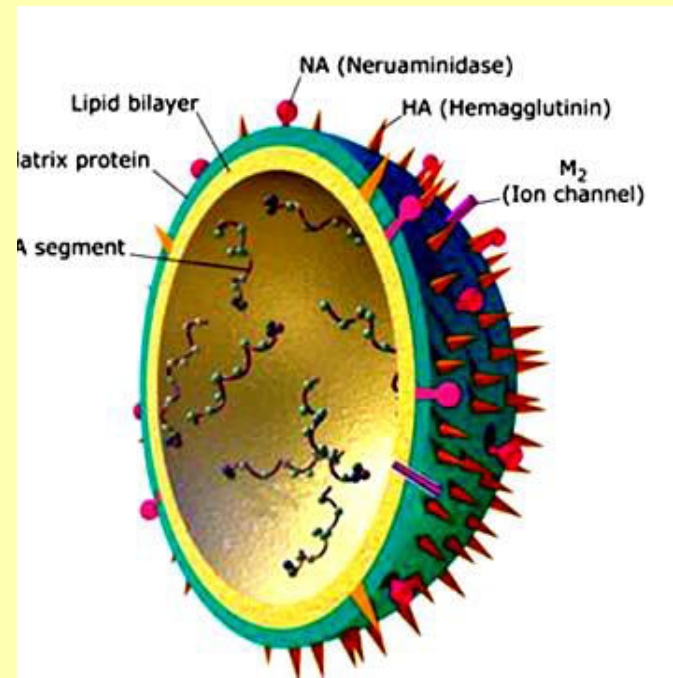
Many types **are labeled** according to H
and N antigen (H1N1,H2N1.....).

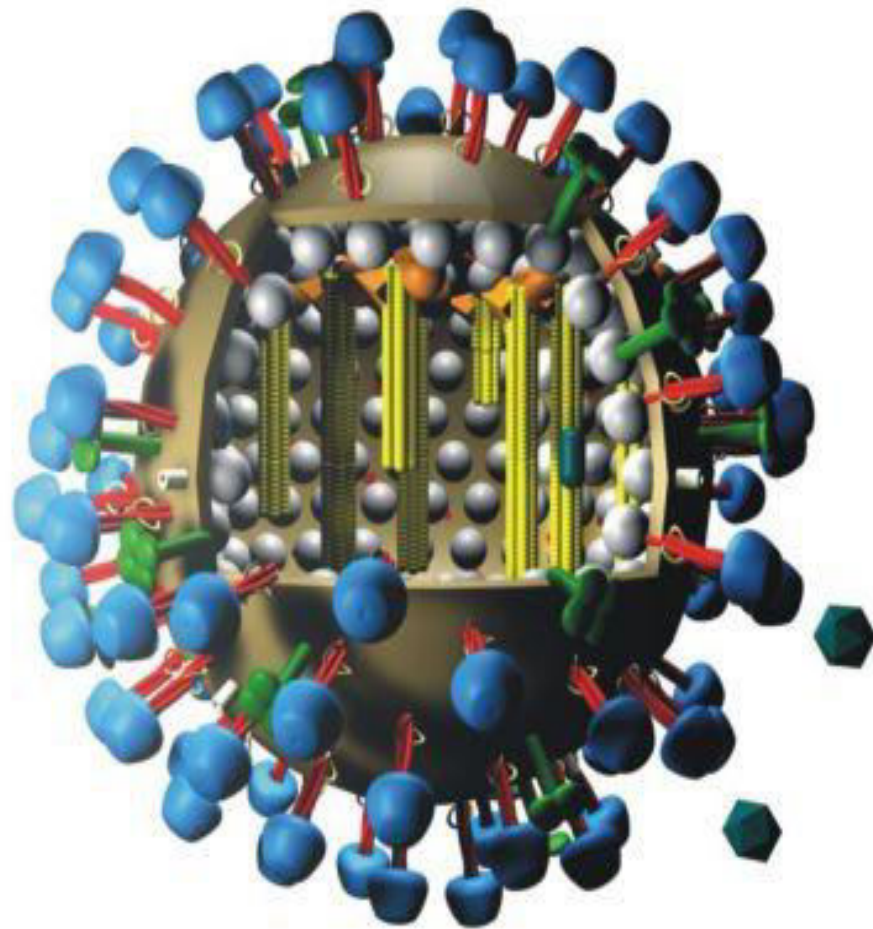



**PLEOMORPHIC OR
FILAMENTOUS**



SPHERICAL





 PB1, PB2, PA

 HA

IMMUNOGENIC
& Infection


 NP

 NA

Identification &
differentiation

 M1

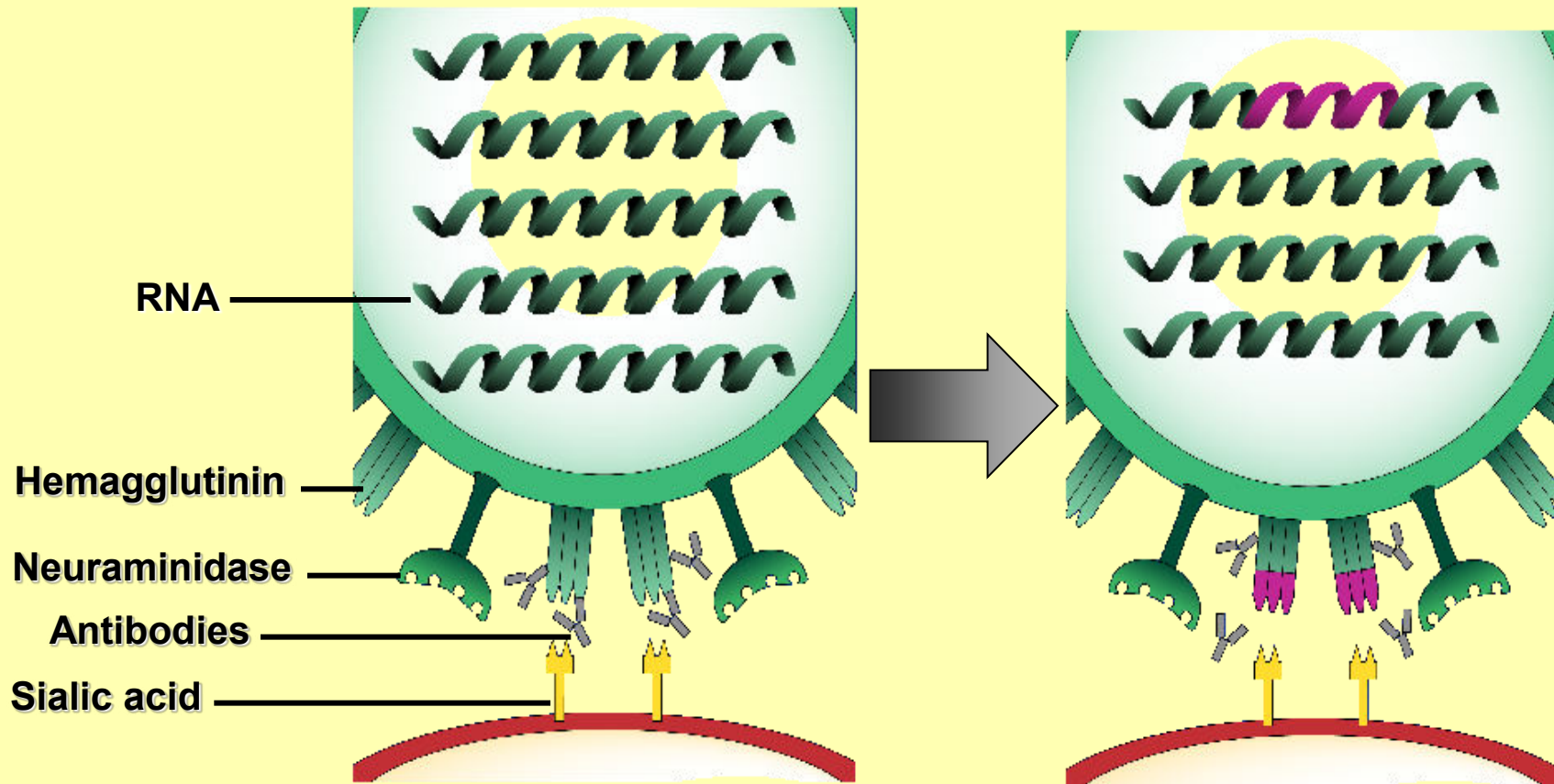
 M2

 NS2

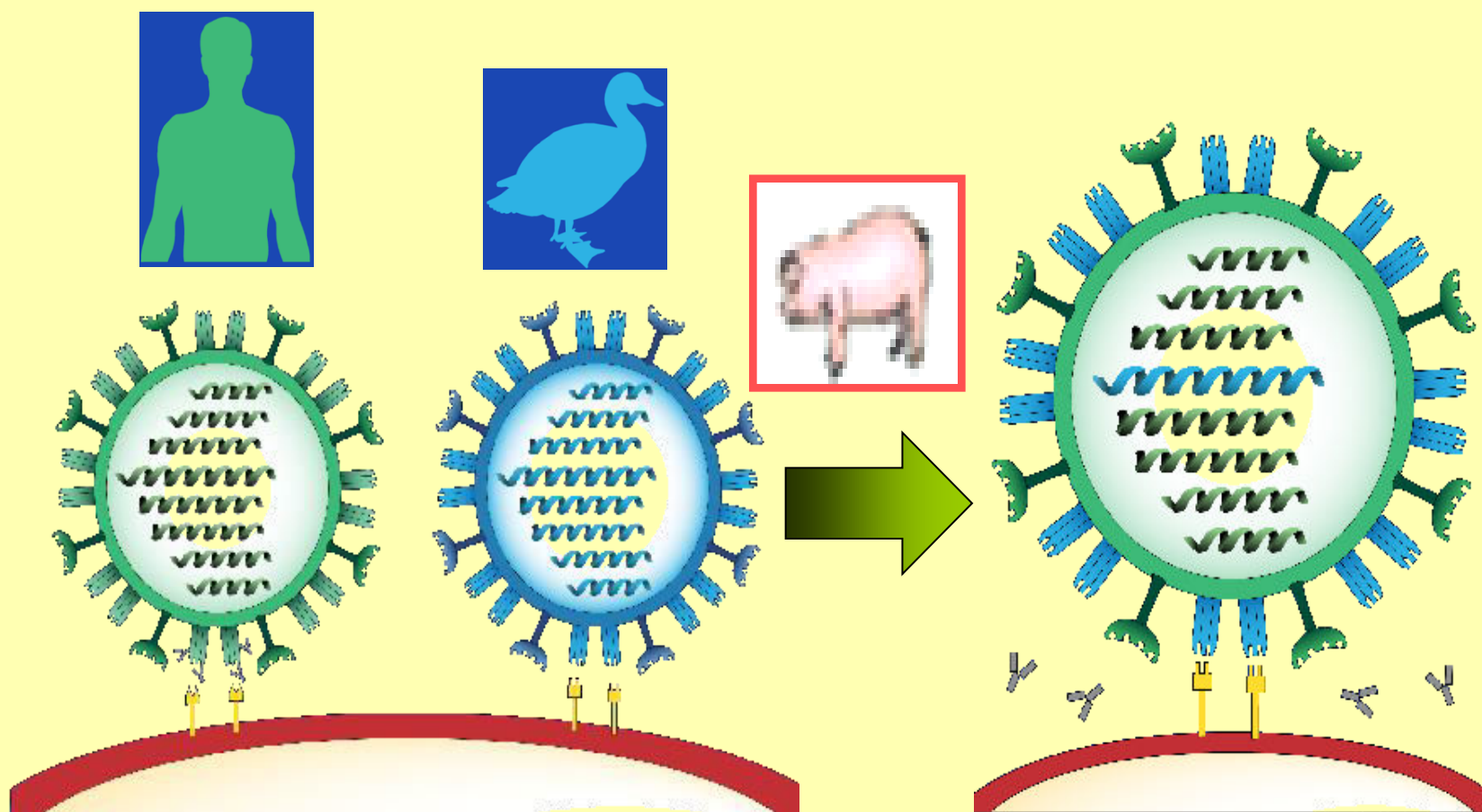
 NS1

VIRAL PROEINS

2. Antigenic Drift: **Change in Surface antigen every 25-30Ys** begins as point mutation occurs in the HA and NA genes



3. Antigenic Shift: mixing of virus segments of two strain in host cell as AIV have 8 segments it is probable to get new 256 virus strains.



IDENTIFICATION OF VIRULANT AIV

1. Any AIV kill 6-8 out of 8 ; 6 week old Susceptible chicks in 10 days i.v injected; each; with 0.1 ml of 1/10 embryonic fluid.
2. Any H5 or H7 virus having amino acid as in Slandered HPAI virus.
3. Any AIV not H5 or H7 kill 5 chickens and grow on TC non treated with trypsin.

•EU and OIE definition : "infection of poultry by any AI virus that has an IVPI in 6-week-old chickens > 1.2 or any AI viruses of H5 or H7 subtype by nucleotide sequencing has multiple basic amino acids at the cleavage site of HI similar to HPAI virus".

❖ AI viruses contain an HA0 protein, during infection it cleaved at the HA0 cleavage site by cellular proteases of the host to form HA1 and HA2 to become functional.

1- **Mono–basic cleavage sites** contain one basic amino acid in the critical position (-1; e.g. PEKQTR/GLF) of the cleavage site and are cleaved by few cellular proteases. These viruses can grow only in limited areas of the poultry host: generally the intestinal and the respiratory systems.

2- **Multi–basic cleavage sites** contain several basic amino acids in the critical position (1 and immediately ; e.g. PQRESRRKK/GLF) of the cleavage site, some having insertions of 1 or more amino acids that lengthen the cleavage site. They are cleaved by several cellular proteases. Therefore these viruses have the potential to grow systemically (throughout the body) of the host.

Sub-type	Clade ¹	no. of sequences 2009-2013	Cleavage site consensus ²	critical basic aa ³	Size of insert
H5	LP	199	PQRE R /GLF	1	0
H5N1	<u>HP</u>	979	PQRE RRKKR /GLF	6	4
	<u>HP</u>	73	PQREG RRKKR /GLF	5	4
	<u>HP</u>	12	PQRES RRKK /GLF	4	3
H5	LP		PQRE R /GLF	1	0
H5N2	HP		PQR RKR /GLF	3	0
H5N2	LP/HP		PQR KKR /GLF	3	0
H5N2	LP/HP		PQR KKR /GLF ⁵	3	0

Full Name	Abbreviation
Arginine	R
Glutamine	Q
Glycine	G
Leucine	L
Lysine	K
Phenylalanine	F

AI- VIRUSES CAN CLASSIFIED ACCORDING TO PAHOGENICITY TO:

- ***HIGHLY PATHOGENIC A I (HPAI):***

“Some viruses of the H5 and H7 subtypes”

Generalised infection, where they may induce very high mortality (up to 100%) sudden on set and short course.

- ***LOW PATHOGENIC AI (LPAI):***

“All H subtypes H1-H16”.

A mild to asymptomatic, primarily respiratory disease in poultry, unless there is exacerbation by other infections or factors.

TRANSMISSION:

International

- Wild water fowl.
- Birds show.
- Legal and illegal birds trade.

NATIONAL

- Live marketing.
- Bad hygiene.
- Use of slaughter wastes.

FARM

AIV transmitted by contact , aerosol , surface water contaminated with feces of infected or wild birds.

Takeoff



Feeding

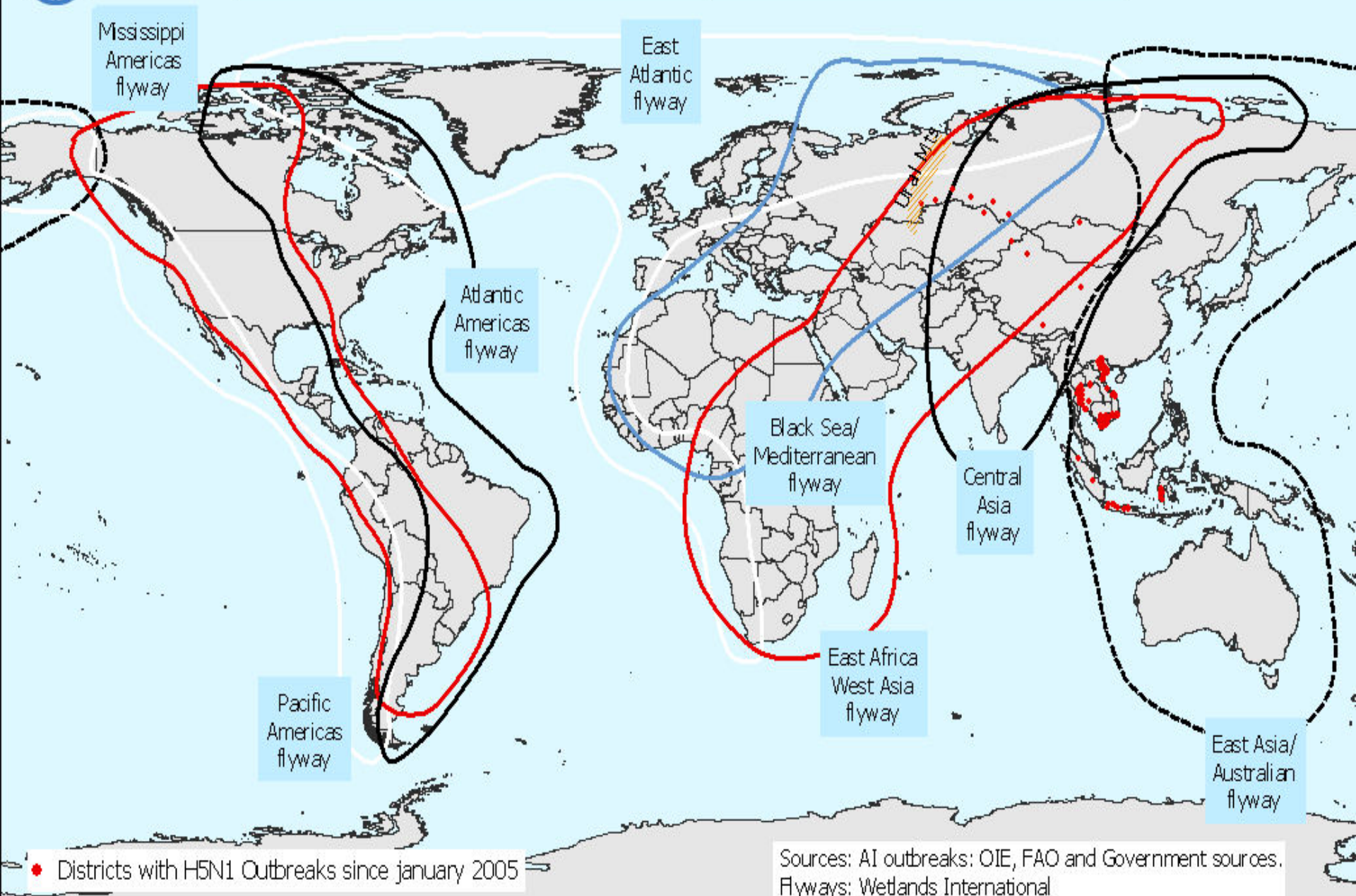


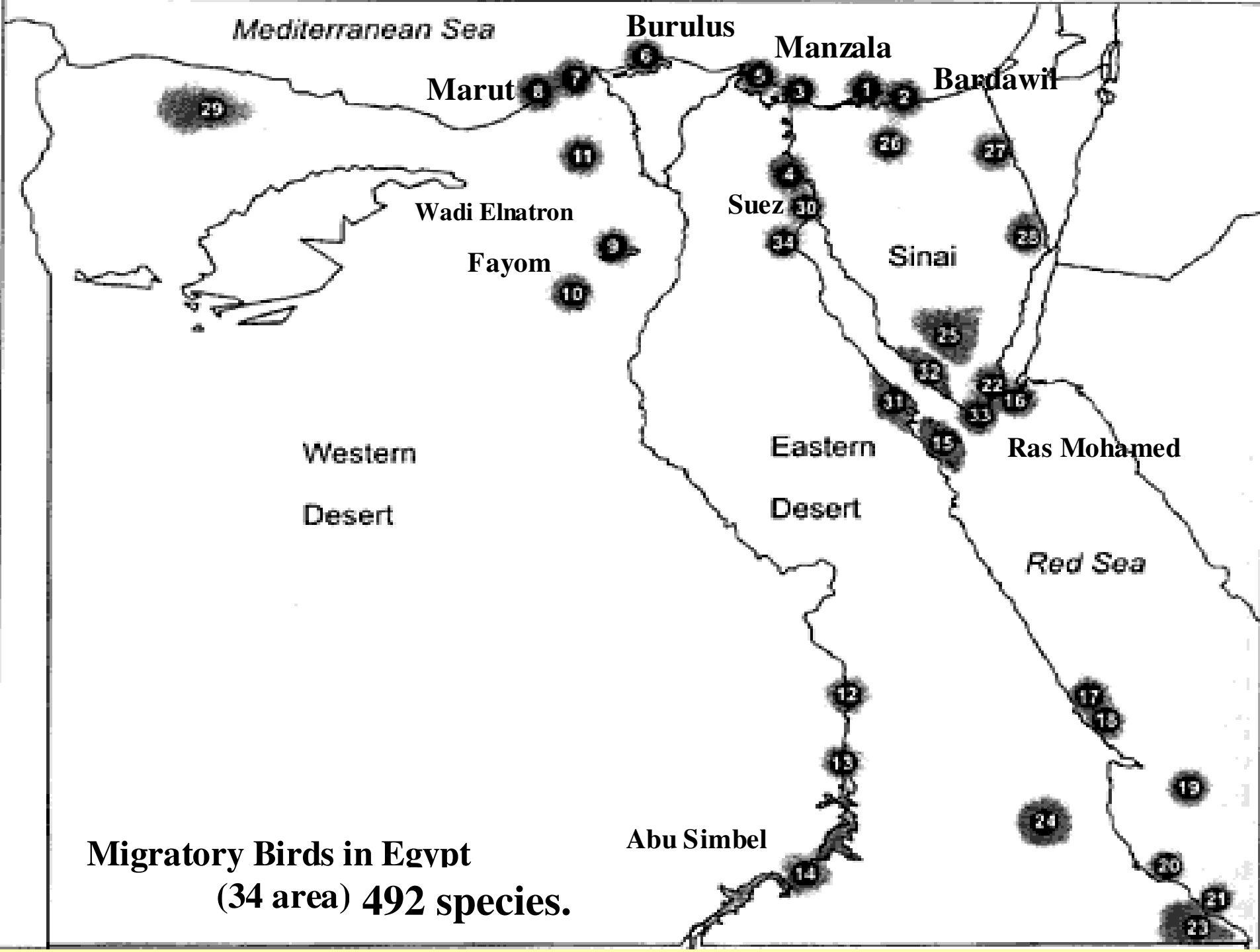
Landing



H5N1 outbreaks in 2005 and major flyways of migratory birds

Situation on 30 August 2005







بط البلبول



بط شرشير



بط خضارى



غر

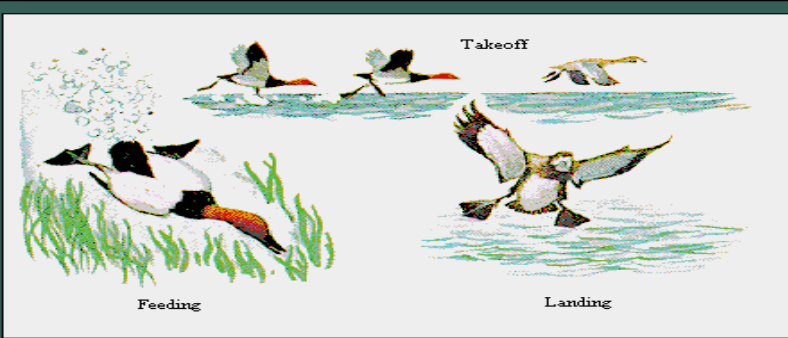


النورس



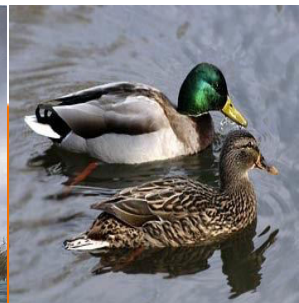
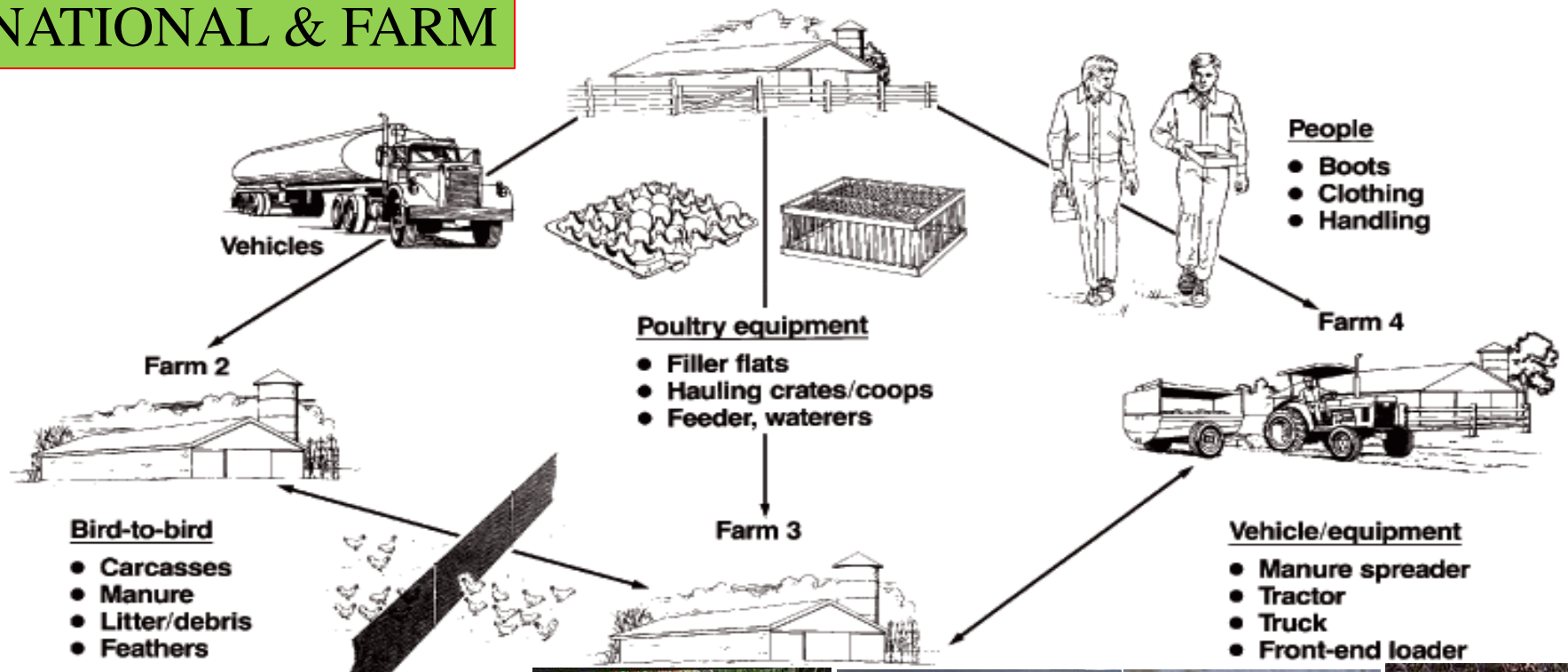
أبو منجل





NATIONAL & FARM

Farm 1



EPIDEMIOLOGY:

- 1.No relation between antigenic structure and virulence.***
- 2. Pathogenicity of virus is variable.***
- 3.AI affect many species of wild and domestic birds, mammals ,pig and man***
- 4.No cross protection between virus strains.***
- 5.One host can infected with more one virus type at the same time.***
- 6.Recovered birds shed virus to along time.***
- 7.Wild water fowl act as a reservoir for virus without signs or AB .***
- 8. LPAI H5 and H7 can emerge to be HP viruses.***
- 9. AI out breaks occur in waves.***













LESIONS:

General congestion ,respiratory tract lesion Sinusitis: Catarrhal mucoid fibrinous caseous. Edema in trachea and larynx ,airsacculitis ,enteritis , peritonitis. Hemorrhages in all serous and mucous mm.

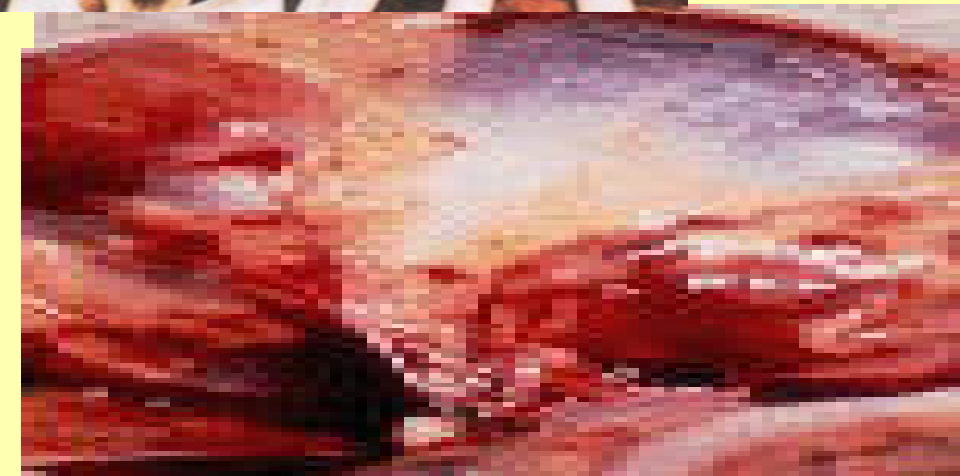
Pancreas had yellow to dark red areas.

Egg peritonitis and exudates in oviduct.

LESION OF HIGHLY PATHOGENIC STRAIN;

Only that of septicemia as hem. And necrotic changes in liver, spleen ,kidney ,and lungs. Head edema with cyanosis of comb and wattles, sinusitis as well as hem. In all serous and mucous mm..





DIAGNOSIS

1. History.
2. Signs
3. lesions.
4. Isolation and identification.
5. Detecytion of antibodies in recovered birds 7-10 dpi.
6. Inoculation of susceptible chicks-->signs of AI.

SAMPLES

Swabs from trachea ,cloacae, sinus& organs

AI. SAC->death at 18-24 h with hemorrhages and HA
+ve EF

IDENTIFICATION: HI monoclonal ,ELISA & PCR.

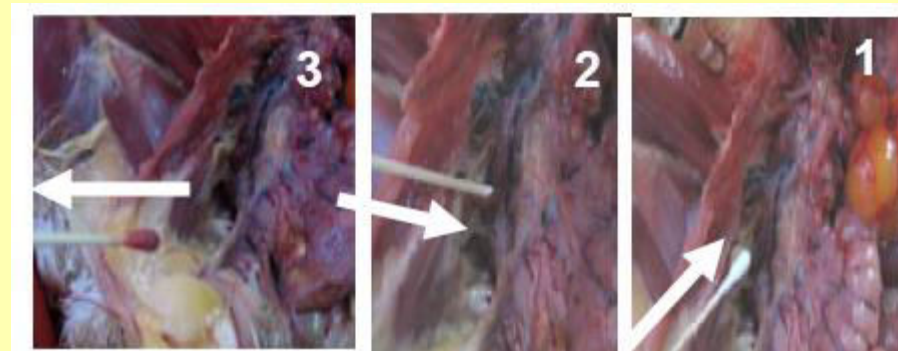
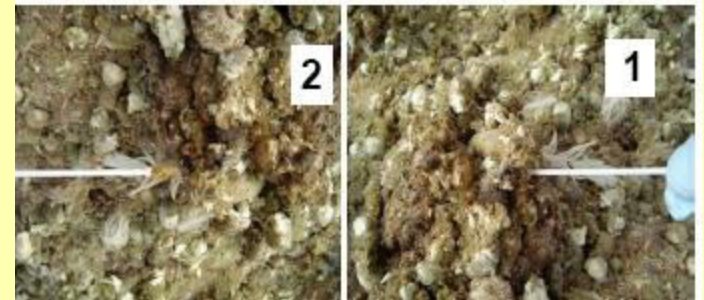
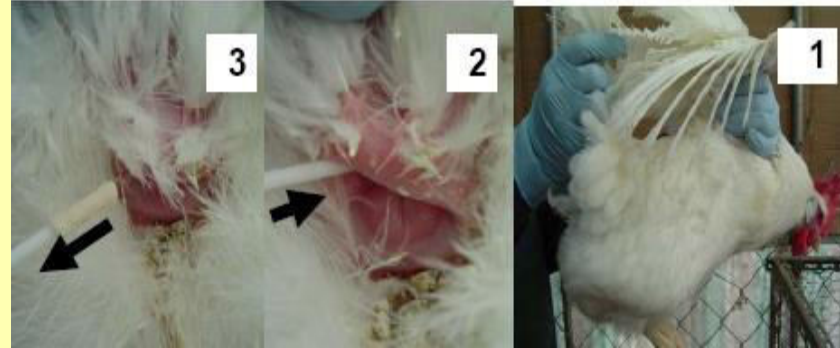
SWABS

TRACHEA

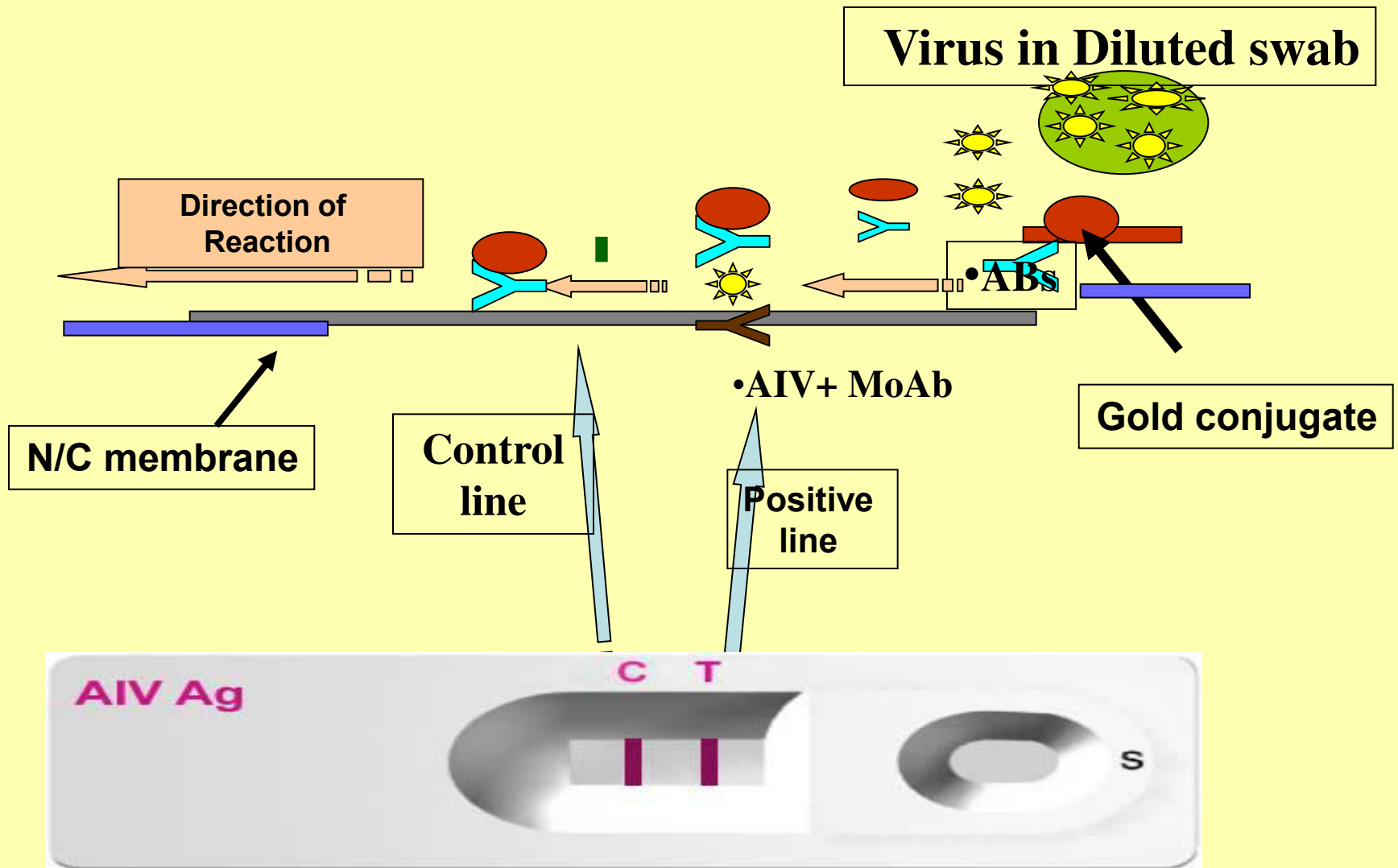
CLOACA

DROPPING

TISSUES



Rapid test



**A. Sample collection
& Transportation**

**B. Sample
Preparation**

C. Test

D. Results

E. Interpret.

one line

Negative

**20
minutes**

2 lines

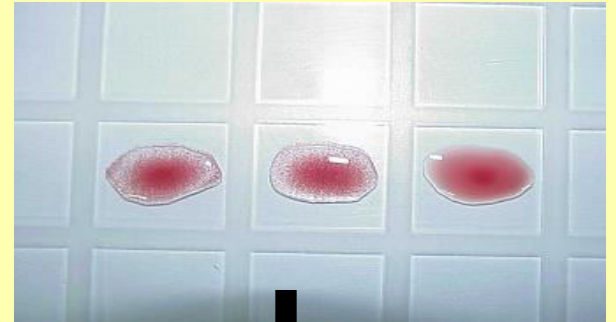
Positive



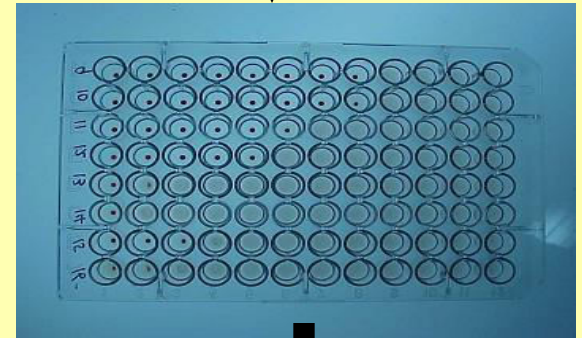
VIRUS ISOLATION AND IDENTIFICATION



HA



HI



NI



Differential diagnosis

***Sept. infections:** ND ,E-coli , Acute fowl cholera and acute spirochetosis

***Courses of head edema :** Pnemovirus (SHS & TRT) Infectious or turkey coryza , chronic fowl cholera. Infectious sinusitis in turkey.

***Respiratory affection :** ND ,ILT , CRD, CHLAMYDIA and CCRD.

PREVENTION:

- 1. Monitoring and observation of migratory birds.**
- 2. Hygienic measures.**
- 3. Prevent contact of wild birds especially water fowls.**
- 4. Avoid use of contaminated surface water in poultry farms .**
- 5. Prophylactic vaccination.**

MONITORING

Samples:

A. Swabs:

Tracheal, coloacal, fecal and tissue Swabs

House , backyards and commercial farms for:

I -Rapid detection influenza type A and H5 strip test kits.

II-RT.PCR .

B. Blood Samples for serum from vaccinated and non-vaccinated :

HI or NI Test for measuring or detection of AI Antibodies.

MONITORING MEASURES IN THE VACCINATION AREA

VACCINATED FARMS

**Monitoring vaccine
efficacy**

**Monitoring epidemiological
situation (all farms)**

Geese, ducks, & ostriches

**30 farms where
vaccination
is practiced**
• HI test
**20 vaccinated birds/
farm/month**

Every 2 months
• **Virological**
**30 cloacal
swabs**

• **Every 30–45 days**
• **Serological**
**10 sentinel birds
/farm**

NONVACCINATED FARMS

Monitoring health situation

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graph TD; A[NONVACCINATED FARMS<br/>Monitoring health situation] --> B[Breeders,<br/>Commercial<br/>layers]; A --> C[Geese,<br/>ducks, &<br/>ostriches]; A --> D[broiler farms]; A --> E[Growers]; B --> B1[• Monthly<br/>• Serological<br/>10 subjects<br/>/farm]; C --> C1[Every 2 months<br/>• Virological<br/>30 cloacal<br/>swabs]; D --> D1[• All at slaughter<br/>• Serological<br/>10 samples<br/>(before loading<br/>for Slaughter)]; E --> E1[• Every 30–45 days<br/>• Serological<br/>10–20samples<br/>/farm<br/>• Virological];
```

**Breeders,
Commercial
layers**

**Geese,
ducks, &
ostriches**

broiler farms

Growers

- **Monthly**
- **Serological**
- 10 subjects**
- /farm**

- Every 2 months**
- **Virological**
 - 30 cloacal**
 - swabs**

- **All at slaughter**
- **Serological**
- 10 samples**
- (before loading**
- for Slaughter)**

- **Every 30–45 days**
- **Serological**
- 10–20samples**
- /farm**
- **Virological**

COMPENSATION

Clear compensation policy in stamping out required well organized private sector and set up a fund for poultry emergency to Encourage farmers for :

- . Reporting of disease.
- . Keeping diseased birds instead of selling them

COMPENSATION RATE

- **70-100% of market value of depopulated birds and 50% of restocking cost in case of:**

Government kill birds for public health.

Farm notification.

- **0% with baying of depopulation cost and 6 months obligatory closure in 1st time in case of no notification To complete closure in 2nd time.**

AI seed **VIRUS LINEAGE** for vaccine:

1. H5N1 (Eurasian).
2. H5N2 (Mexican).
3. H5N9 (European).

AI inactivated vaccines used in EGYPT:

- | | |
|------------------------------------|-------------------------------|
| 1. Reassortant (H5N1,Re-1Strain) . | <u>CHINA</u> |
| 2: FLU-KEM (H5N2) | <u>CEVA</u> |
| 3: H5N2 | <u>Intervet</u> |
| 4: H5N2 Subtype | <u>Lohmann</u> |
| 5: VOLVAC AIKV (H5N2) | <u>Boeh. Ingelheim</u> |
| 6: OPTIMUNE AIV | <u>Biomune</u> |
| 7: H5N2 | China |
| 8: H5N2 | Avimix Mexico |
| 9: H5N9 | |

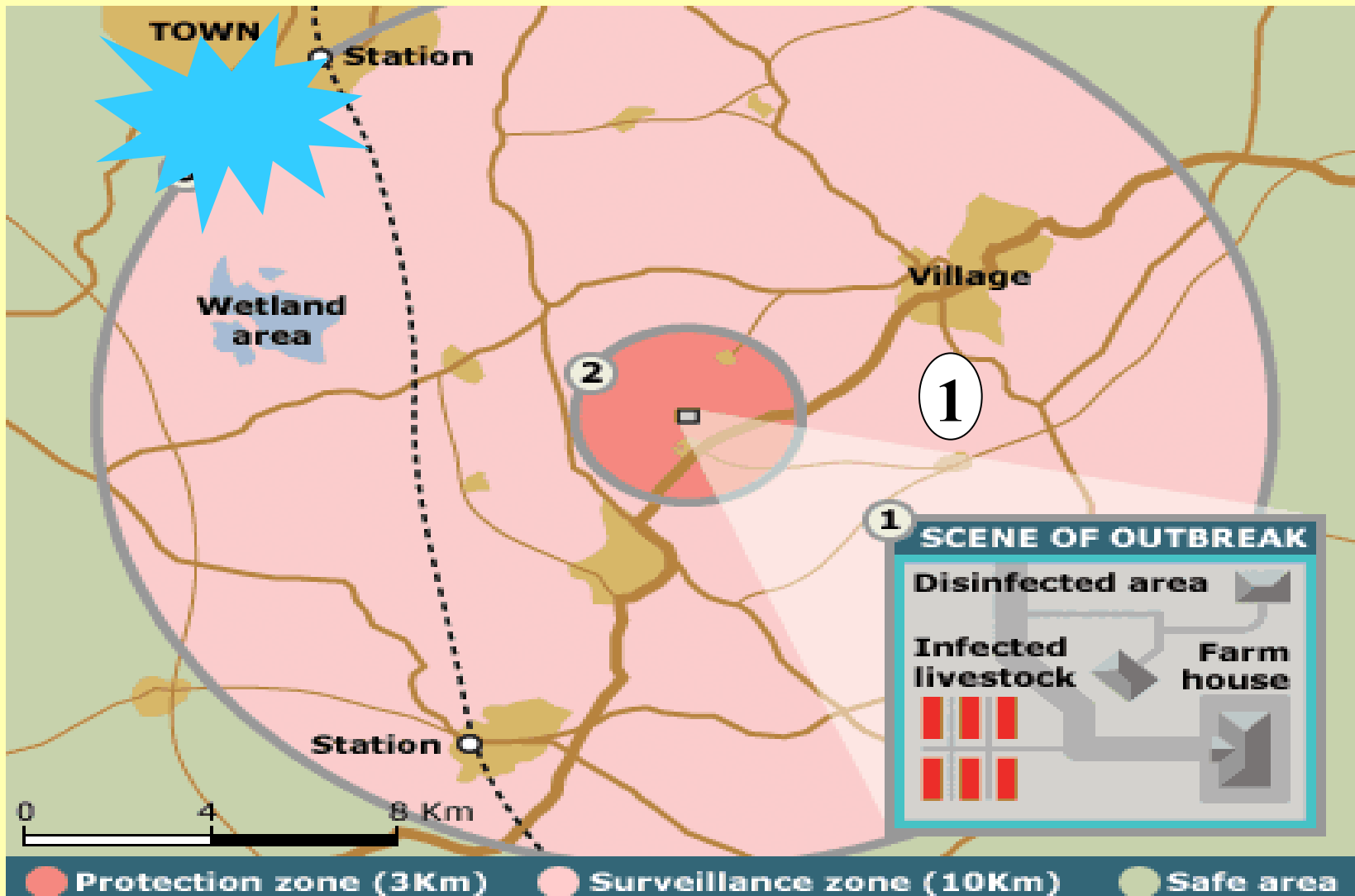
CONTROL

Guidelines for the application of control policies for AI

H5/H7 virus	Index case flock	Evidence of spread to industrial sector	Population density in area	Policy
HPAI/LPA I	Backyard	No	High/Low	Stamping-out
		Yes	Low	Stamping-out
			High	Vaccination
	Industrial	No	High/Low	Stamping-out
		Yes	Low	Stamping-out
			High	Vaccination

CONTROL

1. ERADICATION or STAMPING OUT at 1st Detection in localized area (**SHORT TERM STRATEGY**).



5.VACCINATION:

a. Dead: This used for eradication in **LONG TERM STRATEGY** takes 8-12 years & passed in 4 stages.

a. Vaccination with clinical cases.

b.Vaccination with subclinical cases

c.vaccination no cases.

d.no vaccine no cases.

There is no sufficient commercial vaccine due to many strains ,no cross protection ,continuous shift .while AUTOGENOUS VACCINE for farm or locality is recommended such that used for H5N1

A. Homologus N as H5N1 leaving sentinel birds.

B.Hetrologus N as H5N2 using NI-test to differentiate.

b. Live Recombined AI Vaccine in FOWL POX virus.

ADVANTAGE AND DISADVANTAGE OF OA-INACTIVATED VACCINE:

- Produce **high levels of HUMERAL** antibody that effectively to block viremia.
- prevent HPAI virus from localization in the meat (Swayne, et al, 2006).
- Produce **low levels of LOCAL** antibody on mucosal surfaces.
- Vaccination may aide in control of HPAI, but LPAI can remains endemic and spreads.
- Vaccination can lead to ***“SILENT SPREAD”*** of infection due to incomplete protection at the flock level (Savill et al,2006).

MEASURES OF PROTECTION:

Morbidity, Mortality and Viral shed 3 days post challenge

- **VACCINATION FOR DISEASE CONTROL ONLY:**
 1. Vaccination used only to control clinical disease and losses.
 2. Decrease of viral shedding from infected birds “at least 2 log reduction in viral shedding at peak compared to unvaccinated”.
 3. Decrease risk of transmission of virus to new flock.
- **VACCINATION FOR ERADICATION STRATEGY:**

In relation to Quarantines, Increased surveillance, Movement and marketing controls, and Education with stamping out of infected focus.

 - Vaccination can control of HPAI, but LPAI can remains endemic and spreads.
 - In long term vaccination *“continuously look for antigenic drift in the face of vaccines and Pathogenicity of field virus”*

TO PREVENT ZOONOTIC INFECTION:

- 1. Personal hygiene.**
- 2. Total condemnation of infected flocks.**
- 3. Quarantine measures.**
- 4. Separate pigs from poultry.**





واقى للرأس

واقى تنفسي

بدلة واقية

واقى للعينين

قفاز من المطاط

حذاء واقى



THANK YOU