



"Regards Croisés" sur l'Influenza aviaire

15-19 / 12 / 2008 • Montpellier • France



Rencontres scientifiques autour de deux projets de recherche :
Scientific meeting around two research projects:

GRIPAVI (CIRAD, MAEE) & ARDIGRIP (AIRD)

Study of the Determinants and Patterns of HPAI H5N1 in North Vietnam

General approach and initial
results

GRIPAVI PROJECT

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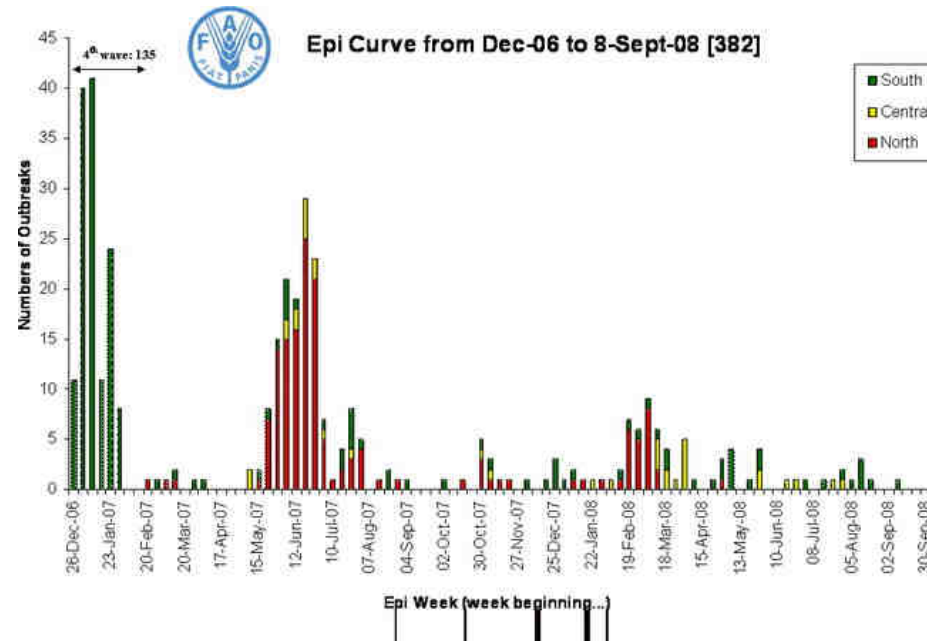
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GRIPAVI project in Vietnam: Context



H5N1 outbreaks declared since 2003 (poultry + transmission to Humans)

Vaccination adopted to face the non clinical expression on waterfowls

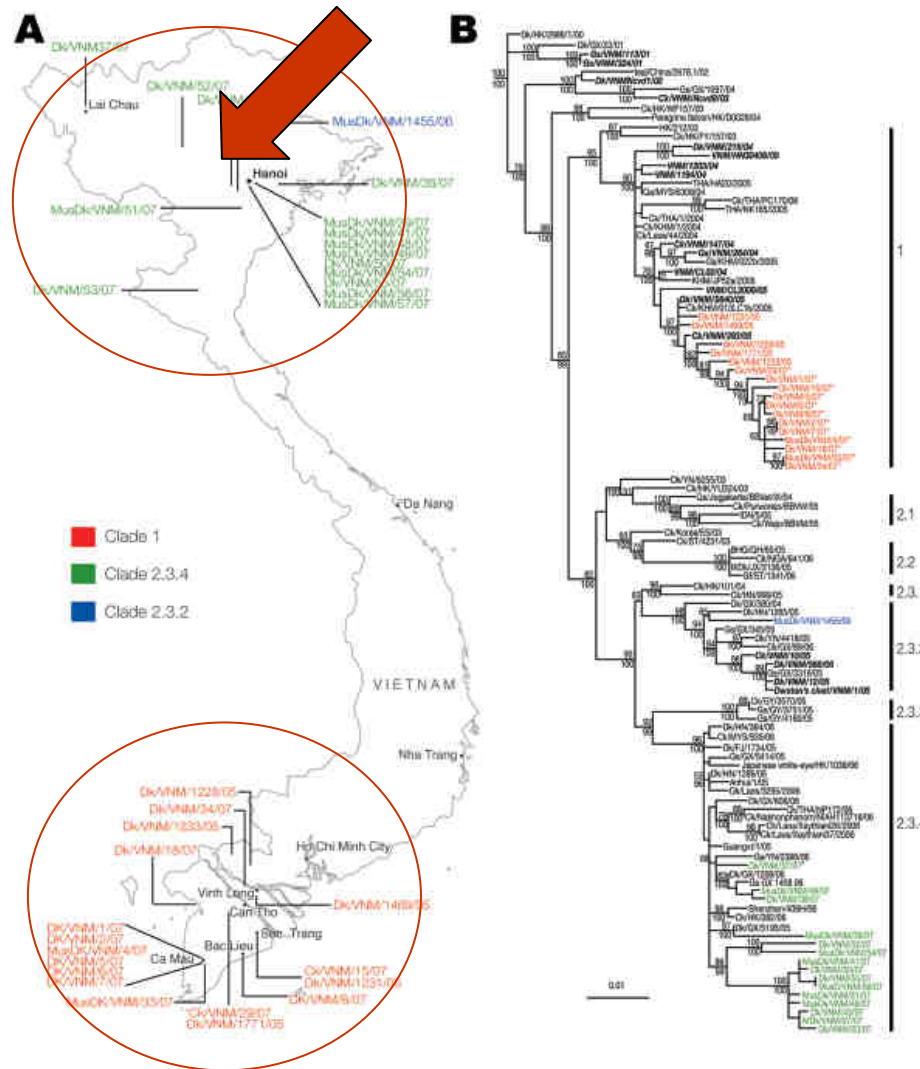
High human and poultry density in the Delta area

More than 200 millions poultry in diverse production systems

Complex poultry commodity chain, many actors

Resident and migratory wild birds population limited

Multiple sublineages present



In the South, index virus clade 1 (Genotype Z) still present
 ⇒ probable *low circulation with sporadic outbreaks*

In the North: clade 2 seems to be predominant ⇒ *needs to be confirmed with representative sampling*

Strains isolated from North Vietnam are close to those from China ⇒ probable *regular introductions*

Pathogenicity is regularly changing (Cf clade 2 and clade 7 recently) ⇒ *recognition in the field more difficult*

From N.T.Dung,2008

Our question

- «What are the determinants and the patterns of introduction, diffusion and persistence of the highly pathogenic avian influenza virus H5N1 in the Red River Delta in North Vietnam and the consequences in terms of surveillance and control? »

⇒ Use the results of epidemiological studies and models to propose an efficient and targeted surveillance model for HPAI in Vietnam

Our hypothesis

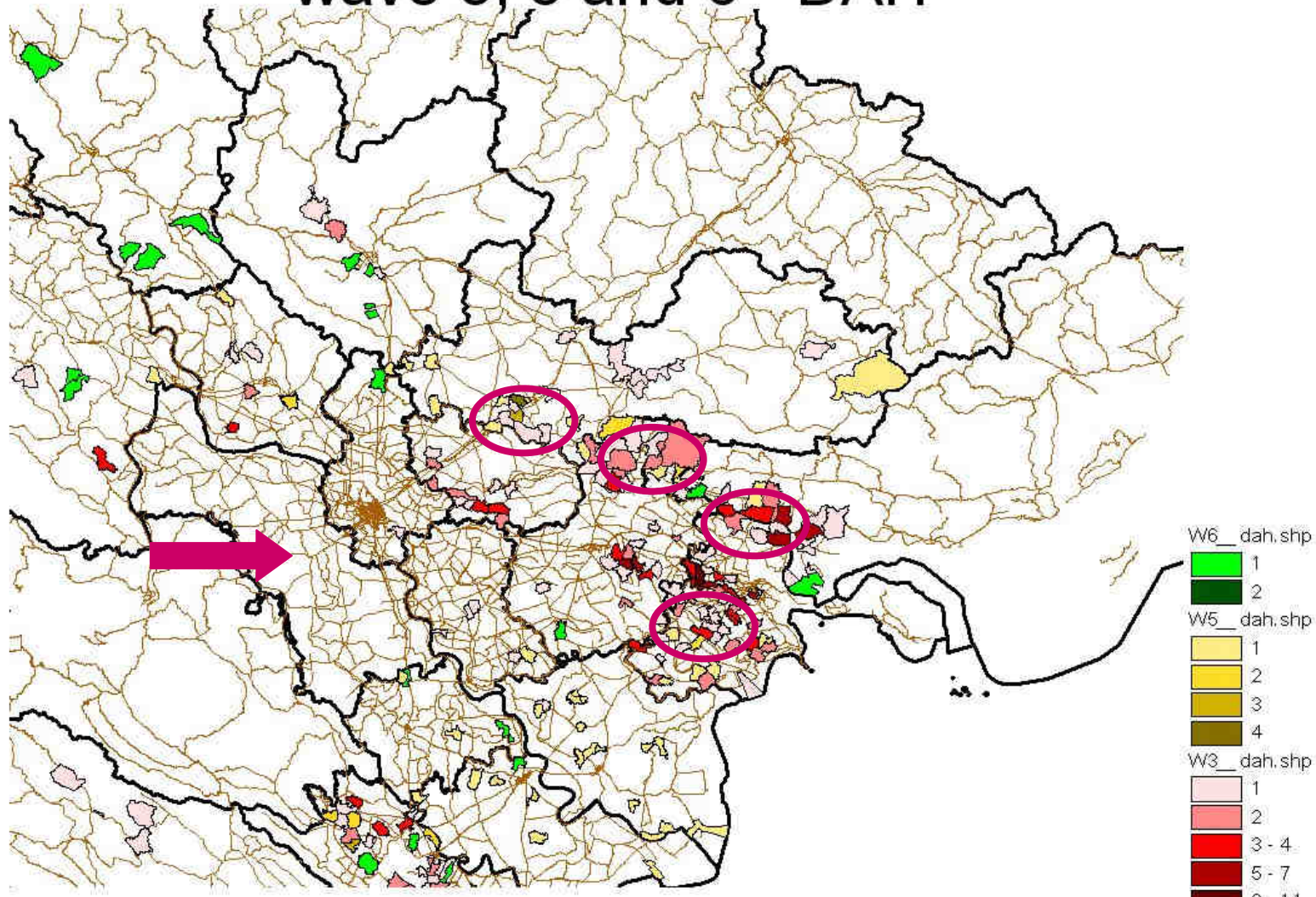
- Both persistence and regular introductions occur
- Low circulation may happen on some domestic poultry populations (long cycle)
- Some wild birds species sharing the same habitat may be part of the ecological cycle
- Environment may play a role in the transmission

Our methodology

- Classical epidemiology:
 - Retrospective studies
 - Prospective study
- Virtual laboratory:
 - Multi-Agent Based modeling in coll with IRD

Retrospective analysis in the RRD

wave 3, 5 and 6 - DAH



Case-control study in BG

- **Case control** study testing different variables related to the human and natural environment and to the poultry production system: **data collected (20 villages – 40 non matched controls, 19 farms - matched controls), analysis on going**

- **Case definition:**

Case definition applied on the lists from different sources:

Farm having reported mortality whatever the percentage or farm with laboratory confirmation reported.

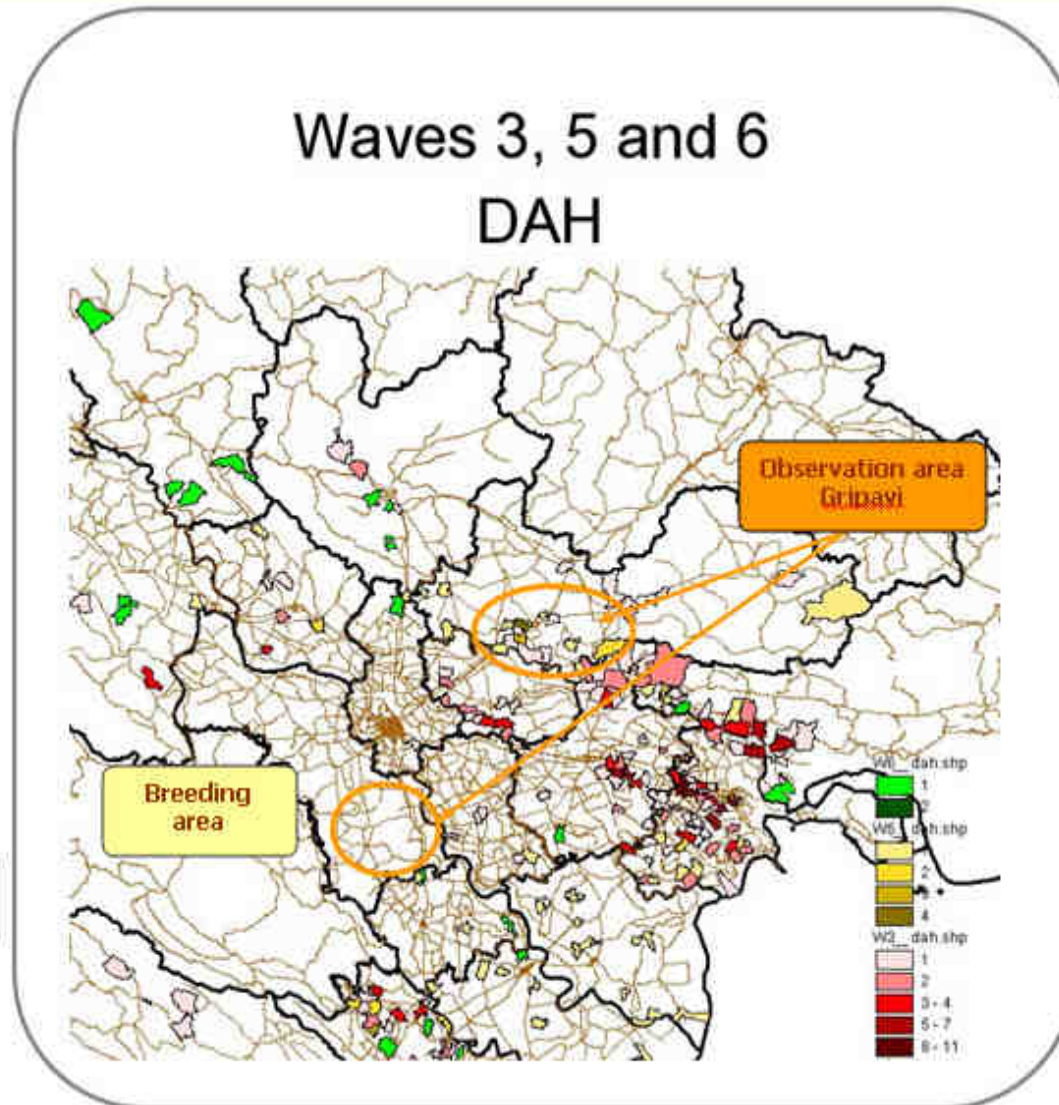
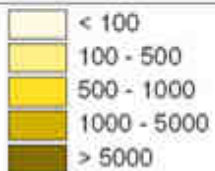
Case definition applied on the field for confirmation:

- Acute disease
- mortality over 10 % within 1 day
- + nervous signs on ducks
- rapid test + (usually not reported on the list)

Prospective study

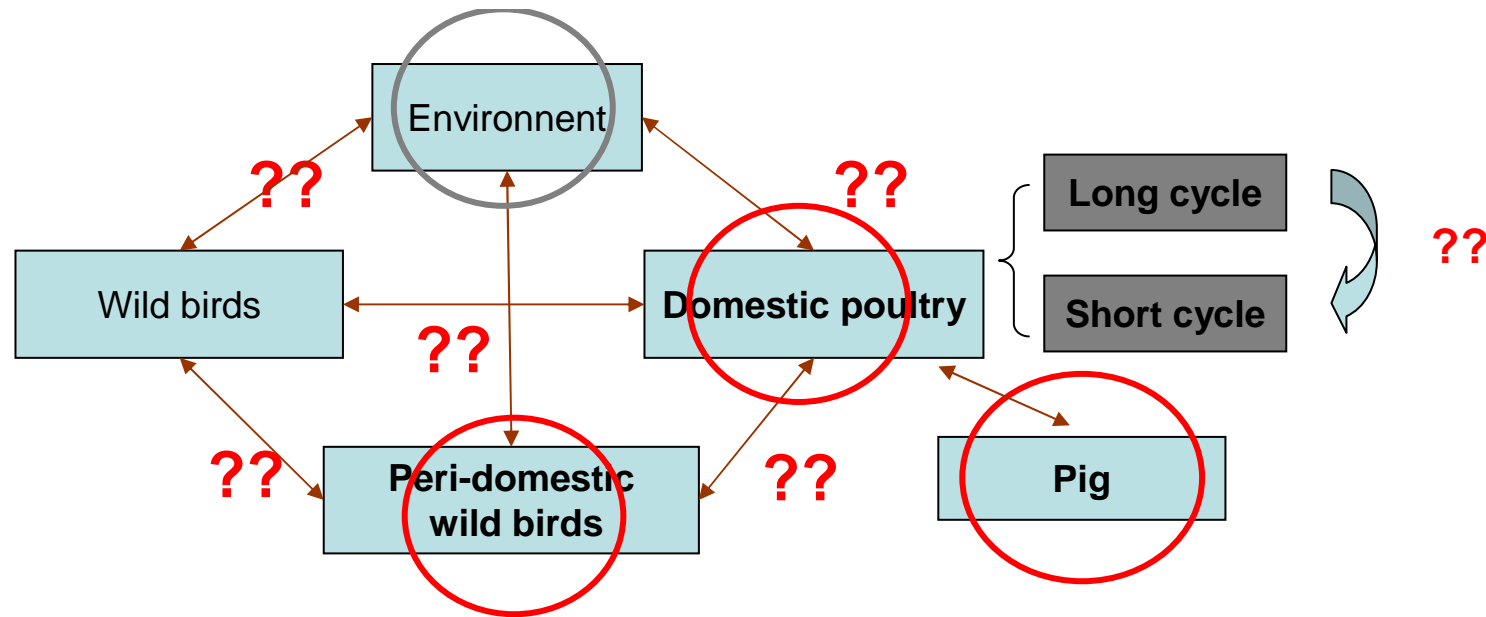


Poultry density (heads/km²)



2 provinces:
Bac Giang,
Ha Tay,
4 districts





Prospective study (sero/viro monitoring)

- Identify **potential seasonal patterns** for the incidence of H5N1 in the different compartments + try to link these patterns to seasonal cycles and other human interventions.
- **Test hypothesis** of the **persistence** of the virus in the population of poultry throughout a year **against a regular reintroduction** using bio molecular analysis of the strains collected.
- Identify the **local factors for the diffusion intra and inter-compartments**.
- Formulate **hypothesis related to the virological ecology** (comparing the strains detected on the different compartments)

Methodology

Domestic poultry

- ⇒ Repeated population-based cross-sectional surveys on domestic poultry (around 1000 birds / survey)
 - Frequency: 4 to 6 surveys over 1 year
 - Virology and serology (exploration of ELISA against NS1 protein)
- ⇒ Sampling of highly connected markets
- ⇒ Nested case-control study at farm level within the study population
- ⇒ Estimation of the risk of getting AI for a subset of the study population followed over the different cross-sectional surveys
- ⇒ Outbreak investigation



Wild birds

- 4 species targeted: Chinese pond heron / Little egret / Munia / Sparrow
- collection from hunters
- feces collection from roosting site (heron / Egret)



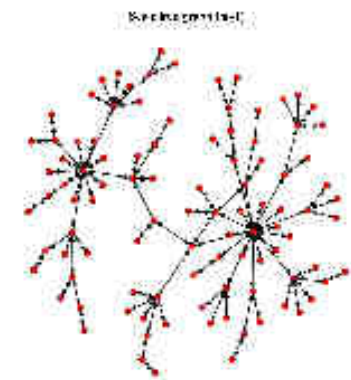
Social networks

Objectives:

- describe the networks for poultry trading
- identify different networks structures and test their possible influence on the risk of HPAI outbreaks
- identify highly connected nodes for sampling

Initial results of the Commodity chain survey:

- Interviews conducted on 240 farms, 60 backyard farmers group meetings, 60 traders and markets
- Descriptive statistics on going
- Matrix under construction to apply SNA



Thank you for your attention!

