AVIAN INFLUENZA IN WILD BIRDS FOR RISK MAPPING IN THE FRENCH WEST INDIES AND FRENCH GUIANA

3 RD CARIBAEA INITIATIVE RESEARCH AND CONSERVATION WORKSHOP
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SUMMARY

Context

I. Avian influenza and wildbirds

II. Material and Methods
   a) Qualitative Risk Assessment
   b) Probability of introduction by wild birds
   c) Probability of exposure

III. Results

IV. Discussion
Influenza virus (A) → HxNy

- Host diversity
- Consequences
  - Public health
  - Poultry production
  - Wild birds

Context: Avian Influenza

CONTEX T : AVIAN INFLUENZA REPORTED CASES IN AMERICAS FROM LITERATURE

- Both North and South Americas are concerned

- Caribbean region exposed:
  - Trading (CARICOM)
  - Migratory birds

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Legend
- Avian Influenza reported cases
  - Countries with reported cases
  - Countries with no reported cases

2 Gonzalez-Reiche et al. « where do AIV meets the Americas ? » 2012
4 IRD Influenza Research Database
CONTEXT: DETECTED CASES OF AVIAN INFLUENZA IN CARIBBEAN COUNTRIES FROM LITERATURE

GATTI, 2018
CONTEXT: DETECTED CASES OF AVIAN INFLUENZA IN CARIBBEAN COUNTRIES FROM LITERATURE

GATTI, 2018
AVIAN INFLUENZA AND WILDBIRDS

- Reservoir LP – Co infection

5 Alexander, "Evolution and ecology of AI", 2000
AVIAN INFLUENZA AND WILDBIRDS

- Reservoir – Co infection

Alexander, « Evolution and ecology of AI », 2000
AVIAN INFLUENZA AND WILDBIRDS

- Reservoir LP – Co infection

- Flyways:
  - American flyways
  - Wintering / breeding / stop

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6 Olsen. « Global Patterns of Influenza A Virus in Wild Birds » 2006
AVIAN INFLUENZA AND WILDBIRDS

- Reservoir LP – Co infection
- Flyways:
  - American flyways
  - Wintering / breeding / stop
- Transmission to poultry
  - Resident / migratory
  - Direct / indirect

Infected birds

Indirect: environment

Indirect: bridge host species

Direct: contact

\[\textit{Alexander, "Evolution and ecology of AI," 2000}\]
Assess the risk of introduction, exposure and spread of avian influenza (LP/HP) in poultry in Guadeloupe, Martinique, French Guiana

- **CaribVET (Caribbean Region)**: Caribbean animal health network

- **Methods**:
  - **Introduction**: legal and illegal trade and wild birds
  - **Exposure**: poultry density
  - **Spread**: SNA, mobility, accessibility

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**Pradel, 2018**

Nov 2015 - Jan-Juin 2016 - Sept 2016 - Jun 2017

- SIG Basic
- Principes de carto risques
- Risk mapping niveau avancé
- Surveillance basée sur le risque

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**Context**: AI and Wildbirds

**Risk assessment**

**Introduction**

**Exposure**

**Results**

**Discussion**
RISK ASSESSMENT APPLIED FOR WILDBIRDS: VARIOUS STEPS

New method: actually still in discussion with experts

Introduction × Exposure = Risk assessment

Migratory birds × Maintenance × Transmission to poultry

Bird community: Resident and migratory birds

Negligible Low High Very high

Local scale (admin3)

Score /12 × Score /12 × Score /12 = Score /12

4 Risk level

7 Gaidet, "Understanding the ecological drivers of avian influenza virus infection in wildfowl," 2011
RISK ASSESSMENT: AVIAN INFLUENZA INTRODUCTION BY WILD BIRDS

**Taxonomy**
- **Species**
  - 2: Anseriformes, Charadriiformes
  - 1: Others

**Density**
- 3: very common
- 2: common
- 1: rare, accidental

**Origin**

SCORE /12

maximum
RISK ASSESSMENT: AVIAN INFLUENZA MAINTENANCE COMMUNITY*

* Actually still in discussion with experts
RISK ASSESSMENT: AVIAN INFLUENZA MAINTENANCE COMMUNITY*

At each administrative level:

1 environment ⇔ 1 capacity

% of each environment * capacity to maintain the virus

⇒ Capacity to maintain virus

* Actually still in discussion with experts
**RISK ASSESSMENT: AVIAN INFLUENZA TRANSMISSION TO POULTRY**

- Proximity farm – wetlands (1/2/5 km)
  - Direct contact with infected migratory birds
  - Indirect contact via environment

- Risk factors for transmission to poultry
  - Sharing habitat capacity

- 1 environment $\Rightarrow$ 1 capacity of transmission

\[ \text{% environment} \times \text{capacity of transmission} \]

*Actually still in discussion with experts*
RISK ASSESSMENT: AVIAN INFLUENZA RISK ASSESSMENT OF WILDBIRDS

- **Introduction**
- **Transmission**
- **Maintenance**

RISK ASSESSMENT FOR AIV ASSOCIATED TO WILDBIRDS IN EACH ADMINISTRATIVE LEVEL

- Non migratory season
- Migratory season
RESULTS: INTRODUCTION

- Temporary methods:
  - Taxonomie
  - Abundance

- Local spatialization
  - Proportion wetlands
  - Proportion protected areas

* Waiting for method validation
RESULTS: EXPOSURE

- Distance between farms and wetlands

* Waiting for method validation
RESULTS: RISK ASSESSMENT OF AVIAN INFLUENZA

- Introduction
- Exposure

* Waiting for method validation
APPLICATION OF THE METHODS

Further applications

- Risk-based surveillance (wild and domestic animals)
- Schedule emergency sanitary plan
- Communication
- Prevention
  - « reducing contact domestic and wild animals »
  - Improve biosecurity
DISCUSSION : ABOUT THE METHODS

- Limits of the methods
  - Data necessary: quantity and quality
  - Subjectivity: expert advices

- Benefits of the methods:
  - Proxying the real risk associated with wildlife
    - Compared to other country (French Guiana…)
  - Compared to other risk factors (trading)
  - Apply for other disease (WNV)
DISCUSSION: WILDBIRDS AND AVIAN INFLUENZA VIRUS PERSPECTIVES

WHY STUDING WILD BIRDS?

- AIV ecology ↔ Wild bird ecology (reservoir)
- Wildbirds as sentinels: surveillance on wildbirds
  - Active (sampling risky areas) – « caller ducks »
  - Passive: mortality rate, clinical signs observance

Interdisciplinary cooperation between experts

- Expertise, Helps, Knowledge
- Fight and control
- Surveillance
THANKS
THANKS FOR YOUR ATTENTION

Questions?

We need your help!

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- Ghersi et al. « Avian influenza in wild birds in central coast of Peru », 2007
- Douglas et al. « IAV surveillance of migratory waterfowl in Barbados », 2000
- Gonzalez- Reiche, et al. « AV from wild birds in Guatemala belong to north American lineage » 2012
- Afanador-Villamizar et al. « AIV in latin america a systematic review of serological and molecular studies from 2000 to 2015 » 2015
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