



EMPRES

Système de veille sanitaire internationale:

collecte, analyse et partage des données sur l'élevage et la santé animale

Vincent Martin

EMPRES Animal Health

Rome, Italy



Outline

- FAO EMPRES programme
- Rationale for Global Early Warning System for Livestock diseases
- EMPRES-I information system
- Risk analysis and risk communication activities



EMPRES Programme in FAO

The Emergency Prevention System for Transboundary Animal Diseases
(EMPRES):

- A **priority programme** within the Animal Health Service of **FAO** that was initiated in 1994
- **Sustainable and economic development of animal production and safeguard human and animal health**
- **Effective national and regional control/eradication strategies** through:
 - Surveillance
 - Preparedness
 - Coordination - Networks
 - Capacity building



EMPRES Programme in FAO

The Emergency Prevention System for Transboundary Animal Diseases
(EMPRES):

- **Target:** high-impact animal diseases (transboundary animal diseases - TADs - and emerging diseases)
- International Partnerships (OIE, GF_TADs, Tripartite)
- **Involves** data collection, analysis and communication using **EMPRES-i platform** (<http://empres-i.fao.org>)



EMPRES-i: *Information – intelligence – intervention*

A Global animal disease information system :

- First released in 2003, with the worldwide flare-up of the H5N1 highly pathogenic avian influenza (HPAI)
- Web-based secure Information System
- Password-protected with individual privileges
- Used by FAO officers, epidemiologists, researchers, modeling experts and, decision makers
- Hosts reliable data on animal disease outbreaks of EMPRES priority diseases (TADS and emerging diseases)



Priority animals diseases within EMPRES

- Rinderpest and Post-eradication program
- Highly Pathogenic Avian Influenza(HPAI)
- Peste des Petits Ruminants
- Foot-and-Mouth Disease
- Rift Valley Fever
- African Swine Fever
- Classical Swine Fever
- Contagious Bovine Pleuropneumonia
- New emerging diseases (e.g. Schmallerberg virus)



EMPRES-i: *information – intelligence – intervention*

- A web-based, secured system for supporting veterinary services and regional/international organizations by facilitating access to disease information (regional and global)
- Provides access to supporting data:
 - Livestock population /density layers (GLiPHA/FAO)
 - Other environmental layers (Geonetwork/FAO)
 - Genetic information (Openflu database)
- Facilitates :
 - Information sharing on TADs and emerging disease events
 - Data analyses and mapping of disease events : disease situation awareness, risk analyses, trends, forecasting
- Used by epidemiologists, researchers, modeling experts and, decision makers



EMPRES-i: *Information – intelligence – intervention*

Public website



<http://empres-i.fao.org>

Internal website



<http://empres-i.fao.org/empres-i3q/>



EMPRES-I: *Information – intelligence – intervention*

- EMPRES-i Modules :

- **Disease Event** : Disease tracking, collection of epidemiological animal disease geo-referenced (lat/long) information.
- **Surveillance** : Collection of information on active surveillance from projects)
- **Genetic**: Link genetic data to outbreaks hosted in EMPRES-I
- **Library**: Publications and images (clinical signs, lesions...)
- **Directory** : Contact details of CVOs, experts
- **Laboratory**: Contact details of national Veterinary laboratories, Reference Laboratories.
- **Mobile**: Disease outbreak access and reporting System



EMPRES-I: *Information – intelligence – intervention*

- Data sources
 - Official sources
 - OIE
 - National authorities/Ministries of Agriculture
 - Officially cleared project and mission reports
 - Reference Laboratories and Collaborating Centers
 - GLEWS partners
 - Unofficial sources
 - Projects / Missions
 - FAO field officers and consultants
 - NGOs and Regional Institutions
 - Media (GPHIN, ProMED, Websites)



EMPRES-i - workflow

DATA ENTRY: DATA ARE ENTERED MANUALLY (COMPUTER AND/OR MOBILE PHONE)



MOBILE PHONE APPLICATION TO PROVIDE AND/OR ACCESS DISEASE OUTBREAK INFORMATION

MY EMPRES-I:

USER PREFERENCES SET UP FOR DIFFERENT SECTIONS INCLUDING DISEASE OUTBREAKS (BY SELECTING A DISEASE, A PERIOD AND A GEOGRAPHICAL AREA), CVOS, LABORATORIES AND NEWSLETTERS.

INTERACTIVE MAP:

ACCESS TO EPIDEMIOLOGICAL AND LABORATORY INFORMATION FROM AN OUTBREAK LOCATION



ADDITIONAL LAYERS: LAYERS SUCH AS LIVESTOCK POPULATION AND PRODUCTION, BIOPHYSICAL, SOCIO-ECONOMIC, ANIMAL HEALTH STATUS OR TRADE (FAO - GLIPHA)



VALIDATION: DATA ARE VERIFIED AND VALIDATED BEFORE BEING OFFICIALLY PUBLISHED BY FAO

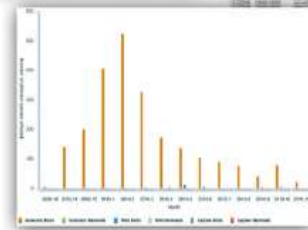


ANALYSIS TOOL:

DATA IS PRESENTED IN TABLES, CHARTS OR GRAPHS AND CAN EASILY BE DOWNLOADED IN CSV OR XLS FORMAT FOR FURTHER ANALYSIS



AUTOMATED DATA UPLOAD: A SPECIAL EXCEL FILE APPLICATION FACILITATES THE UPLOAD OF LARGE AMOUNTS OF DATA INTO THE SYSTEM



<http://empres-i.fao.org>



EMPRES-I: *Information – intelligence – intervention*

- Genetic module:
 - To integrate genetic data from virus sequences stored in databases

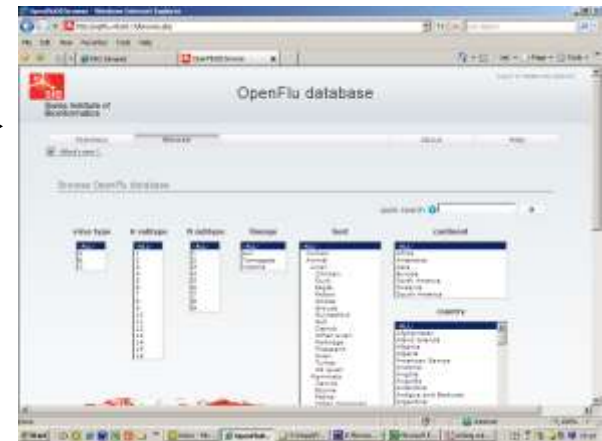


EMPRES-i

...in collaboration with OFFLU and SIB

Sequence ID number

Virus information



OpenFluDB



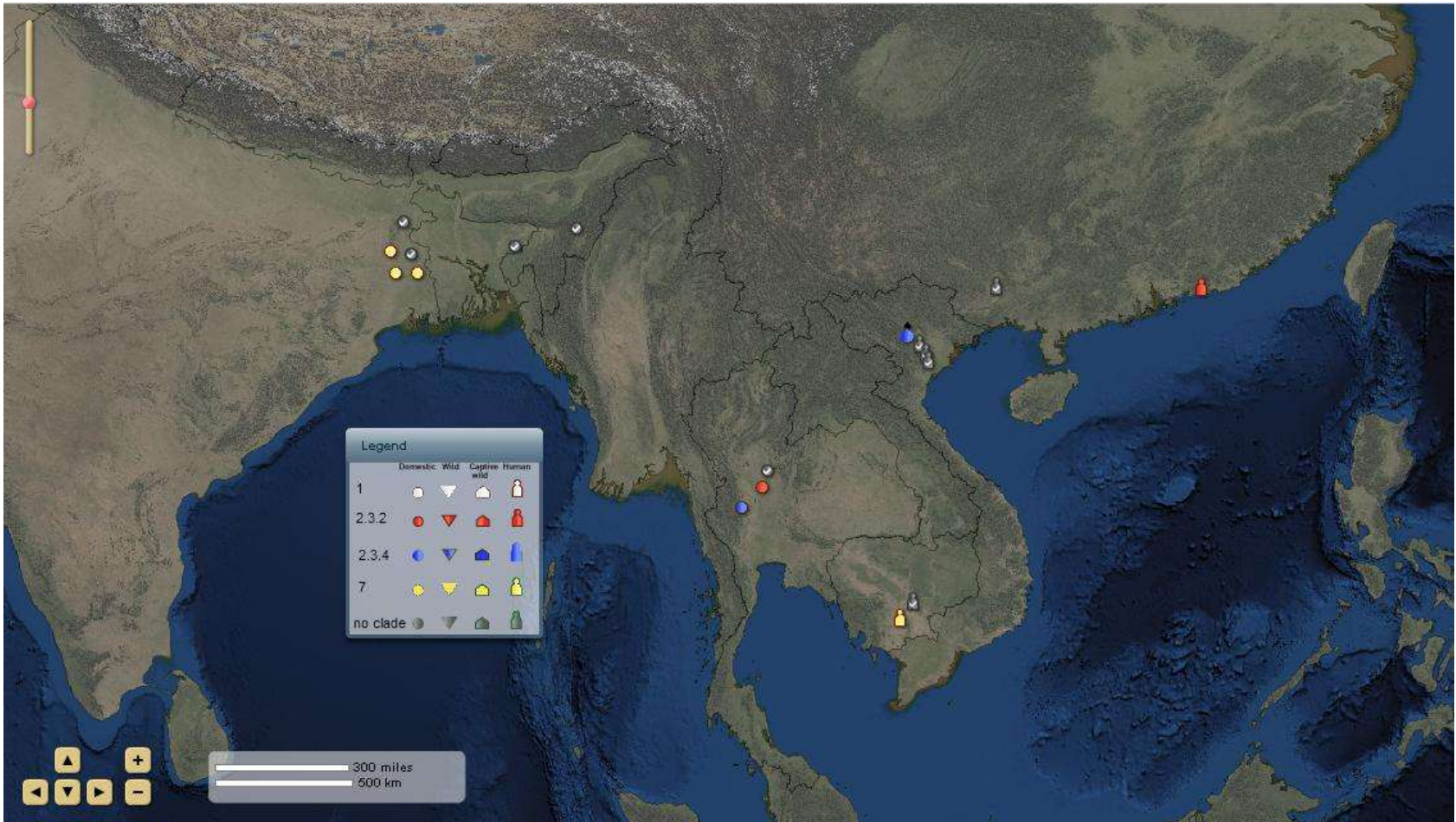
GenBank



OpenFlu

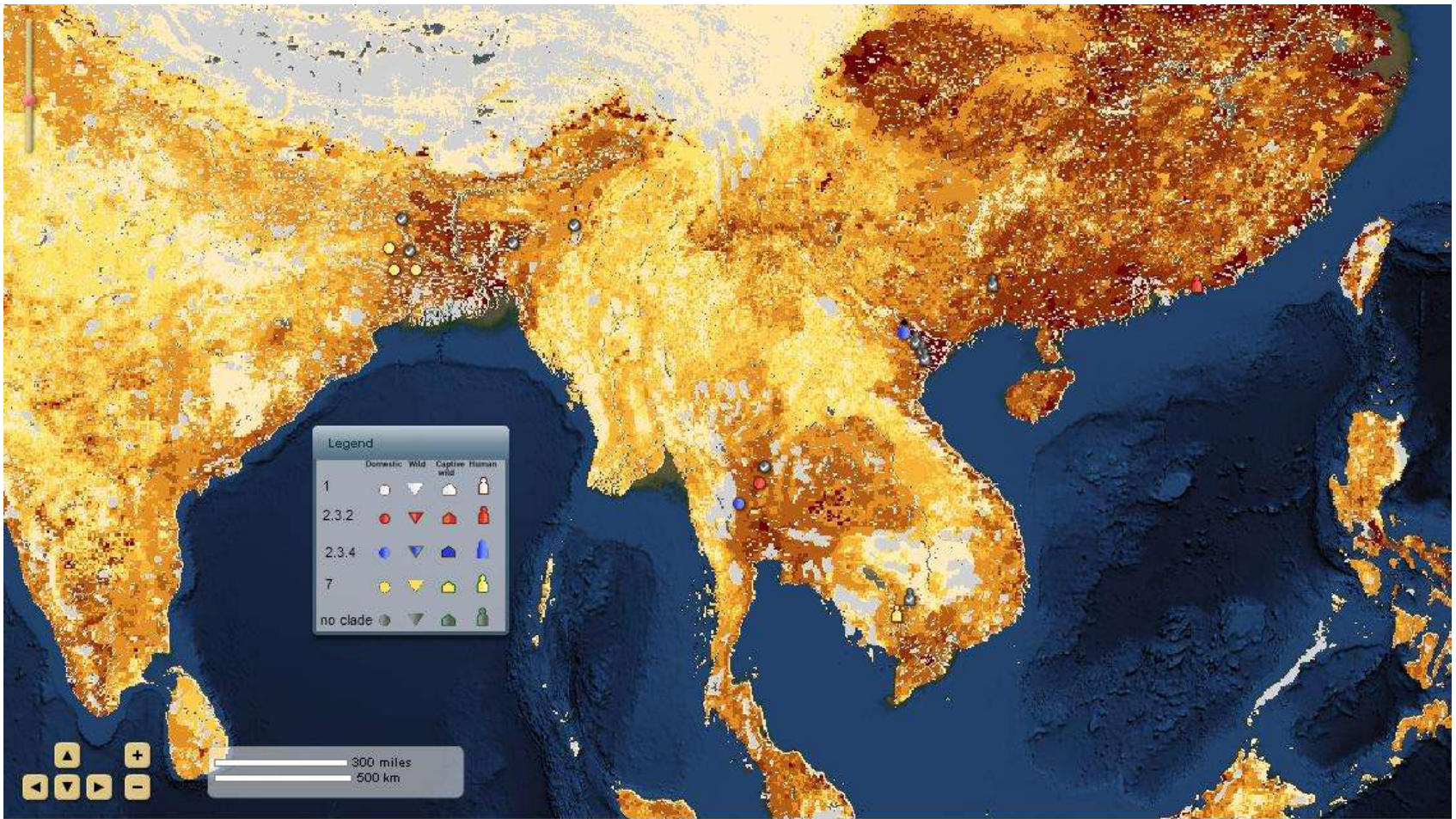


Mapping of H5N1 clades geographically





Adding multiple-layered maps and associated for analysis



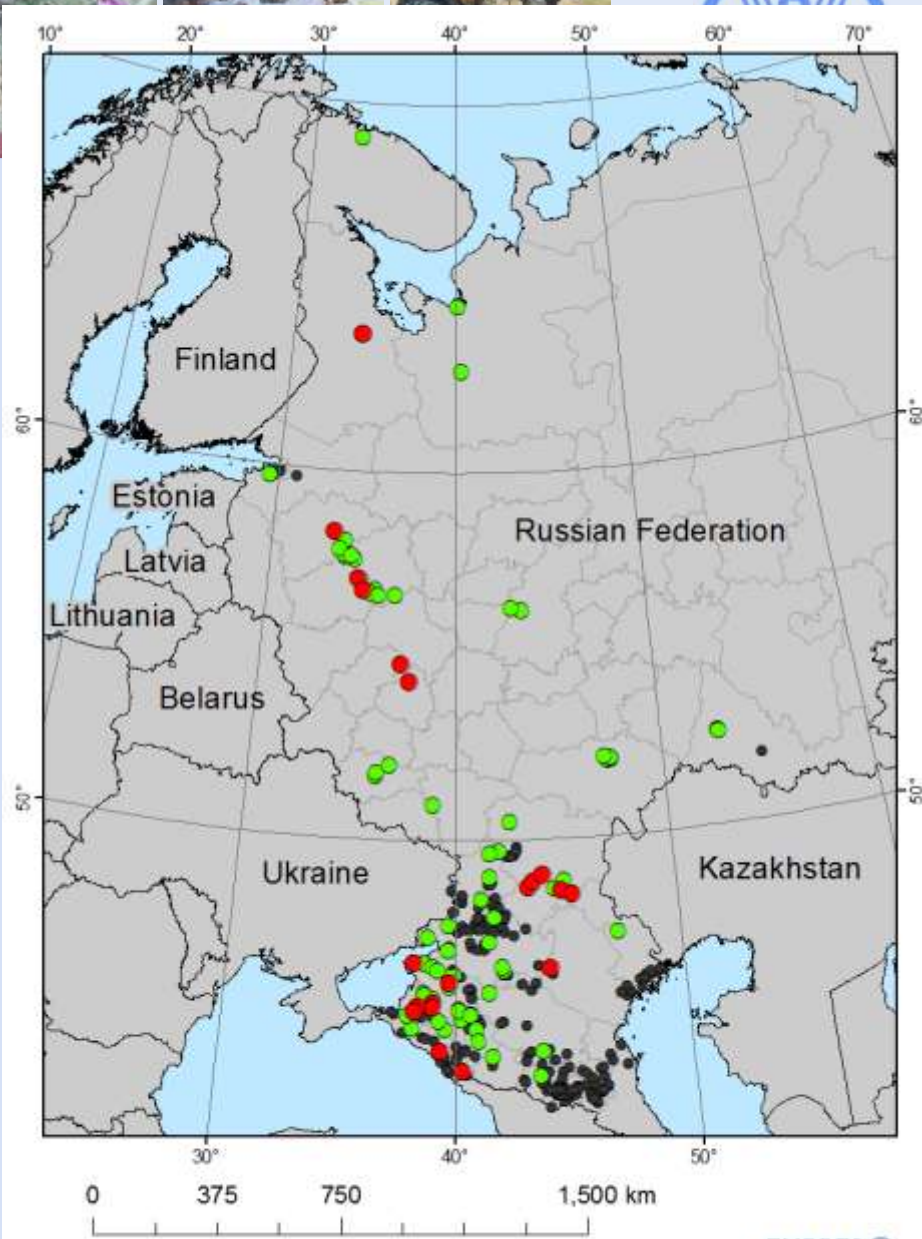


Case studies

ASF in Russia

RVF in West Africa

HPAI in China

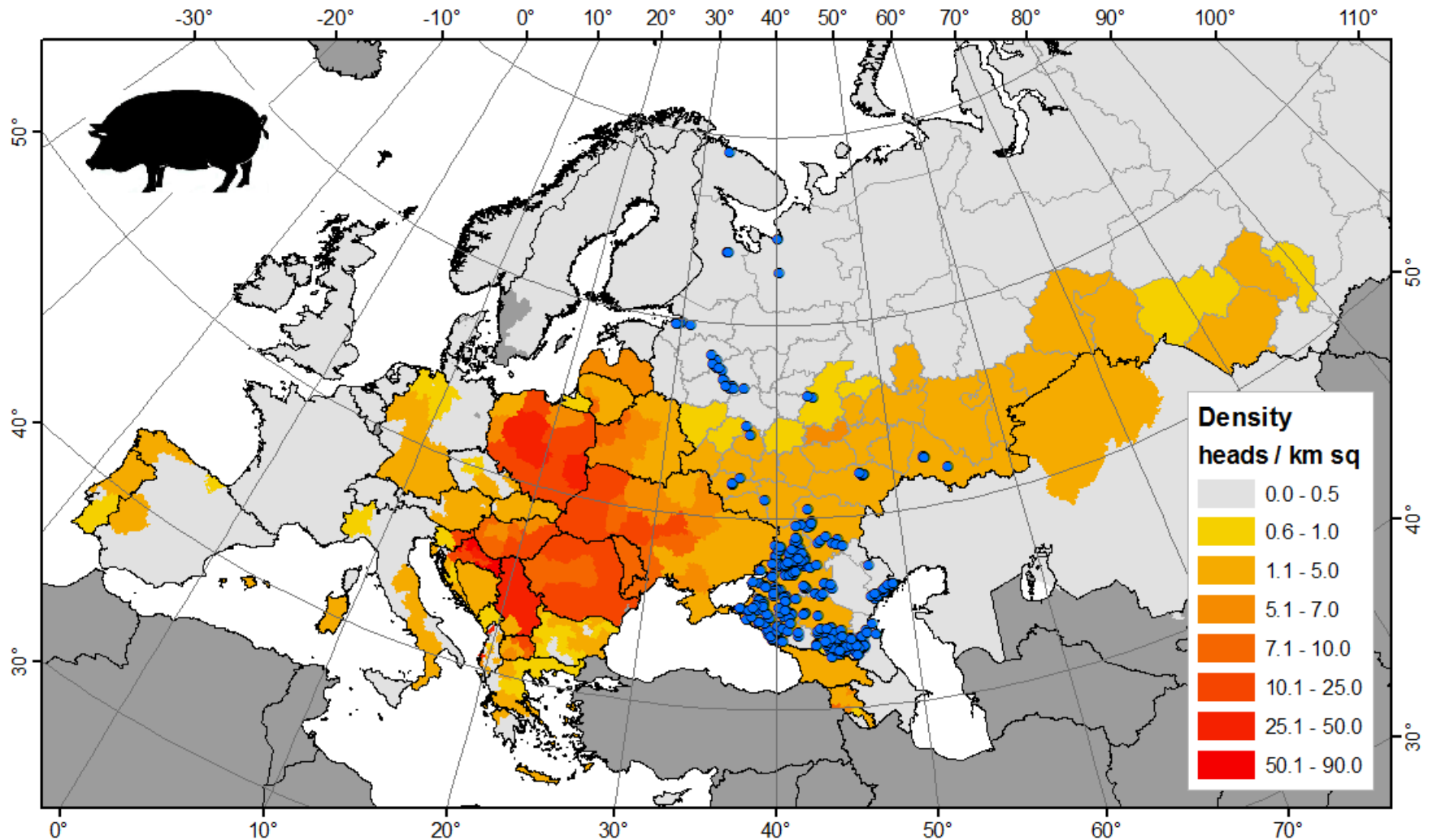


Spatial progress of ASF in the Russian Federation (2007 - 2012)

Spread of ASF ● 2007-2010 ● 2011 ● 2012



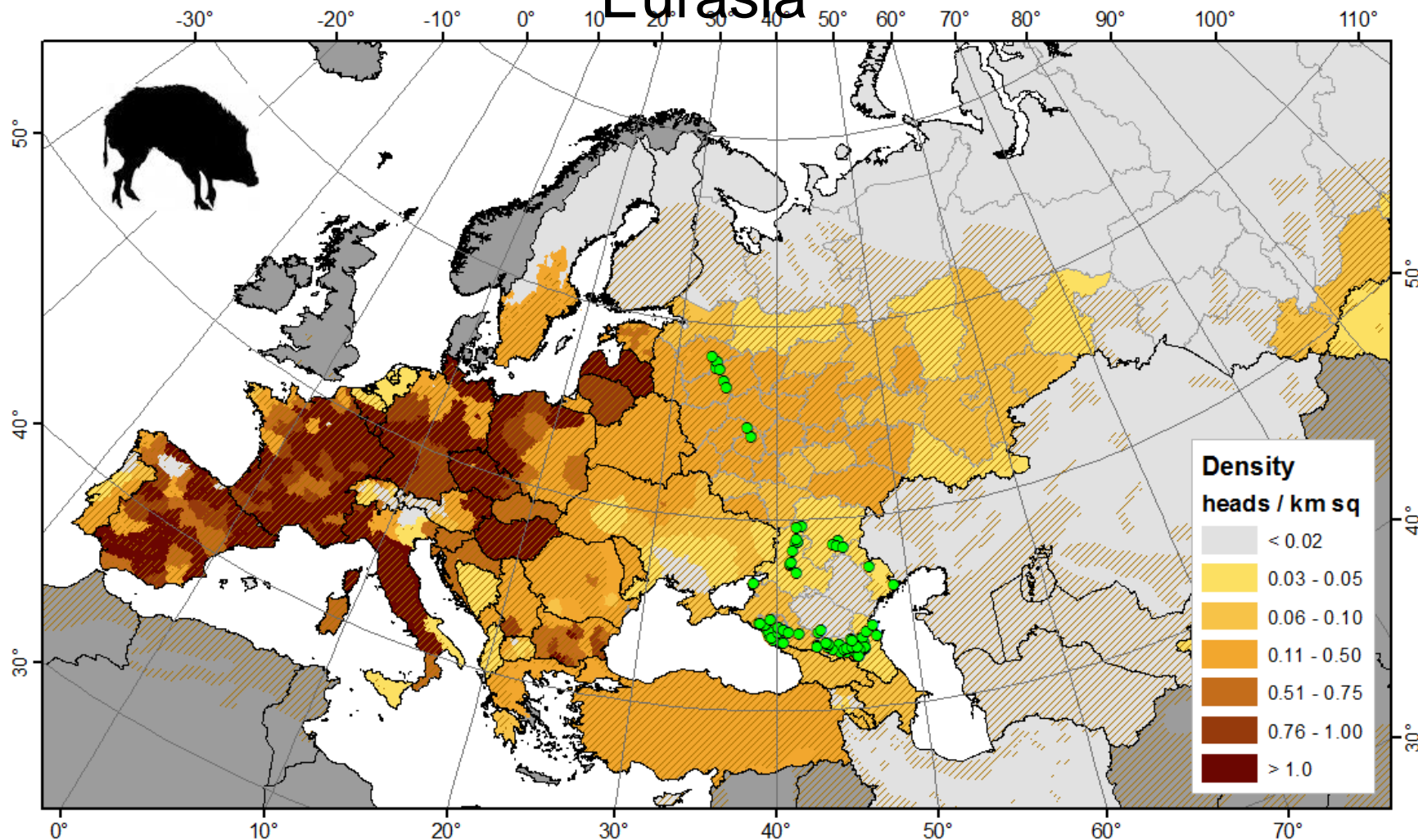
Pigs in low biosecurity holdings in the N Eurasia




0 375 750 1,500 km


● Spread of ASF in 2007-2012

Wild boar density and occurrence range in the N Eurasia



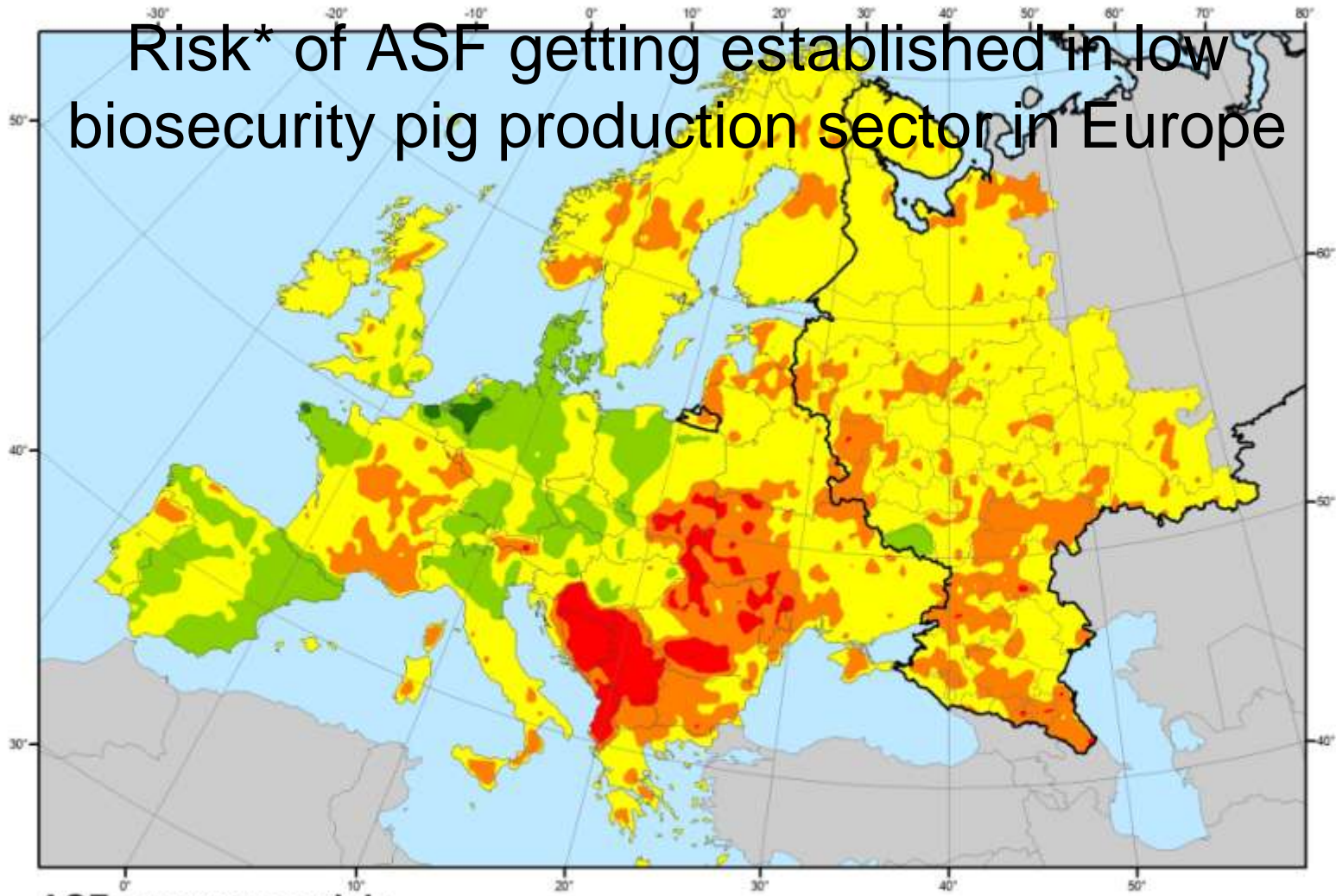
0 375 750 1,500 km

 *S. scrofa* range

 ASF in wild boar 2007-2012



Risk* of ASF getting established in low biosecurity pig production sector in Europe



ASF emergence risk:

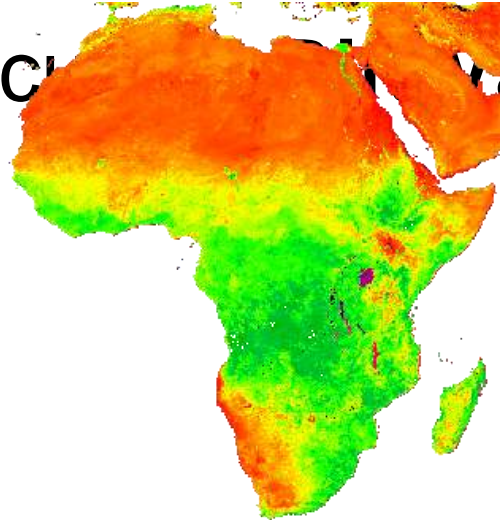


* Projection based on the data from the endemic area in the RF



Seasonal climate forecasting for transboundary animal diseases

Special focus on **valley fever**



Vincent Martin
FAO
Wengen, 12 September 2005



RVF Impact



Trade



Human & animal health

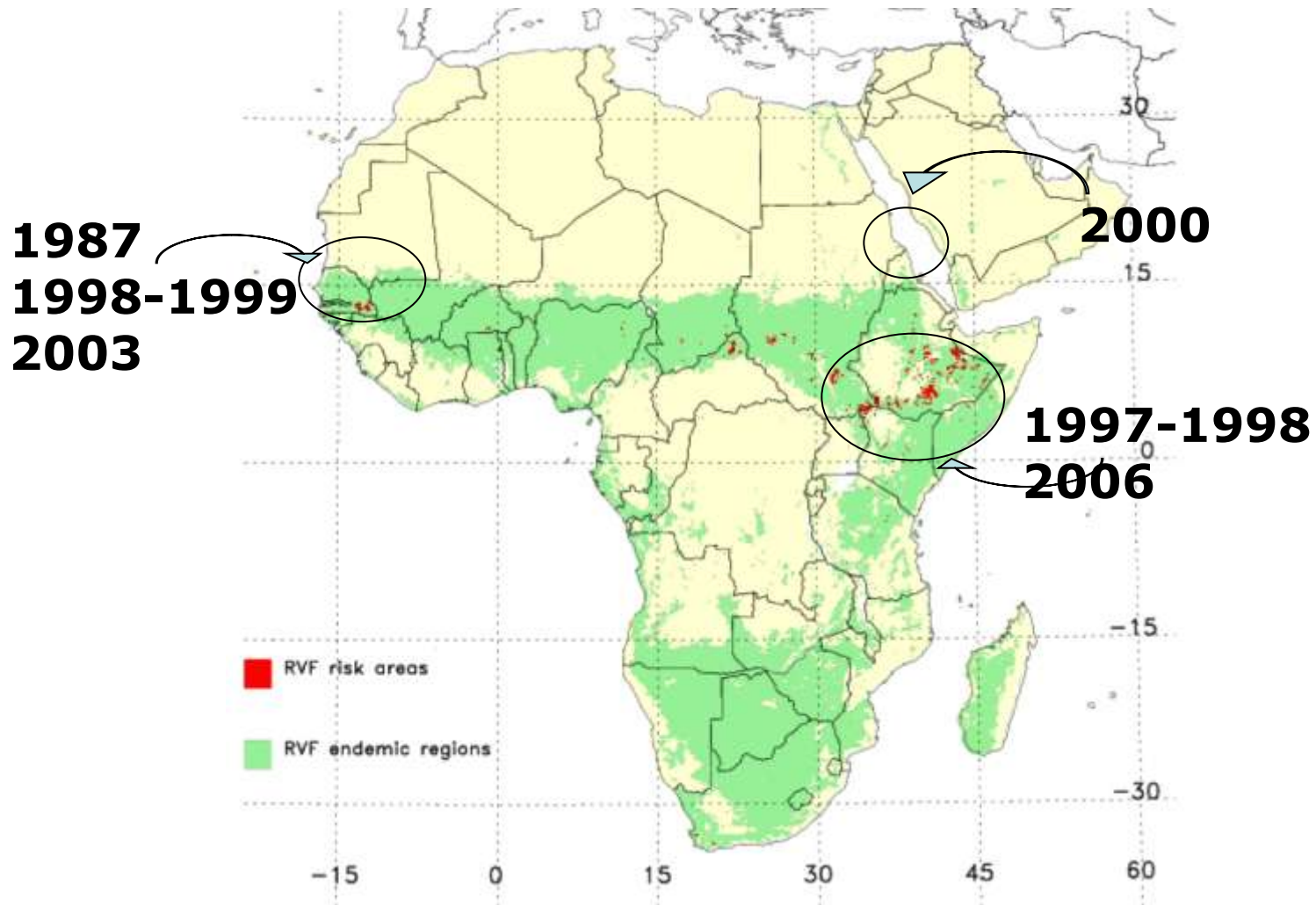


Livelihood





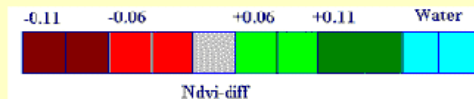
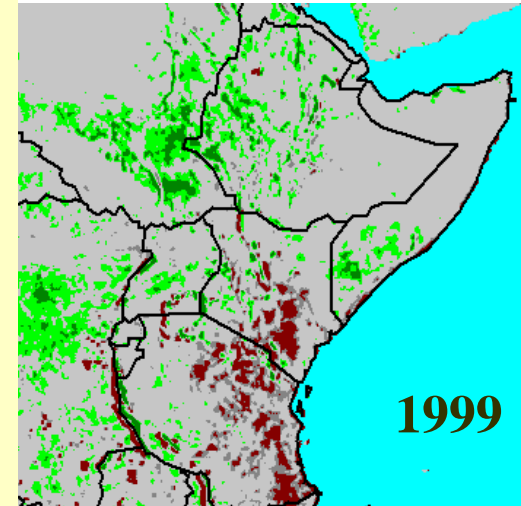
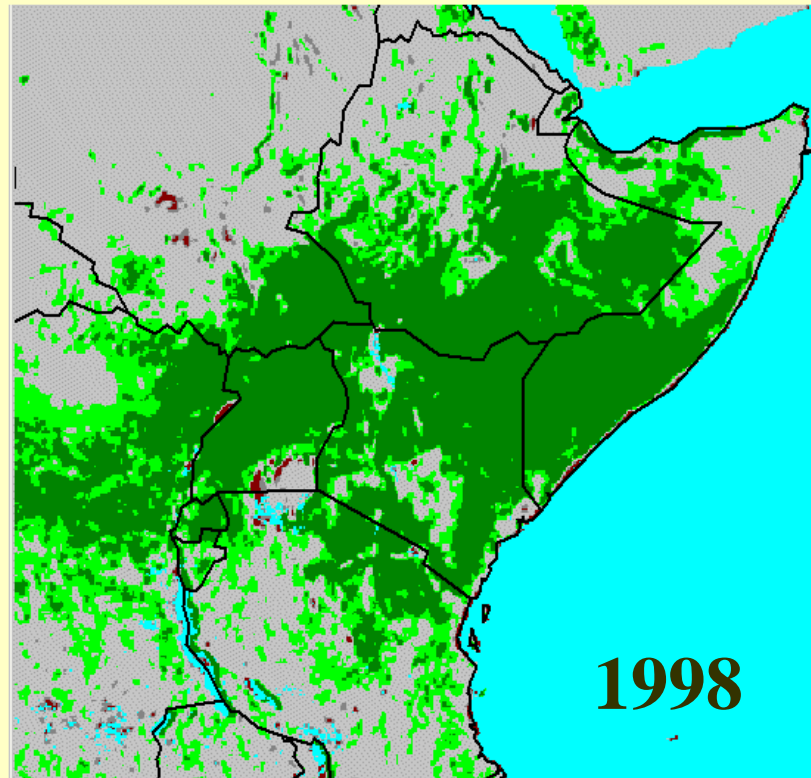
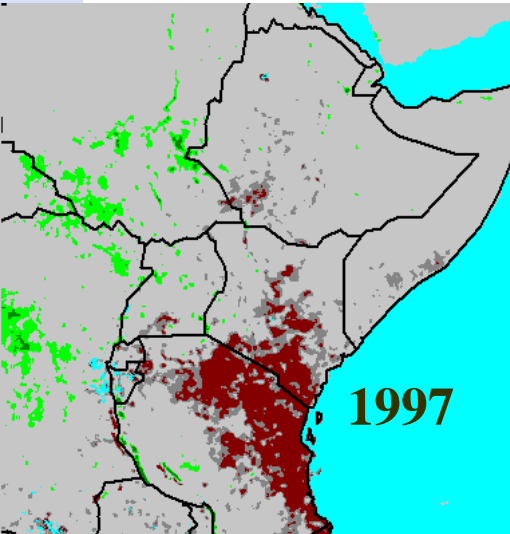
RVF - epidemics





Vegetation index

Normalized difference vegetation index (NDVI)
Difference between January 1998 and average NDVI value





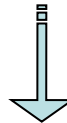
RVF Regional network

MALI MAURITANIA SENEGAL

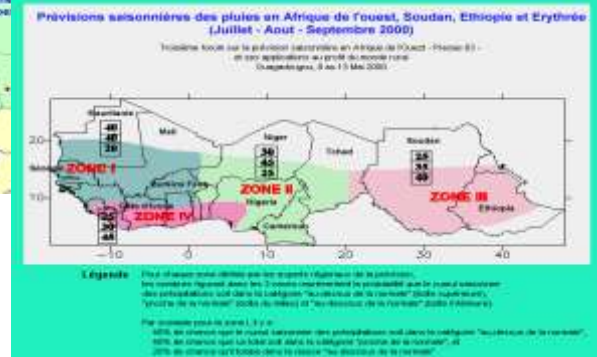


- Field surveillance
- Field investigation
- Monitoring Climatic conditions

ANALYSIS



Maps, graphs, reports



**Feedback to users
RVF bulletin**



Monitoring infectious dynamic in high risk areas



Sentinel herd monitoring



Feedback to users and raising awareness

Systeme sous regional d'alerte et de controle de la FVR
 Bulletin No 1 - Aout 2000

Dakar, le 18 Aout 2000

Systeme sous regional d'alerte et de controle de la Fievre de la vallee du rift au Mali, en Mauritanie et au Senegal

TCPRAF/8911

BULLETIN D'INFORMATION N°1
18 Aout 2000

Dr Yaya Thiougane
 Coordonnateur Regional
 LNERV-ISRA
 BP 2087 Dakar-Hann
 Tel & Fax: 221 832 14 52
 E-mail: yaya@lnerv-isra.sn ou yaya@lnerv-isra.sn

Ce bulletin est le premier diffusé dans le cadre du programme d'alerte et de controle des zoonoses sous regional, un systeme d'alerte et de reaction rapide vis a vis de la fievre de la vallee du rift en complement d'un systeme de surveillance nationale deja en place.

Les activites principales du projet sont basees sur la surveillance d'un reseau regional de troupeaux sentinelles ainsi que sur la surveillance passive et active de la maladie à travers les reseau d'epidemiologie nationale. Le bon fonctionnement de ce systeme repose sur un niveau de bon interaction permanente entre le LNERV-ISRA, CNEDV-Mali, CNEDV-Mauritanie, LNERV-Senegal, equipes d'enquete regionales les services regionaux par le biais de des representants locaux, et la coordination regionale du projet situe a Dakar.

Les donnees sera transmise avec immediete au niveau d'une base de donnees regionale et sera relaye d'un traitement et d'une analyse avec d'infos approprie pour information aux trois pays concernes. De telles informations sont necessaires pour l'analyse decision du geophysique, sanitaire et medicale pour les plans pour stabiliser la maladie au niveau du capital et eviter l'extension hors de controle par contact avec d'autres troupeaux.

Les activites de surveillance des troupeaux ont ete mises en place au debut de l'annee dans tous les pays (sous pasteurisation des lait etablies) et ces troupeaux font l'objet de suivi serologique (surtout de la mastite...). L'analyse serologique de classe II et III et serologique (notamment de classe II) durant toute la saison des pluies 2000, periode a risque.

I. RESUME DE LA SITUATION SANITAIRE (JUIN-AOÛT 2000)

- FAIS DE CIRCULATION RECENTE DU VIRUS DE LA FVR DANS LES TROUPEAUX SENTINELLES DU SENEGAL.
- MISE EN EVIDENCE D'UNE CIRCULATION RECENTE DU VIRUS DANS DEUX TROUPEAUX AU MALI, (dont un au niveau de la frontiere avec la Mauritanie) (N°2).
- RESULTATS SEROLOGIQUES EN ATTENTE POUR LA MAURITANIE.
- PREVISION D'UNE RAMPON DES PLUIES 2000 NORMALE A SUPERIEURE A LA NORMALE POUR LA SOUS REGION.

LA FIEVRE NAWU WALEE RIFT
DE LA VALLÉE DU RIFT

NAWU KEENGI ADUPE
 WOPPEE VOER JINGONG,
 KAM E WADEE JAWDI
 TOKSIRI NOI

C'EST UNE ZOONOSE MATURE
 ELLE AFFECTE AUSSI BIEN LES ANIMAUX
 QU'É LES HOMMES.

*** MANIFESTATIONS * NO DU SIFORTEE ?**

CHEZ LES ANIMAUX • TO JAWDI TOO
 - MINQUEZ D'ABORD
 - PA NEWA ADUPE WOPPEE (MORUE)

CHEZ L'HOMME • TO NEDDO TOO
 - FORTÉ MENTALE DES ANIMÉS
 CHEVAUX ET BOVINS.
 - FORTÉ MÊME DÉBOUTANT
 AU RELEVANT DE LA FIEVRE
 JAWDI.

*** SOURCES DE CONTAMINATION * HOL NO NAWU NGU WALEE RIFT**

CHEZ LES ANIMAUX • TO JAWDI NAI TOO
 - FORTÉ MENTALE • FALO SANGRE
 - INCUBÉ
 - MANGÉ TEEHU WOPPEE
 (ENVOI)

CHEZ L'HOMME • TO NEDDO TOO
 - CONTACT DEBÉ
 ANIMAUX MALADES SANTUS
 - MANGÉ F'YON JAWDI NOI
 (MANGÉ)

*** PREVENTION * HOL NA NAWU NGU REENTORTEE ?**

VACCINER LES ANIMAUX
 - NO DON FANGU JAWDI NOI
 SAMA JALA

ÉVITER LE CONTACT
 - CONTACTÉ SUSPECTS
 MANGÉ MANGÉ TEEHU
 MANGÉ WOPPEE ADUPE
 NAWU KEENGI

NE PAS BOISSER
 - MANGÉ MANGÉ JAWDI
 NOI SELLAMA

PRÉVENIR LE POSTE
 VÉTÉINAIRE LE PLUS PROCHE
 - FORTÉ GALLE DOKTOR
 VÉTÉINAIRE MANGÉ NAWU

Préparé et diffusé dans le cadre du :
 PROJET DE COOPERATION TECHNIQUE TCPRAF/8911 (T) :

Mise en place d'un système de surveillance
 et de contrôle de la fievre de la vallée du rift et des maladies
 transfrontalières au Mali, en Mauritanie et au Sénégal

DIRECTION DE TELEFRAZ
 BP 17 de Dakar - Dakar-Senegal
 Tel: 221 832 14 52

Laboratoire National de Téléfraz
 et de Recherches Téléfraz

BP 2087 Dakar-Hann - Senegal
 Tel: 221 832 14 52 et 221 832 14 53
 Fax: 221 832 14 53



HPAI H5N1 Risk mapping in China

Martin, V., Pfeiffer, D.U., Zhou, X., Xiao, X., Prosser, D.J., Guo, F., Gilbert, M., 2011. Spatial distribution and risk factors of highly pathogenic avian influenza (HPAI) H5N1 in China. *PLoS Pathog.* 7(3): e1001308

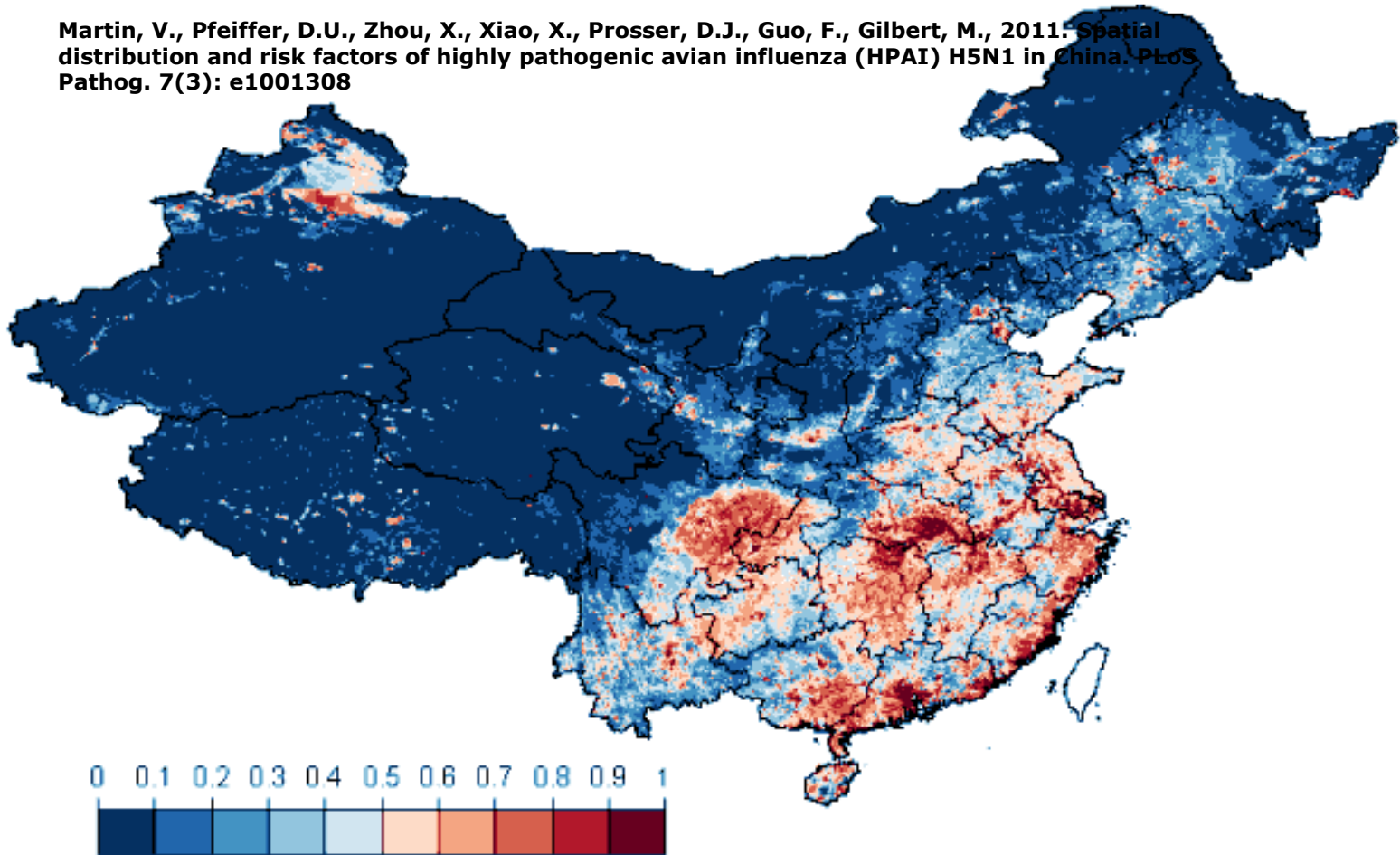
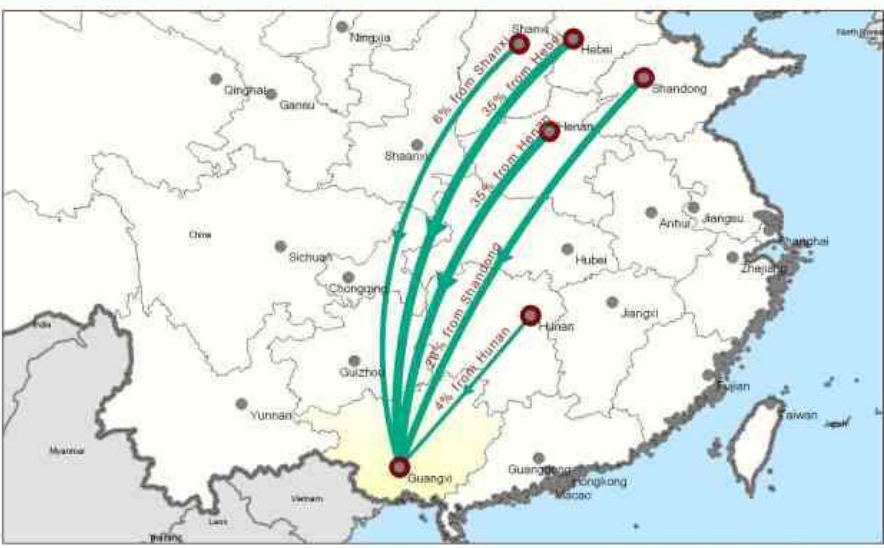


Fig. Predicted distribution of HPAI H5N1 risk according to the bootstrapped logistic regression model based on reported HPAI H5N1 clinical disease outbreak data or HPAIV H5N1 risk-based surveillance data



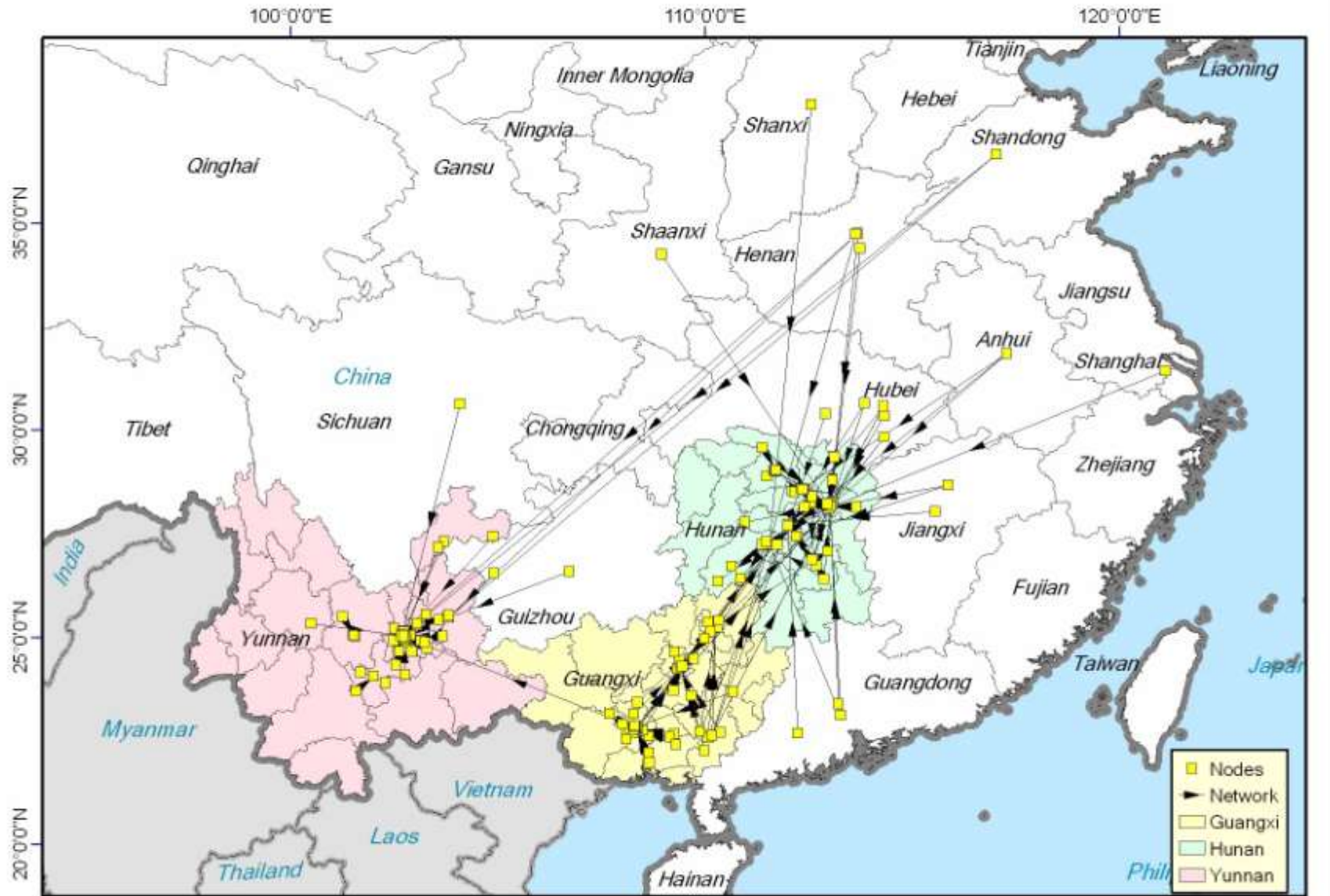
- Market chain analysis and Social Network Analysis
- Etudes de filières et analyse des réseaux sociaux

Spent hens import to Guangxi from other provinces

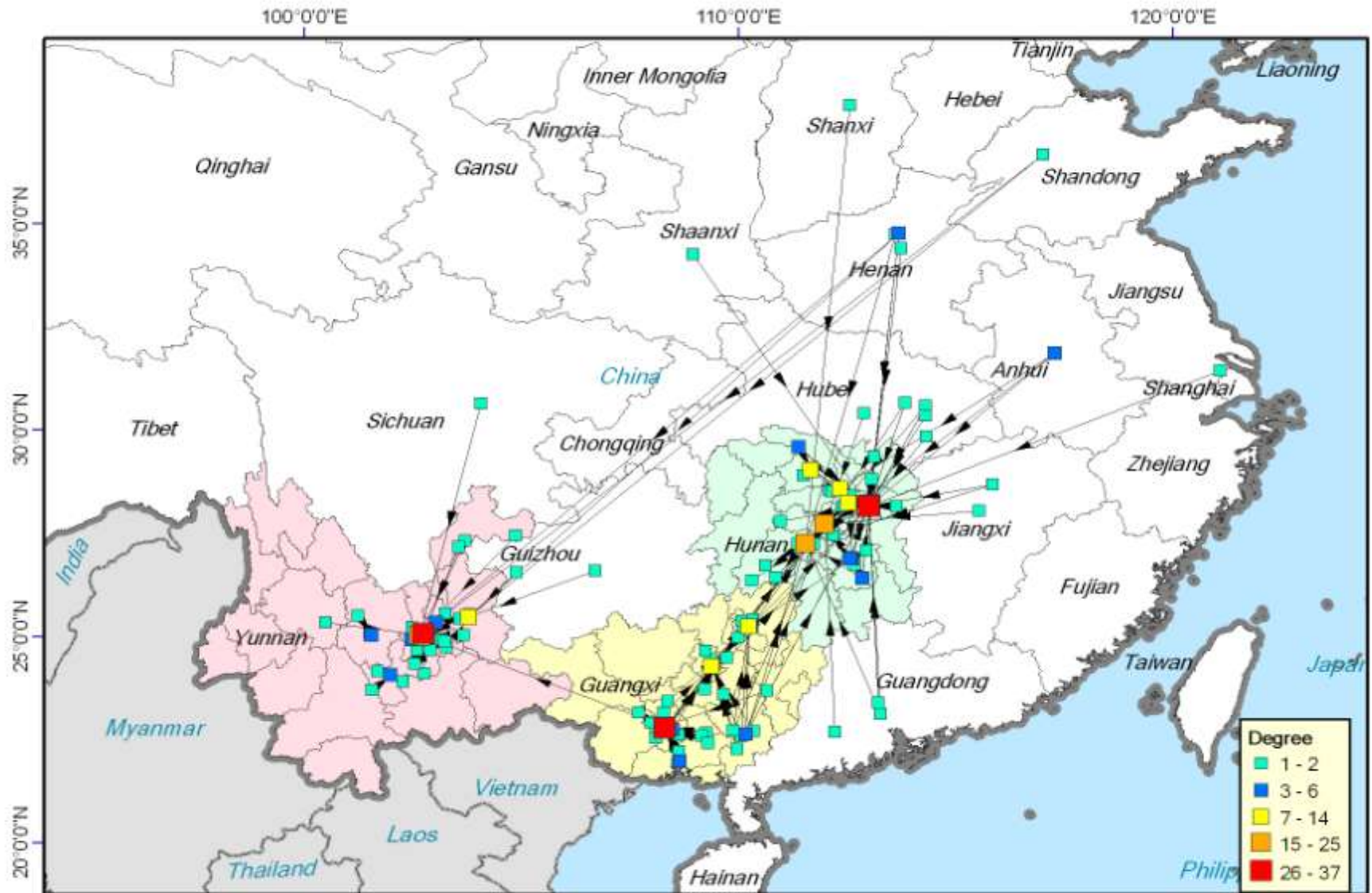


Martin, Vincent., Xiaoyan Zhou, Edith Marshall, Beibei Jia, Guo Fusheng, Mary Ann FrancoDixon, Nicoline DeHaan, Dirk U. Pfeiffer, Ricardo J. Soares Magalhães, Marius Gilbert, 2011. Risk-based surveillance for avian influenza control along poultry market chains in South China: The value of social network analysis. PREVET (2011), doi:10.1016/j.prevetmed.2011.07.007

LBM ego-networks of China



SNA parameter: Mean Degree



Outputs

- Disease situation updates/Digested analysis
- Alert and forecasting messages

ECTAD HPAI SITUATION UPDATE

No. 266 | February 12, 2009

Highly Pathogenic Avian Influenza H5 events



FIG. 1. A map of the world showing confirmed outbreaks in various countries.

AFRICAN REGION

- Egypt:**
 - Confirmed case of H5N1 infection in human (Al-Nor & Boud)
 - Confirmed outbreaks of H5N1 HPAI in poultry (Al-Shakiba, Abd-El-aziz, & Al-Fayoum)

ASIAN REGION

- Bangladesh:**
 - Confirmed H5N1 HPAI outbreaks in Bangladesh (Barisal & Jessore)
- Cambodia:**
 - Reports received from HPAI surveillance
- China:**
 - Last time outbreak of H5N1 HPAI in poultry (Xijiang)
 - Confirmed cases of H5N1 infection in wild birds and
 - Confirmed H5N1 HPAI outbreaks in poultry (Hong Kong SAR)
 - Suspected case of H5N1 infection in human (Hong Kong SAR)

H5N1 HPAI Global overview

December 2008 | Issue No. 2

WORLDWIDE

Eighty three outbreaks of H5N1 HPAI in poultry were reported officially worldwide in December 2008 from seven countries (Bangladesh, Cambodia, China, Egypt, India, Indonesia and Viet Nam). No cases of infection in wild birds were reported. The number of reported outbreaks/cases by country and their geographical location are illustrated in Figures 1 and 2, respectively.

The evolution of the number of outbreaks/cases over the last six months by species group (wild or domestic) and by geographical area is represented in Figures 3 and 4, respectively. The evolution of the number of confirmed cases of H5N1 AI infections in humans reported to the World Health Organization (WHO) by country between November 2003 and December 2008 is illustrated in Figure 5.

FIGURES 3 H5N1 HPAI outbreaks/cases worldwide during December 2008

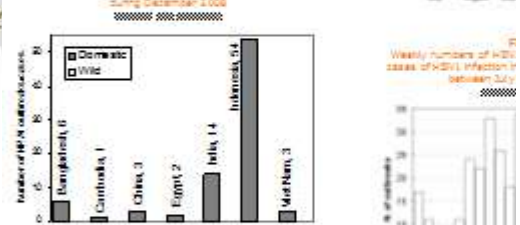


FIGURE 2 H5N1 HPAI outbreaks in poultry, and cases of H5N1 infection in wild birds in December 2008



FIGURE 5 Confirmed cases of H5N1 AI between November 2003 and December 2008

Japan: - **MINISTERIAL CASE OF H5N1 INFECTION IN HUMAN:** - **WORLD HEALTH ORGANIZATION (WHO)** - The Ministry of Health and Welfare of Japan has announced a new human case of avian influenza A (H5N1) virus infection. The case is a one and a half year old male from the

EMPRES W

African swine fever in Caucasus

1. INTRODUCTION

African swine fever (ASF) is caused by a DNA currently the sole member of the Asfarviridae highly contagious virus infection of domestic also be acquired through the ingestion of feedstuffs and transmitted by certain ticks a serious socioeconomic impact on pig production in international commerce. Feral pigs (susceptible) or European wild boar (non-domestic) are equally susceptible to ASF, which makes to control the disease if the infection be in these populations. Humans are not susceptible.

The potential distribution of the transcontinental; it can occur wherever it is and therefore most countries free of this serious measure to prevent its entry. endemic is domestic and wild porcine sub-Saharan Africa and Sardinia (an Italian Mediterranean). Where the infection occurs is usually sustainable only by adoption of levels on individual holdings.

Outbreaks of ASF were reported in 2 Caucasus region for the first time and are further to eastern Europe or other areas raised.

2. ABOUT THE VIRUS AND THE DISEASE

In a suitable protein environment, the ASF over a wide range of temperatures and does not necessarily inactivate the virus

CONTENTS

1. Introduction
2. About the virus and the disease
3. The pig industry in the Caucasus
4. Main challenges in the area and the risk for the region
5. References



Porcine reproductive and respiratory syndrome (PRRS) regional awareness

Prepared by FAO/EMPRES
 Contributors: David Robinson-Alonso, EMPRES; Juan Labrador, EMPRES; Contributor: Fair Njaram, EMPRES; Julio Pineda, EMPRES; Klaus Dreyer, EMPRES; S. Stephanie DeLafontagne, EMPRES; Vincent Martin, Senior Technical Advisor in Charge for avian influenza, William Amey, SCIRD, USAID

Recent reports from the People's Republic of China and Southeast Asia have alerted the world to a new variant of porcine reproductive and respiratory syndrome (PRRS) virus. The disease produced by this virus is characterized by high morbidity and significant mortality that has devastated the pig industries of the affected countries (Fig. 1). The growing import/export activities in that part of the world and the many countries involved, have prompted EMPRES to issue an early warning message to those areas, and in particular to official veterinary services throughout Southeast Asia and parts of Africa, to be aware of this new variant of the PRRS virus and to offer advice on how to prevent the disease from establishing itself in new areas and how to effectively control outbreaks in the event that the virus does take hold.

1. INTRODUCTION

Porcine reproductive and respiratory syndrome (PRRS) is an infectious viral disease of swine that is easily transmitted through direct contact to susceptible pigs and vertically to fetuses. PRRS is considered the most economically important disease of intensive swine farms in Europe and North America. It is characterized by reproductive failure in sows and respiratory distress in piglets and fattening pigs, which, combined with its potential for rapid spread, can cause significant production and economic losses. PRRS, also known as Myxomatous Swine Disease, Blue Ear Disease, Porcine Endemic Abortion and Respiratory Syndrome (PEARS) and Swine Infertility Respiratory Syndrome (SIRS), is not known to be a zoonosis. The PRRS virus (PRRSV) is an enveloped positive-stranded RNA virus, classified in the order Nidovirales, family Arteriviridae, and genus Arterivirus (Zimmerman et al. 2004). Two major serotypes of the virus are currently described, the European and the American types. This classification is significant in that vaccines made for one serotype will not completely protect against the other.

2. GEOGRAPHICAL DISTRIBUTION

PRRS was first detected in North America in 1987 and in Europe in 1990 and has since then been recorded in most major pig-producing areas throughout the world (Table 1).



No. 2 - 2007

TABLE OF CONTENTS	
1. Introduction	1
2. Geographical distribution	1
3. Clinical signs and diagnosis	2
4. Epidemiology	3
5. Prevention and control	3
6. References	5

Only Australia, New Zealand and Switzerland are reportedly free from PRRSV infection. The most recent outbreaks have occurred in Sweden, South Africa, Russian Federation, Viet Nam and China.

Table 1. Status of PRRS in affected countries (Source: OIE, WHO)

State	Countries reporting
Infection present (with clinical cases)	Spain, Thailand, Denmark, Mexico, Slovakia
Infection present (with clinical cases)	Denmark, Colombia, Costa Rica, France, Germany, Ireland, Japan, Republic of Korea, Netherlands, Philippines, Portugal, Spain, United Kingdom, United States of America
Disease controlled (no clinical cases reported)	Bolivia, Chile, Dominican Republic, Romania

Viet Nam: Between March and August 2007, 44 outbreaks grouped into two main epidemics were reported: the first in northern provinces between March and May, and the second in southern provinces during June and July. About 44,000 pigs were affected, of which over 4,000 died (OIE, 2007a). At the end of August 2007, Viet Nam declared that the epidemic was under control. However, during August and September 2007, nine new PRRS outbreaks were reported in Khanh Hoa, Da Nang and Lang Son provinces with mortalities of up to 24 percent (OIE, 2007b). Preliminary clinical experiments suggest that secondary or concomitant infections have been the cause of high mortality and morbidity.

China: Two major (American-type) PRRS occurrences have been reported in China since the mid 1990s. From June to September 2006, an atypical form of PRRS affected over two million pigs, of which 600,000 died in 16 provinces according to the China Animal Disease Control

PRRS is a highly contagious disease that causes economic loss due to peracute or acute, and the morbidity and mortality rates



Conclusion

- Risk analysis for decision making
- Cost effective interventions along market chains
- Integration of Animal production and socio-economic data is key
- New approaches and methodologies available