

VIGILANCIA BASADA EN RIESGO

ENESA - MAGRAMA

25 de Junio de 2013

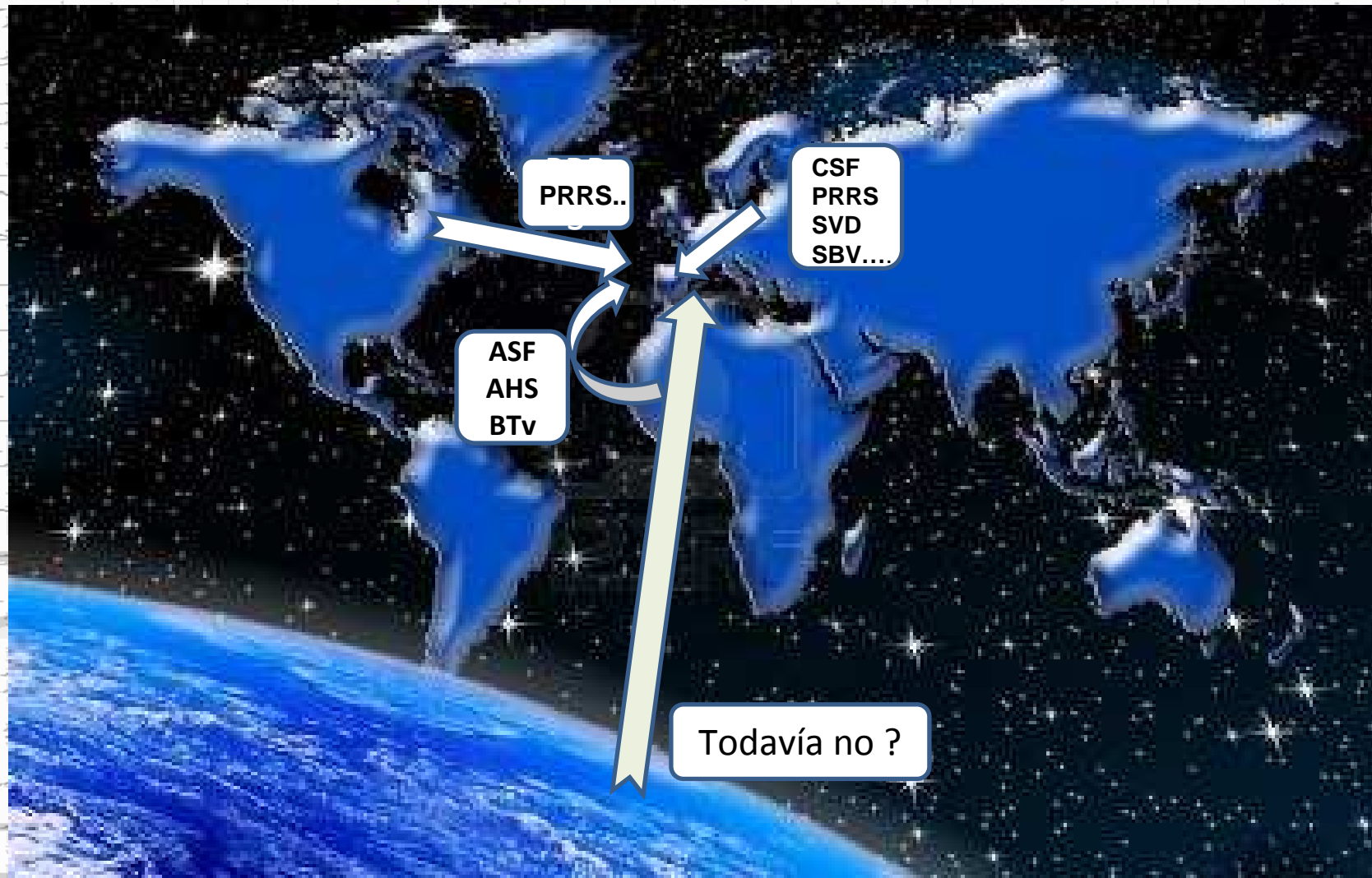
Prof. JM. Sánchez-Vizcaíno

**Universidad Complutense de Madrid
Laboratorio de Referencia de la OIE**

jmvizcaino@visavet.ucm.es

EL PROBLEMA

- ✓ **ENFERMEDADES EMERGENTES Y REEMERGENTES**
- ✓ **GLOBALIZACIÓN**
- ✓ **DETECCIÓN TARDÍA EN CAMPO**



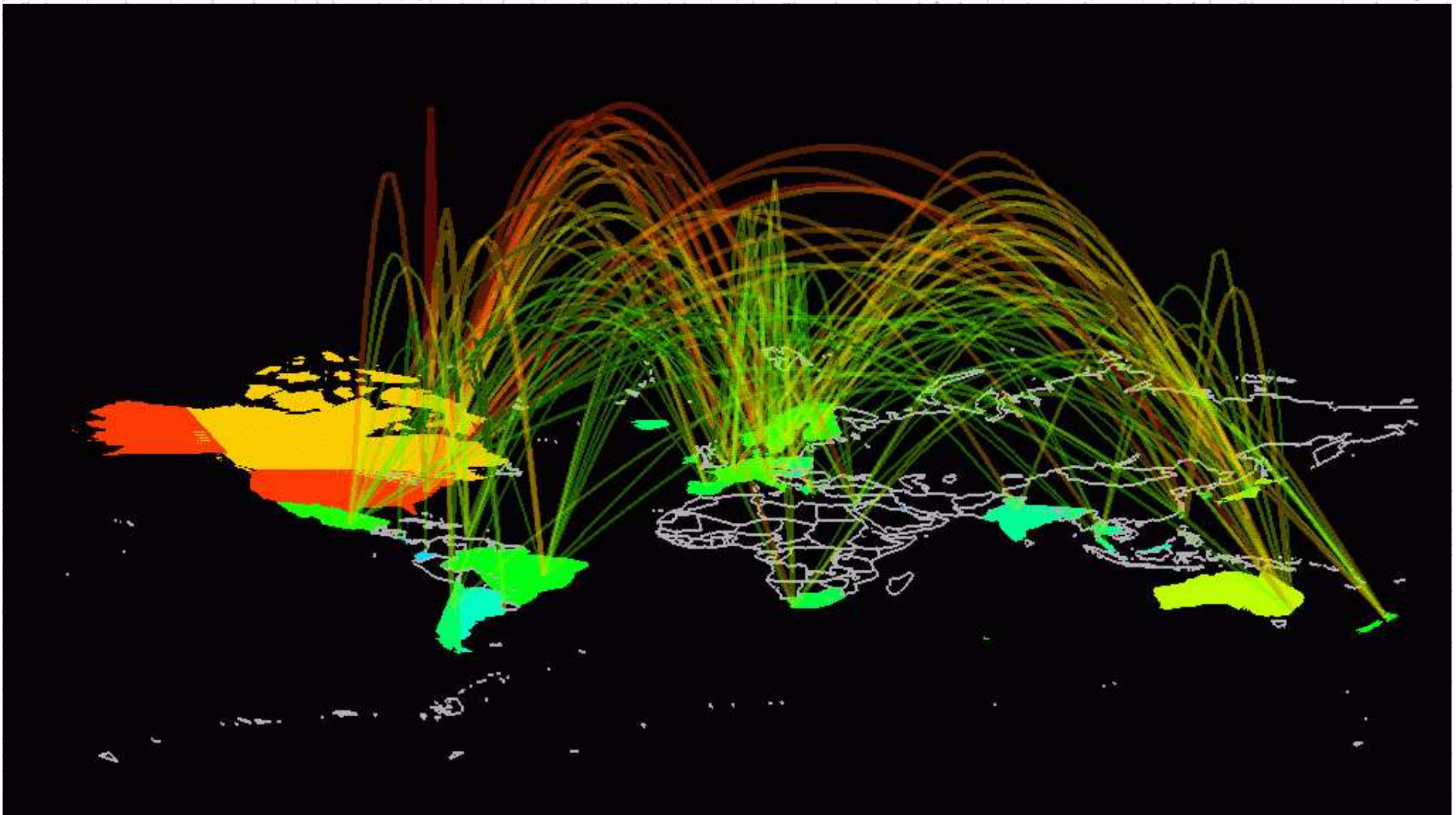
PRRS..

CSF
PRRS
SVD
SBV...

ASF
AHS
BTV

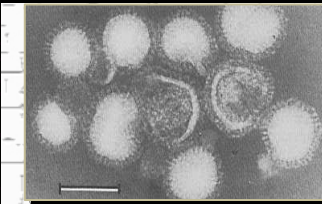
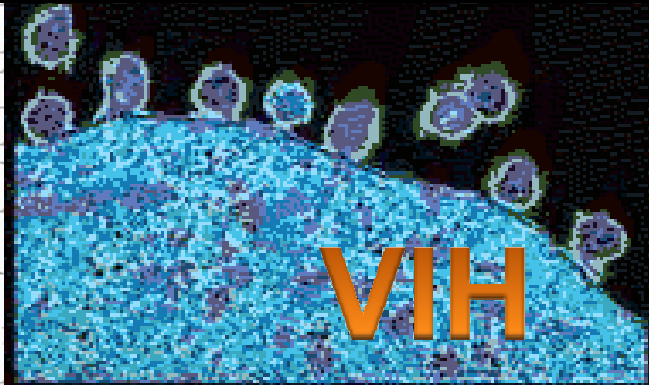
Todavía no ?



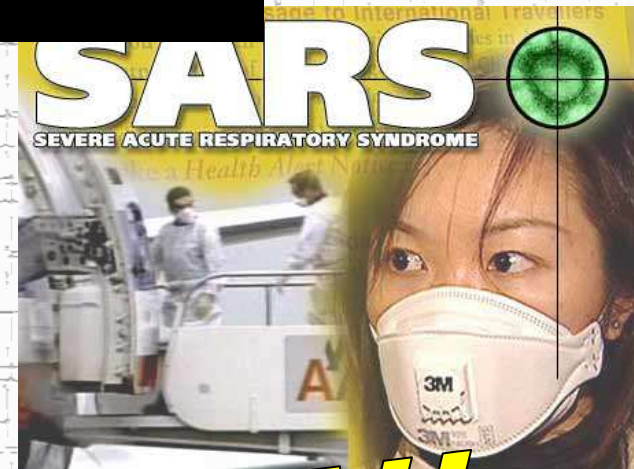


**GLOBALIZACIÓN. Movimientos sin precedentes
Mas rápidos que el periodo de incubación**

ZOONOSIS EMERGENTES



IF



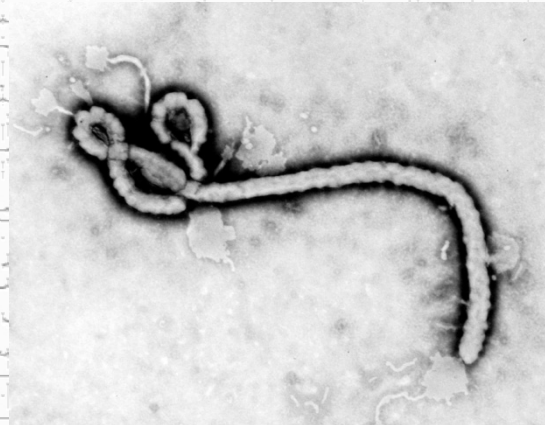
NIPAH



Alarma sanitaria



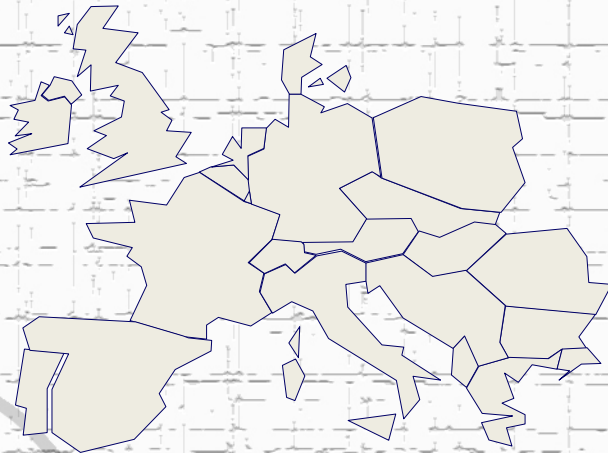
WN, RVF



Ebola Reston



ENFERMEDADES APARECIDAS EN LA UE EN LOS ÚLTIMOS AÑOS



TIEMPO TRANSCURRIDO DESDE LA INFECCIÓN
AL DIAGNÓSTICO ? : SOSPECHA CAMPO? LAB?

PPC

FA

LA

PPA

IF AV

EVC

Etc

1 a 3 meses



Muestras llegan al laboratorio
Los VIERNES a las 12,00



4 horas

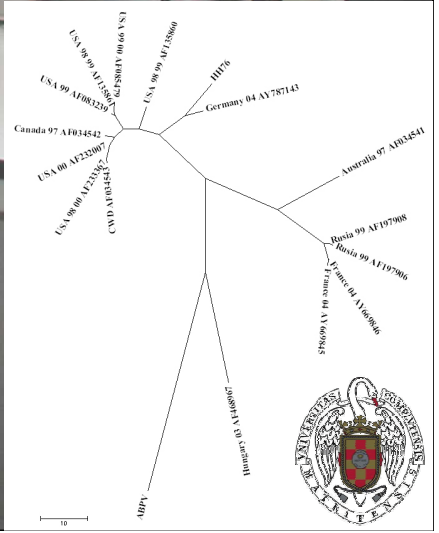


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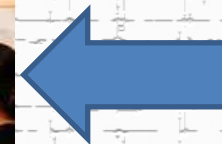
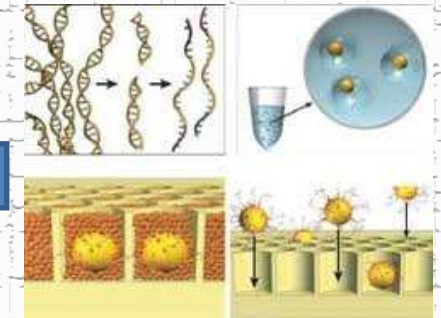
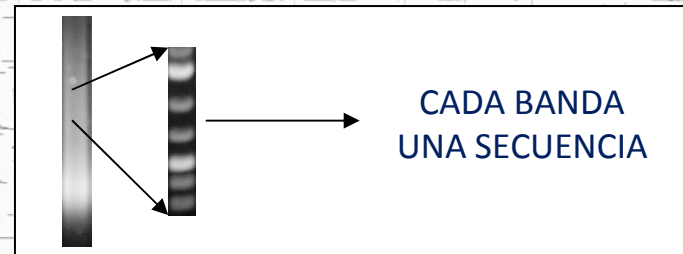
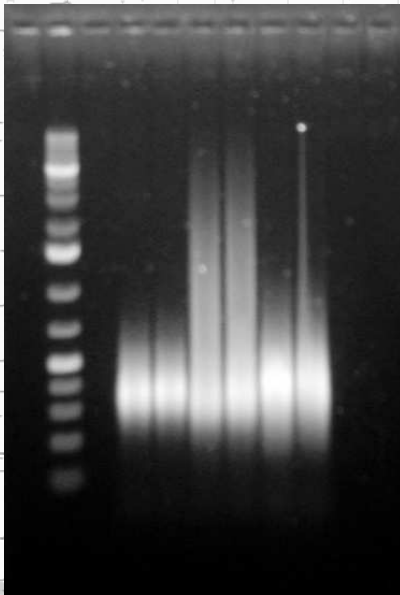
M I A I A R A L S V S B A C V T V T D A R V S L S P F C V M E T L G I
GTTAAATTCGGTAGAGTGCAGCGGATAGACACACAGACTTCTCTGTTACGGGCGAGCGTCCAGCCAGCAGCATACAGCAATTCAGTCCAGCATATGCGTACTTAGGAA
110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000 1010 1020 1030 1040 1050 1060 1070 1080 1090 1100 1110 1120 1130 1140 1150 1160 1170 1180 1190 1200
...

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Fig. 1. The nucleotide sequence of the 57 gene of AHSV-4 shown as the cDNA of the message-sense RNA. The open reading frame begins at positions 18 to 20 and is terminated by the TAG codon at positions 1077 to 1079. Amino acids are shown above their respective IUPAC codons.



METAGENOMICA



Tratamiento informático
de las secuencias



specimen	1	2	3	4	5	6	7	8	9	10	11	12	13	14
specimen 1	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 2	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 3	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 4	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 5	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 6	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 7	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 8	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 9	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 10	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 11	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 12	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 13	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA
specimen 14	TAAAGATTAAAT	TATCTATTTTAA	AGAAAGCCCAAT	AGAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA	AAATTC	TAAAGTTTAA

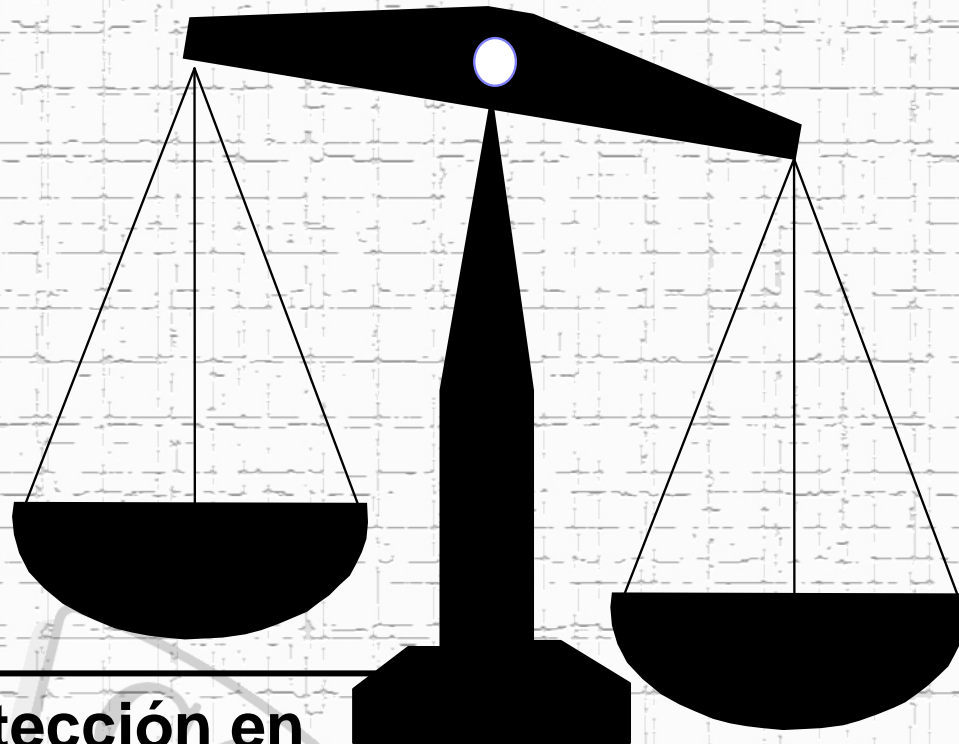
Comparación de secuencias en base de datos



Detección por
homología

**DETECCIÓN DE VIRUS
DESCONOCIDO**

FALTA EQUILIBRIO



**Detección en
Laboratorio 4 – 10 H**

**Detección en
Campo. De 1 a 3 M**

PRINCIPALES PROBLEMAS OBSERVADOS:

I. FALTA DE INFORMACIÓN. FUNDAMENTALMENTE VET. PRIVADOS :

- a) No percepción del riesgo de entrada de enfermedades
- b) Pobres programas de vigilancia y no basados en el riesgo
- c) Problemas con los síntomas y lesiones (no experimentales. Varias)
- d) Problemas en la elección de la muestra y el laboratorio

II. MEJOR RELACIÓN ENTRE LOS VETs PÚBLICOS Y PRIVADOS:

- a) Contacto mas cercano y fluido
- b) Mejor contacto entre labs públicos y privados

III. FALTA DE SIMULACROS CON PRIVADOS:

- a) Mas ejercicios de simulación: web-interactivos y campo

IV. GRANJAS CENTINELAS: Monitorización en tiempo real

DETECCIÓN TEMPRANA



LA SOLUCIÓN

✓ **VIGILANCIA BASADA EN RIESGO. CENTINELAS**

✓ **ENTRENAMIENTO PERMANENTE EN CAMPO**

✓ **PROGRAMAS DE ACTUACIÓN RÁPIDOS**

A. Riesgo: Que enfermedades , Donde y Cuando



Prevención

Vigilancia Activa y Pasiva
Basada en riesgo

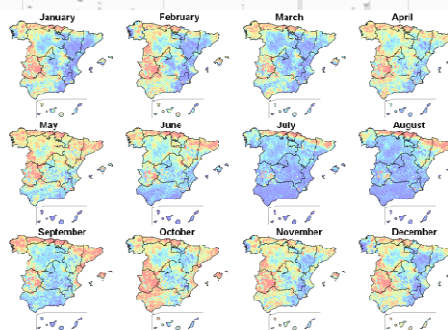
Técnicas y Modelos
EPI

Vigilancia -
-RIESGO
DIAGNÓSTICO



Educación

- ✓ Educación Continuada
- ✓ Mejor Comunicación Sanitarios
- Simulacros de campo



Control

Detección Temprana (SA-SP)

Planes de
Contingencia
Bancos Vacunas
Coste/eficacia



Rápido control. P. Contingencia

HERRAMIENTAS



SIMULACIÓN EN CAMPO

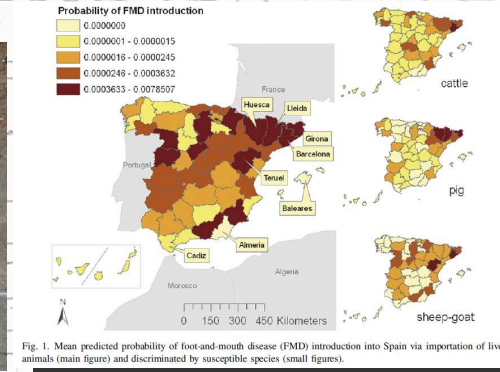


Fig. 1. Mean predicted probability of foot-and-mouth disease (FMD) introduction into Spain via importation of live animals (main figure) and discriminated by susceptible species (small figures).

ANÁLISIS DE RIESGO FACTORES DE RIESGO.

Ruminant Density

+

Altitude

+

Proximity to Aquatic Areas

+

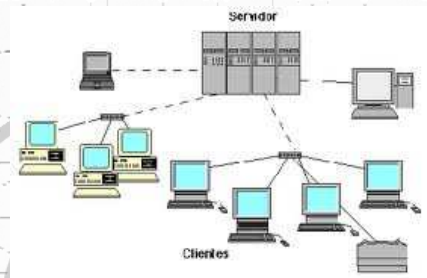
Rainfall

+

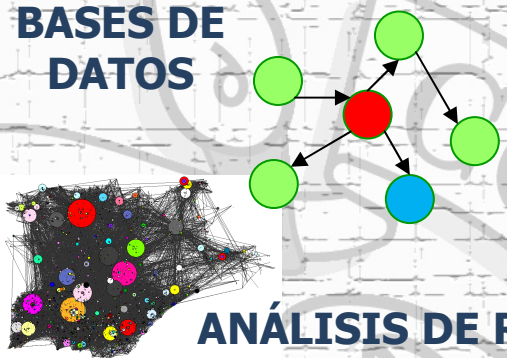
Temperature

ENTRENAMIENTO

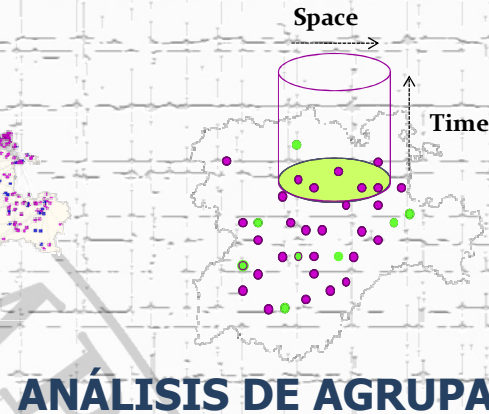
DETECCIÓN TEMPRANA



BASES DE DATOS

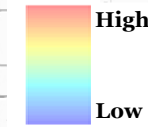


ANÁLISIS DE RIEDES



ANÁLISIS DE AGRUPACIONES

Risk of RVF



MAPAS DE RIESGOS

Probability of FMD introduction

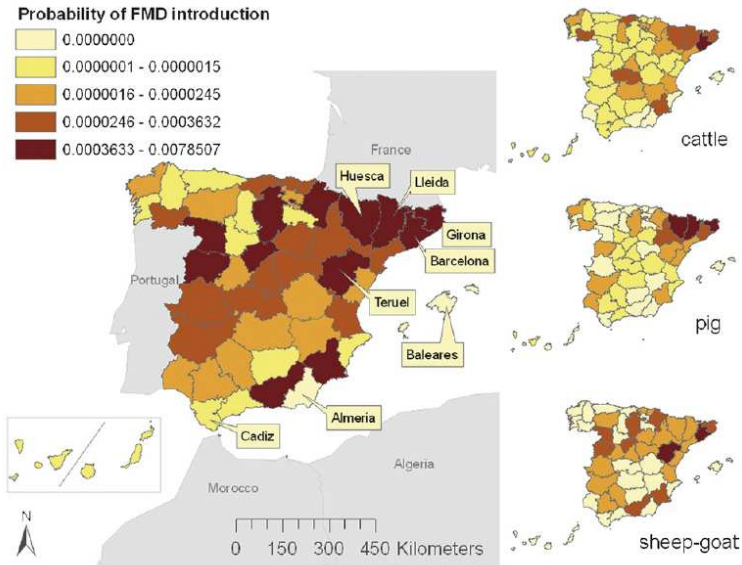
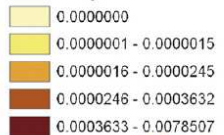
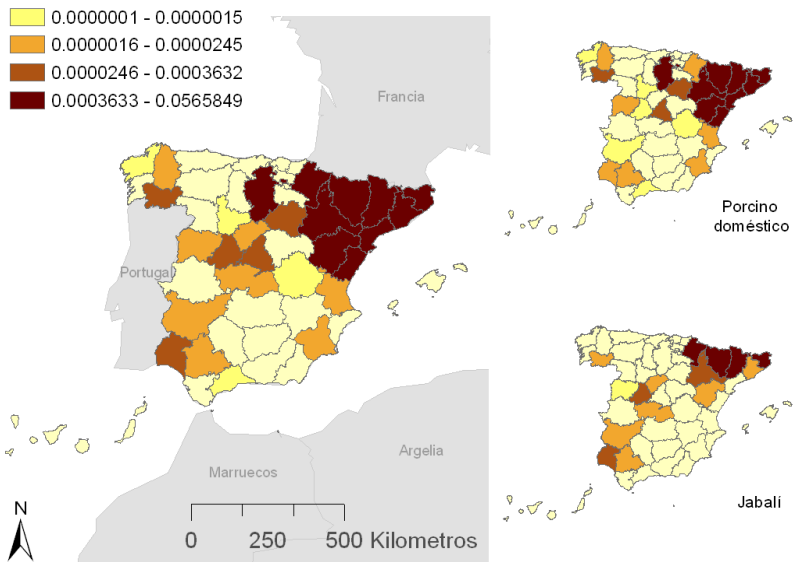
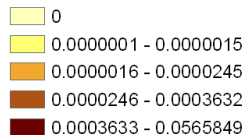


Fig. 1. Mean predicted probability of foot-and-mouth disease (FMD) introduction into Spain via importation of live animals (main figure) and discriminated by susceptible species (small figures).

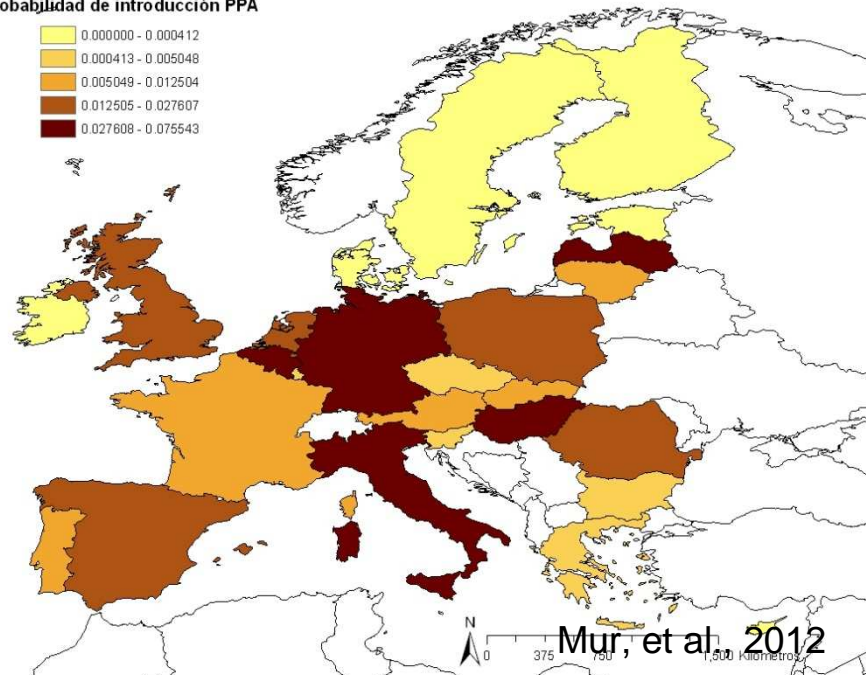
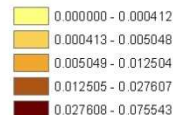
La mayoría:
AHS
ASF
CSF
FMD
RVF
WN
ETC....

Martinez-Lopez et al., 2006 , 2009

Probabilidad de introducción de VPPC



Probabilidad de introducción PPA

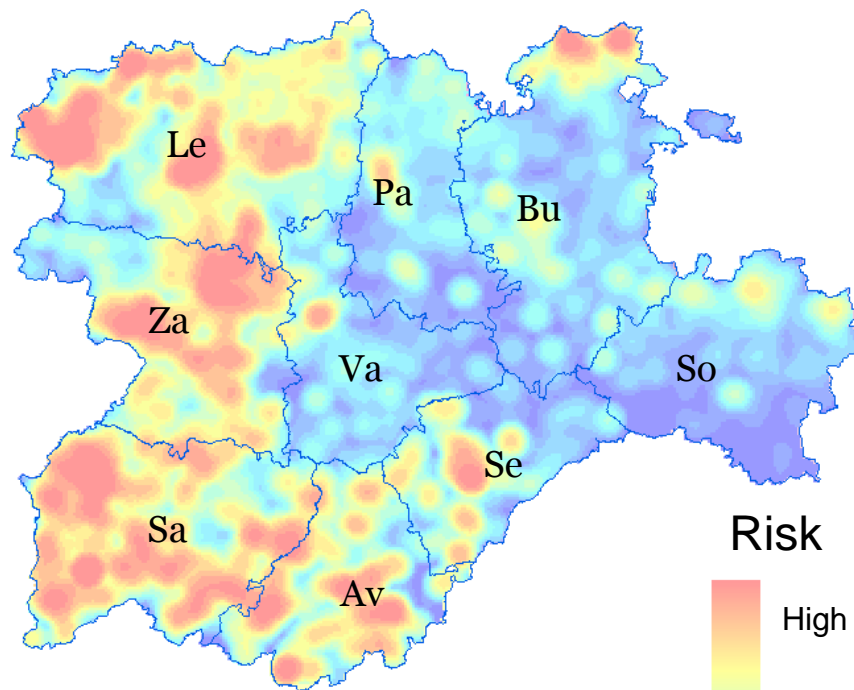


Mur, et al., 2012

Modelos espaciales y estocásticos

fa

ppc

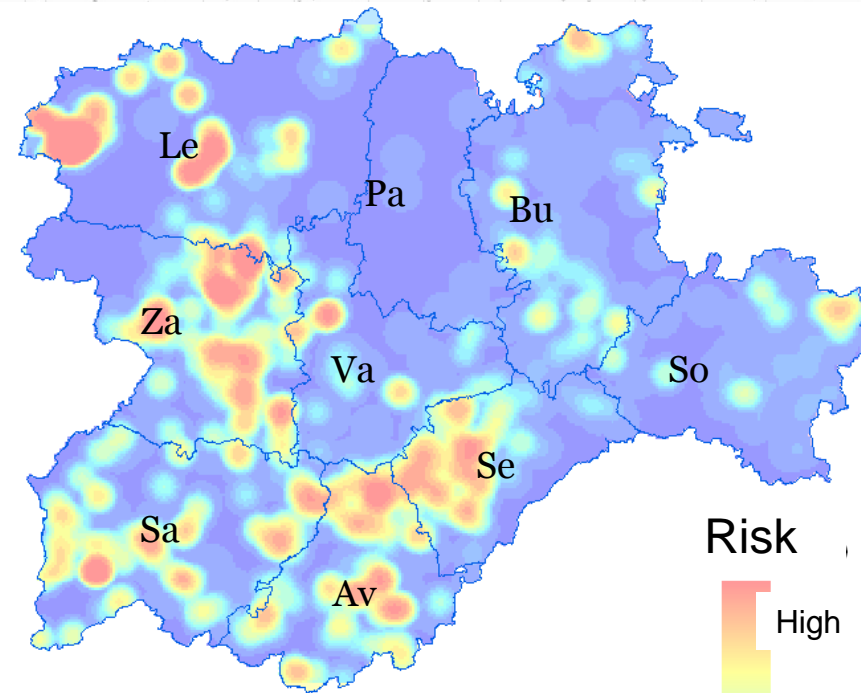


0 30 60 Kilometros

Risk

High

Low



0 30 60 Kilometros

Risk

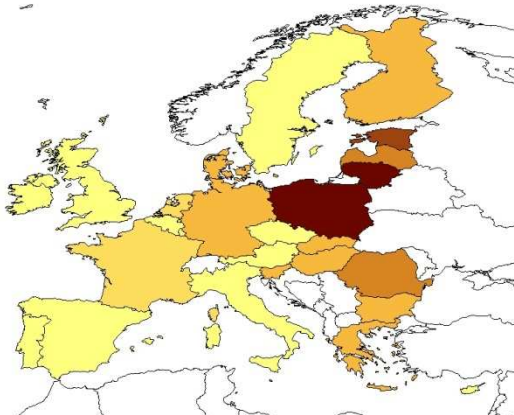
High

Low

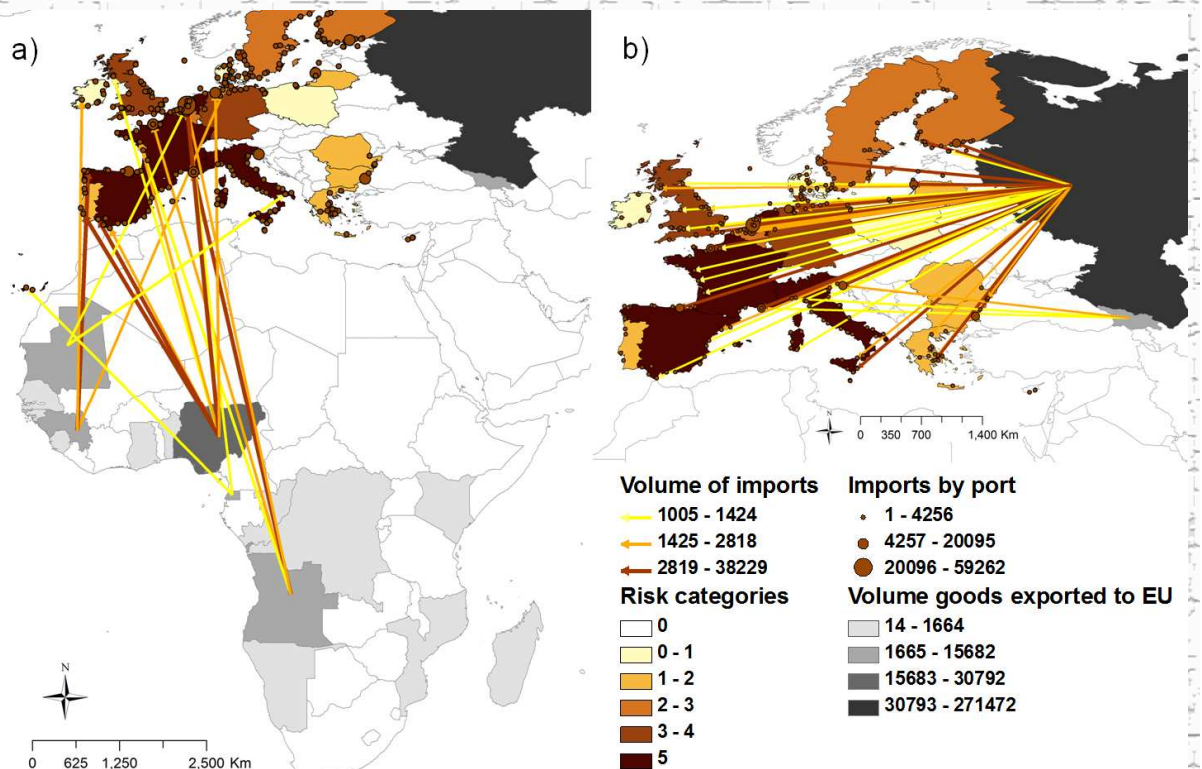
ANÁLISIS DE RUTAS DE ENTRADA

ASF INTRODUCTION BY TRANSPORT ROUTES

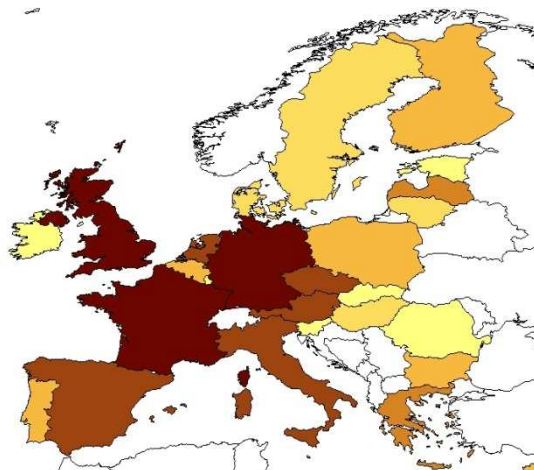
ASF BY ROAD



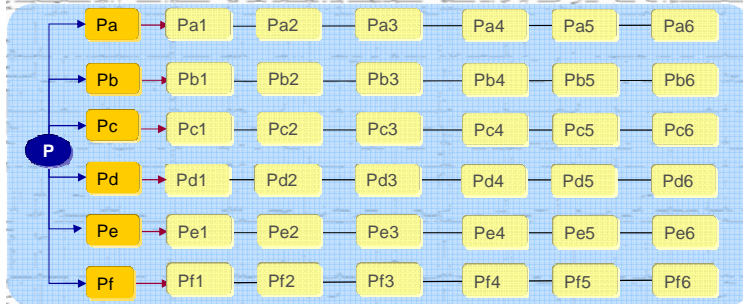
ASF BY CARGO BOATS



ASF BY PLANES

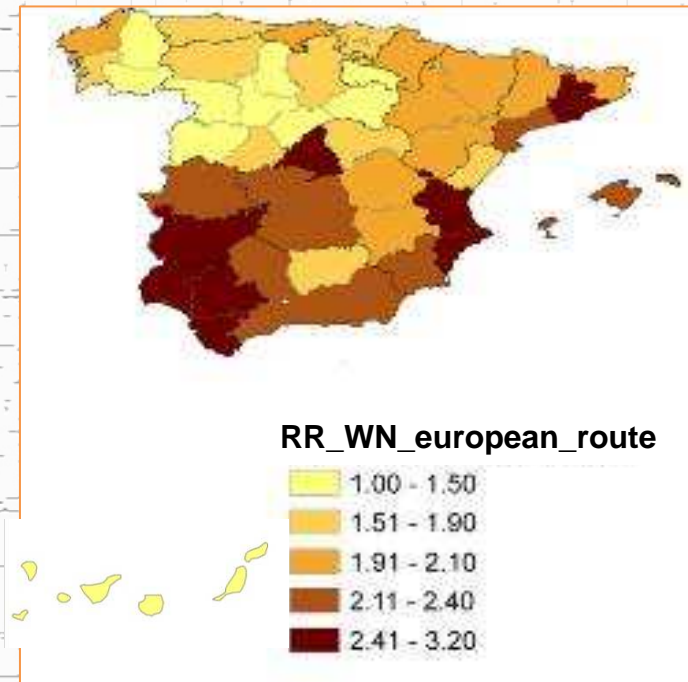
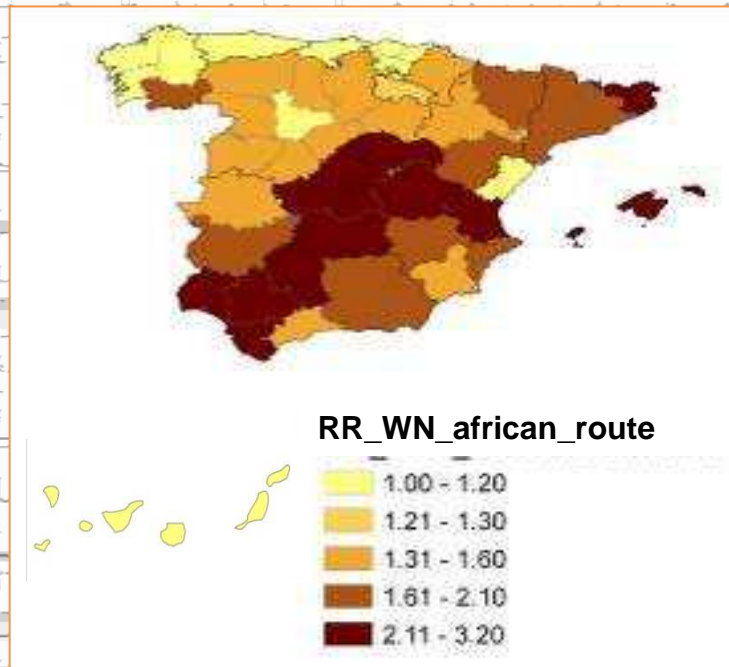


RIESGO DE ENTRADA DE WN



RESULTADOS

Risk maps for the potential WNV entrance into Spain

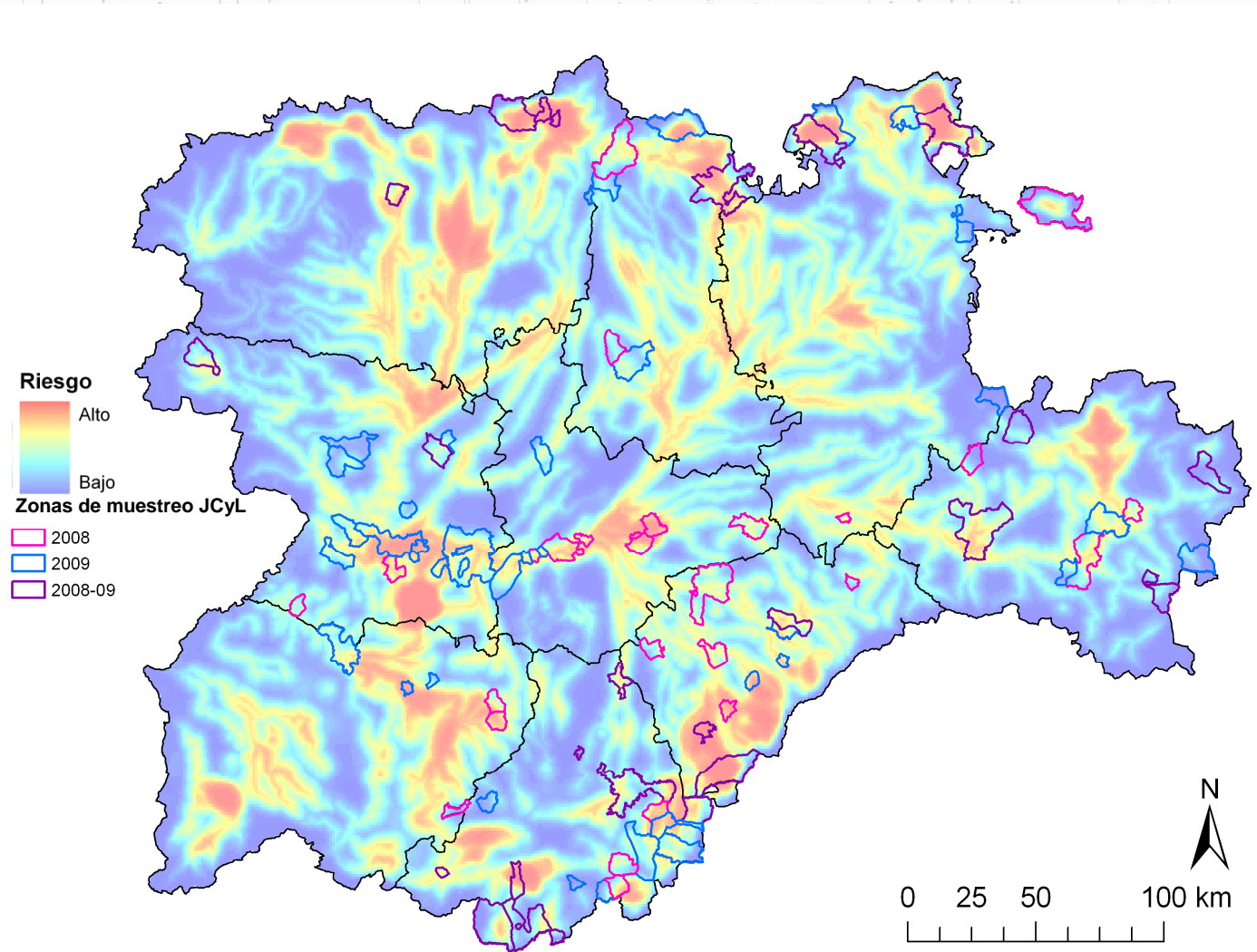


Rodríguez-Prieto et al., 2012

- Spring
- Breeding spp (paseriforms and raptors)

- Autumn
- Wintering spp (aquatic)

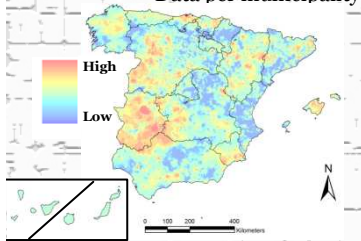
MAPA DE RIESGO Y VIGILANCIA DE WN EN CyL



Mapa multifactorial de la FVR

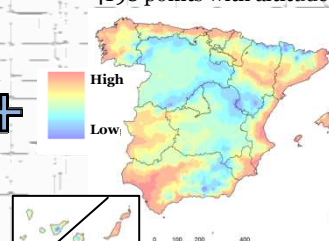
Ruminant Density 50%

Data per municipality

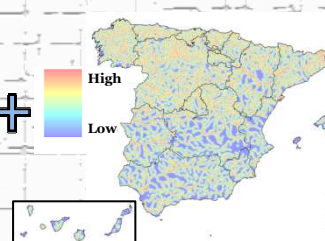


Altitude 4%

4198 points with altitude

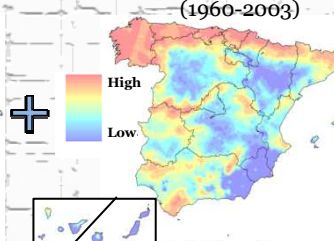


Proximity to Aquatic Areas 12%



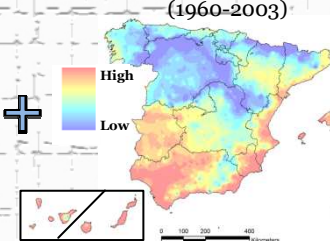
Rainfall 24%

4189 points with rainfall rates (1960-2003)

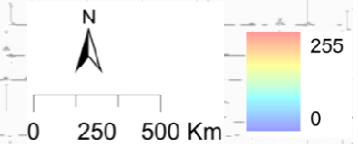


Temperature 10%

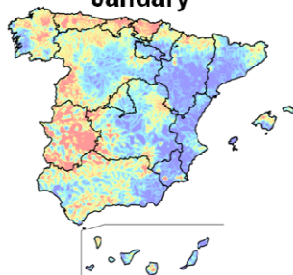
1802 points with temperature (1960-2003)



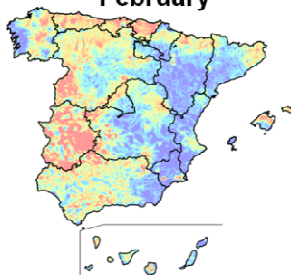
Identificación de las zonas susceptibles por meses



January



February



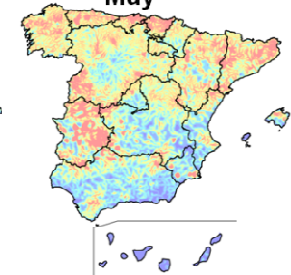
March



April



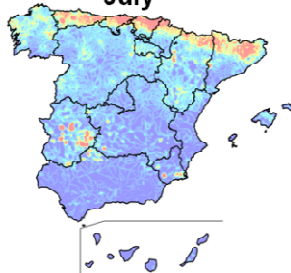
May



June



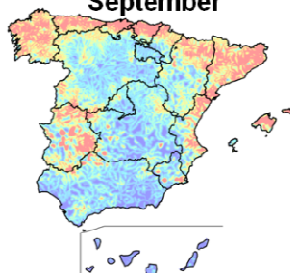
July



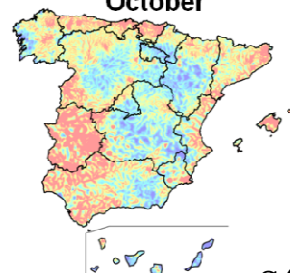
August



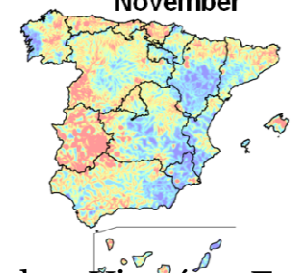
September



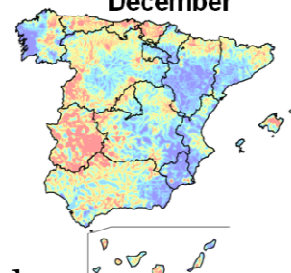
October



November



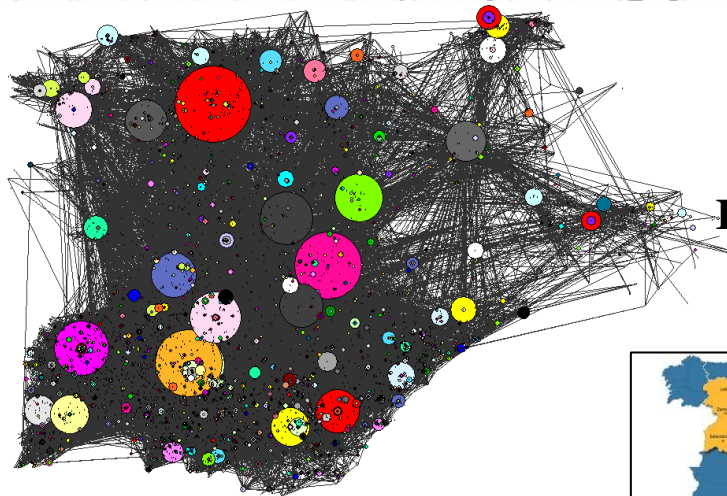
December



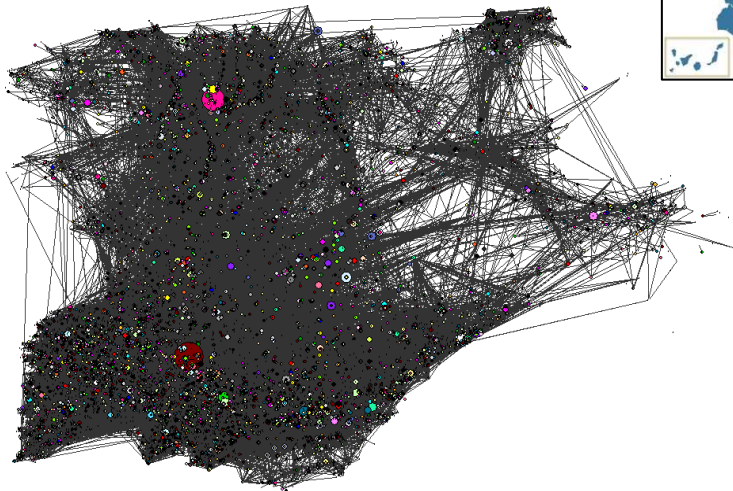
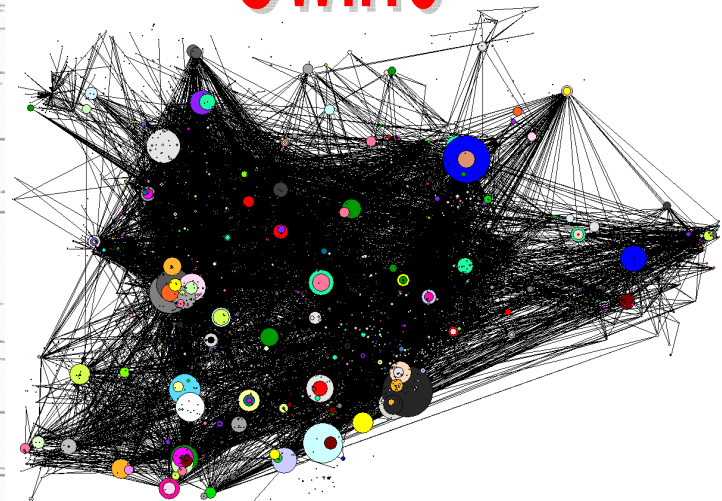
Análisis de Redes (SNA)

Bovine

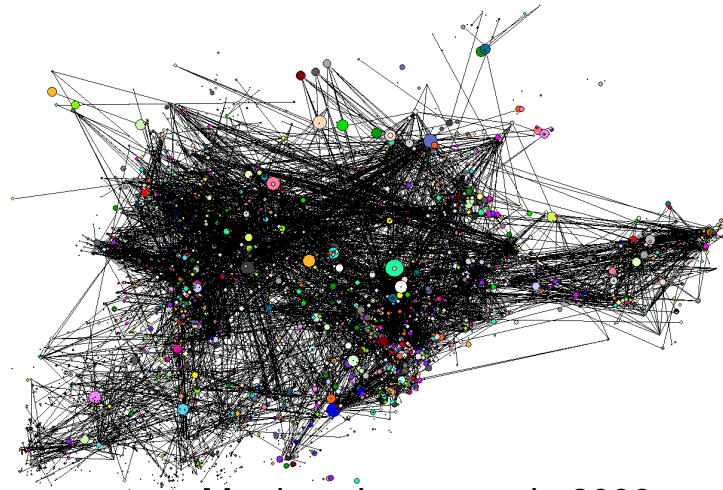
Swine



ENTRANCE



EXITS



Martinez-Lopez et al., 2009

GRANJAS CENTINELAS



GRANJAS CENTINELAS ON LINE



Proyecto RAPIDIA

Esquema de funcionamiento de los sistemas de recogida, transmisión y procesamiento de datos



Sistema referencial externo
Cámara termográfica

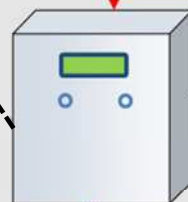
Servidor central
(core)



Router



Unidad Base



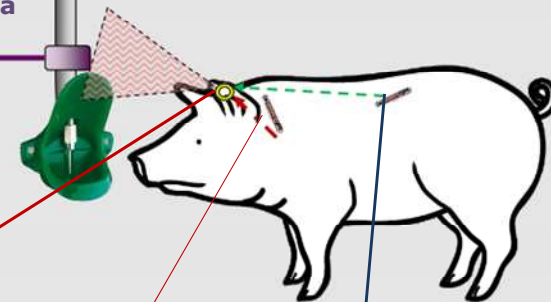
Sensor de temperatura ambiente

Sensor de caudal

Dispositivos de lectura de la señal RFID

Transpondedor en forma de crotal

Transmisión de los datos por radio



Ordenador central

- Control, procesado y análisis de datos en tiempo real
- Control del sistema
- Programación de alertas

Avisos y alertas

- Alertas por SMS/e-mail
- Control directo de datos
- Avisos a personal cualificado

2 Sistemas RFID incorporados:

-Temperatura e identificación

-Movimiento



AGRADECIMIENTO:



EQUIPO SUAT:

**Facundo Linares
Luis Martín Otero
Beatriz Martínez
Mar Melero
Lina Mur
Ana C. Pérez
Belén Rivera
Consuelo Rubio
Almudena Sánchez
Rocío Sánchez
Ana Sánchez
Fernando Sánchez-V
Víctor Rodríguez
Raquel Vargas
Marina Vicente**