# Global situation of ASF



TAFS forum
Scientific Conference on ASF,
Beijing, 2019

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# Laboratories BSL-3









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### Nivel 3 de Contención Biológica



### **BSL-3 BOXES**

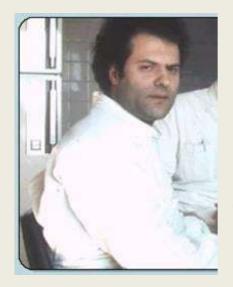




#### **MONITORED**

- Video
- On line: Animals Temperature, motion, water consumtion



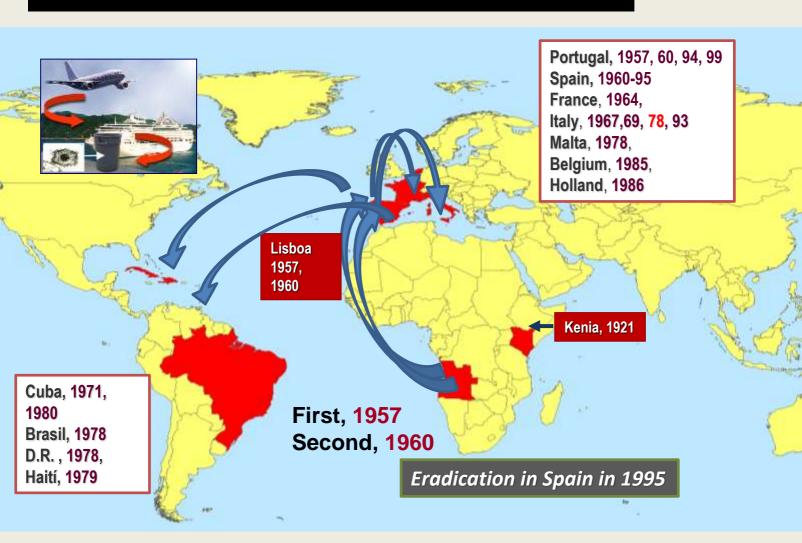


**40 YEARS**With ASF





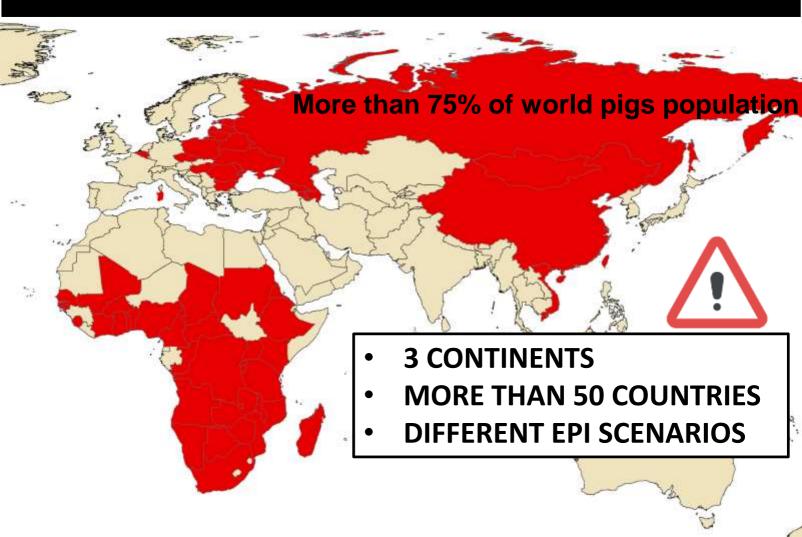
# ASFv out of Africa I and II



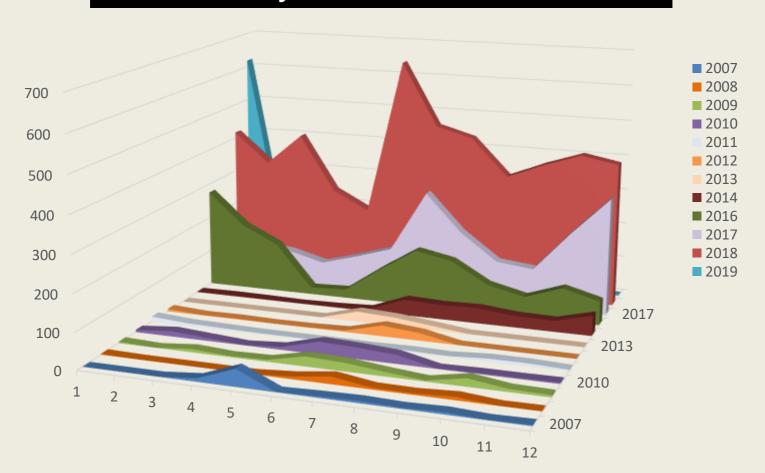
# ASFv our of Africa III



# ASF the threat of the global pig industry



# Total outbreaks of ASF from 2007 to February 2019 around the world



# ASF situation in Africa **West Africa East and South Africa**

## **EAST AND SOUTH AFRICA**

10<sup>7</sup>

First time reported: Kenya 1921

24 genotypes

Recognized to have been present in its wildlife hosts for a very long time

Vectors and reservoirs: wild pigs (Potamochos larvatus, Phacochoerus aethiopicus and Phacochoerus africanus) and ticks of the Ornithodoros spp (O. moubata, O. porcinus domesticus and O. porcinus porcinus)

→Sylvatic and domestic cycles of

 High levels of seropositivity have been observed in apparently healthy animals.

## **West Africa**

- First time reported in West Africa: Senegal 1957
- 1 genotype (I)
- The role of ticks and warthogs in epidemiology of the disease is considered limited
- The maintenance of the disease is mainly pig-to-pig transmission

**Backyard farms** 

Weak biosecurity

Swill feeding

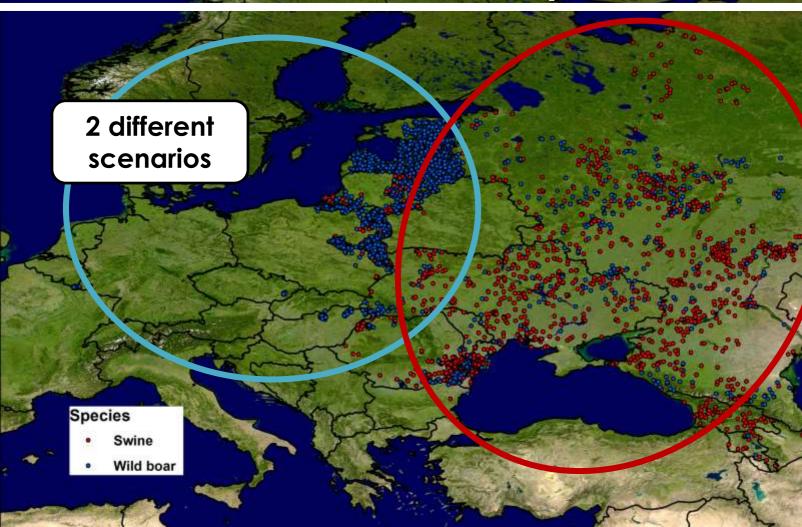


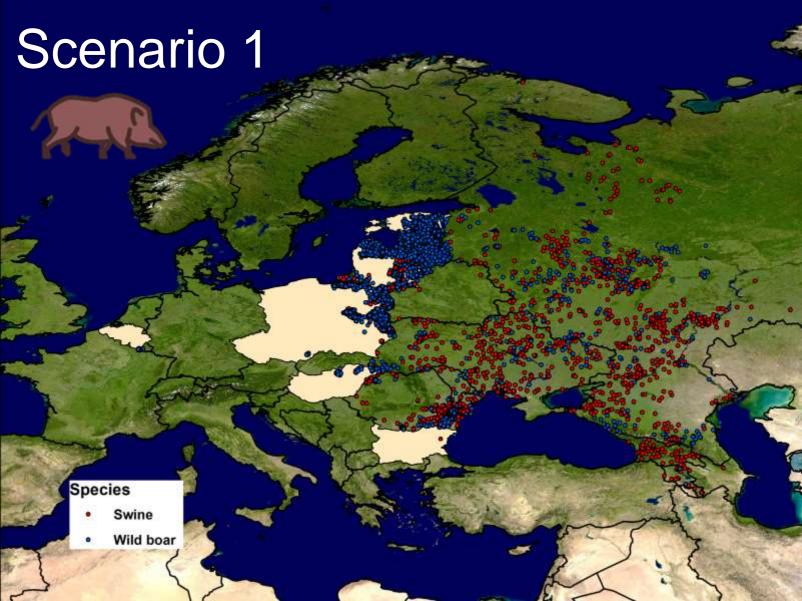
# ASF situation in Europe

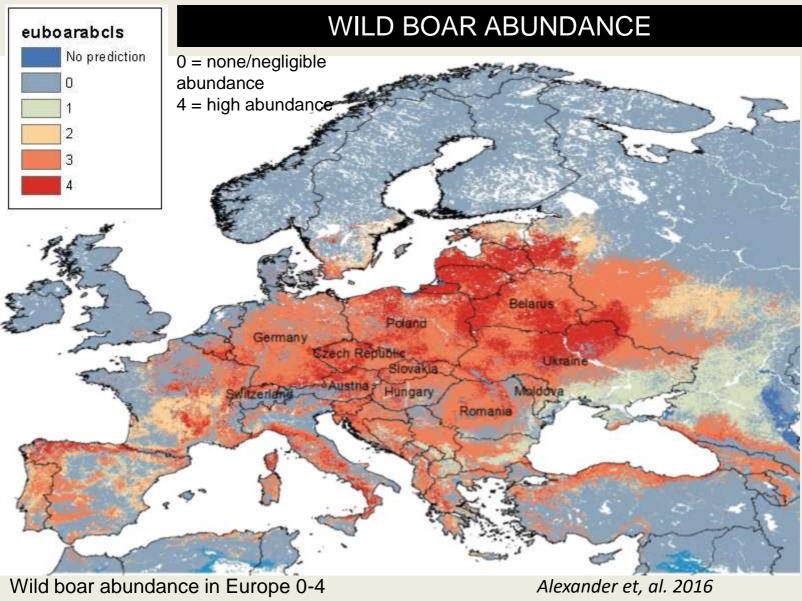
## ASF Was

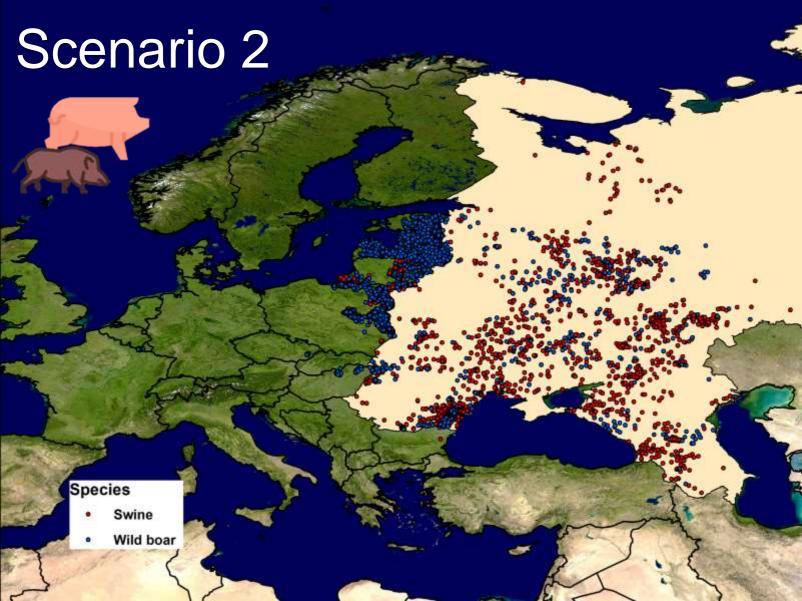
	Underesti	mate?
Açones (PT)	Country	Year
MACERIA MACERIA	Georgia	2007
Milme P1 CANARIAS (RS)	Armenia	2007
GUYANE (FR) SEARCH	Azerbaijan	2007
Norya Finland	Russia	2007
Sverige	Ukraine	2012
United Kingdom	Belarus	2013
Eire lreiand	Estonia	2014
Neclegated Bourns Guzanpten	Latvia	2014
Deutschland Polaka  Daraina  Deutschland	Lithuania	2014
France Science Albertaid	Poland	2014
France Oaberreich Magy Beng Roll in Sakarvein Sakarvein	Moldova	2016
Portugal: Station State	Romania	2017
España Data Hana Hana Hana Hana Hana Hana Hana H	Czech Republic	2017
EAAu Str-Elleda,	Hungary	2018
El Maghreib El Ojachir Tounis Maha Korra Librain trong	Bulgary	2018
CURRENTLY 9+1 EU COUNTRIES ARE AFFECTED	Belgium	2018

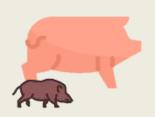
# ASF situation in Europe



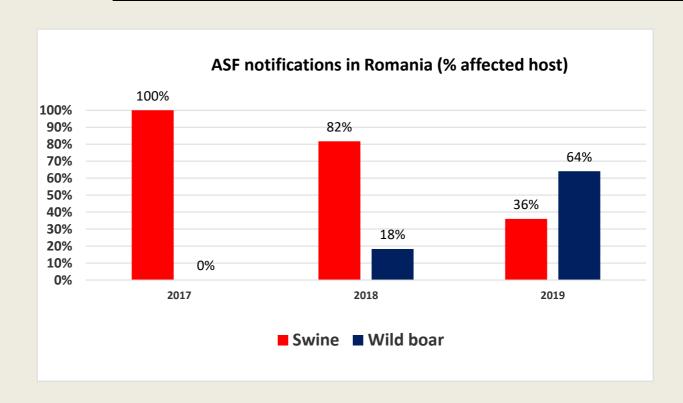






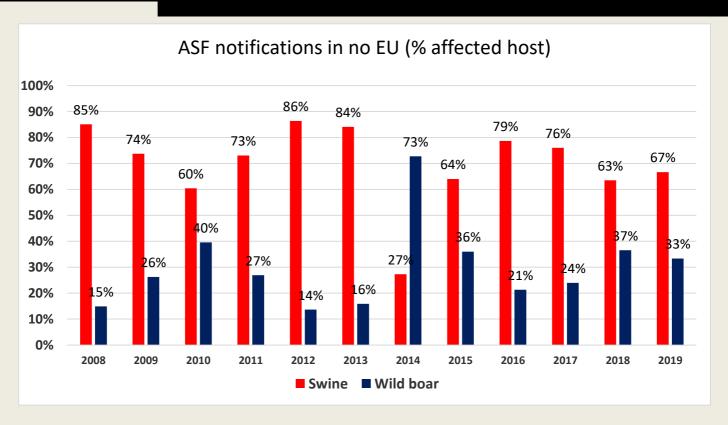


# Scenario 2 in EU (Romania





# Scenario 2 in no EU countries





# Scenario 2 in Romania and no EU countries

Cases reported both family and factory farms

### **ROMANIA**

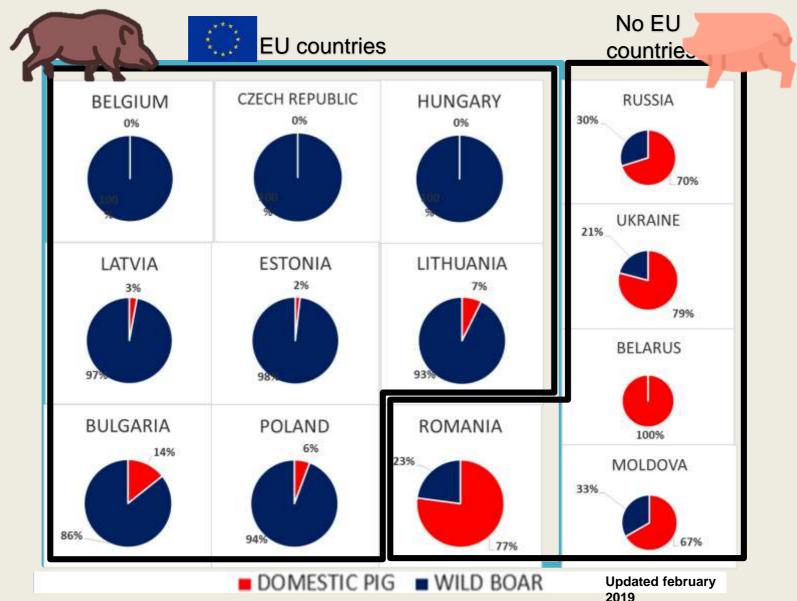


#### **RUSSIA**



Family farms (less than 15 animals)

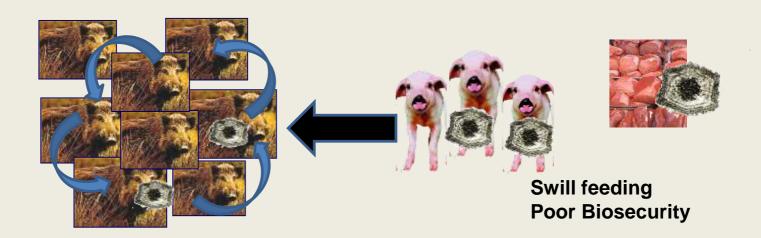
- Family farms (less than 15 animals)
- Medium farms (15-500 animals)
- Industrialized farms (more than 500 animals)



# DIRECT TRANSMISSION: THE ROLE OF THE WILD BOAR and BACKYARD pigs

The presence of infected domestic pigs potentially in contact with wild boar will facilitate the endemicity

## Wb + backyard pigs (low biosecurity): High Risk



# ASF situation in Asia



#### Overview

Hazard: African swine fever (ASF) is a viral disease affecting pigs and wild boar with up to 100% fatality rate.

#### Affected Provinces:

<u>China</u>: Anhui, Hellongjiang, Henan, Jilin, Liaoning, Jiangsu, Zhejiang, Shanxi, Yunnan, Hunan and Guizhou, Hubei, Jiangxi, Fujian, Sichuan, Shaanxi, Qinghai, Guangdong, Gansu, Shandong Provinces, Tianjin, Chongqing, Shanghai and Beijing Municipalities, and Inner Mongolia, Ningxia Hui and Guangxi Zhuang Autonomous Regions <u>Mongolia</u>: Bulgan, Darkhan-Uul, Dundgovi, Orkhon, Selenge, Töv Provinces and Ulaanbaatar <u>Viet Nam</u>: Hung Yen, Thai Binh, Thanh Hoa, <u>Ha Nam</u>, <u>Hai Duong</u>, <u>Dien Bien</u>, <u>Hoa Binh</u>, <u>Thai Nguyen</u> Provinces, Hai Phong and <u>Ha Noi</u> Cities.



### Situation update

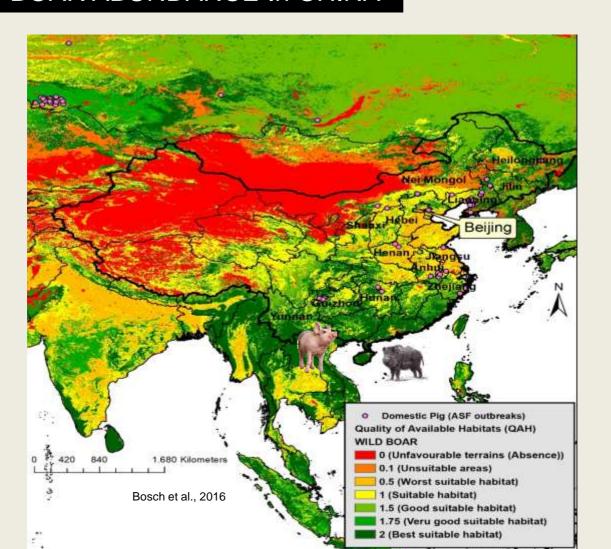
#### China

Since the China Ministry of Agriculture and Rural Affairs (MARA) confirmed its first African swine fever (ASF) outbreak in Liaoning Province on 3 August 2018, 112 ASF outbreaks detected in 28 Provinces / Autonomous Region / Municipalities. More than 950,000 pigs have been culled in an effort to halt further spread.

Guangxi Zhuang Autonomous Region: ASF outbreak occurred on one farm with 3,127 pigs in Gangnan District, Guigang City, Guangxi Zhuang Autonomous Region (reference).

Source FAC

## WILD BOAR ABUNDANCE In CHINA





## Cases reported both family and factory farms

**CHINA** 

Even more industialized farms than family farms



### **POSSIBLES RISK FACTORS**

Blood + feed (by tradition)
Swill feeding (by tradition)
Infected or carriers to slauterl
Infected vehicules. Transports
Lack of biosecurity

Family farms (less than 15 animals)

# Backyard vs Farm Asia

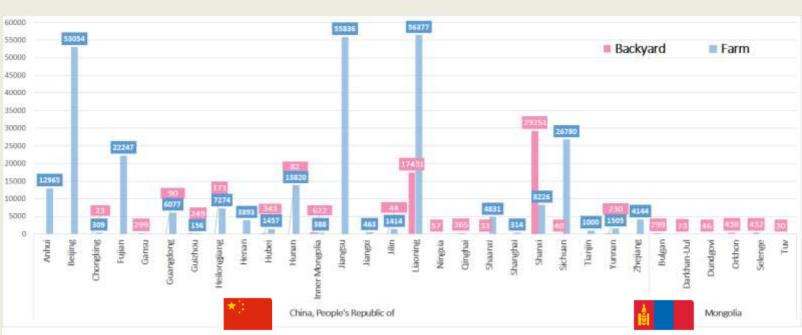
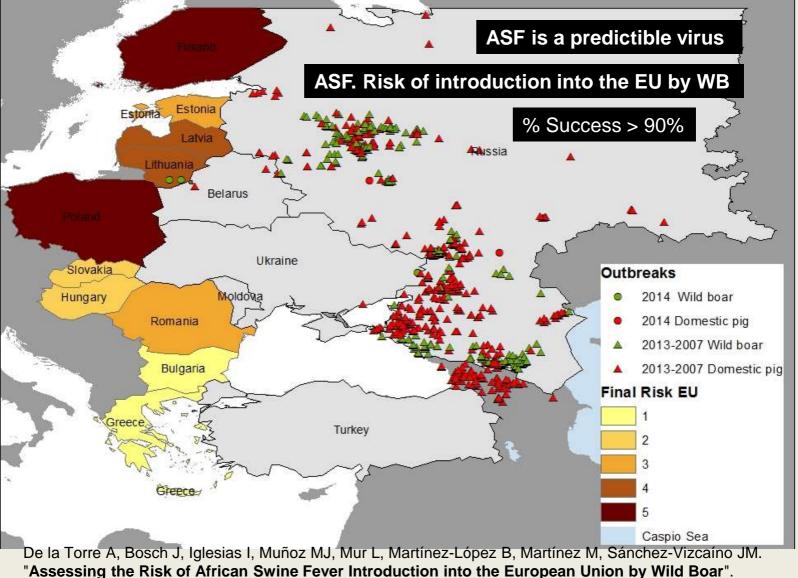


Figure 2. Impact of ASF in Asia (China, People's Rep. of; and Mongolia). Cumulative number of animal losses (dead animals + culled animals), by administrative division affected, divided by the affected emidemiological unit (backyard swine and farmed swine).

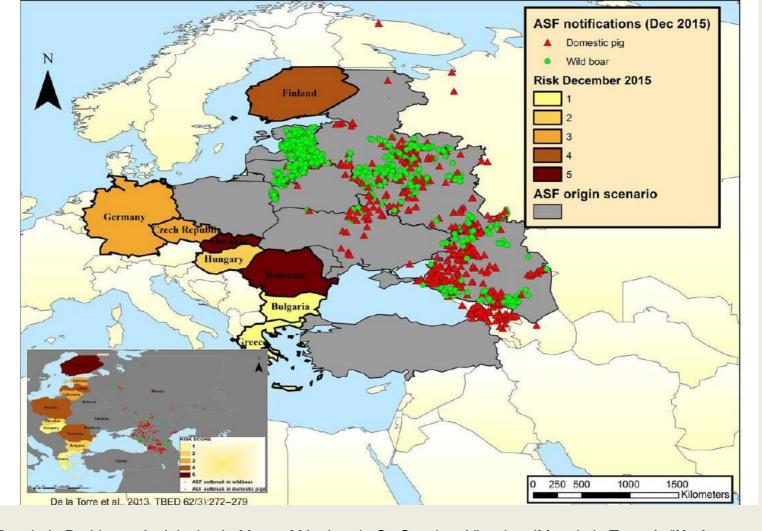


# What is happening today with ASF in Europe and Asia, was predictable?



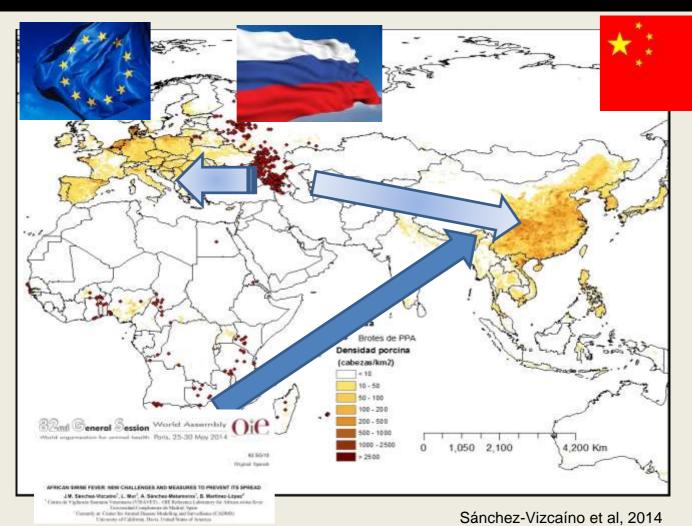


Transhound Emera Dis 62/3):272-0 6/2015



Bosch J., Rodriguez A., Iglesias I., Munoz MJ., Jurado C., Sanchez-Vizcaino JM. y de la Torre A. "**Update on the Risk of Introduction of African Swine Fever by Wild Boar into Disease-Free European Union Countries**". Transboundary and Emerging Diseases. 64(5):1424-1432. 10/2017.

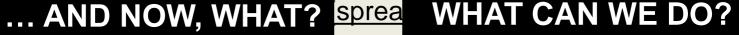
# **Risk for ASF introduction in China?**

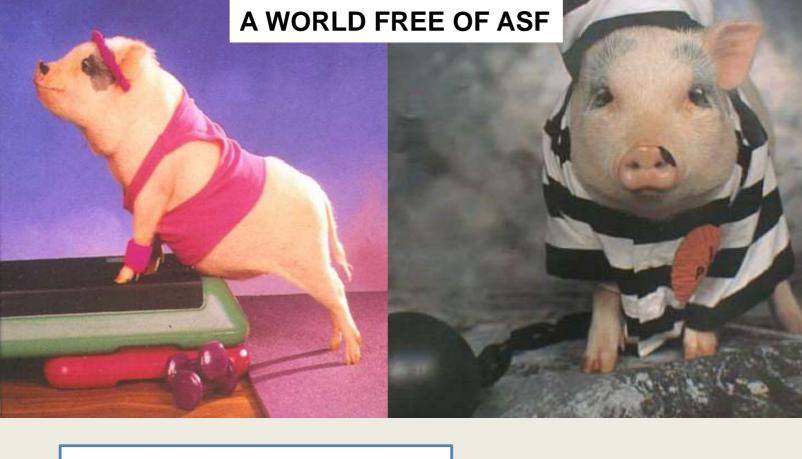


# Conclusions

- 3 Continents affected:
  - More than <u>30 countries in Africa</u> with 2 different scenarios:
    - East and central Africa: the role of reservoirs and vectors is very important
    - West Africa: the role of reservoirs and vectors is limited
  - 17 countries in Europe

    - And BRADO (Sardinia) Wild boar is the most severely affected host
  - Domestic pig is the most affected host > ROMANIA
    - 7 no EU countries
      - Domestic pig is the most affected host (both factory and family farms) WB also affected





# Thanks a lot Muchas

jmvizcaino@ucm.es

# Control and erradication of ASF in different epidemiological scenarios: China

# TAFS forum. Scientific Conference on ASF Beijing, 2019

Prof. JM. Sánchez-Vizcaíno

Complutense University of Madrid Visavet Center OIE-ASF Reference Laboratory www.sanidadanimal.info jmvizcaino@.ucm.es

# THE ASF CONTROL CHALLENGE

NO VACCINE

NO TREATMENT

**EARLY DETECTION** 

FAST RESPONSE. CONTIGENCY PLAN



# The zonification is the epidemiological approach used so far

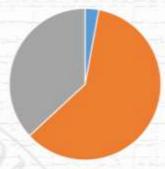
#### SAME PROBLEM THAN NO EU COUNTRIES (e.g. RUSSIA)



#### Cases reported both family and factory farms

Even more industialized farms than family farms





- Family farms (less than 15 animals)
- Medium farms (15-500 animals)
- Industrialized farms (more than 500 animals)

### **AVOID THE VIRUS ENTRY**







# FIRST BARRIER: AVOID THE VIRUS ENTRY:

**EDUCATION AND TRAINING. Knowing the disease** 

**BIOSECURITY: Food, Blood, Vehicules,** 

carriers.....

OUT

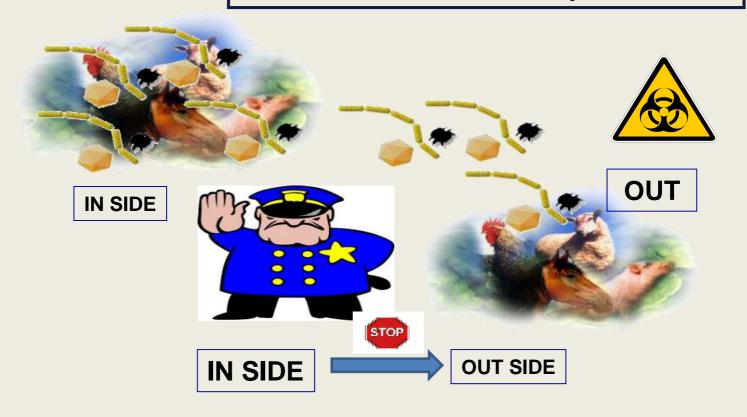


IN

### **SECOND BARRIER: DIFFUSION:**

**EARLY DETECTION. How can be ASF detected** 

**BIOSECURITY.** How avoid the spread

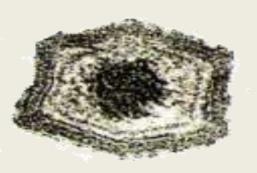


### FIRST, TO KNOW THE DISEASE

#### **SCENARIOS**

### THE HOST

### THE VIRUS



















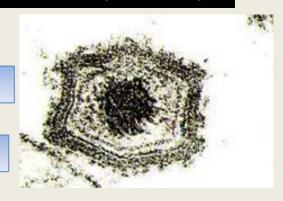


No commercial vaccine yet

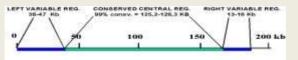
### AFRICAN SWINE FEVER VIRUS (ASFV)

Complex virus, big size, large genome: 170-190 kb

Complex molecular structure and not well known yet



**Genetic variability\*** 



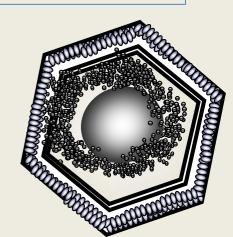
200 nm More than 100 structural proteins

Macrophages and endothelial are the target cells

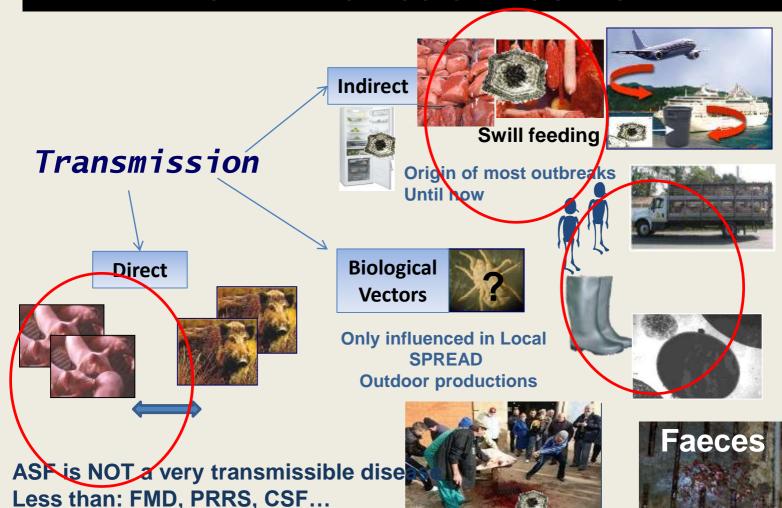
NO production of neutralizing antibodies



\*The current genotype classification is not related with the virus virulence or the disease evolution (Mur et al. 2016)



### **ASF TRANSMISSION ROUTES**



But it goes everywhere

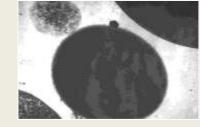
### **ASFV: Routes of transmission**

## **BLOOD!!!!**

- Hemorrhages
- Necropsies
- Hunting
- Feed with blood



48 hours Mellor et al. 1987





3 × 10<sup>6</sup> copies



It Usually doesn't start as: **EXPLOSIVE INFENCTION** 

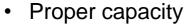


# SPECIAL ATTENTION IN SUMMER Clean/Dirty boundaries: Animals

Properly biosecured designed dead stock containers



Courtesy of Agropecuaria Vaqueril



 Consider different systems: refrigeration, alkaline hydrolysis



**Unprotected ones** 



18 months in blood at 4°C 200 µl of blood 3 × 10<sup>6</sup> copies

- Presence of flies?
- Other animals contacting?
- Blood



### Clean/Dirty boundaries: Vehicles

- Gates and proper parking area (good car disinfection system)
- Traffic analysis
- **■Proper truck disinfection protocols**







### Effective cleaning and disinfection



Source www.pig333.com

- √ Workers play a key role
- ✓ All IN All OUT

### Susceptible to ether and chloroform. Inactivated 30 min :

- 8/1000 sodium hydroxide
- hypochlorites
- 2.3% chlorine
- 3/1000 formalin
- 3% ortho-phenylphenol
- · iodine compounds.

### **ASF** virus is very stable in the enviroment



when organic matter is present

# ASFV in pigs, products and organic material SWILL FEEDING

**ASFv** is highly resistant





18 months in blood at 4°C



1 month in contaminated pig pens

### TO INCREASE BIOSECURITY OF FARMS



NO FARMS IN WB SUITABILITY AREAS

INCREASE BIOSECURITY OF FARMS

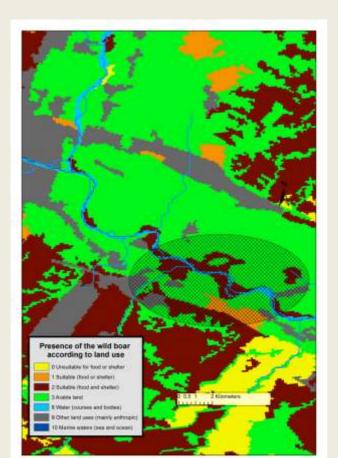
### Double fencing for controlled vehicle movement

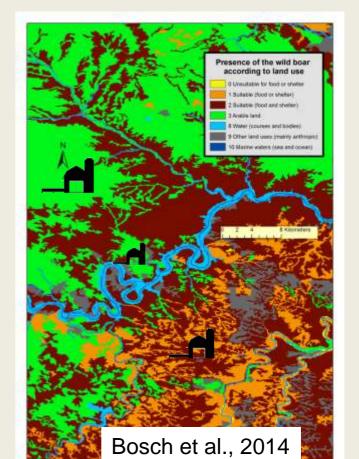


Courtesy of Agropecuaria Vaqueril

### Management Measures Need to be Increased

- Avoid arable land between suitability areas of WB
- Avoid pig farms in suitability areas of WB





# Important preventive measure for domestic pigs farms

 Education of farmers, workers, operators, veterinarians and society



Applying correctly the biosecurity measures between





Control measures against flies (especially in summer) **NO** 



People must be aware of the importance and the risks of ASF



NO swill feeding



NO swine products carried by air passengers



African Swine Fever Detected in South Korea as UN Warns of Spread From China to Other Countries Japan finds African swine fever in sausage brought from China





African Swine Fever Discovered in Pork Sausage at Taiwan Airport

FEBRUARY 12, 2018 09.37 AM

Like B Share \* Twent



# PORK BROUGHT TO AUSTRALIA CONFIRMED TO CONTAIN ASF

BY NAFB | January 23, 2019

Home + News + Agricultural News



### EARLY DETECTION

### FIELD IS THE FIRST STEP

### **INFORMATION & TRAINING**





#### **COLLABORATION:**

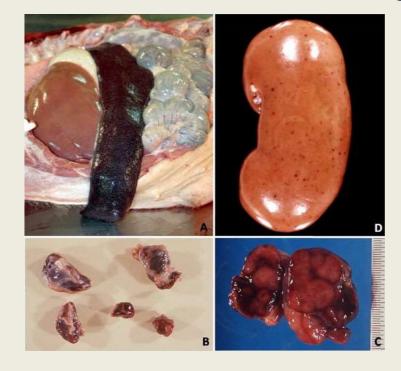
ADMINISTRATION - FARMERS/HUNTERS -VETS

# Different Forms are circulating. Usually not start as an EXPLOSIVE INFECTION









### SYMPTOMS and LESIONS: From Acute to Asymptomatic

The ASF genotypes evaluated presented the same disease evolution Mur et al.

# Acute-subacuate forms of ASF



- Fever
- Lethargy
- Anorexia
- Skin hemorrhages
- Circulatory
- Respiratory
- Digestive
- And nervous disorders





# Acuate-subacuate forms of ASF:

Could be Easily Confused with:

Fever

- Erysipelas
- Salmonellosis
- Actinobacillus (App)
- Other Septicaemic conditions
- PDNS



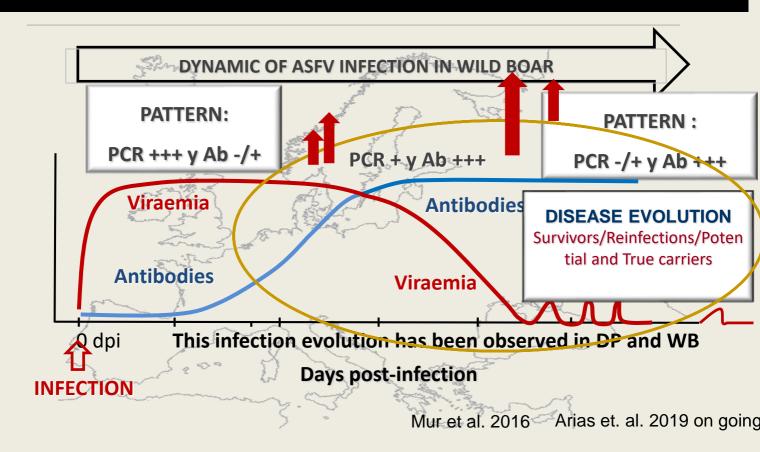






Thereby laboratory diagnosis is essential

### **Evolution of the ASF infection in WB**



This evolution don't look genotypes dependent: Observed in gl and

### WB – to PCR and Positives to ELISA and IPT

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RT PCR (Blood) – and ELISA and IPT + . No LN evaluated

**WB FROM POLAND, 2018** 

EU ASF Info - Note 27/2018

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# DETECTION OF ASF ANTIBODIES IN EXPERIMENTAL AND FIELD INFECTED PIGS WITH RUSSIAN ISOLATE

In field Russian sample from 2013 to 2014 the **3,7% of animal was Ab positives** To ASF virus isolates

Experimental infection with three different Russian isolate show the presence of Antibodies in the inoculated animals

#### Transboundary and Emerging Diseases



Transboundary and Emerging Diseases

#### SHORT COMMUNICATION

Detection of African Swine Fever Antibodies in Experimental and Field Samples from the Russian Federation: Implications for Control

L. Mur<sup>1</sup>, A. Igolkin<sup>2</sup>, A. Varentsova<sup>2</sup>, A. Pershin<sup>2</sup>, S. Remyga<sup>2</sup>, I. Shevchenko<sup>2</sup>, I. Zhukov<sup>2</sup> and J. M. Sánchez-Vizcaíno<sup>1</sup>

<sup>&</sup>lt;sup>1</sup> VISAVET Center and Animal Health Department, Veterinary School, Universidad Complutense de Madrid, Madrid, Spain

Federal Center for Animal Health FG81 "ARRIAH", Vladimir, Russia

# Free-ranging pigs *Negatives* to PCR and *Positives* to ELISA and IPT





Rapid Communication @ Full Access

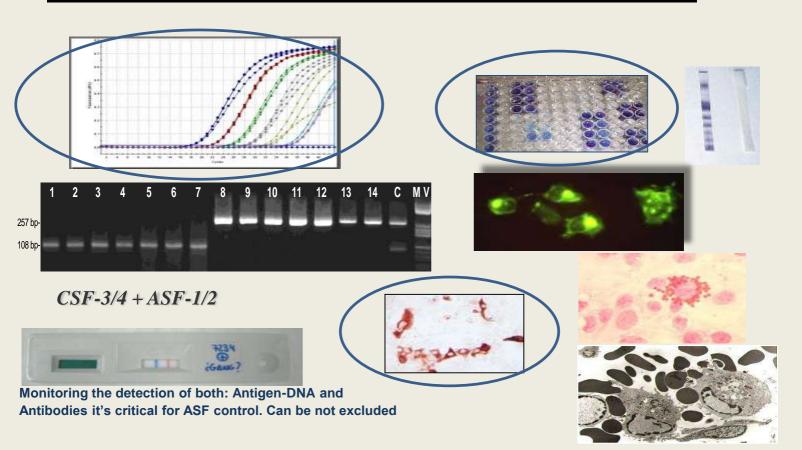
#### Surveillance and control of African Swine Fever in free-ranging pigs in Sardinia

Alberto Laddomada, Sandro Roiesu, Federica Loi S. Stefano Cappai, Annalisa Oggiano, Maria Pacia Madrau, Maria Liuta Sanna, Glovarinantonio Pilo, Ennio Bandino, Diego Brundu, Simonetta Cherchi, Sergio Masala, Daniela Marongiu, Giuseppe Bitti, Pietro Desini, Vincenzo Horis, Luigi Mundula, Giovanni Cariboni, Marco Pittau, Francesco Feliziani, José Manuel Sanchez-Vizcaino, Cristina Jurado, Vittorio Guberti, Michele Chessa, Marco Muzzeddu, Daniela Sardo, Bornello Silvio, Daniela Mulas, Gianni Salis, Paola Zinzula, Sebastiano Piredda, Alessandro De Martini, Francesco Sgarangella .... See fewer authors.

First published: 04 February 2019 | https://doi.org/10.1111/tbed.13138

Municipality	Number serum samples tested	Samples positive to antibody presence (ELISA	Seroprevalence (%)	Tested organs	Samples positive to virus presence (PCR)	Virus prevalence (%)
		+ Ib)			<b>1</b>	(13)
Aritzo	15	9	60	15	0	0
Arzana	46	32	69.6	46	4	8.7
Baunei	37	5	13.5	35	0	0
Desulo	147	104	70.7	111	19	17.1
Irgoli	61	0	0	61	0	0
Loculi	6	0	0	6	0	0
Nuoro	33	0	0	59	0	0
Orgosolo	566	409	72.3	690	11	1.6
Orosei	17	0	0	17	0	0
Ovodda	13	0	0	13	0	0
Talana	39	2	5.1	39	0	0
Urzulei	139	60	43.2	265	0	0
Villagrande Strisaili	99	30	30.3	104	4	3.8
Total	1218	651	53.4	1461	38	2.6

# **ASF LABORATORY DIAGNOSIS**



# WB and DP survivors: Role as carriers (live or dead-carcasses)





#### **CARCASSES:**

- Great quantity of virus

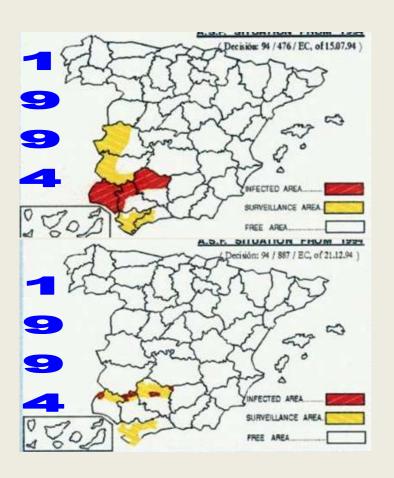
  18 months in blood at 4°C

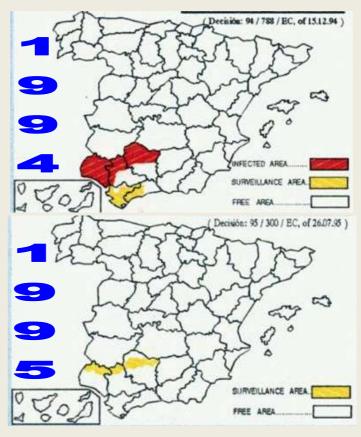
  200 ul of blood 3 × 10<sup>6</sup> copies
  - Environmental contaminant→ Virus very stable in the field at low

#### **SURVIVORS:**

- Less virus but more movements
- The biggest problem in control and eradication programs
- 2-8 % presented virus in LN

### IMPORTANT RISK FACTORS FOR THE ERADICATION IN SI







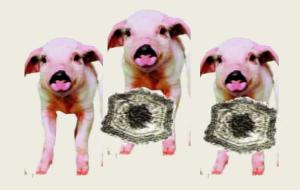
### THREE MAIN PROBLEMS







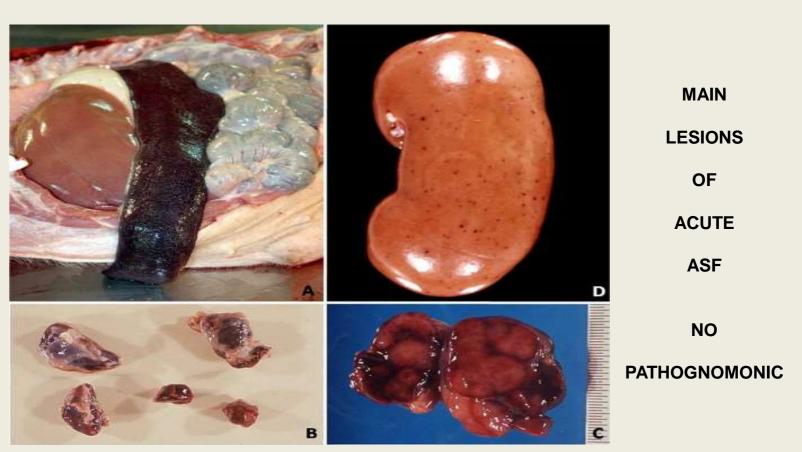
Canals A.; Oleaga A.; Pérez R.; Domínguez J.; Encinas A.; Sánchez-Vizcaíno J.M. (1990).



## POST-MORTEM STUDIES







Sánchez-Vizcaíno et al. 2015 (J. Comp. Pathol) ez-Vizcaíno et al. 2015 (J. Comp. Pathol)



MAIN
LESIONS
OF
ACUTE
ASF

Sánchez-Vizcaíno et al. 2015 (J. Comp. Pathol) sánchez-Vizcaíno et al. 2015 (J. Comp. Pathol)

# External findings: Acute form

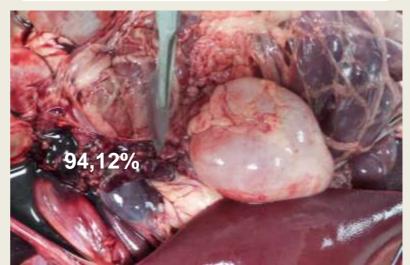




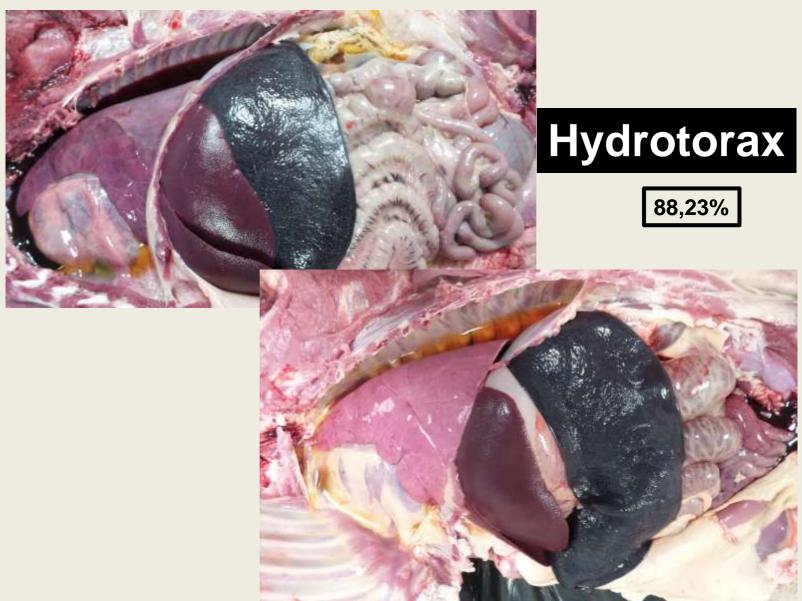




# Lymphoadenomegaly Hemorrhagic lymphadenitis









### Tonsillar hyperemia

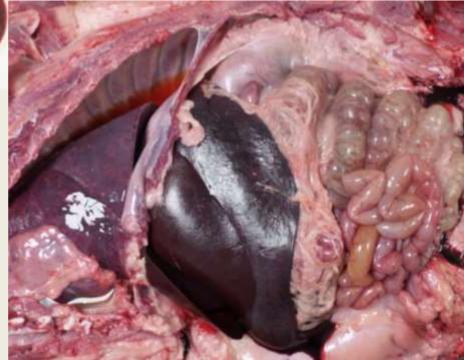
88,23%

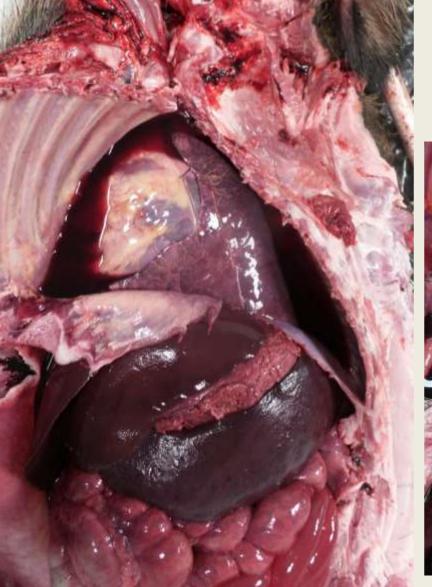
00,2070



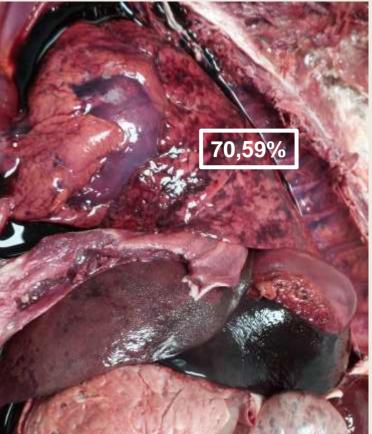
# Hepatomegaly

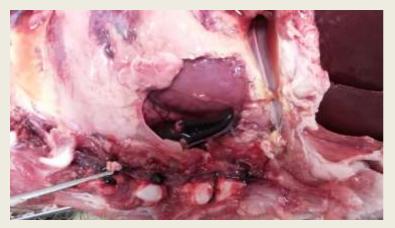
88,23%





# Shock lung Bronchiolointerstitial pneumonia





### Hydropericardias Hemorrhages

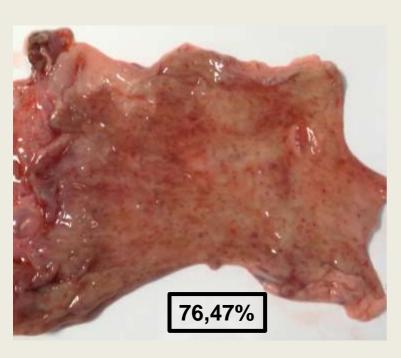
70,59%







Necrotic Peyer's patch





#### PATHOLOGICAL FINDING WITH ARMENIA 07 IN WB

Tissue	Pathological finding	Percentage of affected animals
Spleen	Splenomegaly	100%
Lymph nodes	Lymphoadenomegaly	94.12%
	Hemorrhagic lymphadenitis	88.23%
Pleura	Hydrotorax	88.23%
Tonsils	Tonsillar hyperemia	88.23%
	Purulent tonsillitis	52.94%
Liver	Hepatomegaly	88.23%
Lung	Shock lung	70.59%
	Bronchiolointerstitial	64.7%
	pneumonia	
Heart	Hydropericardias	70.59%
	Hemorrhages	47%
Intestine	Hemorrhages	76.47%
	Necrotic Peyer's patch	35.29%
Kidney	Hemorrhages	41.17%

Infection by Armenia/07 strain resulted in 100% lethality wild boar (total= 17) in both intramuscular infected (6) and in contact animals

#### **CONCLUSIONS**

## The ASF virus is doing a FAST and good job. We should work much better



## CONTROL MEASURES

- A good early detection system and contingency plan is essential
- **Education** of farmers, workers, operators, veterinarians and society in general about the importance and **the risks of ASF**
- It's urgent to increase more the **biosecurity of farms**, and with special attention to **backyards** and farms located in WB suitable areas
  - > More control of the desinfection and movements of vehicles,
  - Control against flies
  - Control of the presence of ticks (O. erraticus)
  - > Control of swill feeding. Attention to the feed of the worker at the farm
  - Control of blood. Never use blood for feefing
  - > Control of potential infected or carriers animals at the slauterhouse
- New epidemiological approaches could be implemented => Compartment free

#### **CONCLUSIONS**

## The ASF virus is doing a FAST and good job. We should work much better



# CONTROL MEASURES

- An **urgent effective control of the role of WB** is needed. A strong compromise from the hunters is also need
- Study more potential WB-survivors the presence of virus in tissue to understand better it's role as a potential carriers in field conditions
- Continuing the Research on ASF vaccines and other control measures need more support



# Thanks a lot Muchas

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