

Control and eradication of ASF in different epidemiological scenarios: China

***TAFS forum. Scientific Conference on ASF
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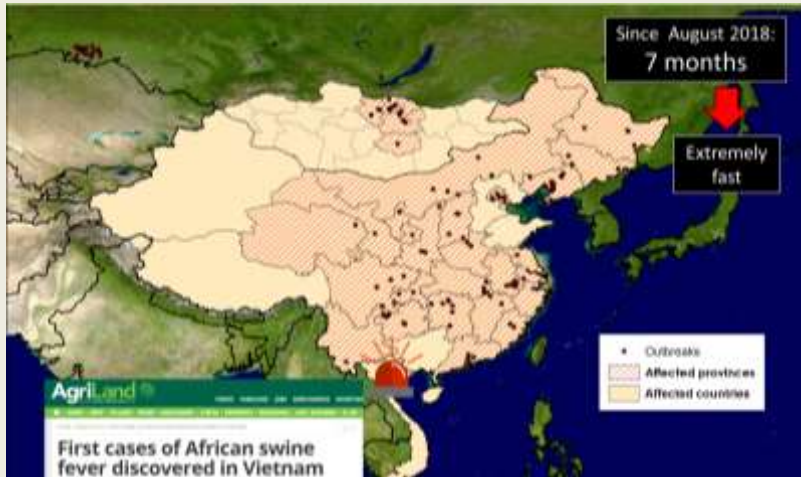
THE ASF CONTROL CHALLENGE

NO VACCINE

NO TREATMENT

EARLY DETECTION

FAST RESPONSE. CONTINGENCY PLAN



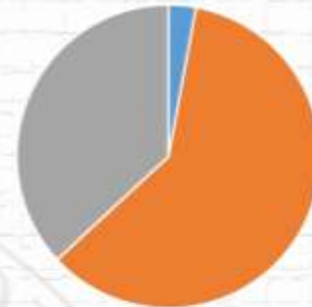
SAME PROBLEM THAN NO EU COUNTRIES (e.g. RUSSIA)



Cases reported both family and factory farms

Even more industrialized farms than family farms

CHINA



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

The zonification is the epidemiological approach used so far

AVOID THE VIRUS ENTRY



FIRST BARRIER: AVOID THE VIRUS ENTRY:

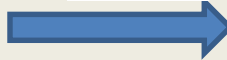
EDUCATION AND TRAINING. Knowing the disease

BIOSECURITY: Food, Blood, Vehicules, carriers.....

OUT

STOP

IN



SECOND BARRIER: DIFFUSION:

EARLY DETECTION. How can be ASF detected

BIOSECURITY. How avoid the spread

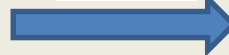


IN SIDE



IN SIDE

STOP



OUT SIDE



OUT



FIRST, TO KNOW THE DISEASE

SCENARIOS

THE HOST

THE VIRUS



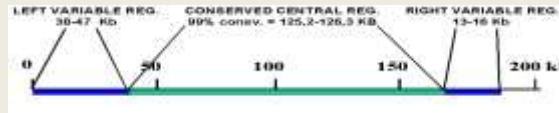
No commercial vaccine yet

AFRICAN SWINE FEVER VIRUS (ASFV)

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

Complex molecular structure and not well known yet

Genetic variability*



Macrophages and endothelial are the target cells

NO production of neutralizing antibodies

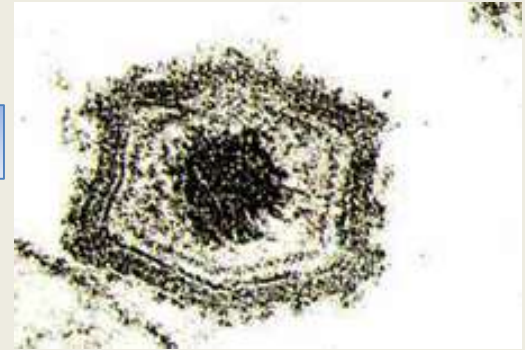


Lack of effective vaccine
yet

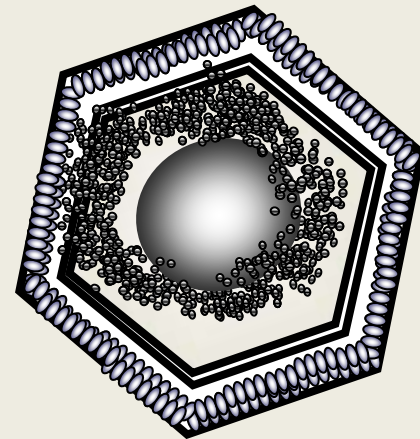
24 genotypes*

*The current genotype classification is not

related with the virus virulence or the disease evolution (Mur et al. 2016)



200 nm
More than 100 structural
proteins



ASF TRANSMISSION ROUTES

Transmission

Direct



ASF is NOT a very transmissible disease
Less than: FMD, PRRS, CSF...
But it goes everywhere

Indirect



Origin of most outbreaks
Until now



Biological
Vectors



Only influenced in Local
SPREAD
Outdoor productions



Faeces



ASFV: Routes of transmission

BLOOD!!!!

- Hemorrhages
- Necropsies
- Hunting
- Feed with blood

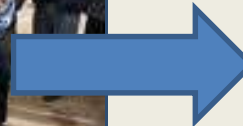


48 hours
Mellor *et al.* 1987

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



200 µl of blood
 3×10^6 copies



SPECIAL ATTENTION IN SUMMER

Clean/Dirty boundaries: Animals

Properly biosecured designed dead stock containers



Courtesy of Agropecuaria Vaqueril

Unprotected ones



VS



- Proper capacity
- Consider different systems: refrigeration, alkaline hydrolysis



18 months in blood at 4°C
200 µl of blood 3×10^6 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 environment



ASFv could be stable for long periods of time and even more when organic matter is present

ASFV in pigs, products and organic material

SWILL FEEDING

ASFv is highly resistant



110 days in
chilled meat



1000 days in
frozen meat



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

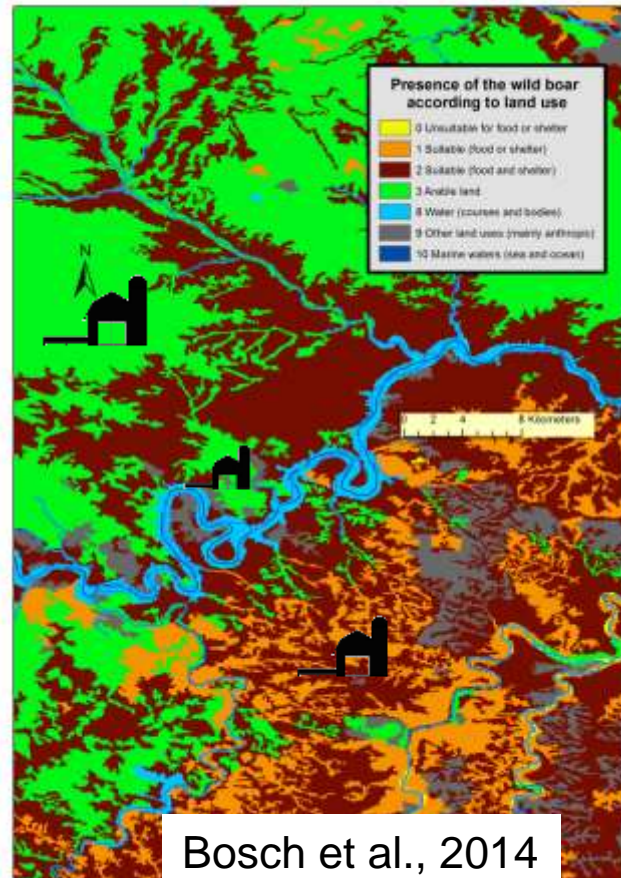
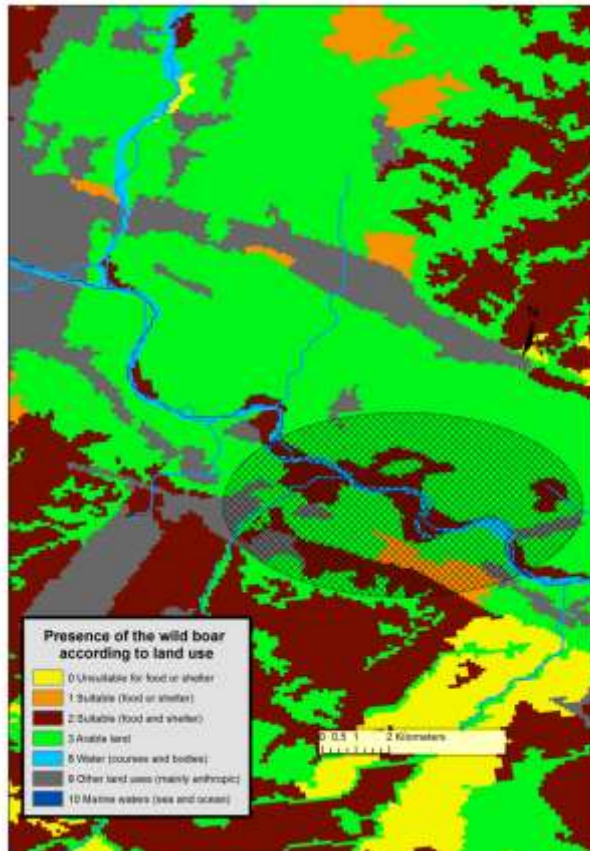


Courtesy of Agropecuaria Vaqueril



Management Measures Need to be Increased

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



Bosch et al., 2014

Important preventive measure for domestic pigs farms

- Education of farmers, workers, operators, veterinarians and society



Applying correctly the biosecurity measures between farms **VE**



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



Pigs in a pen at a pig farm in Hubei province, China's central Hubei province, on Aug. 31, 2018. (Xinhua/Reuters)

African Swine Fever Detected in South Korea as UN Warns of Spread From China to Other Countries

BY BRADY RAY, WOODRUM

African Swine Fever Discovered in Pork Sausage at Taiwan Airport

FEBRUARY 12, 2019 09:37 AM

Like 0 Share Tweet



Japan finds African swine fever in sausage brought from China



PHILIP

African Swine Fever detected in pork products at Phuket Airport



Published 4 weeks ago on January 23, 2019

By The Thaiger



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

Different virulence ASF isolate are circulating in the



SYMPTOMS and LESIONS: From Acute to Asymptomatic

The ASF genotypes evaluated presented the same disease evolution Mur et al.
2016

Acute-subacute forms of ASF



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



Acute-subacute forms of ASF:

Could be Easily Confused WITH:

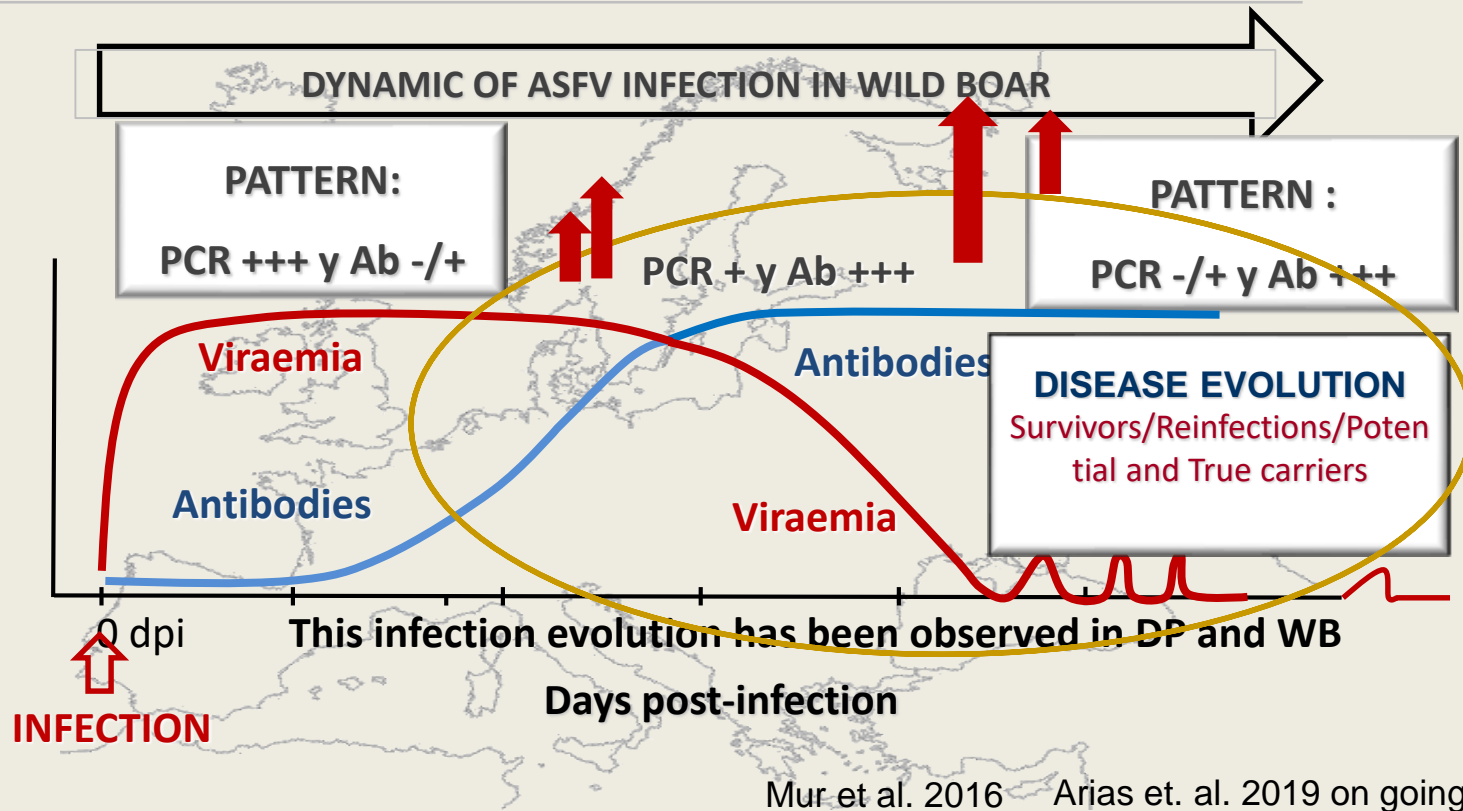
Fever

- 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

Information on cases of African swine fever (ASF) in wild boar in Poland for the period 15.02 – 28.02.2018 r.

No. of the case	Description of the case		Location of the place of finding/hunting		Diagnostic for ASF (method, date)		Status of carcass (method, date)	Comments
	Description of wild boar (breed, sex, weight, age)	Wild boar shot or found dead	Location (county, municipality, district, region)	Distance from the nearest border: PL/SK = (km); PL/LA = (km); PL/IT = (km); PL/HU = (km)	Case tested in	Date results were received	Method used, result	
1936 03.02.2018	3 female, app. 13 kg, 400, 1 year	shot	Świdnik (Lower Silesia, Lubuskie)	113 km PL/IT	Part II of the Annex to CE 2014/709/EU	20.02.2018	RT-PCR – ELISA + IPT+	Carcass sent to rendering plant on 20.02.2018
1937 03.02.2018	3 wild boars, unspecifed sex	found dead	Świdnik (Lower Silesia, Lubuskie)	42 km PL/IT	Part II of the Annex to CE 2014/709/EU	20.02.2018	RT-PCR –	Carcass sent to rendering plant on 21.02.2018
1938 04.02.2018	4 female, app. 45 kg, app. 2 years	shot	Świdnik (Lower Silesia, Lubuskie)	11 km PL/IT	Part II of the Annex to CE 2014/709/EU	20.02.2018	RT-PCR – ELISA + IPT+	Carcass sent to rendering plant on 22.02.2018
1939 04.02.2018	3 female, app. 38 kg, app. 2 years	shot	Świdnik (Lower Silesia, Lubuskie)	18 km PL/IT	Part II of the Annex to CE 2014/709/EU	20.02.2018	RT-PCR – ELISA + IPT+	Carcass sent to rendering plant on 22.02.2018

1

1936 03.02.2018	3 female, app. 13 kg, 400, 1 year; 21 female, app. 1 year, app. 20kg; 81 female, app. 1 year, app. 30 kg	found dead	Świdnik (Lower Silesia, Lubuskie)	113 km PL/IT	Part II of the Annex to CE 2014/709/EU	20.02.2018	RT-PCR +	Carcass sent to rendering plant on 20.02.2018
1937 03.02.2018	3 female, app. 13 kg, 400, 1 year; 21 female, app. 1 year, app. 20kg; 81 female, app. 1 year, app. 30 kg	found dead	Świdnik (Lower Silesia, Lubuskie)	113 km PL/IT	Part II of the Annex to CE 2014/709/EU	20.02.2018	RT-PCR +	Carcass sent to rendering plant on 20.02.2018
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1

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

WB FROM POLAND, 2018

EU ASF Info – Note 27/2018

1936 03.02.2018	3 female, app. 13 kg, 400, 1 year; 21 female, app. 1 year, app. 20kg; 81 female, app. 1 year, app. 30 kg	found dead	Świdnik (Lower Silesia, Lubuskie)	113 km PL/IT	Part II of the Annex to CE 2014/709/EU	20.02.2018	RT-PCR +	Carcass sent to rendering plant on 20.02.2018
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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

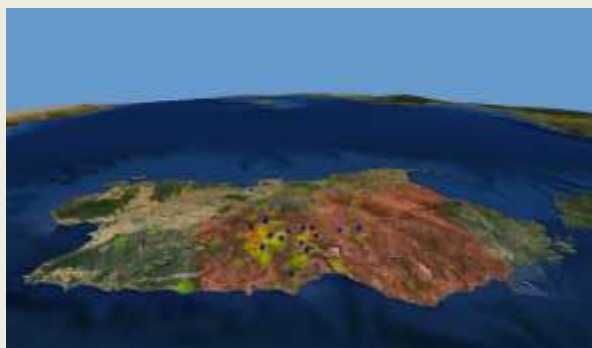
Detection of African Swine Fever Antibodies in Experimental and Field Samples from the Russian Federation: Implications for Control

L. Mur¹, A. Igolkin², A. Varentsova², A. Pershin², S. Remyga², I. Shevchenko², I. Zhukov² and J. M. Sánchez-Vizcaíno¹

¹ VISAVET Center and Animal Health Department, Veterinary School, Universidad Complutense de Madrid, Madrid, Spain

² Federal Center for Animal Health FGRI "ARRIAH", Vladimir, Russia

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



Transboundary and Emerging Diseases

Rapid Communication  Full Access

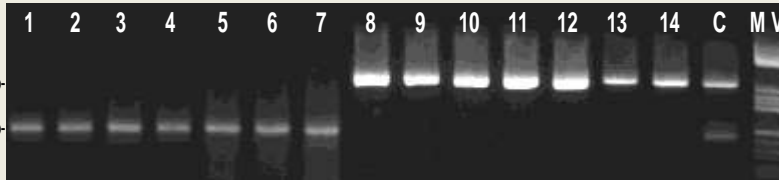
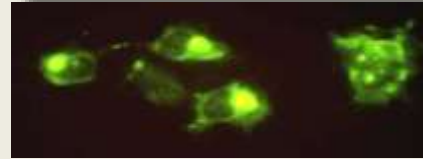
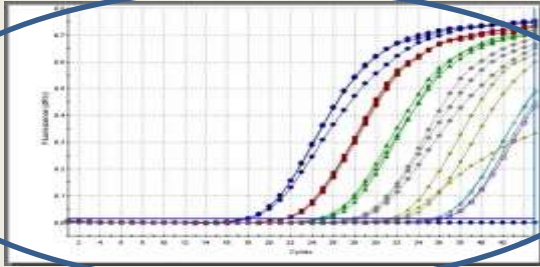
Surveillance and control of African Swine Fever in free-ranging pigs in Sardinia

Alberto Laddomada, Sandro Rolejsu, Federica Loi, Stefano Cappai, Annalisa Oggiano, Maria Paola Madrau, Maria Luisa Sanna, Giovannantonio Pilo, Ennio Bandino, Diego Brundu, Simonetta Cherchi, Sergio Masala, Daniela Marongiu, Giuseppe Bitti, Pietro Desini, Vincenzo Floris, Luigi Mundula, Giovanni Carboni, Marco Pittau, Francesco Feliziani, José Manuel Sanchez-Vizcaino, Cristina Jurado, Vittorio Guberti, Michele Chessa, Marco Muzzeddu, Daniela Sardo, Borrelli 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 + Ib)	Seroprevalence (%)	Tested organs	Samples positive to virus presence (PCR)	Virus prevalence (%)
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

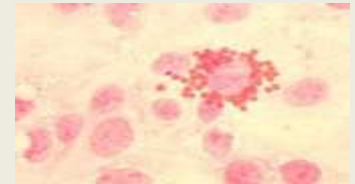
ASF LABORATORY DIAGNOSIS



CSF-3/4 + ASF-1/2



Monitoring the detection of both: Antigen-DNA and Antibodies it's critical for ASF control. Can be not excluded



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



CARCASSES :

- Great quantity of virus
18 months in blood at 4°C
200 µl of blood 3×10^6 copies
- Environmental contaminant → Virus very stable in the field at low



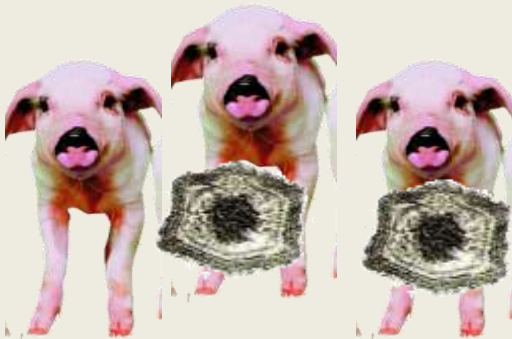
SURVIVORS :

- 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 SPAIN



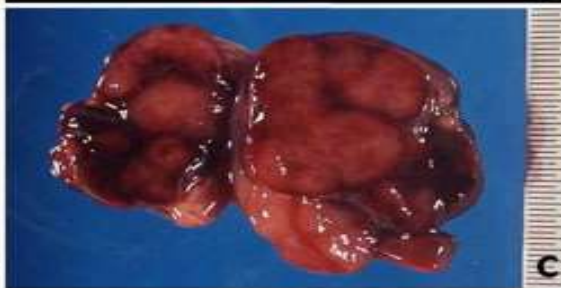
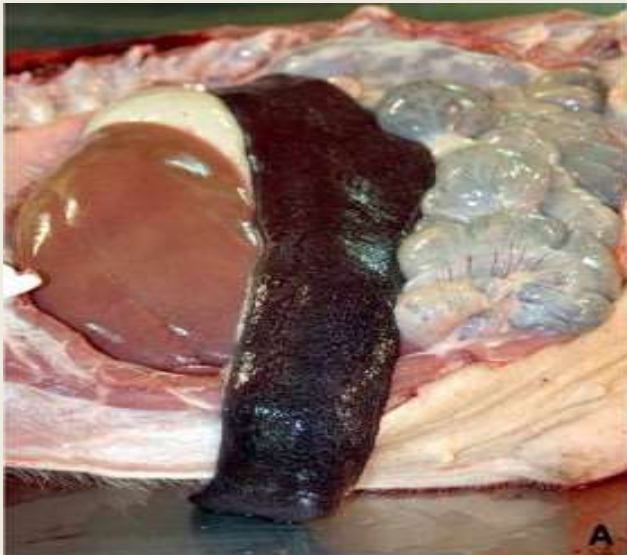
THREE MAIN PROBLEMS



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

POST-MORTEM STUDIES





**MAIN
LESIONS
OF
ACUTE
ASF**

**NO
PATHOGNOMONIC**

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

**MAIN
LESIONS
OF
ACUTE
ASF**



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

External findings: Acute form

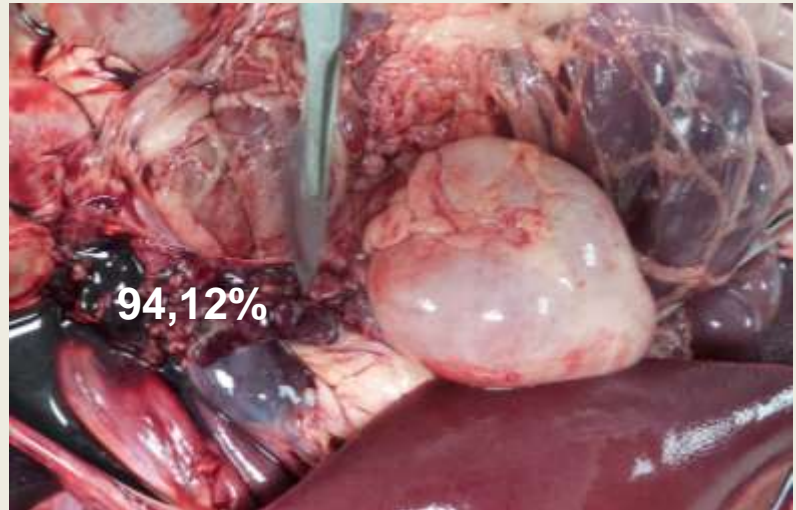


Splenomegaly

100%



Lymphadenomegaly Hemorrhagic lymphadenitis



Hydrotorax

88,23%

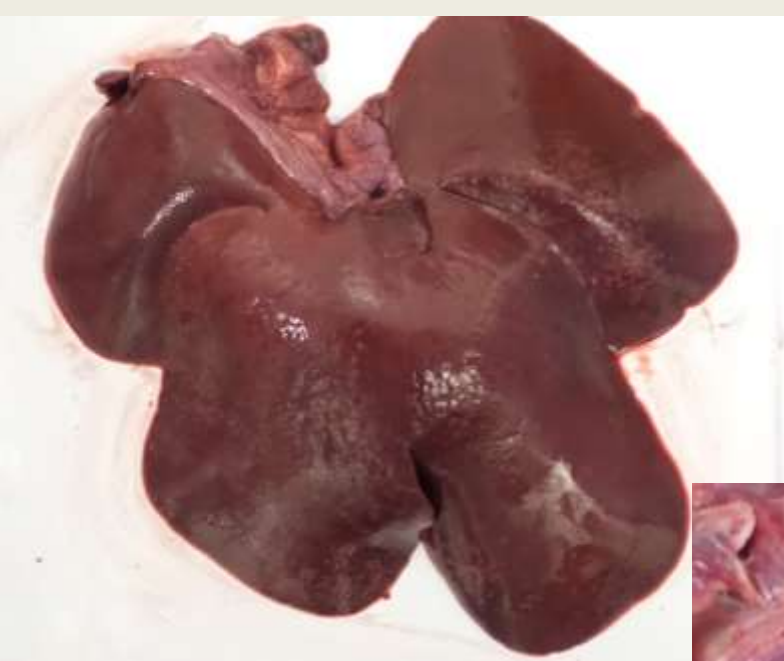




**Tonsillar
hyperemia**

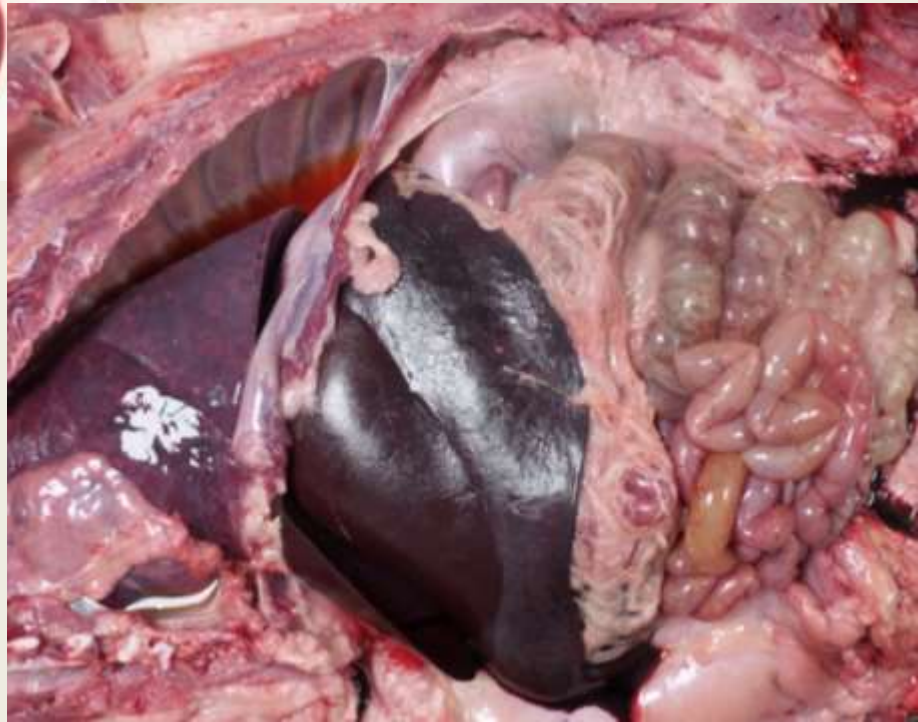
88,23%

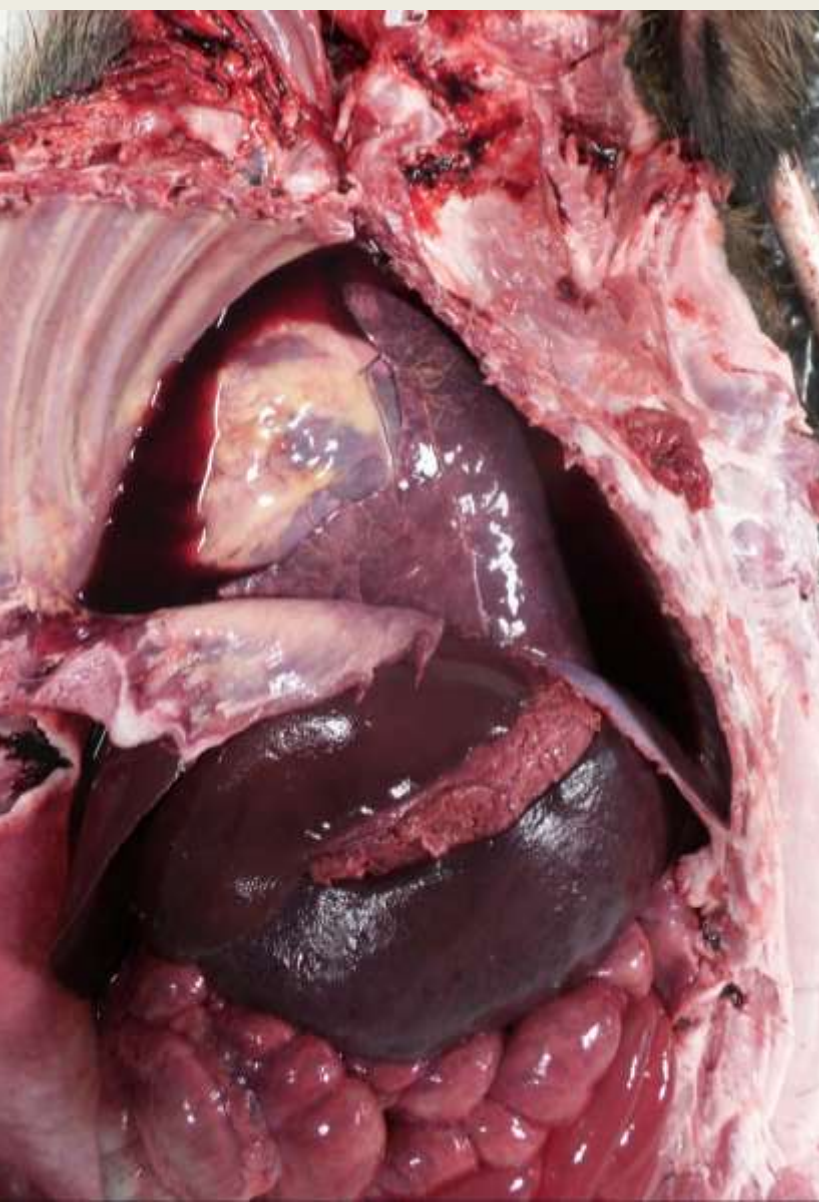
88,23%



Hepatomegaly

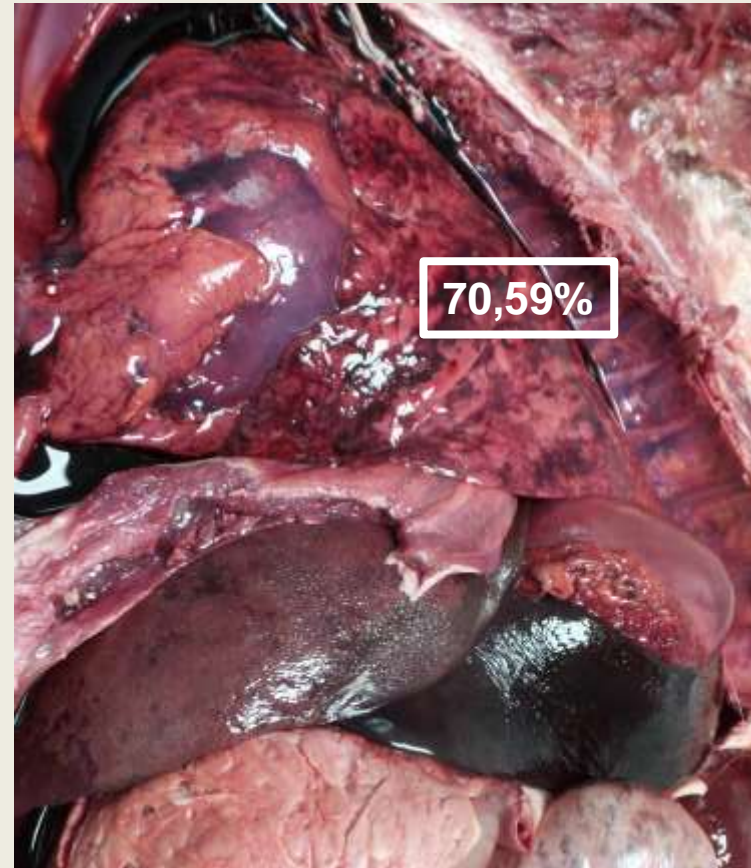
88,23%





Shock lung

Bronchiolointerstitial pneumonia





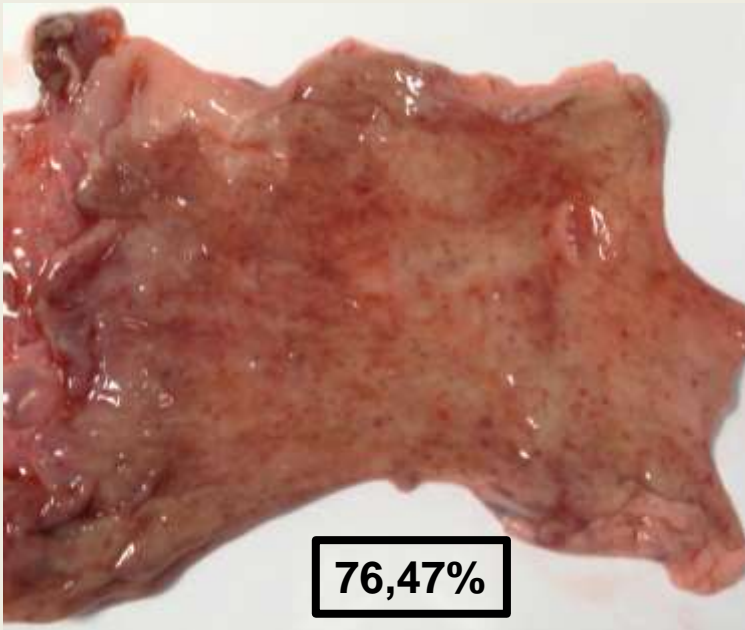
Hydropericardias Hemorrhages

70,59%





INTESTINE
Hemorrhages
Necrotic Peyer's patch



76,47%



PATHOLOGICAL FINDING WITH ARMENIA 07 IN WB

Tissue	Pathological finding	Percentage of affected animals
Spleen	Splenomegaly	100%
Lymph nodes	Lymphadenomegaly	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 pneumonia	64.7%
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 (11)

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 disinfection 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 feeding**
 - **Control of potential infected or carriers animals at the slaughterhouse**
- New epidemiological approaches could be implemented => **Compartment free**

CONCLUSIONS

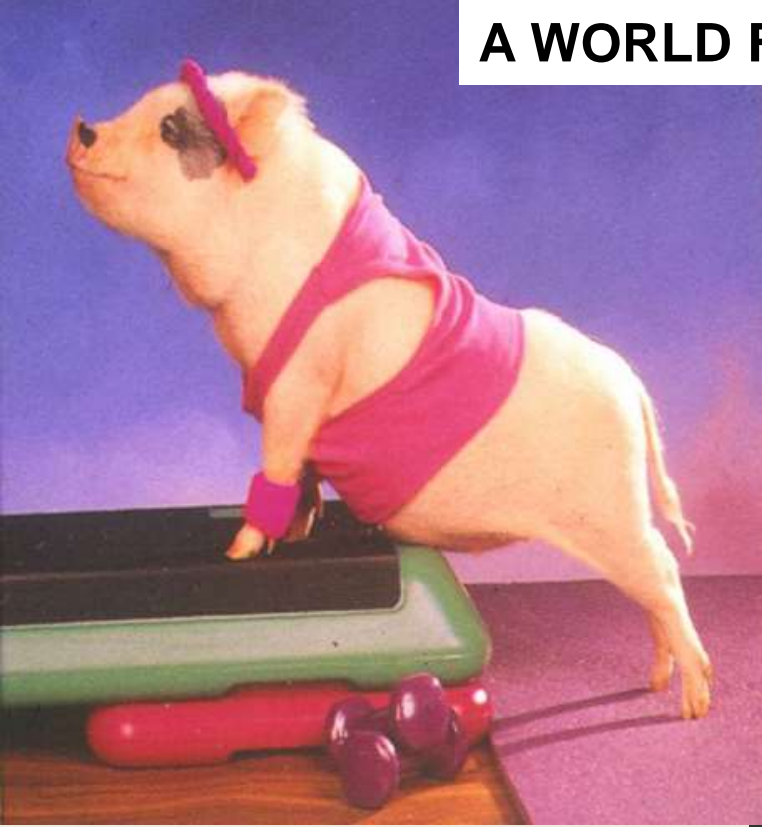
The ASF virus is doing a FAST and good job.
We should work much better



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

A WORLD FREE OF ASF



**Thanks a lot
Muchas**

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