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Lesson Learned from the ASF- affected countries: How to deal with it?

ASF FAO meeting, BKK, September 2018

EIDAs

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Dr. Sandra Blome, CU Vet March 15, 2019

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ASF in Sardinia - ... since 1978

FLI

Cr. S. Blome

FLI

Municipality (from dec. 2017 to april 2018)	Pigs culled	Sera sample tested	Sera (ELISA+IB) positives	Seropositivity	Organs tested	Virus (PCR) positives	Virus prevalence
Arzana (612)	55	44	32	66,67	46	4	8,7
Baunei (341)	36	36	5	13,51	39	0	0
Dorgali (612)	90	85	70	82,35	69	4	5,14
Dorgali (2012)	35	14	5	35,71	14	0	0
Nuoro (222)	139	61	10	16,41	55	0	0
Orgosolo (612)	70	19	13	72,22	51	1	1,96
Orgosolo (2012)	200	83	69	74,19	103	1	0,97
Orgosolo (341)	218	129	105	81,4	132	4	3,03
Orgosolo (641)	260	112	69	61,61	111	2	1,8
Orgosolo (222)	81	38	31	81,58	40	2	5
Orgosolo (3855)	72	60	44	73,33	60	0	0

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Biosecurity Issues!!

ORIGINAL ARTICLE

WILEY

Why is African swine fever still present in Sardinia?

C. Jurado[1] | E. Fernández-Carrión[1] | L. Mur[2] | S. Rolesu[3] | A. Laddomada[3] | J. M. Sánchez-Vizcaíno[1]

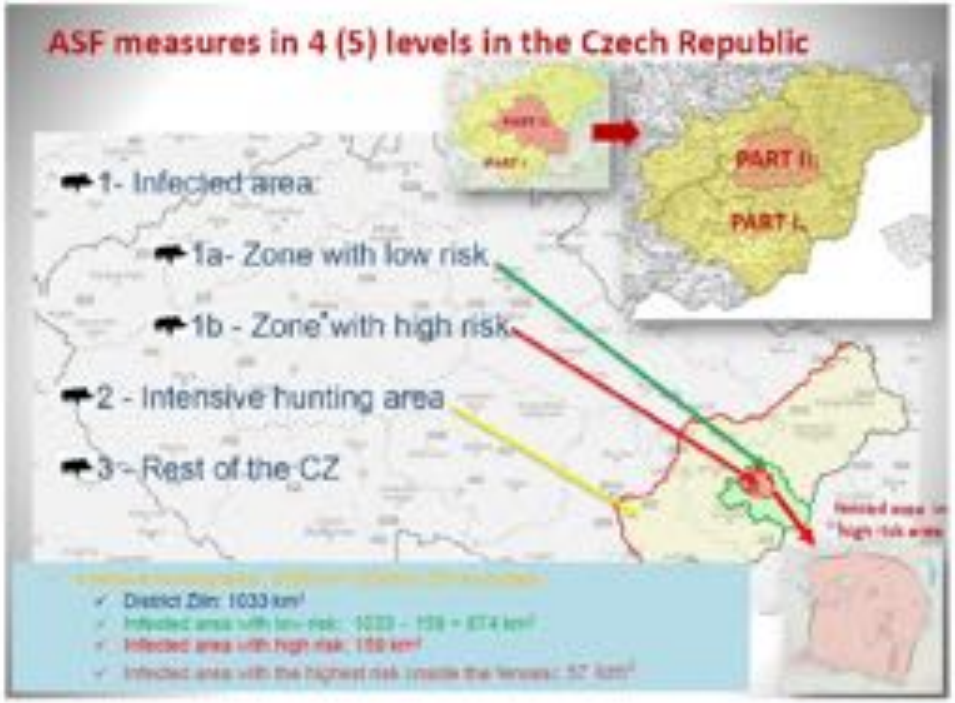
- Reduce potential contact with wild boar and free-ranging pigs.
-
- Reduce number of family farms, raise biosecurity levels on remaining farms, improve farming practices as well as increase knowledge, concern and awareness among pig owners.
- Implement protocols applied during slaughters for self-consumption.
- Implement measures to increase biosecurity during animal movements.
- Implement efforts to identify and penalize farms that do not perform annual censuses.

Current situation in Eastern European countries

- Wild boar is the most severely affected host (scavenging behaviors).
- Multiple viral introductions through movements of infected free-ranging wild boar.
- Combination of pig farms located in areas suitable for wild boar as well as the existence of low biosecurity measures.

A human driven-disease

Czech Republic



Source: African Swine Fever in wild boar in the Czech Republic (Feb 25, 2019)

Health

News | Feb 28, 2019

Czechia officially free from African Swine Fever

Czechia is the 1st country in the EU to be officially declared free from African Swine Fever (ASF) after it was infected in recent years. As no outbreak has been found in Czechia since April 2018, the country received the support of the EU member states to lift all restrictions in the country.

Cr. S. Blome

FLI

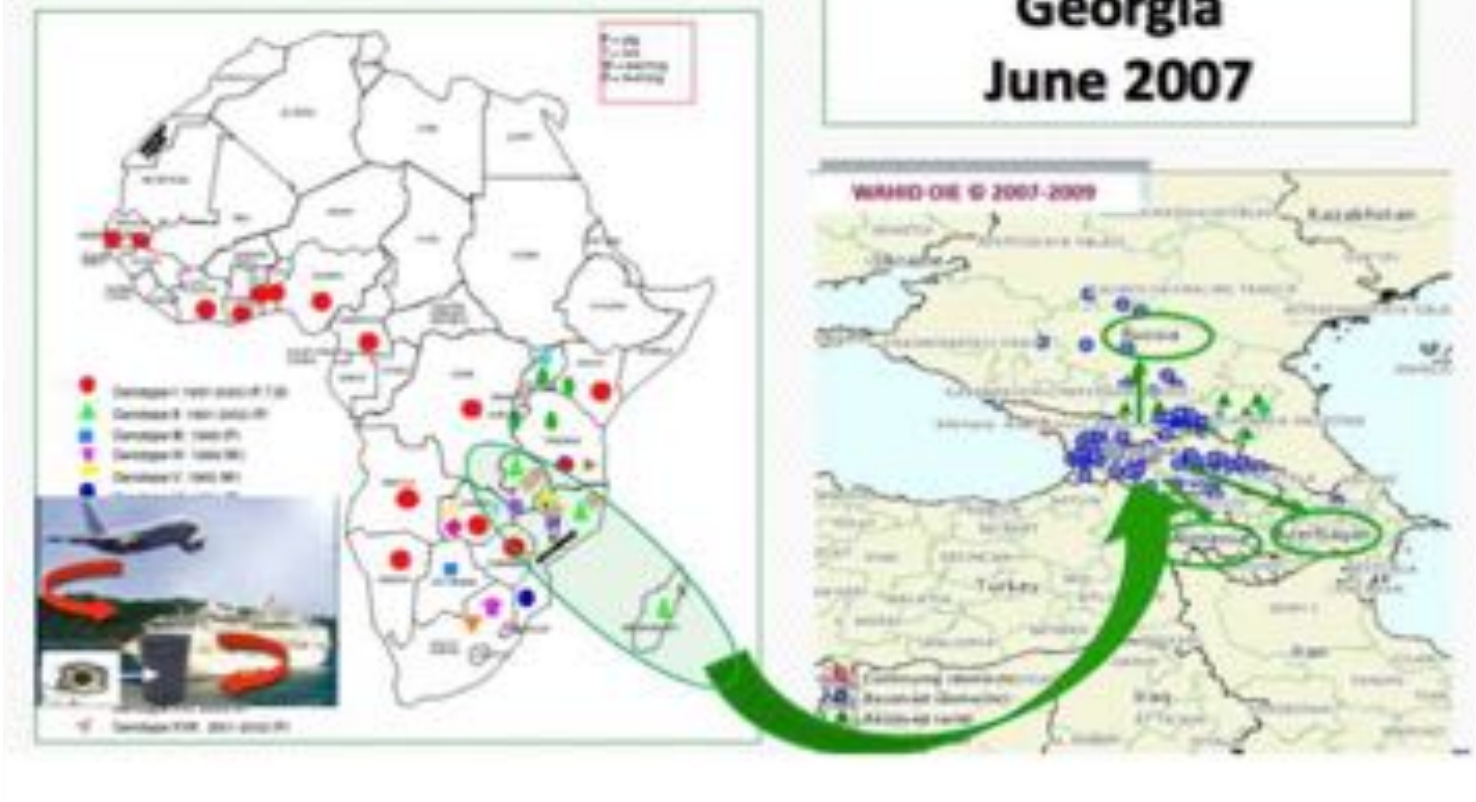
What ASF did not do after its re-introduction into the EU:

- No explosive spread to the West
- No self-termination of outbreaks

Lessons learned:

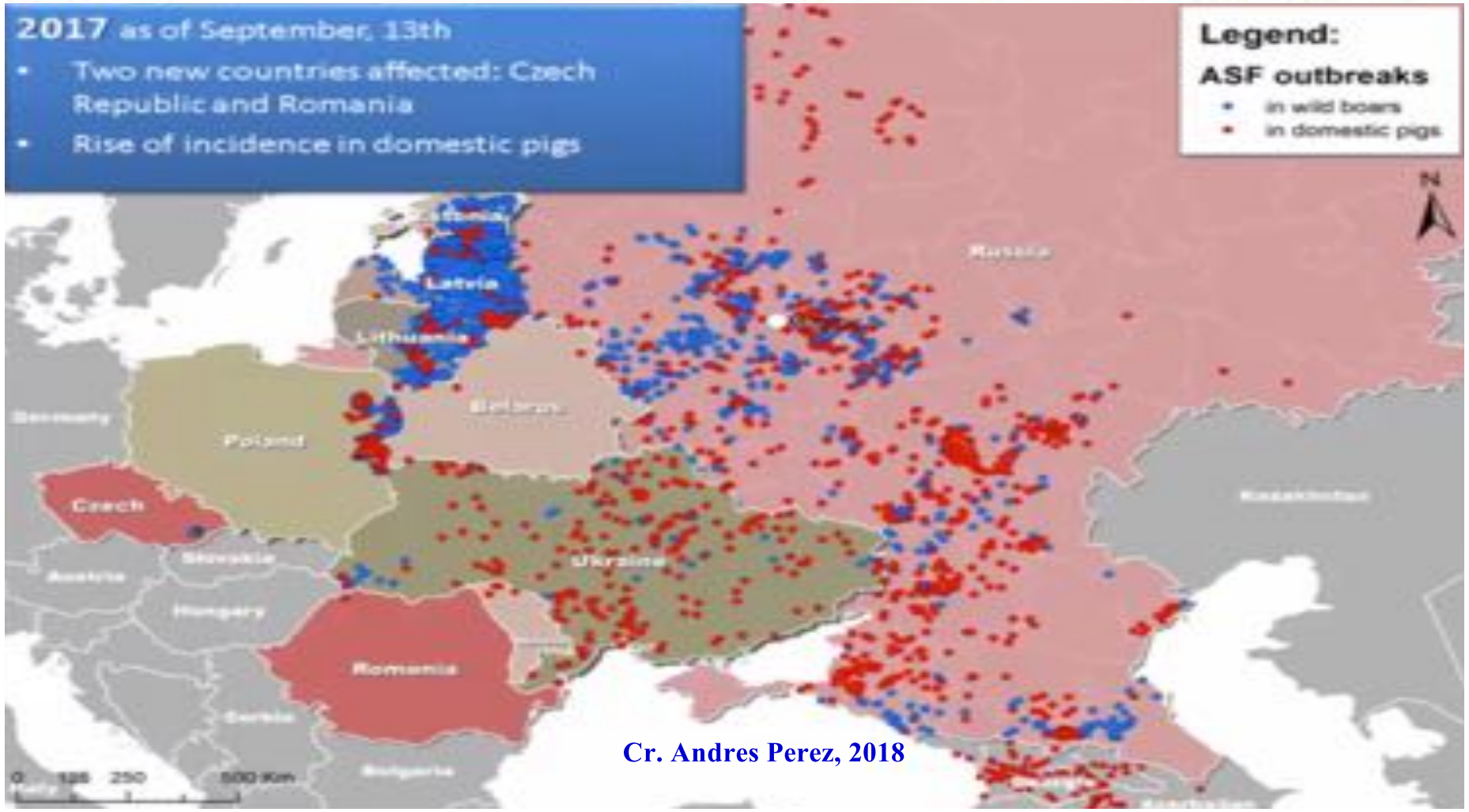
- Contagiosity was overestimated
- Endemic cycles were established in the wild boar population, independently from domestic pigs
- The contaminated habitat plays a crucial role
- Transmission routes are often „golden bullet events" with very low probability but high impact, risk assessments and predictions are most difficult
- Remember transmission in the natural cycle: one droplet of blood can start an epidemic
- Lethality is still high but mortality can be low, especially at the beginning of an epidemic
- There are some virus variants with lower (moderate) virulence; these viruses seem to have a disadvantage in wild boar (disappeared quickly)
- Surviving animals carry the virus for a long time and genome even longer; however, the percentage of animals that do not eliminate the virus in the end is very low (not existent in our long-term experimental studies), no transmission from true convalescent animals to sentinels (surviviors are detected by ELISA)
- Antibody detection does not have a predictive value towards the outcome of the infection

Tracing the origin



Spreading by throwing dead pigs to the river

Cr. V. Guberti, Ispra, Italy



Cr. Andres Perez, 2018

Health

News | Aug 27, 2018

ASF on Romania's largest pig farm: 140,000 pigs culled

African Swine Fever (ASF) has been confirmed on Romania's largest pig breeding farm where 140,000 animals are being culled.

Dead pigs in a ditch after they were culled near Lanurile, southern Romania. Photo: Daniel Mihailescu/AFP

Burn & Bury Pigs (Russia)

Nadezhda Konovalova

2 kg lime per 1 square meter, and later water 10 L. per 1 square meter

Found in Summer time due to contaminated environment such as water sources and dead wild boars in the park!!

Disease introduction and transmision

Cr. S. Blome

FLI

General ways of transmission	Relevance for African swine fever
Direct pig-to-pig contact	High
Airborne transmission	Works over short distances (studies NL)
Semen (AI)	ASFV was shown in semen
Vehicles and fomites	Depending on contamination, high (exp. blood contamination)
Pig feed	Depending on material, moderate; can be high for blood products
Manure and bedding	Moderate (see stability)
Drinking water	Cannot be excluded (example Romania)
Birds, bats, rodents, stray and domestic animals	No competent vectors but mechanical transmission possible
Arthropods (competent)	Only Ornithodoros ticks
Arthropods (mechanical)	Possible especially within farms, but so far no significant evidence for far distance spread

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Survival and localization of African swine fever virus in stable flies (*Stomoxys calcitrans*) after feeding on viremic blood using a membrane feeder

Ann Sofie Olesen[a] Mette Frimodt Hansen[b] Thomas Bruun Rasmussen[a] Graham J. Belsham[a] Rene Bødker[b] Anette Bøtner[a]*

[a] DTU National Veterinary Institute, Technical University of Denmark, Lindholm, DK-4 Kalvehave, Denmark
[b] DTU National Veterinary Institute, Technical University of Denmark, Kemitorvet, building 202, DK-2800 Kgs. Lyngby, Denmark

?

29 January 2019

DNA segments of African Swine Fever Virus detected for the first time in hard ticks from sheep and bovines

Su Chen, Xiaofeng Jia, Haifeng Wang, Jinliang Bei, Xiaofeng Jia, Weihuan Dou, Shaozhan R, Yafei Duan, Xiaofan Jiang, Shuo Zhai

Author Affiliations

Systematic & Applied Acarology 24(1): 185–186 (2019)
http://doi.org/10.11158/saa.24.1.14

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Editorial

African swine fever in China: a new twist to an emerging crisis

ZHI-QIANG ZHANG[1,2]

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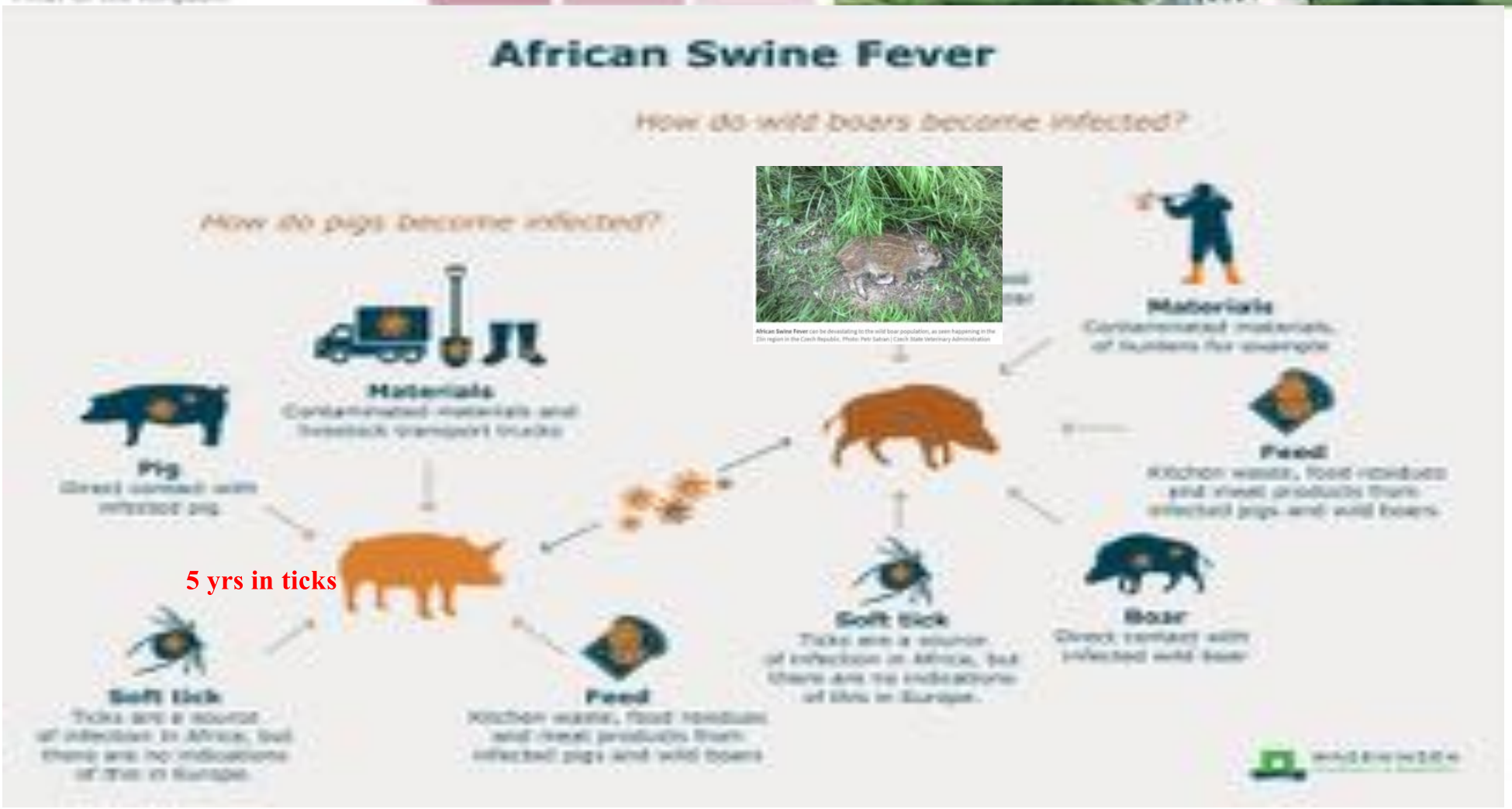
Email: zhangz@landcareresearch.co.nz
[2] *Centre for Biodiversity & Biosecurity, School of Biological Sciences, University of Auckland, Auckland, New Zealand*

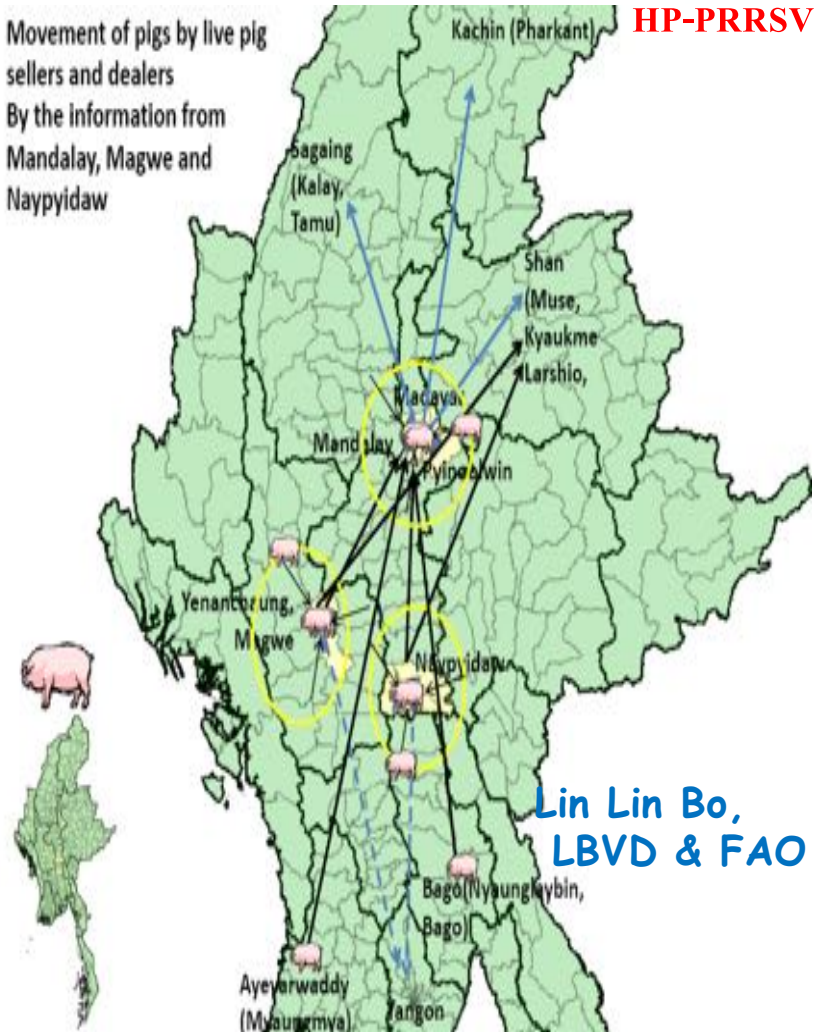
means of transmission and reservoirs of ASFV. A report in this issue by Chen *et al.* (2019) adds a new twist to this emerging crisis. They showed for the first time that ASFV can infect sheep and bovines in addition to Suidae, and *Dermacentor* hard ticks (not just *Ornithodoros* soft ticks) can be vectors. They also showed the transovarian transmission of ASFV in *D. niveus*. The new results highlight the urgent need to study new means of ASFV transmission (esp. wildlife/domestic interface—Quembo *et al.* 2018) and the development of new prevention and control measures for ASF in China—the world's largest producers and market of pork.

African Swine Fever



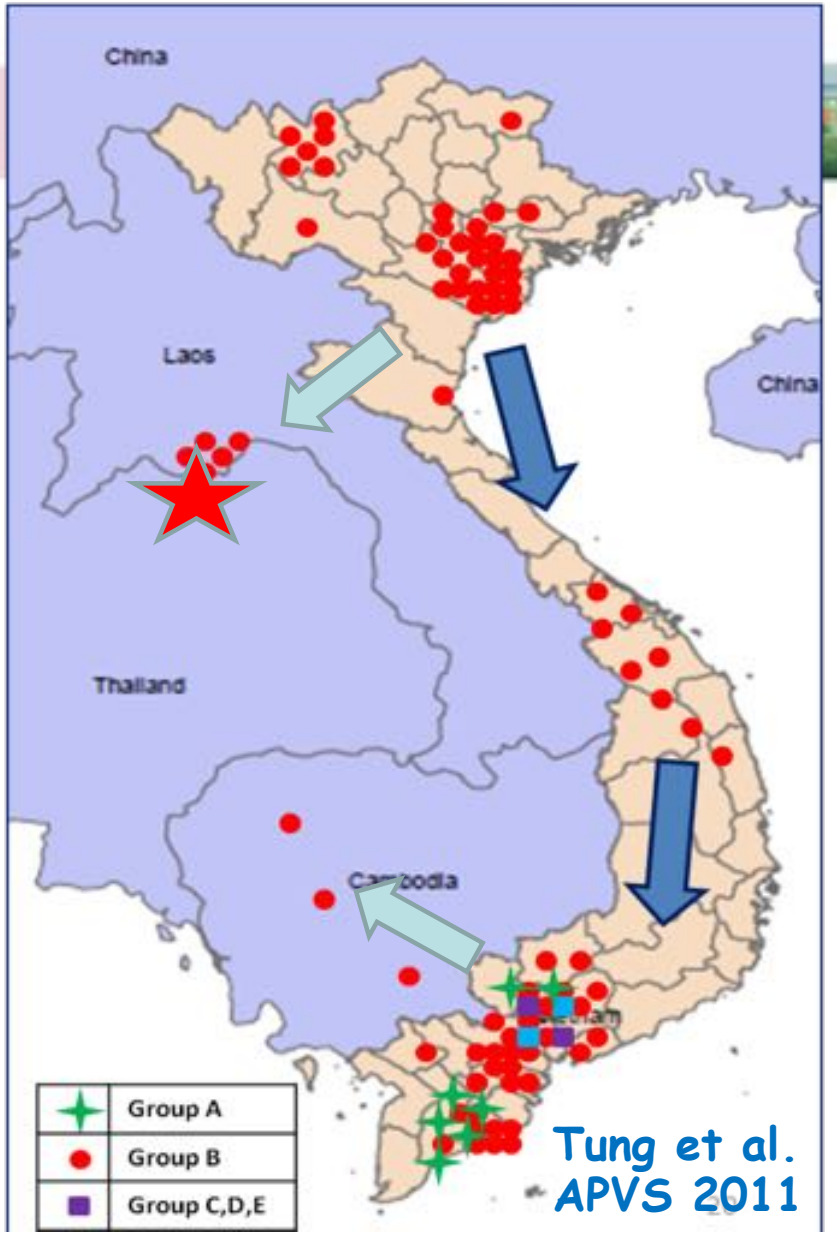
- Two different, even if connected, ASF cycles are present in Europe: the back yard cycle and wild boar cycle
- Back yard pigs and low biosecurity farms are at high risk
- The presence of infected wild boar populations increases the probability of virus introduction in domestic pigs
- Due to the high environmental resistance of the virus, infected areas are likely to remain infected for long time
- The likelihood of long distance transport of the virus by humans increases proportionally to the size of the infected areas
- In wild boar the safe removal of infected carcasses plays a pivotal role in ASF control

Cr. V. Guberti, Ispra, Italy

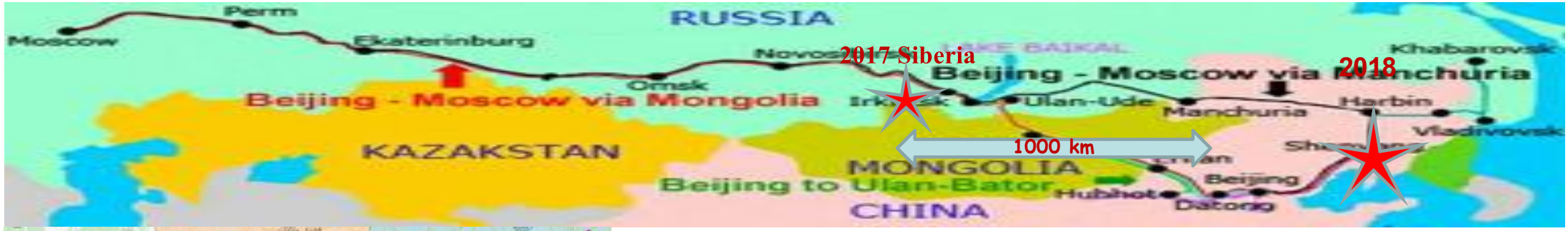


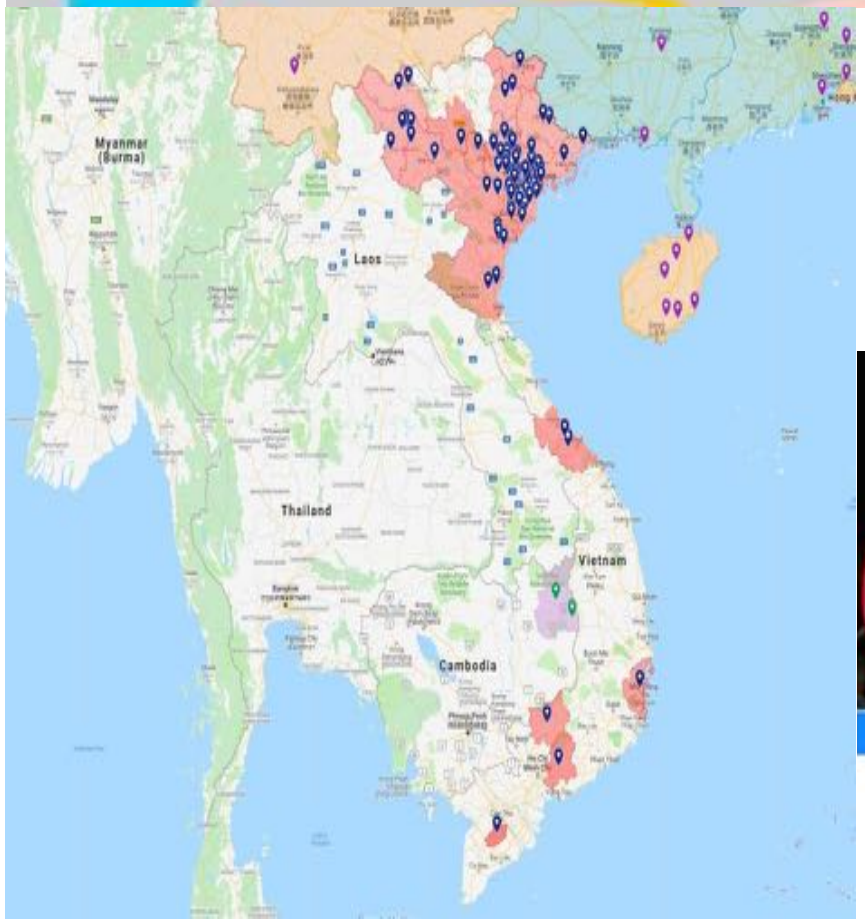
HP-PRRSV

Lin Lin Bo, LBVD & FAO



Tung et al. APVS 2011





How can the virus spread?

- **Long distance movement**
- **Transport vehicles and humans**

- **Swill feeding**
- **etc.**

A smuggler paying cash to secure safe passage

With contributions from Li Xueqing

Truck Station (Cr. CPF, Thailand)

What have we learned from China? (Positive Samples)

- Dried porcine plasma
- Pellet feed & Swill feeding
- Meat products in the feed mill kitchen
- Raw materials (Corn, Soybean meal, wheat etc.)
- Employee cloths, boots etc.
- Truck surface & tires of the feed mill
- Road outside of the pig farms
- Ground surface of the feed mill & slaughter houses
- Outside of disinfectant boxes

Cr. Jason Yan

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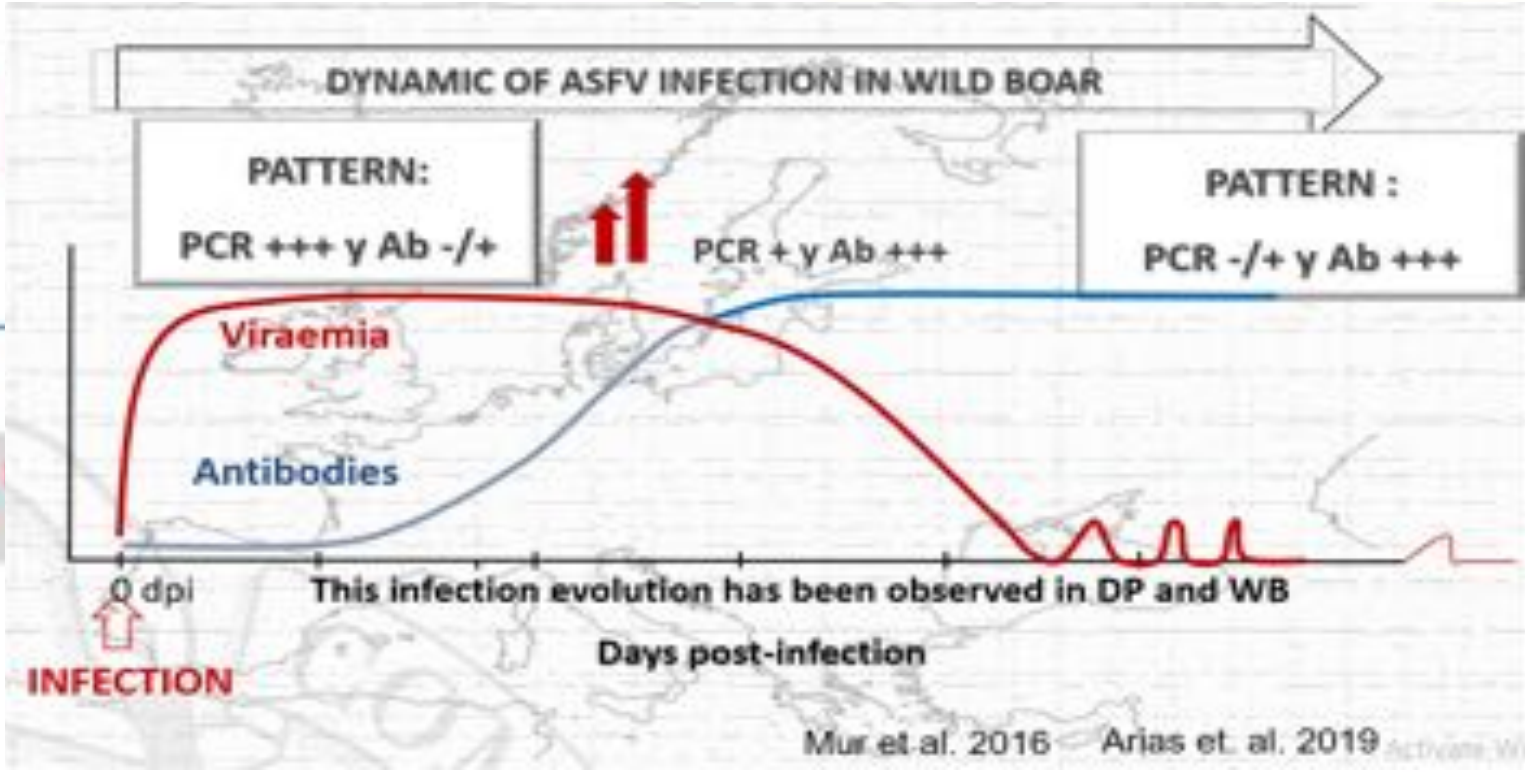
Lab



PCR	Ab-Test	duration of infection (estimates)
pos	neg	<12d (or the animal died/sampled before 12d)
pos	pos	>12d (or the animal died/sampled after 12d)
neg	pos	>24d (or the animals was sampled after 24d

Cr. K. Depner, FAO, Bkk

TABLE 3
Main clinical signs and postmortem findings observed in the different forms of ASF

	Peracute ASF	Acute ASF	Subacute ASF	Chronic ASF
Fever	High	High	Moderate	Irregular or absent
Thrombocytopenia	Absent	Absent or slight (late)	Transient	Absent
Skin	Erythema	Erythema	Erythema	Necrotic areas
Lymph nodes	-	Gastrohepatic and renal with marbled aspect	The majority of lymph nodes resemble a blood clot	Swollen
Spleen	-	Hyperaemic splenomegaly	Partial hyperaemic splenomegaly or focal infarction	Enlarged with normal colour
Kidney	-	Petechial haemorrhages, mainly in cortex	Petechial haemorrhages in cortex, medulla and pelvis; peri-renal oedema	-
Lung	-	Severe alveolar oedema	-	Pleuritis and pneumonia
Gall bladder	-	Petechial haemorrhages	Wall oedema	-
Heart	-	Haemorrhages in epicardium and endocardium	Haemorrhages in epicardium and endocardium; hydropericardium	Fibrinous pericarditis
Tonsils	-	-	-	Necrotic foci
Reproductive alteration	-	-	Abortion	Abortion

Source: Extracted from Sánchez-Vizcaíno et al., 2015

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Chronological spreading of ASF in the Farm

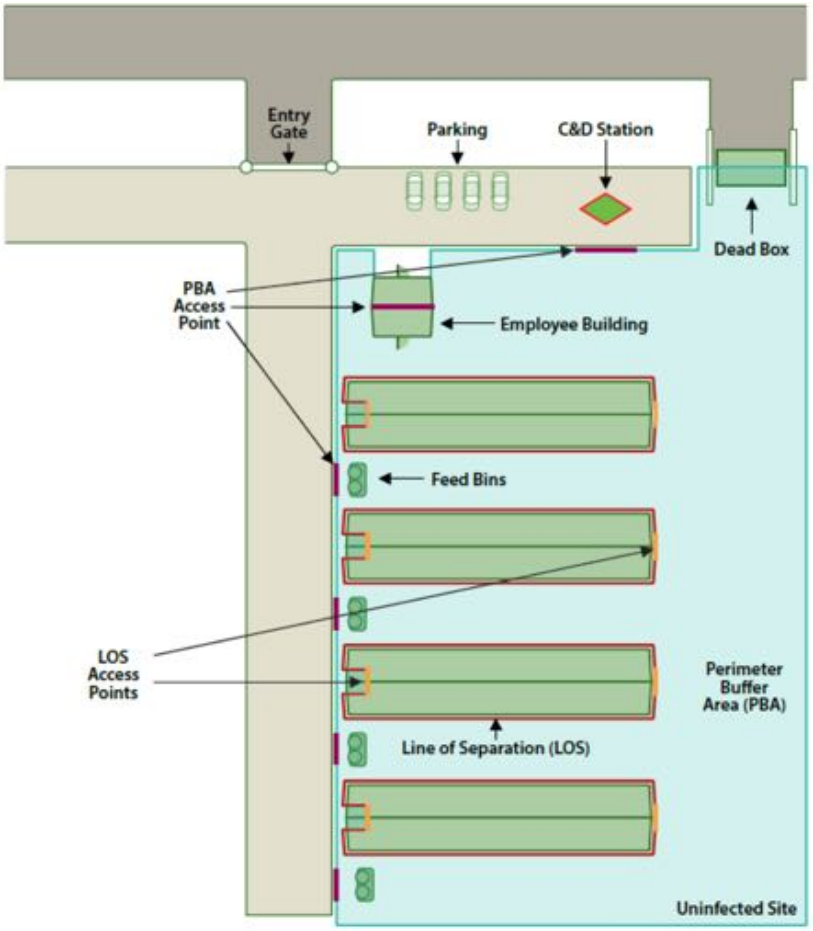
Cr. Nadezhda Konovalova

- August 22, 2016
- August 29, 2016
- August 30, 2016
- September 1, 2016

Once you found the disease,

You can't keep them All!

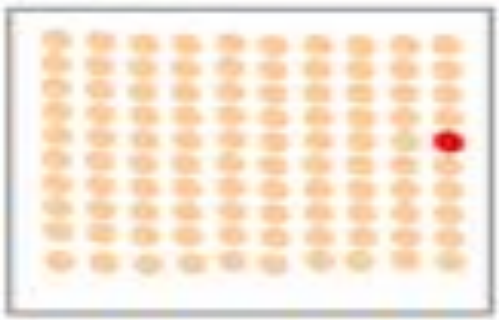
Line of Separation (LOS) Perimeter Buffer Area (PBA)

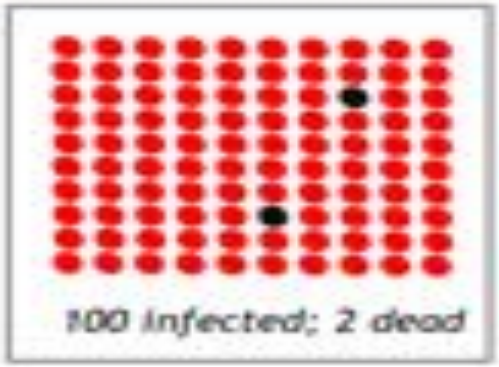


Cr. James Roth

ASF - CSF - FMD

FLI



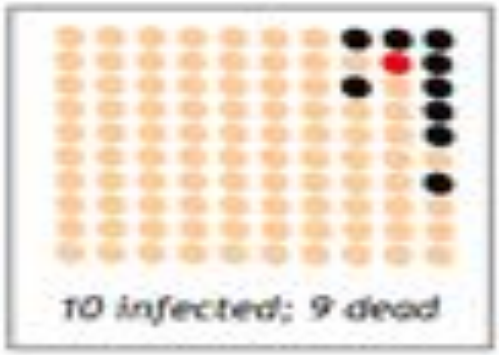


FMD

Prevalence: 100%
Mortality: 2%
Lethality: 2%

Contagiousity: +++

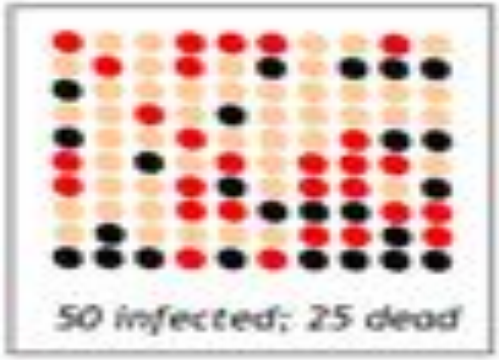
● infected ● dead



ASF

P: 10%
M: 9%
L: 90%

Contagiousity: +



CSF

P: 50%
M: 25%
L: 50%

Contagiousity: ++

Cr. K. Depner, FAO, Bkk

ASF - CSF - FMD

FLI

	ASF	CSF	FMD
Contagiousness	+	++	+++
Virus survival	+++	+	+
Case fatality	+++ (few survivors)	++	+
Initial mortality	+	+++	+
Transmission ways	direct contact (blood)	droplet	droplet
Protective immunity	+	+++	++
Exposer opportunity	+++ (weeks)	+ (days)	+ (days)

Cr. K. Depner, FAO, Bkk

TABLE 3 Resilience of ASFV in various environmental conditions

Items	ASFV survival time
Meat with and without bone and ground meat	105 days
Salted meat	182 days
Cooked meat (minimum of 30 minutes at 70 °C)	0
Dried meat	300 days
Smoked and deboned meat	30 days
Frozen meat	> 1000 days
Chilled meat	112 days
Offal	105 days
Skin/Fat (also dried)	308 days
Blood stored at 4 °C	15 months
Faeces at room temperature	11 days
Putrefied blood	15 weeks
Contaminated pig pens	> month

Source: Beltran-Alcrudo et al., 2017

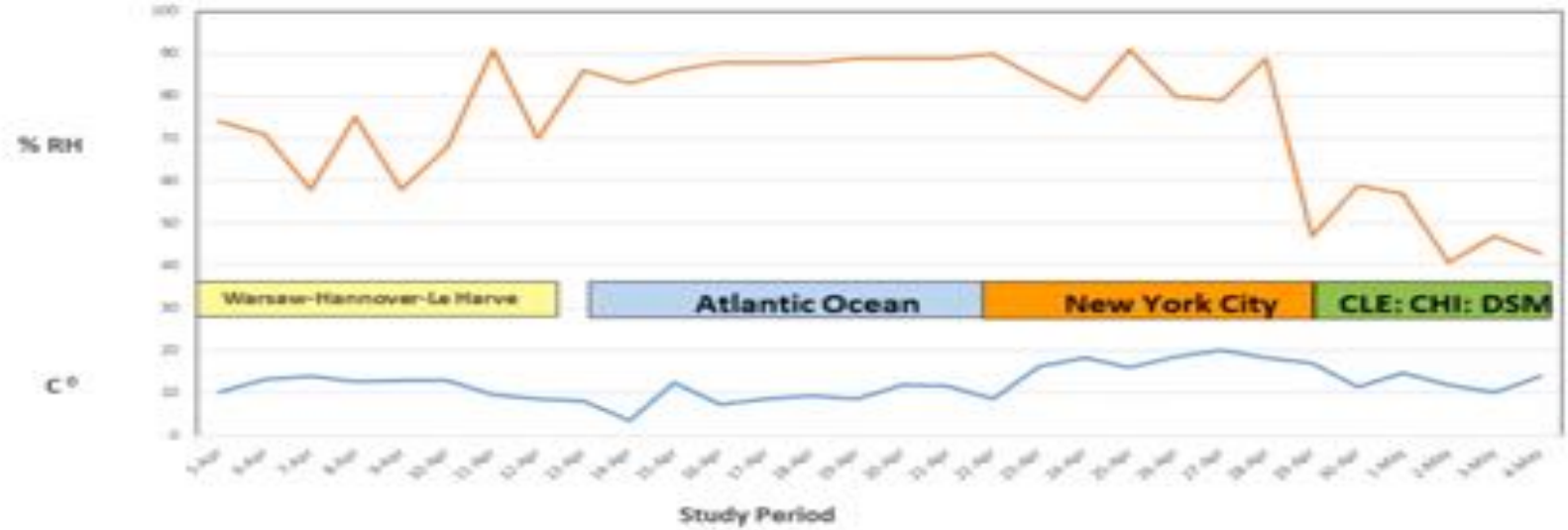
Infective doses depend on the route of infection

RESEARCH ARTICLE

Survival of viral pathogens in animal feed ingredients under transboundary shipping models

Scott A. Dee[1]*, Fernando V. Bauermann[2], Megan C. Niederwerder[3,4], Aaron Singrey[1], Travis Clement[1], Marcelo de Lima[1,5], Craig Long[1], Gilbert Patterson[1], Maureen A. Sheahan[1], Ana M. M. Stoian[1], Vlad Petrovan[1], Cassandra K. Jones[1], Jon De Jong[1], Ju Ji[6], Gordon D. Spronk[1], Luke Minion[1], Jane Christopher-Hennings[7], Jeff J. Zimmerman[8], Raymond R. R. Rowland[9], Eric Nelson[10], Paul Sundberg[10], Diego G. Diel[11]

Mean daily temperature & % RH data: Trans-Atlantic model



Five grams of gamma-irradiated ingredients (in 50 mL mini bioreactor tubes) were spiked with 100 µL of MEM (minimum essential media, Gibco, ThermoFisher Scientific, Waltham, MA, US) containing 1 x 10^5 tissue culture infectious dose 50 ($TCID_{50}$) of each virus [12].

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RESEARCH ARTICLE

Survival of viral pathogens in animal feed ingredients under transboundary shipping models

Ingredient	SVA (FMDV)	ASFV	PSV (SVDV)	PEDV	FCV (VESV)	PCV2	BHV-1 (PRV)
Soybean meal-Conventional	(+)	(+)	(+)	(+)	(+)	(-)	(+)
Soybean meal-Organic	(-)	(+)	(+)	(+)	(-)	(-)	(-)
Soy oil cake	(+)	(+)	(+)	NT	(-)	(-)	(+)
DDGS	(+)	(-)	(-)	NT	(-)	(-)	(-)
Lysine	(+)	(-)	(+)	(+)	(+)	(+)	(-)
Choline	(+)	(+)	(-)	(+)	(-)	(+)	(-)
Vitamin D	(+)	(-)	(+)	(+)	(-)	(+)	(-)
Moist cat food	(+)	(+)	(+)	NT	(-)	(-)	(-)
Moist dog food	(+)	(+)	(+)	NT	(-)	(-)	(-)
Dry dog food	(+)	(+)	(+)	NT	(-)	(-)	(-)
Pork sausage casings	(+)	(+)	(+)	NT	(+)	(-)	(-)
Complete feed (+ control)	(+)	(+)	(+)	NT	(+)	(+)	(-)
Complete feed (- control)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
Stock virus control	(-)	(+)	(-)	(-)	(-)	(-)	(-)

Fig 4. Virus viability in feed ingredient from Batch 4 samples, inclusive of previous PEDV results [14].
A red-colored box with a (+) indicates that virus was recovered in a viable form from a specific ingredient, while a green-colored box with a (-) indicates that viable virus was not recovered by VI and/or swine bioassay. Finally, a blue-colored box with NT denotes that these ingredients were not used in this study and therefore, no results are available.

doi:10.1371/journal.pone.0194509.g004

It is unlikely that the grain, hay and straw were the source of ASFV capable of causing the (infectious) disease (EFSA, 2017).

Grzegorz WoŹniakowski, Poland

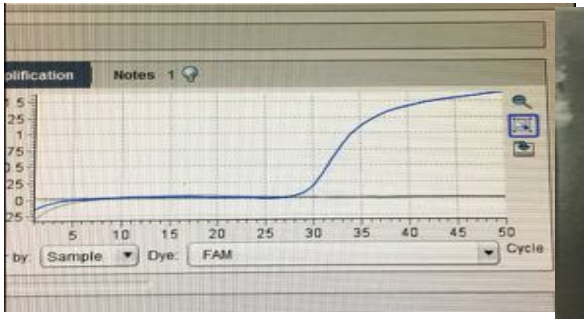
However, the use of grass, straw and hay from the areas where ASF was confirmed in wild boar pose a potential threat of virus introduction into the pig farm.

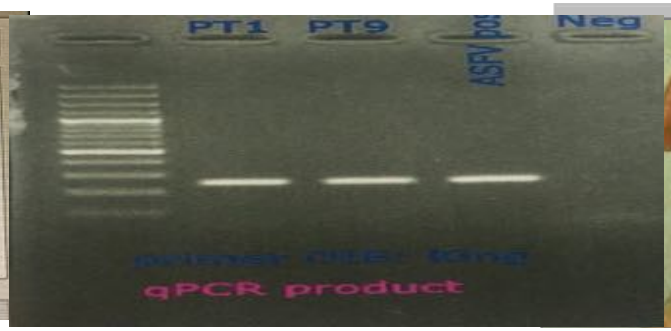
Procedures should be implemented: inactivatin of ASFV or storage for at least 30 days

Permit for use of straw from areas where ASFV occurs, only after virus inactivation or storage for at least 90 days (EFSA, EU 2017)

African Swine Fever	Classical swine Fever
• Asfivirus (DNA)	• Pestivirus (RNA)
• Transmit by ticks	• Not transmit by ticks
• No vaccine available	• Available vaccines
• No neutralizing Abs	• NPLA
• No immunotolerance	• Immunotolerance
	• Button ulcer in chronic cases

Differential Dx: HP-PRRS, Salmonellosis, Erisipelas, PHE, PDNS, other Pestiviruses & septicaemic conditions





Cr. S. Blome

Differentiation of African and classical swine fever is impossible based on clinical signs alone! The same is true for several other differential diagnoses!

Domestic fattening pigs at the seventh day post inoculation with a highly virulent ASFV strain („Armenia08")

Domestic pigs and wild boar at the seventh day post inoculation with a highly virulent CSFV strain („Kostov")

Laboratory confirmation is mandatory!

Clinical signs in domestic pigs

FLI

Cr. S. Blome

- First signs are observed app. four days post infection: High fever, reluctance to move, inappetence, huddling, it is „too quiet" when you enter the stable
- Some animals develop conjunctivitis and gastro-intestinal signs (vomiting, diarrhea)
- With progression of the disease, animals become somnolent, appear desorientated, and show dyspnea
- In the final phase, affected animals may show petechiae or map-like bleedings and cyanoses as well as seizures and haemorrhages (epistaxis, bleedings from the anus)

EM-TH-19-0052

ASF
Splenomegaly

Provided by Yaliang Duan

Chronically infected pig

Key Risk factors – why is control proving so challenging?
3. Role for recovered 'carrier' pigs (domestic and wild)?

- Different forms of the virus are circulating: high – low virulence
- Carrier status in recovered pigs / wild boar

Transbound Emerg Dis. 2016 Oct;63(5):e406-40. doi: 10.1111/tbed.12304. Epub 2014 Nov 30.

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

Mor L[1], Ipolitov A[2], Varentsova A[2], Parshin A[2], Ramova D[2], Shevchenko I[2], Zhukov I[2], Sánchez-Vizcaíno JM[1]

Vet World. 2018 Jan;11(1):5-9. doi: 10.14202/vetworld.2018.5-9. Epub 2018 Jan 11.

Third wave of African swine fever infection in Armenia: Virus demonstrates the reduction of pathogenicity.

Sargsyan MA[1], Voskanyan HE[2], Karalova EM[2], Hakobyan LH[2], Karalyan ZA[2,3]

Veterinary Microbiology

journal homepage:

Evolution in Europe of African swine fever genotype II viruses from highly to moderately virulent

Gallardo C.[1,*], Nurmoja I.[1], Soler A.[1], Delicado V.[1], Simón A.[1], Martín E.[1], Perez C.[1], Nieto R.[1], Arias M.[1]

[1] European Union Reference Laboratory for African Swine Fever (EURL), Centro de Investigación en Sanidad Animal, INIA-CISA, Valdeolmos, 28130, Madrid, Spain
[2] Estonian Veterinary and Food Laboratory, Kreutzwaldi 30, Tartu, 51006, Estonia

Which samples in alive animals ?

3-5 ml

- Blood with EDTA from viremic pigs for detection of viral antigens and/or viral DNA (heparin hind PCR !)

- Clotted blood (without EDTA)
- Oral fluid

for detection of specific Abs
NO EARLY DETECTION

Cr. V. Guberti, Ispra, Italy

Proposed sampling strategy for outbreak investigation

- Suspected farms
  - Collect tissue samples from 5 **dead pigs**
  - Inguinal lymph node
  - If dead pigs<5, collect blood from **sick pigs**
- Neighbor farms
  - Collect blood samples from 5 **sick pigs**
  - Serum or plasma
  - If sick pigs<5, no need to collect 5 samples

FAO

Place	Types	No. samples
Suspected farms	Dead / sick pigs	5
Neighbor farms (n=5)	Blood from sick pigs (n=5)	25
Total		**30**

Early detection of ASF in wild boar

Passive surveillance vs. active surveillance

	tested	positive	% positive
Passive (found dead)	245	177	*72.24*
Active (hunted)	2765	40	*1.45*
		217	

Passive / Active: 72.24 / 1.45 = 49,82

The probability to detect an ASF positive case is 50 times higher in dead animals than in hunted animals

81 out of 100 positive cases are likely to be detected in dead wild boar
(177 / 217 x 100 = 81)

Cr. K. Depner, FAO, Bkk

Passive (reactive)	Active (proactive)
Animals that belong to the "**Suspect case definition**" are tested **Animal owners report** a suspect case to the Vets The suspect case definition drives the whole detection system	The Veterinarians directly collect animal health data using a defined protocol A population or a part of it (risk based) is actively investigated to detect an infection Vets, go in the farm and take samples, check the animals

Cr. V. Guberti, Ispra, Italy

ASF early detection in domestic pigs

PASSIVE SURVEILLANCE

- The most effective tool for detecting ASF [Evident clinical signs, High lethality (94.5-100%)].
- Due to the clinical similarity with other *diseases* (e.g. CSF) passive clinical surveillance always needs to be confirmed by laboratory

In Commercial holdings

- *Strict health monitoring programme of pig holdings*
  Reporting of dead and sick animals
- *Reporting any decreasing of production parameters*

In Backyard holdings

- *Reporting of sick or dead animals*
- *Vet inspection on pig slaughtering for own consumption*

(pigs with lesions/symptoms examinned and tested)

Cr. V. Guberti, Ispra, Italy

Good news (domestic pigs): no (rapid) spread of the disease

ASF in domestic pigs can be controlled effectively by good biosecurity!!!

Bad news (wild boar): no (rapid) spread of the disease

ASF in wild boar survives locally over months or years in wild boar populations (a habitat disease)

Cr. K. Depner, FAO, Bkk

Culling and disposal

Bloodless method: bisdimethylaminoethyl succinate d
known as succinylcholine 5mg/kg

Cr. Nadezhda Konovalova

- Cull all pigs in positive farm
  - Minimize virus propagation
- Monitor health of non-infected farms
  - Investigate all fever case with high mortality
- Pigs in non-affected farm can be slaughtered and consumed
- Humane euthanasia method

Table 1: Size-related Appropriateness of Various Euthanasia Methods in Swine

	Farrowing pig less than 3 weeks (12# or 5.5 kg)	Nursery pig less than 10 weeks (70# or 32 kg)	Grower pig (less than 150# or 68 kg)	Finisher pig (greater than 150# or 68 kg)	Mature animal, sows or boars
Carbon Dioxide (CO_2)*	yes	yes	not practical	not practical	not practical
Gunshot	no	yes	yes	yes	yes
Captive Bolt	no	yes	yes	yes	yes
Electrocution	yes	yes	yes	yes	yes
Anesthetic overdose	yes	yes	yes	yes	yes
Blunt trauma	yes	no	no	no	no

* CO_2 means Carbon Dioxide NOT Carbon Monoxide (CO). Carbon Monoxide is a method of euthanasia but is not currently recommended because of its high potential as a human health hazard.

FAO

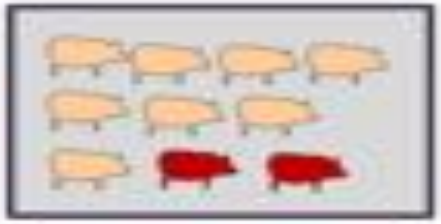
ASF control and eradication

FLI

Key characteristics of ASF:

- low contagiousity, slow spread, few secondary infections
- no transmission by wind or insects,
- **site fidelity** (stable disease / habitat disease),

DP: stable disease

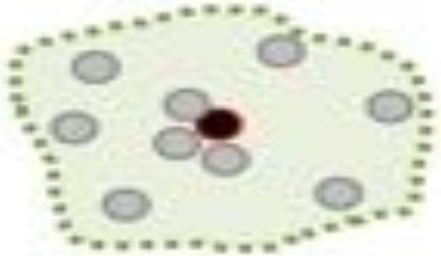


Measures:
1. Standstill
2. Culling
3. C&D

Cleaning & Disinfection

Successful approach!!

WB: habitat disease

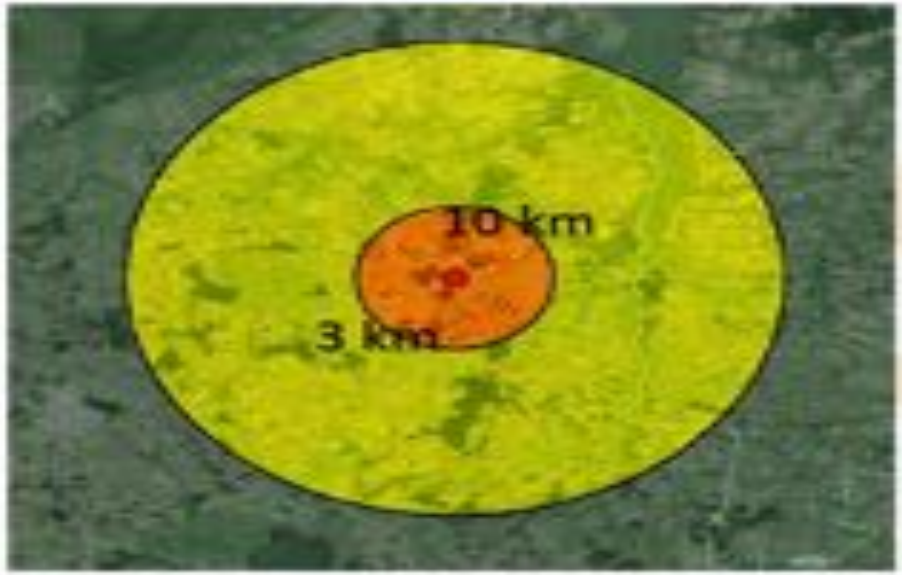


Measures:
1. Standstill (no disturbance of WB, no hunting, electrical fence, (feeding)
2. (Trapping)
3. Disposal of carcasses

"Virtual stable" in forest

Cr. K. Depner, FAO, Bkk

Establishment of protection and surveillance zones

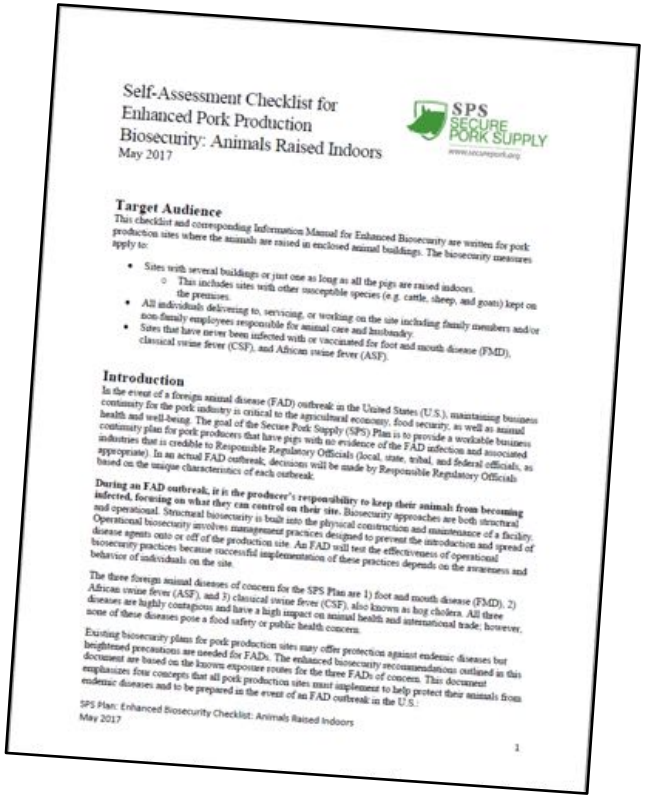


Hypothetical examples of different approaches

Cr. V. Guberti, Ispra, Italy

Biosecurity Self-Assessment Checklist

- ***Biosecurity Manager and Written Plan***
- ***Training***
- ***Protecting the Pig Herd***
- ***Vehicles and Equipment***
- ***Personnel***
- ***Animal and Semen Movement***
- ***Carcass Disposal***
- ***Manure Management***
- ***Rodent, Wildlife, and Other Animal Control***
- ***Feed***



Self-Assessment Checklist for Enhanced Pork Production Biosecurity: Animals Raised Indoors

SPS SECURE PORK SUPPLY

May 2017

Target Audience

This checklist and corresponding Information Manual for Enhanced Biosecurity are written for pork production sites where the animals are raised in enclosed animal buildings. The biosecurity measures apply to:

- Sites with several buildings or just one as long as all the pigs are raised indoors.
  - This includes sites with other susceptible species (e.g. cattle, sheep, and goats) kept on the premises.
- All individuals delivering to, servicing, or working on the site including family members and/or non-family employees responsible for animal care and husbandry.
- Sites that have never been infected with or vaccinated for foot and mouth disease (FMD), classical swine fever (CSF), and African swine fever (ASF).

Introduction

In the event of a foreign animal disease (FAD) outbreak in the United States (U.S.), maintaining business continuity for the pork industry is critical to the agricultural economy, food security, as well as animal health and well-being. The goal of the Secure Pork Supply (SPS) Plan is to provide a workable business continuity plan for pork producers that have pigs with no evidence of the FAD infection and associated industries that is credible to Responsible Regulatory Officials (local, state, tribal, and federal officials, as appropriate). In an actual FAD outbreak, decisions will be made by Responsible Regulatory Officials based on the unique characteristics of each outbreak.

During an FAD outbreak, it is the producer's responsibility to keep their animals from becoming infected, focusing on what they can control on their site. Biosecurity approaches are both structural and operational. Structural biosecurity is built into the physical construction and maintenance of a facility. Operational biosecurity involves management practices designed to prevent the introduction and spread of disease agents onto or off of the production site. An FAD will test the effectiveness of operational biosecurity practices because successful implementation of these practices depends on the awareness and behavior of individuals on the site.

The three foreign animal diseases of concern for the SPS Plan are 1) foot and mouth disease (FMD), 2) African swine fever (ASF), and 3) classical swine fever (CSF), also known as hog cholera. All three diseases are highly contagious and have a high impact on animal health and international trade; however, none of these diseases pose a food safety or public health concern.

Existing biosecurity plans for pork production sites may offer protection against endemic diseases but heightened precautions are needed for FADs. The enhanced biosecurity recommendations outlined in this document are based on the known exposure routes for the three FADs of concern. This document emphasizes four concepts that all pork production sites must implement to help protect their animals from endemic diseases and to be prepared in the event of an FAD outbreak in the U.S.:

SPS Plan: Enhanced Biosecurity Checklist: Animals Raised Indoors
May 2017

1

In place ☐ In progress ☐ Not In place ☐

Cr. James Roth

Backyard/small scale confined pig production

Options for small scale and backyard farms (on top of what was said for scavenging pigs):

- fence farm units to avoid wildlife contacts
- use nets to avoid contact to birds
- implement access control
- visitor log book
- specific clothing, especially footwear
- clean and disinfect vehicles
- safe pig loading bays
- keep equipment to one unit (or at least clean and disinfect properly
- control of pests
- age segregation
- regular cleaning and disinfection

ASF control strategy in China

- Stop swill feeding (whole country)
- Movement control
  - Live pigs
  - Pork and pork products
- Culling and disposal
  - All pigs in positive farms
  - Compensation (1,200Y/head or 175 USD)

FAO

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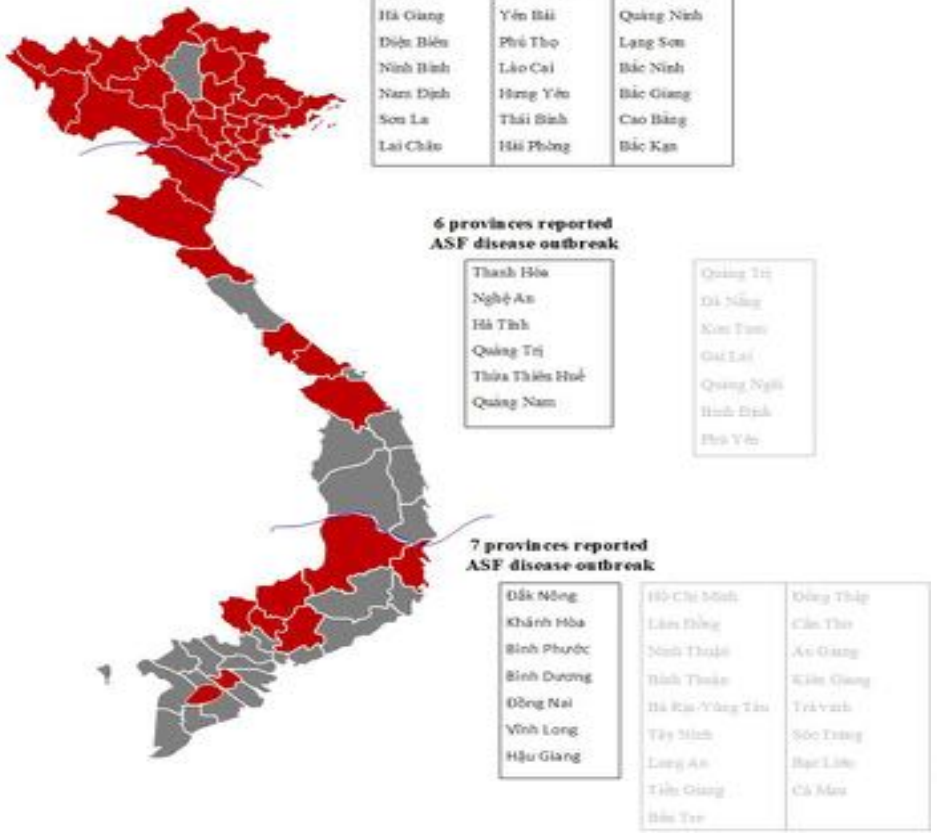
ASF response strategy in Viet Nam

- Early detection and quick response
  - Outbreak investigation
- Movement control
- Culling and disposal
- Prohibit swill feeding

THE GOAL IS TO DESTROY VIRU

37 provinces repoeted ASF disease outbreak
(22-05-2019)



Russia

Detect ASF outbreak (48 hours)

Official Government Quarantine 30 days, signed by the head of the region

Preparation

Start euthanasia of pigs and transfer to the burial site for incineration

Disinfection all farm, around, road.

Quarantine 30 days

8 months before the first bioassay on the farm

2 bioassay and final disinfection

You can start farming AGAIN

Cr. Nadezhda Konovalova

PIC

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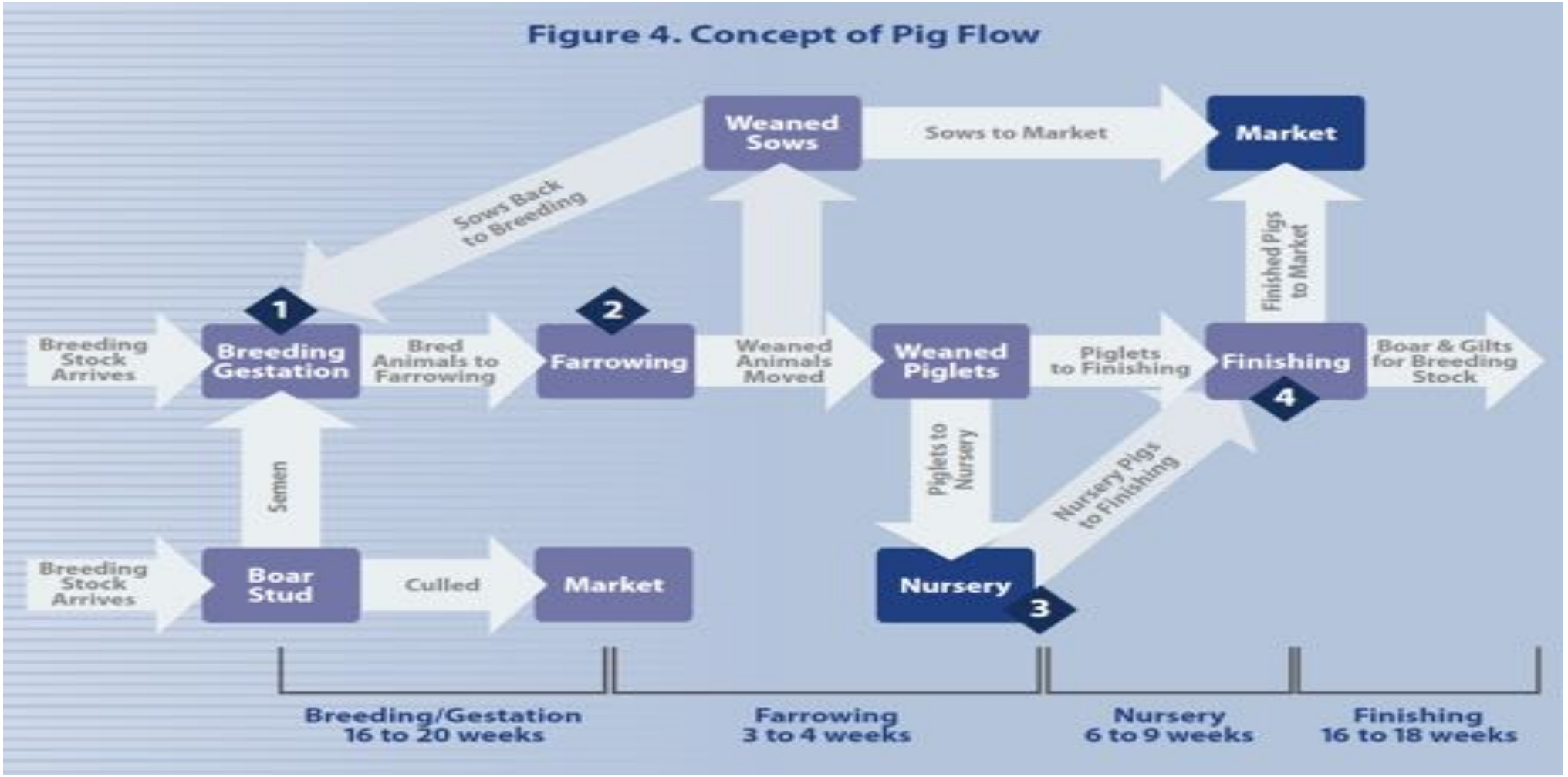
Stop Movement is Difficult for the Swine Industry: Secure Pork Supply Plan

Cr. James Roth



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ASF Outbreak Phase 1 (USA)

Phase 1 is the period of time from the confirmation of the first ASF case in the United States until there is reasonable evidence to estimate the extent of the outbreak. The transition to Phase 2 should be accomplished as soon as possible, with a goal of less than 4 days.

- Establish Control Areas around Infected Premises and Contact Premises
- A nationwide 72 hour movement standstill of swine may be recommended by USDA APHIS
- Swine in transit (~ 1 million/day) need to be “landed” somewhere
  - Continue to destination (especially if to harvest)
  - Return to premises of origin (?)
  - Euthanize if they are from a control area or epidemiologically linked to an infected premises

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ASF Outbreak Phase 1 (USA)

- Initiate rapid quarantine and stamping-out (within 24 hours) of infected and contact herds
- Implement a validated, enhanced national ASF surveillance plan
- Enforce biosecurity protocols within the Control Area(s)
- Work with USDA APHIS Wildlife Services and other appropriate Federal, State, and Tribal authorities to initiate the containment, testing, and then eradication of feral swine in the Control Area (if possible)

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ASF Outbreak Phase 2 (USA)

Phase 2 is the period of time after surveillance and epidemiologic investigation provide timely evidence of the extent of the outbreak and the virulence of the ASF virus strain to support planning and decision making by the Unified Incident Command

Cr. James Roth

Phase 2 Type 1 ASF Outbreak (USA)

- **Type 1 ASF Outbreak: Any Outbreak of ASF virus that can logistically be stamped out in domestic and feral swine and carcasses safely disposed of.**
  - Implement aggressive stop movement and stamping-out of infected and contact herds, stamping out of feral swine populations in the Control Area (if possible) and continue until ASF-free status is obtained

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Phase 2 Type 2 ASF Outbreak (USA)

- **Type 2 ASF Outbreak: An outbreak of ASF that has become established in feral swine with continuing outbreaks in domestic swine and no realistic chance of stamping out infection in feral swine in the foreseeable future.**

OR

- **An outbreak of low virulence ASFV that has become widespread before it was detected.**

Multiple areas of infection with low virulence ASF are detected in a region, or the type, number and/or size of infected and contact herds are too great to consider only a stamping-out strategy. It may be desirable to depopulate some premises by movement of healthy animals to slaughter.

Cr. James Roth

During a Type 2 ASF Outbreak (USA)

Implement all of the recommendations under a Type 1 ASF outbreak, with the exception that a modified stamping-out policy may be used

- Some Infected and Contact Premises may be depopulated by movement of healthy animals to slaughter
- All Infected Premises should be de-populated by either stamping-out or slaughter (or a combination), cleaned and virus eliminated
- Swine production systems infected with ASF virus should develop a plan for controlled depopulation and repopulation of premises
- Healthy animals from an ASF virus-infected herd should be slaughtered with implementation of biosecurity during transportation and at a processing facility to avoid transmission of virus to negative herds

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ASF Outbreak Phase 3 (USA)

Surveillance and epidemiologic evidence indicates that the outbreak is under control and a plan is implemented to regain ASF virus-free status (OIE TAHC 2018 Article 15.1.6)

Cr. James Roth

ASF Take home messages?

- Suspicion of ASF

  Diagnosis confirmed (Differential Dx)

  - Quarantine
    - Entire herd
    - Strict enforcement
    - Authorities notified
- Disposal of carcasses
  - Burial
  - Burning

The sooner you found the disease,
The better you can control successfully!!

Why NO vaccine for ASFV?

Large complex virus with many proteins (60-185 encoded)
Inactivated / passaged virus does not protect
Vaccine candidate antigens (viral proteins) do not protect
Vaccine trials require high containment facilities - expensive
Largely African problem (in past) - lack of commercial market.
Few groups involved in research – USA example

Cr. Chris Oura, 2018

The bottom line

More research is needed!