Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

AFRICAN SWINE FEVER

Disease Overview and Recognition - Part 1

Canadian Veterinary Medical Association

Canada

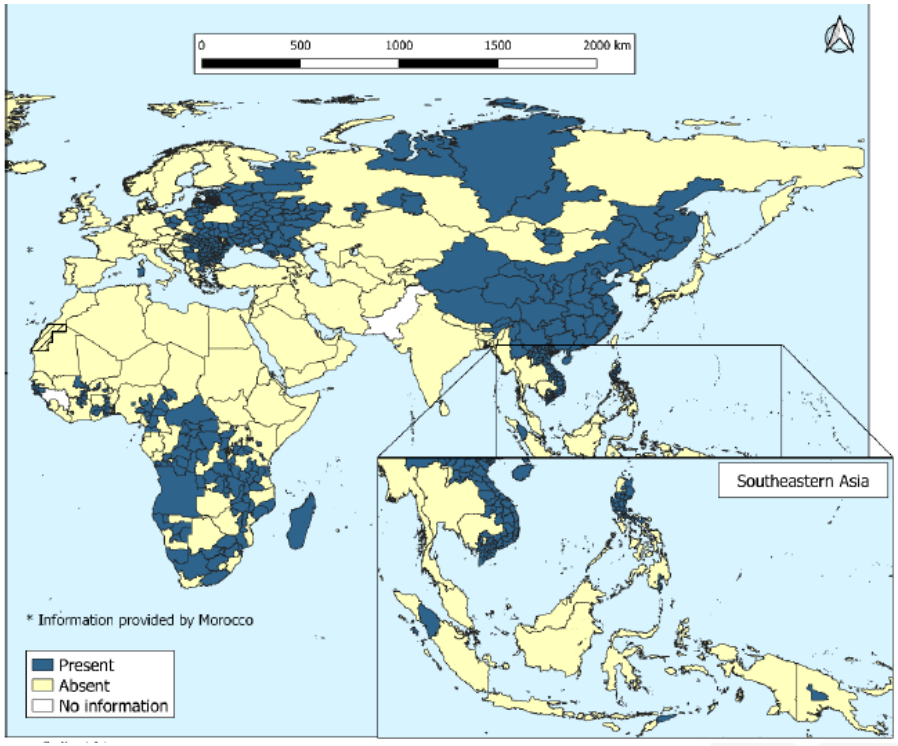
Agenda

- African swine fever (ASF) overview
- Disease recognition

ASF Overview

What is ASF?

- ASF is a contagious viral disease that affects pigs.
- There is no treatment or vaccine for ASF and it has a high mortality rate.
- ASF does not cause disease in humans (not a food safety risk).
- ASF continues to spread globally at an alarming pace.

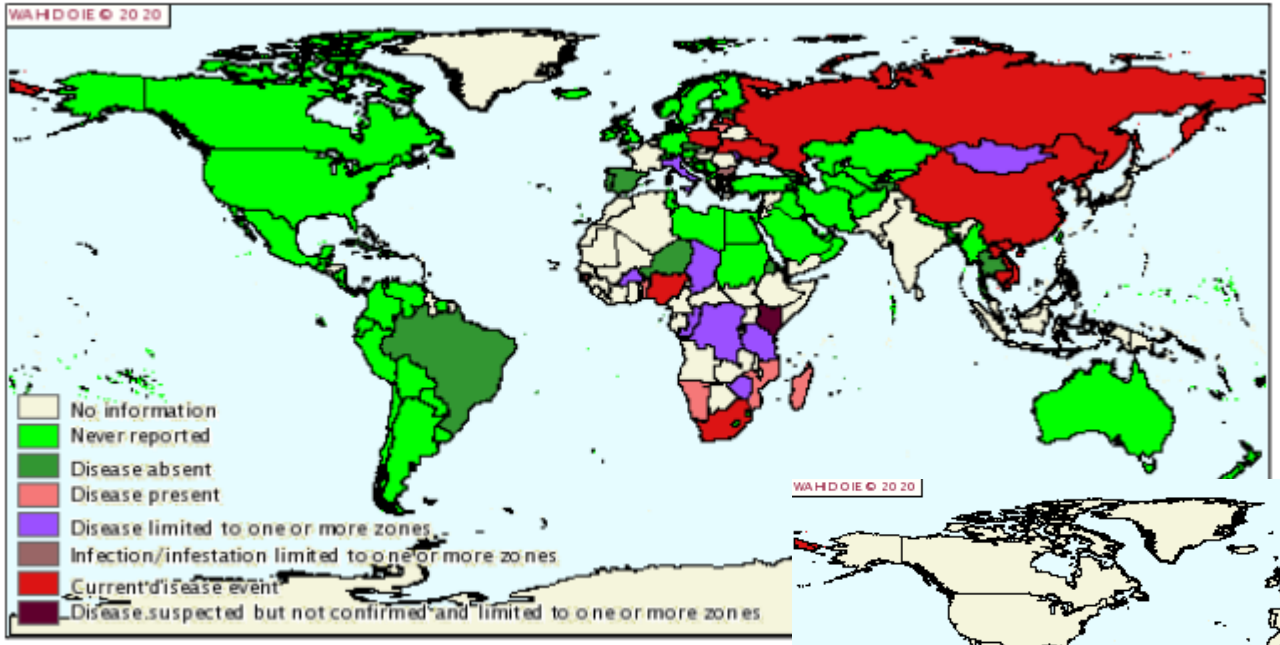


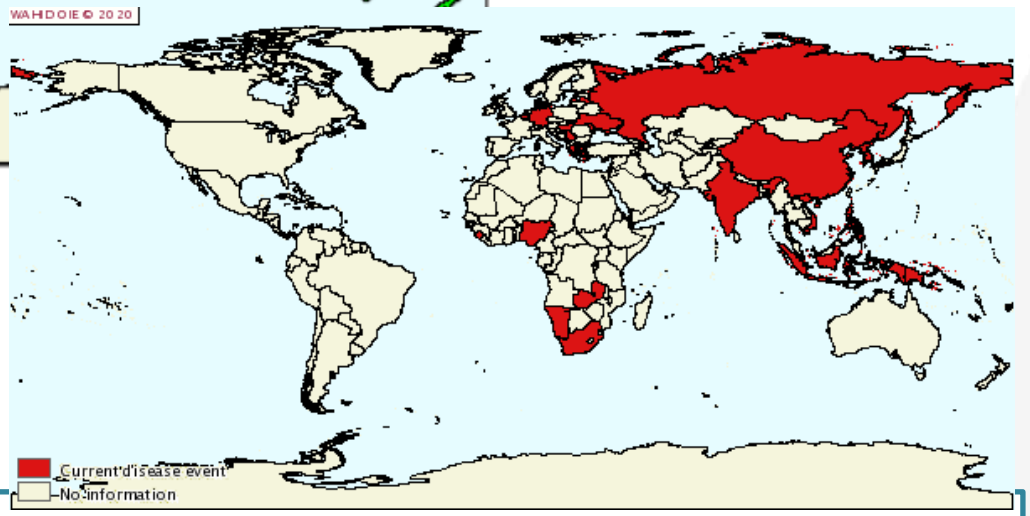
Global ASF Situation (2016-20, reference: www.oie.int)

- ASF has never been reported in Canada; as the global viral load increases, risk of introduction to Canada goes up.

ASF Global Context

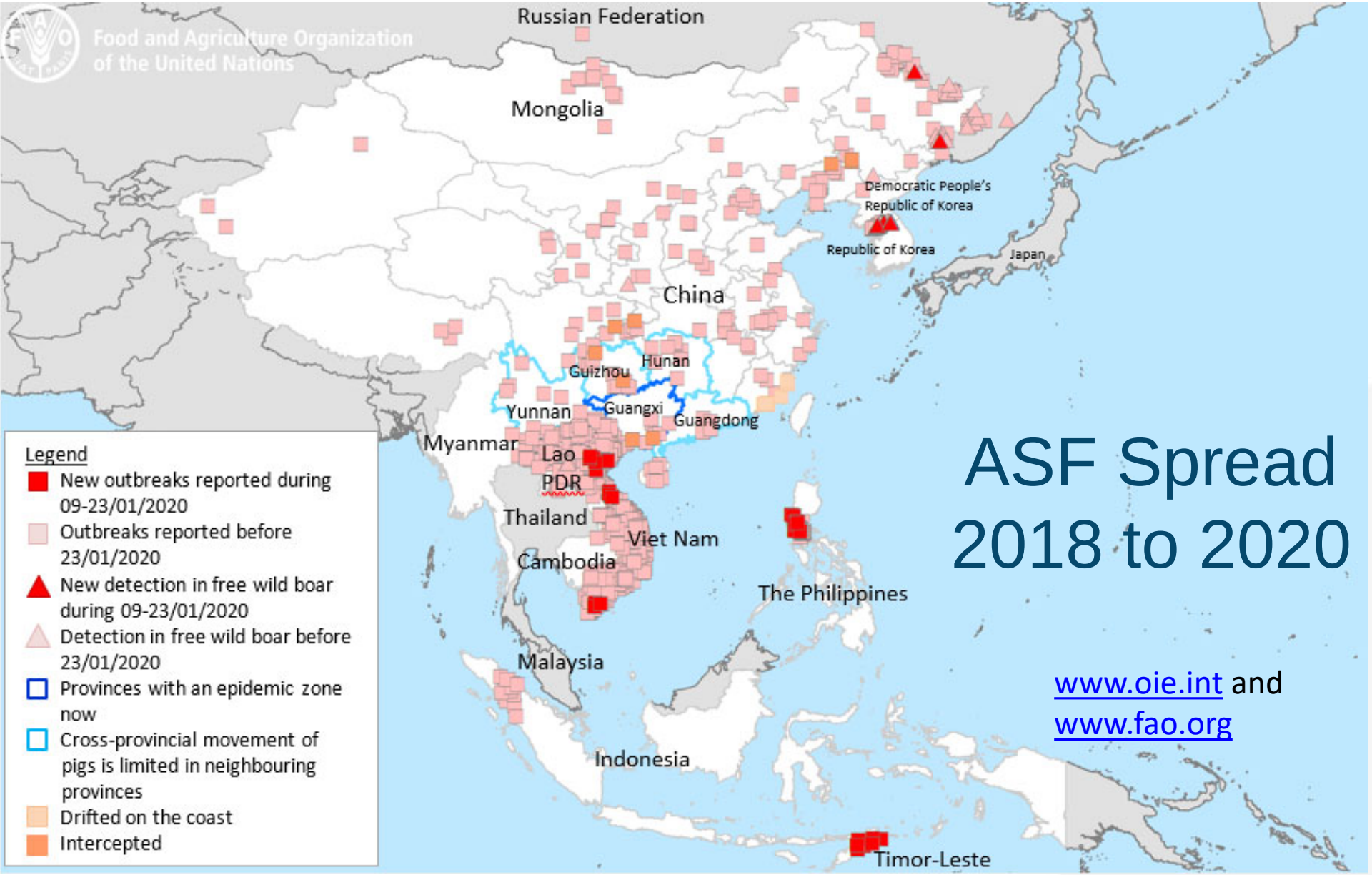
Disease distribution maps





Reference: www.oie.int

OIE estimates that about **25%** of the global pig population is expected to die due to an ASF epidemic



ASF Spread 2018 to 2020

www.oie.int and www.fao.org

Why Are We Concerned?

Top 3 Markets for Canadian Pork

U.S. 

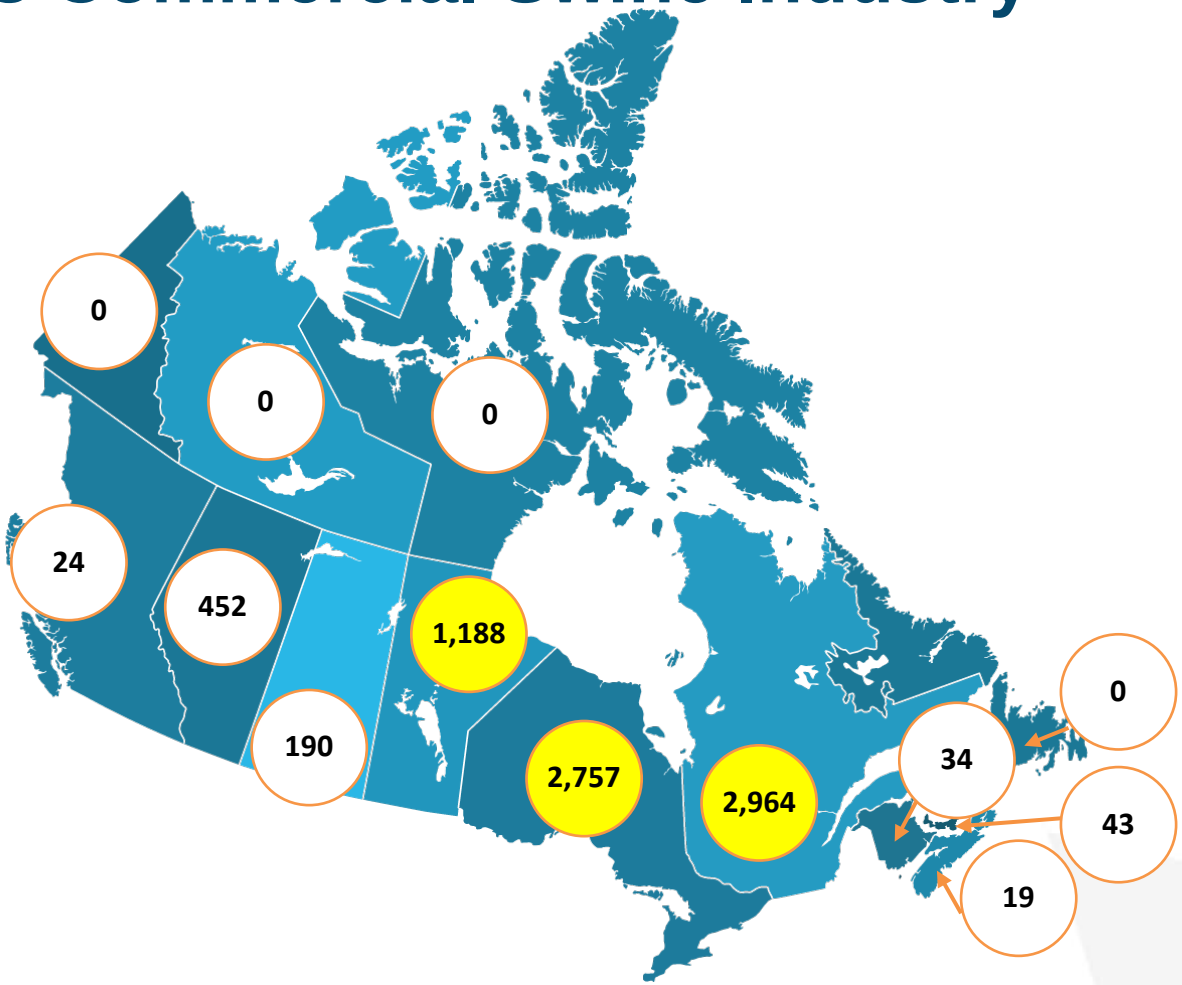
Japan 

China 

- The Canadian pork industry is worth **24 billion** CAD and employs over **45,000** individuals in the producing and processing sectors.
- Canada exports **70%** of its hog production; (includes live pigs, germplasm and pork/pork products).
- In 2018, Canadian pork production was **2.1 million tonnes** with 1.3 million tonnes of pork, valued at $3.8 billion CAD, exported to 87 countries.

One positive case in Canada would stop all hog and pork product exports immediately; markets could take months to years to reopen.

Canada's Commercial Swine Industry



- Over 7000 pig farms produce ~27 million hogs annually.
- At any given time, 12.6 million hogs are in production.

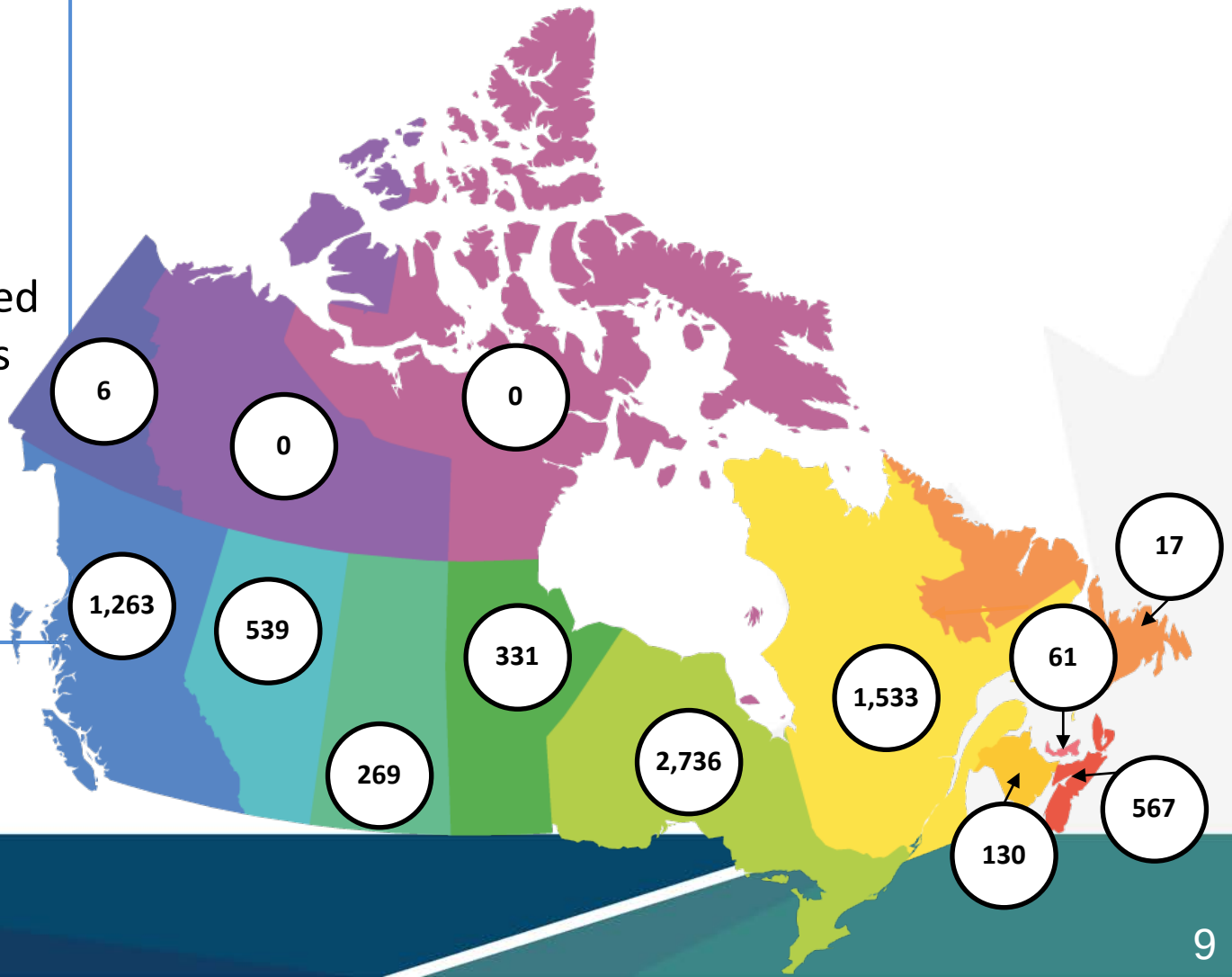
*Data is suppressed for NL to meet confidentiality requirements of the *Statistics Act* and data is unavailable for NWT, YT, NU

Small Holdings

Why do you think small holder operations pose a greater risk?

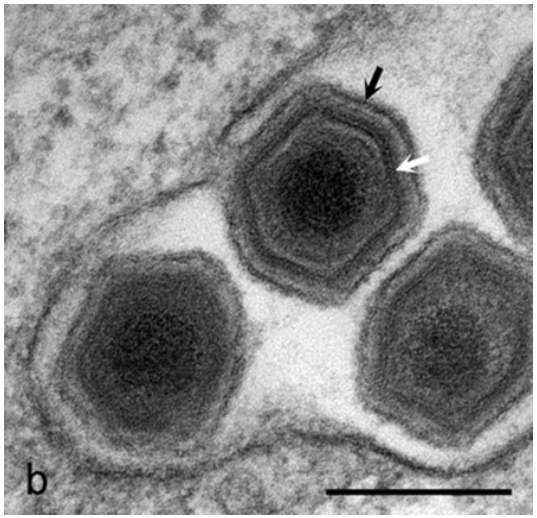
Small holders pose a greater risk because pigs are:

- more likely raised outside,
- more likely to be fed alternative sources of feed,
- less likely to have regular vet oversight, etc.

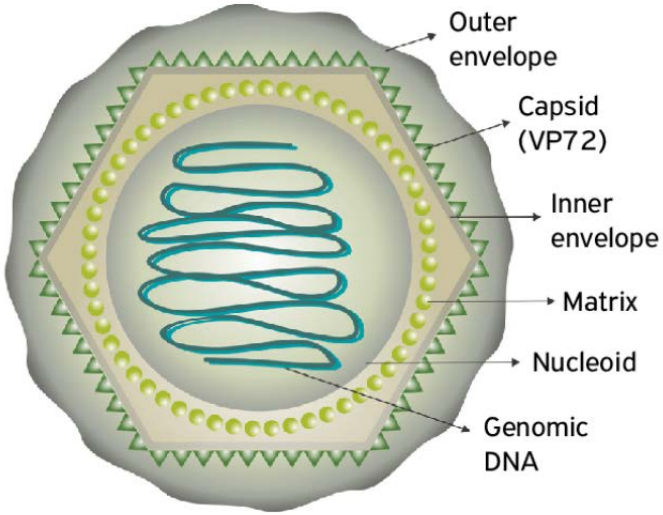


African Swine Fever Virus

- The only known DNA arbovirus
- The only member of the Asfavirus genus in the family Asfaviridae
- Virion - enveloped, highly complex, 200 nm in diameter, ~50 proteins



https://www.researchgate.net/publication/323954376



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SUSCEPTIBLE SPECIES

START

Sus scrofa domesticus and Sus scrofa ferus

PREVIOUS

NEXT

Warthogs
Phacochoerus africanus

AFRICA'S SYLVATIC CYCLE

PREVIOUS

NEXT

ASFV Transmission

Oronasal

- Contact with secretions or excretions (including blood or bloody exudates, saliva, semen) from infected animals
- Ingestion of infected tissues via fighting/cannibalism or uncooked contaminated pork scraps (swill feeding)
- Ingestion of feed contaminated with ASF
- ASFV titers in blood can range from 107 to 108 HAD50/mL

Experimental Infections (USA)

- *O. turicata*
- *O. coriaceus*
- *O. parkeri*

Bite from infected tick

- Soft (Argasid) ticks
- Ornithodorus moubata – Africa
- Ornithodorus erraticus – Europe

African Swine Fever

How do wild boars become infected?

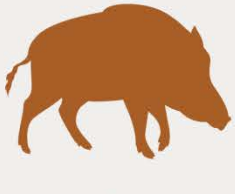
Carcase
Carcase or possibly blood from an infected wild boar

Materials
Contaminated materials, of hunters for example

Feed
Kitchen waste, food residues and meat products from infected pigs and wild boars

Boar
Direct contact with infected wild boar

Soft tick
Ticks are a source of infection in Africa, but there are no indications of this in Europe.



How do pigs become infected?

Materials
Contaminated materials and livestock transport trucks

Pig
Direct contact with infected pig

Soft tick
Ticks are a source of infection in Africa, but there are no indications of this in Europe.

Feed
Kitchen waste, food residues and meat products from infected pigs and wild boars

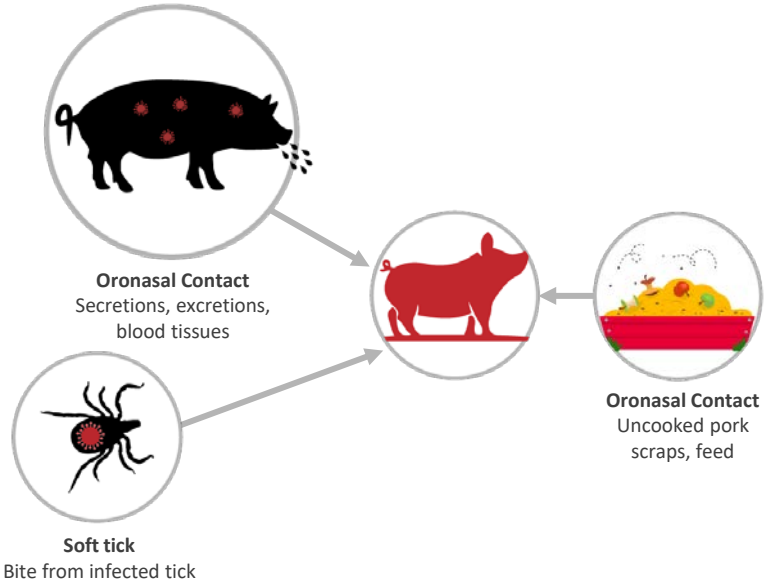
WAGENINGEN
UNIVERSITY & RESEARCH

Epidemiology

- Incubation period: average is 7 days
  - OIE officially recognized incubation period = 15 days
- Infectious period = start of viremia to 30 days post recovery
  - Viremia occurs 2-3 days post exposure
  - Viral shedding can occur up to 48 hours prior to clinical signs
- Morbidity = up to 100%
- Mortality = variable 5 -100%

Viral Tropism and Pathogenesis

- Has a *complex pathogenesis* - only partially understood
- Portal of entry: oronasal contact (secretions, excretions, blood tissues, uncooked pork scraps, feed), bite from infected tick
- Primary site of replication: Monocyte & Macrophages (tonsils, lymph nodes)
- Virus spread: Blood or lymph to secondary rep. sites (lymph nodes, bone marrow, spleen, liver, lung, kidney)



- Activation of endothelial cells and the coagulation system which leads to a consumption coagulopathy
- Hemorrhages in multiple organs, parietal pleura & peritoneum, joints, GI tract

Virus Survival and Inactivation

Resistant to inactivation

- Survive several months in frozen, fresh or uncooked meat as well as salted dried meat products
- Fresh blood stored at 4°C for 18 months
- Putrefied blood for 15 weeks
- Animal feed for ~ 30 days under simulated shipping conditions

Can be inactivated

- Lipid solvents & commercial disinfectants based on iodide & phenolic compounds and hypochlorites
- At pH < 3.9 and > 11.5
- In cooked or canned hams heated to 70°C at least 30 min
- In cured Serrano, Iberian hams, shoulders at 122-140 days of curing will inactivate the virus

Medium	Virus Survival
Processed Pork products (i.e. hams)	Up to 300 days
Boned pork	150 days
Bone Marrow	Months
Frozen meat/carcasses	>1000 days
Swine tissues	3 – 6 months
Blood	15 weeks – 18 months
Feed	30 days
Manure	Days to months
Slurry	112 days at 4°C *(research ongoing)*

Role of Veterinarians

- Understand the global situation and associated risks to industry
- Understand transmission pathways as they relate to your clients (think BIOSECURITY!)
  - Rules related to international waste and meat feeding: PROHIBITED
- Educating clients on the risks of ASF

What types of biosecurity protocols have you seen implemented that would mitigate the introduction of disease?

Disease Recognition

Clinical Presentation

Acute, sub-acute & chronic forms - relates to the virulence of the ASFV isolate

Highly Virulent - Acute

- Fever – 40.1° to 41.7°C
- Anorexia
- Erythema
- Leukopenia
- Death in 7-10 days

Moderately Virulent - Subacute

- Fluctuating to continuous fever
- Moderate anorexia
- Erythema
- Abortions
- Leukopenia
- Death in 12-14 days
- Survivor pigs can recover
- Shed virus from oropharynx ≥70 days.

Compared with CSF the progression to death in ASF tends to be more rapid. Animals can appear mild to moderately ill and then deteriorate rapidly.

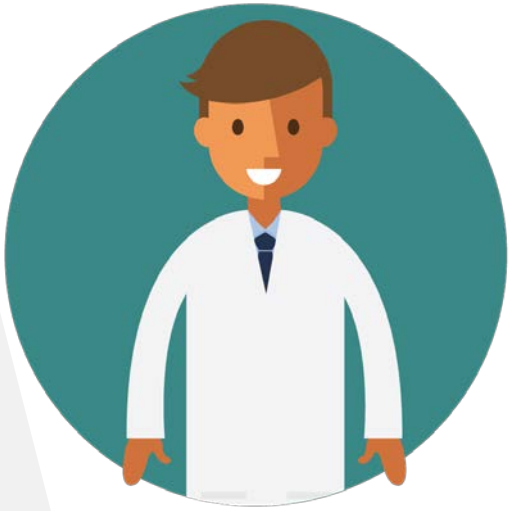
Clinical Presentation

START

NEXT

PREVIOUS

NEXT



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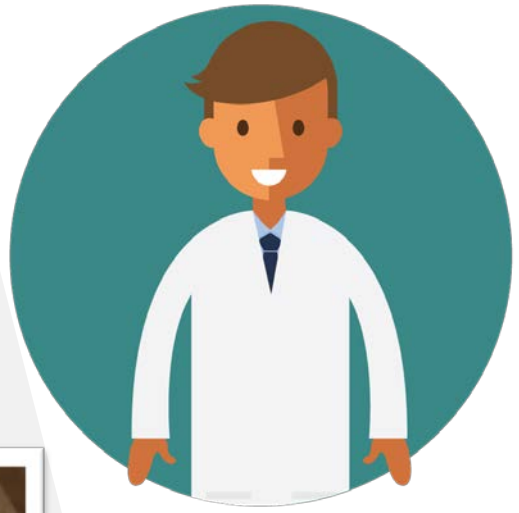

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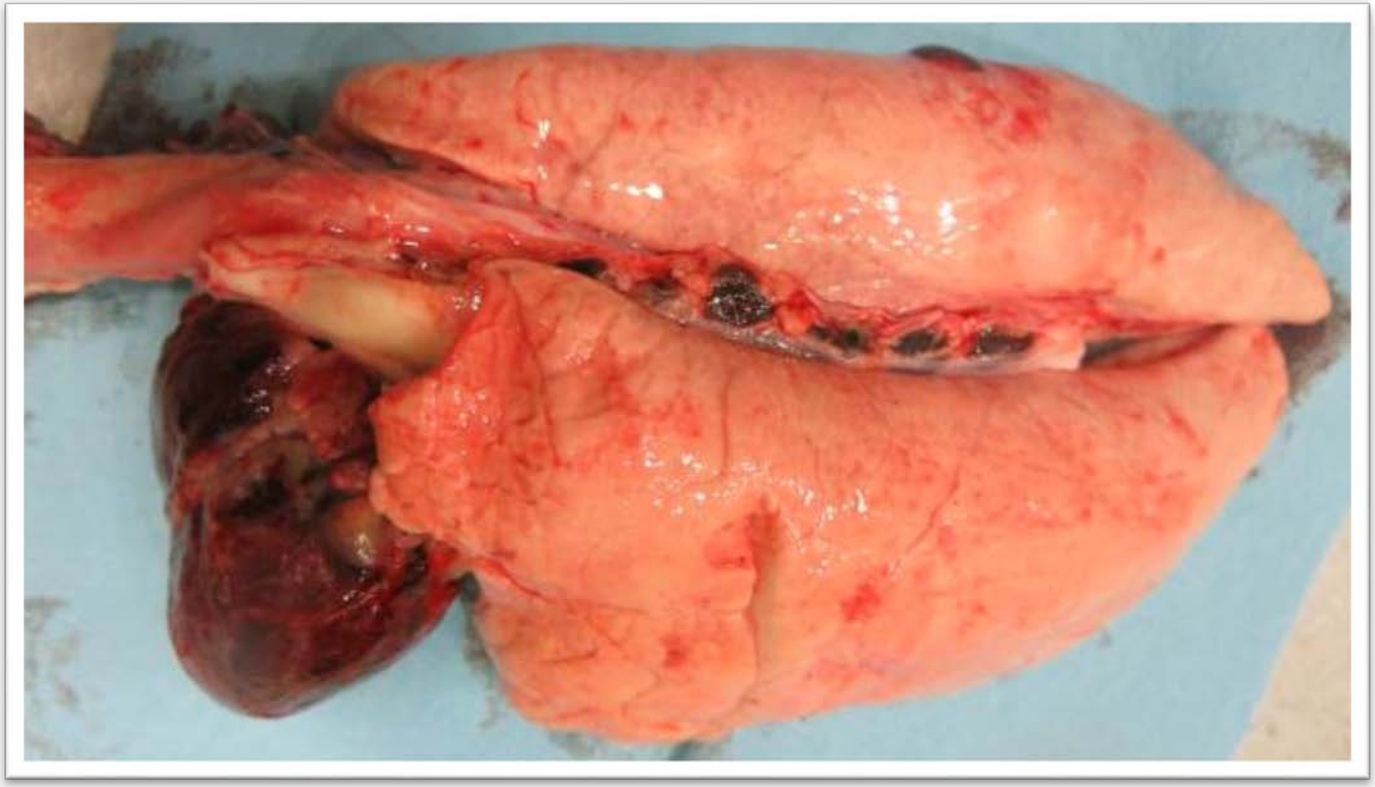
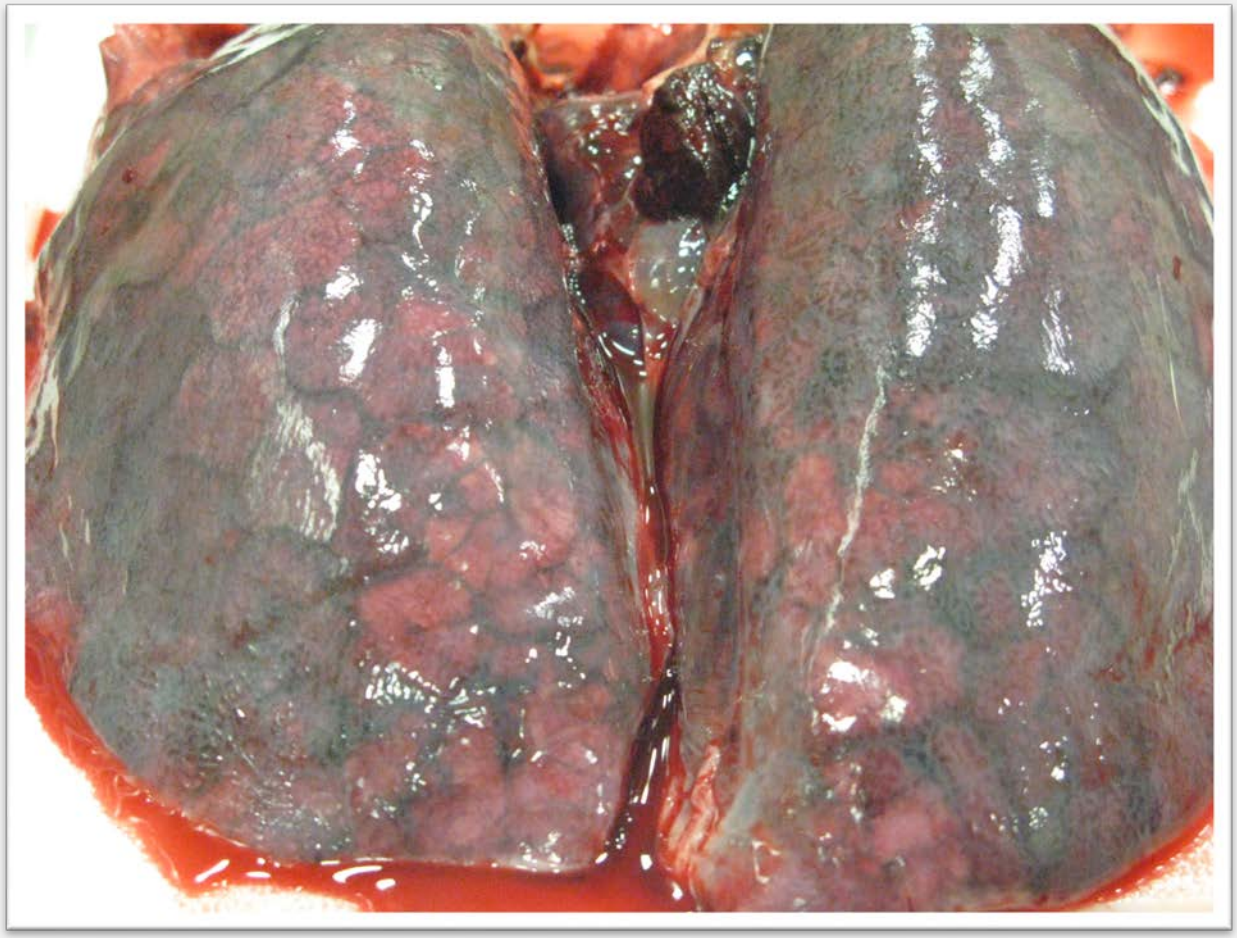


Hemorrhagic peribronchial lymph nodes

PREVIOUS

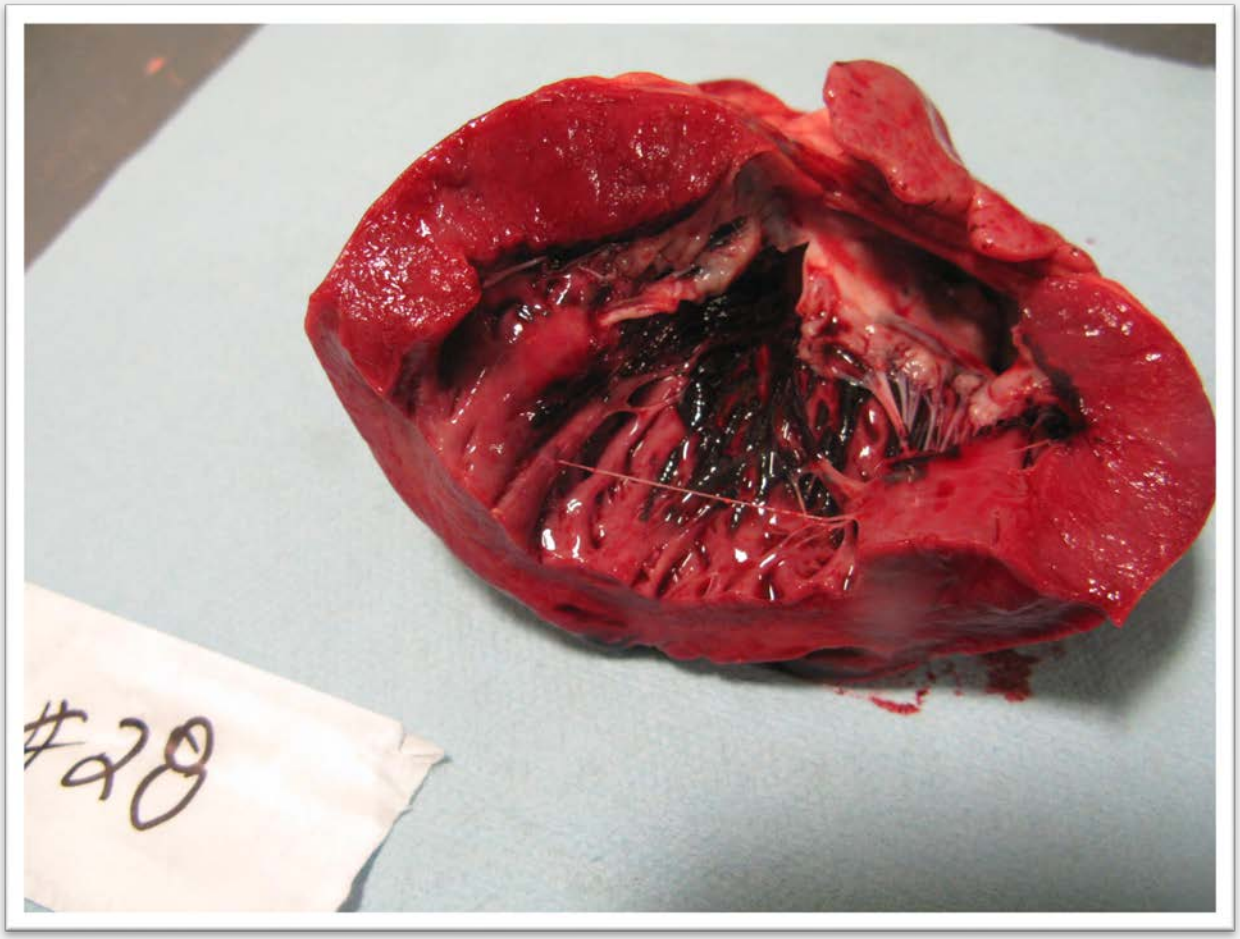
NEXT



Severely congested and edematous lungs

PREVIOUS

NEXT



Hemorrhages on the endocardial surface of the heart

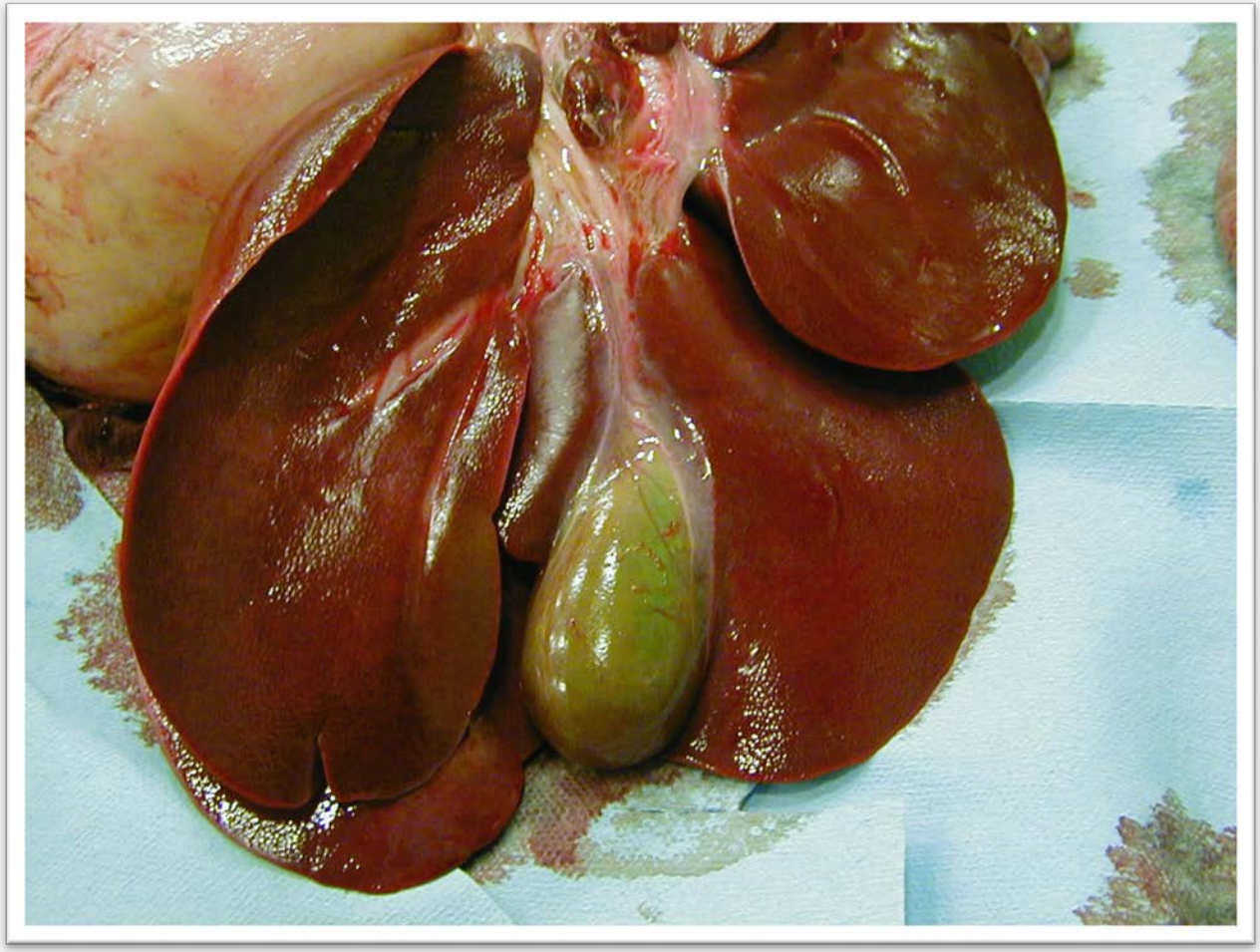
PREVIOUS

NEXT

Hemorrhagic gastro-hepatic lymph node

PREVIOUS

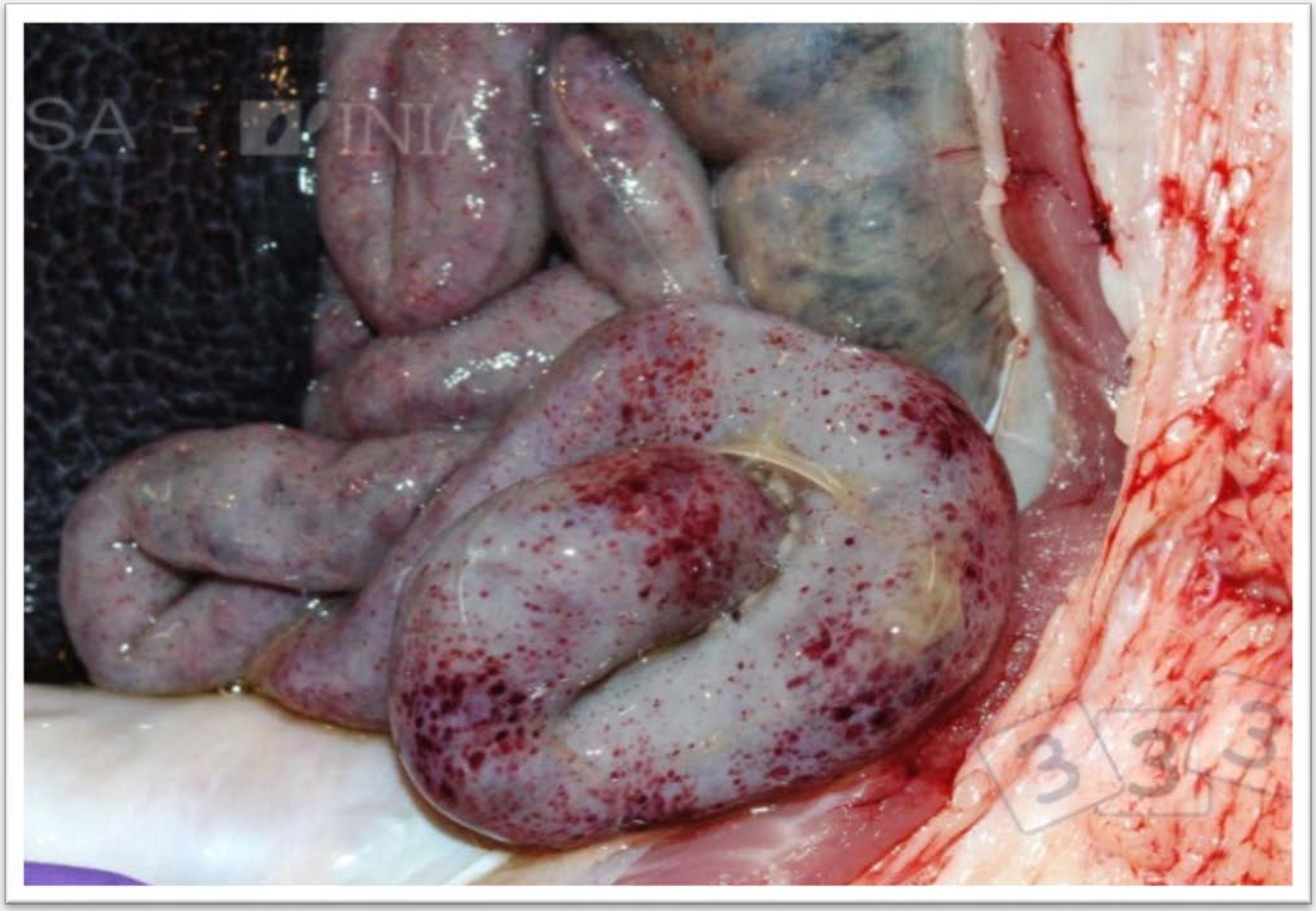
NEXT



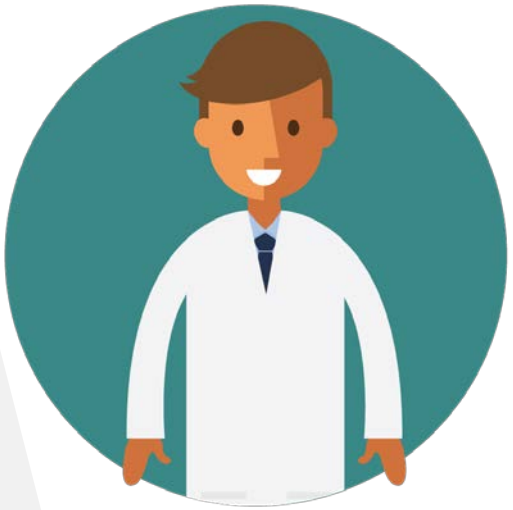
Gall bladder edema

PREVIOUS

NEXT



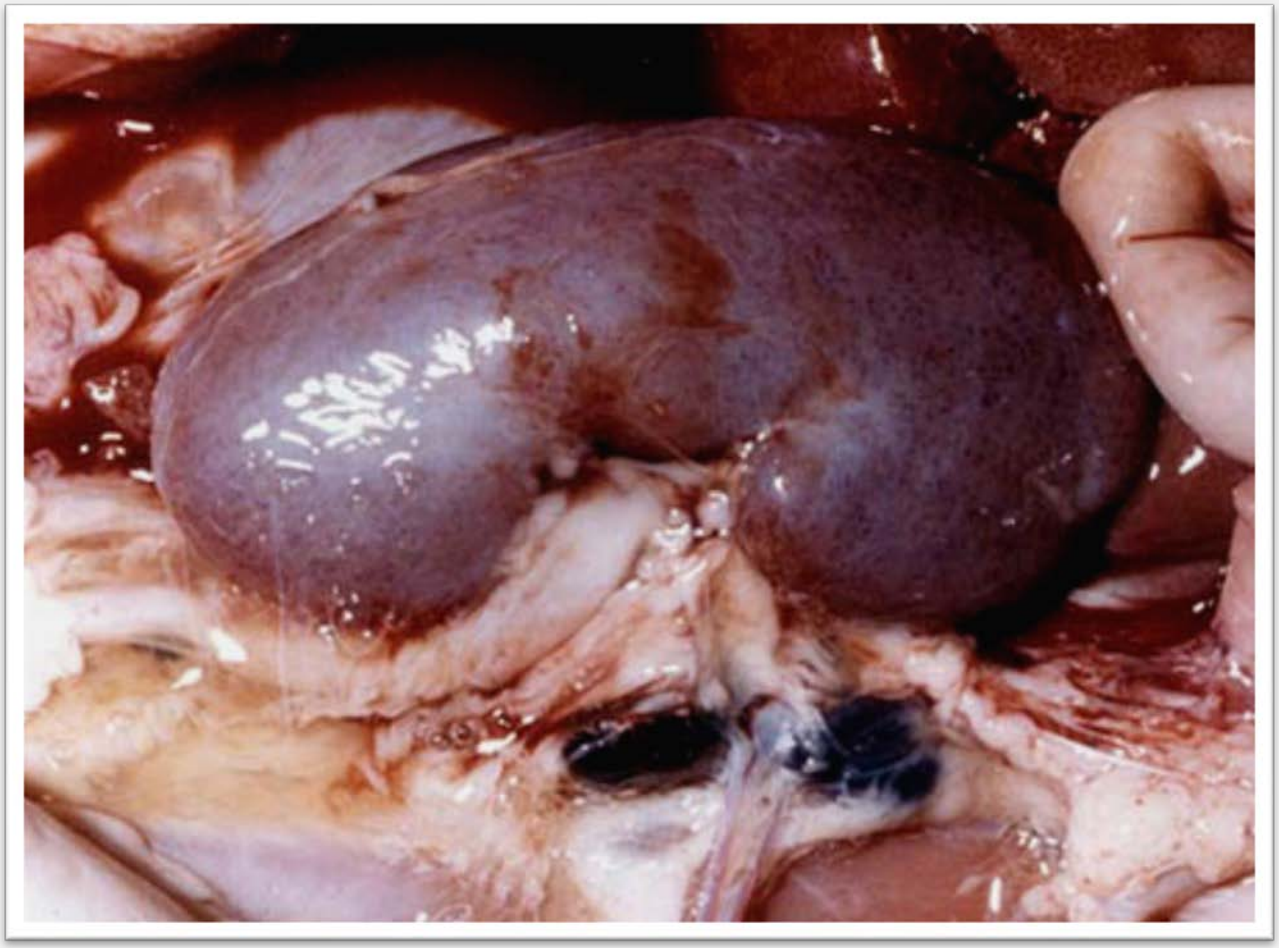
Serosal hemorrages



Splenomegaly / Marginal splenic infarcts

PREVIOUS

NEXT



Hemorrhagic renal lymph node

PREVIOUS

NEXT

Renal cortical hemorrhages

PREVIOUS

NEXT

Can you tell, just by looking, that these pigs have ASF?

No, you cannot determine that these pigs have ASF simply by looking, diagnostic tests are needed to be certain.

PREVIOUS

NEXT

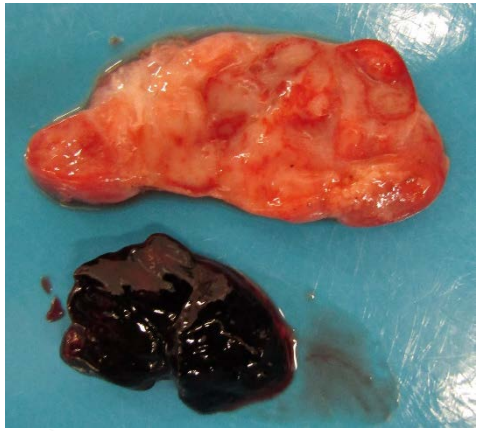
Based on the clinical presentation just reviewed, what domestic diseases do we have in Canadian swine that can mimic ASF?

Erysipelas, Salmonellosis, Septicemic pasteurellosis, and other septicemic diseases look very similar to ASF.

PREVIOUS

NEXT

Can you identify which lesions are from animals diagnosed with African swine fever?



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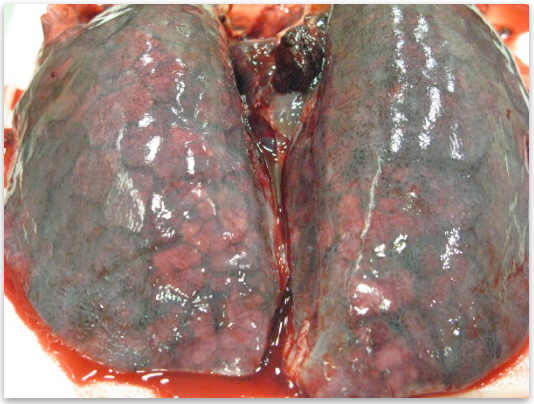

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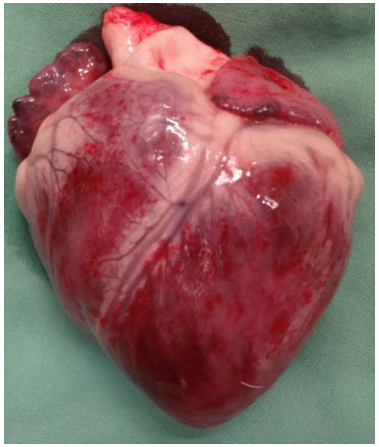


D

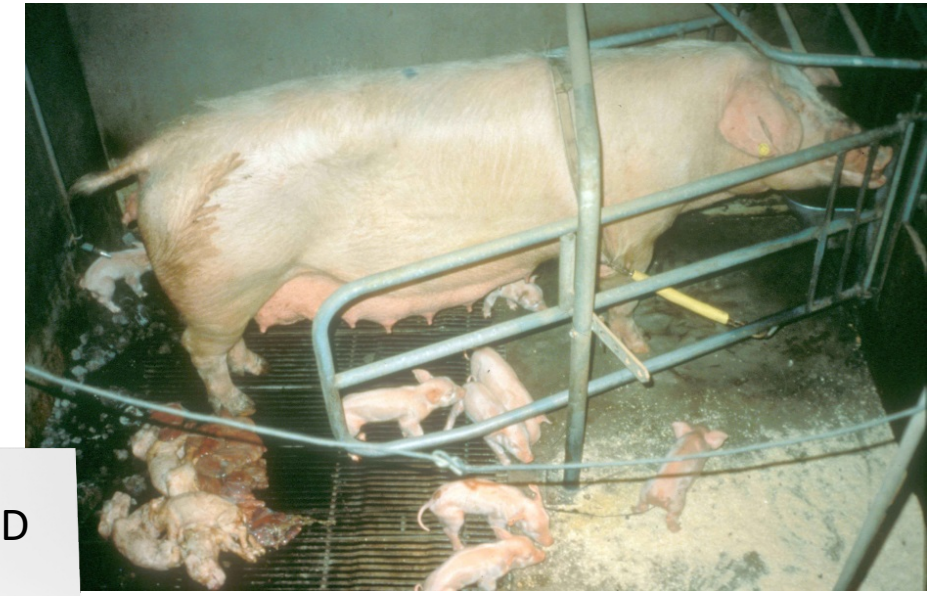
E

Which of these animals have a diagnosis of African swine fever?

A

B

C



D

E

ASF /CSF Differential Diagnosis

Viral

- Porcine circovirus associated diseases
- Post-weaning multi-systemic wasting syndrome
- Porcine dermatopathy nephropathy syndrome
- Virulent PRRS
- Porcine Parvovirus infection
- Pseudorabies

Bacterial

- Acute Swine Erysipelas (*Erysipelothrix rhusiopathiae*)
- Salmonellosis
- Acute pasteurellosis
- *Streptococcus suis*
- Glasser's Disease (*Haemophilus parasuis*)
- Actinobacillosis (*Actinobacillus suis*)
- Extraintestinal pathogenic Escherichia coli (ExPEC)

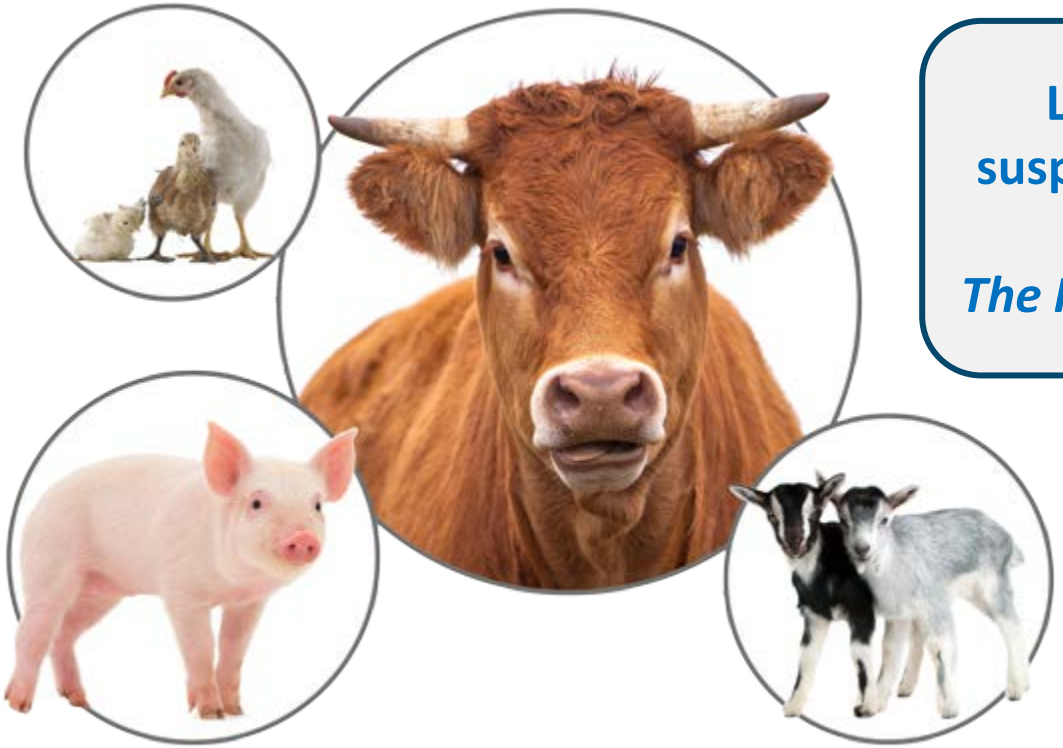
Hemorrhagic syndromes

Intoxication and poisoning

Depending on the virulence of the strain involved, ASF and CSF can present identically and therefore laboratory diagnostics are required to distinguish between the two.

Federal Legislation: The *Health of Animals Act*

An Act respecting diseases and toxic substances that may affect animals or that may be transmitted by animals to persons, and respecting the protection of animals.



Legal obligation to report the suspicion of a reportable disease to CFIA veterinarian
***The Health of Animals Act*, Section 5.**

Role of Veterinarians

As a veterinarian, when would you suspect ASF?

Suspect ASF when:

- Increased mortality
- Compatible clinical signs
- Other differential diagnosis or domestic diseases have been ruled out
- Presence of risk factors (i.e. recent international travel to affected countries and potential contact of infected product with susceptible pigs)

You need to understand the disease reporting requirements for yourself and your clients.

Any producer or veterinarian who suspects ASF must report their suspicion to the CFIA immediately!

Conclusion

We have completed part 1 of the African swine fever presentation series.

Part 2 (October 27, 2020) will cover:

- Disease control strategies

Part 3 (November 3, 2020) will cover:

- Prevention and preparedness
- Role of veterinarians

http://animalsbirds.com/animals-pig-stock-photos-and-pictures/beautiful-animals-pigs-pics-free-download/