ASF experiences in Russia

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Iowa Swine Day, June 2019
The virus

- ASFv is a large double stranded DNA enveloped virus, 170–190 kbp
- Only member of the Asfaviridae family
- 22 known genotypes (p72 gene)
- Warthog is its natural reservoir
The virus

• Found in saliva, urine, feces, and meat of infected animals
• Highly resistant virus
  • Can survive long periods of time in fresh, smoked and frozen meat (Mebus et al)
  • Survives long periods on tissues of dead infected animals (Mebus et al)
  • Stable between at pH between 4-11.5
  • Disinfectants: Quaternary ammonia, Phenols, Sodium hypochlorite, Caustic soda, etc. (Time, temperature and organic material)
## Survival of ASFV in meat and meat products

<table>
<thead>
<tr>
<th>Product</th>
<th>Virus survival time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>De-boned meat</td>
<td>105</td>
</tr>
<tr>
<td>Meat bone-in</td>
<td>105</td>
</tr>
<tr>
<td>Ground meat</td>
<td>105</td>
</tr>
<tr>
<td>Salted de-boned meat</td>
<td>182</td>
</tr>
<tr>
<td>Salted meat bone-in</td>
<td>182</td>
</tr>
<tr>
<td>Cooked de-boned meat*</td>
<td>0</td>
</tr>
<tr>
<td>Cooked meat bone-in*</td>
<td>0</td>
</tr>
<tr>
<td>Canned meat</td>
<td>0</td>
</tr>
<tr>
<td><strong>Dried de-boned meat</strong></td>
<td><strong>300</strong></td>
</tr>
<tr>
<td><strong>Dried meat bone-in</strong></td>
<td><strong>300</strong></td>
</tr>
<tr>
<td>Smoked de-boned meat</td>
<td>30</td>
</tr>
<tr>
<td><strong>Frozen meat</strong></td>
<td><strong>1000</strong></td>
</tr>
<tr>
<td><strong>Dried fat</strong></td>
<td><strong>300</strong></td>
</tr>
<tr>
<td>Offal</td>
<td>105</td>
</tr>
<tr>
<td>Skin/fat</td>
<td>300</td>
</tr>
</tbody>
</table>

(Adkin et al. 2004)
### Survival of ASFV in different conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>ASFV survival time</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature of 50° C</td>
<td>3 hours</td>
<td>USDA, 1997</td>
</tr>
<tr>
<td>Temperature of 56° C</td>
<td>70 minutes</td>
<td>Mebus et al, 1997</td>
</tr>
<tr>
<td>Temperature of 60° C</td>
<td>20 minutes</td>
<td>Mebus et al, 1997</td>
</tr>
<tr>
<td>pH &lt; 3.9 or pH &gt; 11.5 (serum free media)</td>
<td>minutes</td>
<td>Mebus et al, 1997</td>
</tr>
<tr>
<td>pH 13.4 in serum free media</td>
<td>21 hours</td>
<td><a href="http://www.oie.int/esp/maladies/fiches/e_A120.htm">http://www.oie.int/esp/maladies/fiches/e_A120.htm</a></td>
</tr>
<tr>
<td>pH 13.4 with 25% serum</td>
<td>7 days</td>
<td><a href="http://www.oie.int/esp/maladies/fiches/e_A120.htm">http://www.oie.int/esp/maladies/fiches/e_A120.htm</a></td>
</tr>
<tr>
<td>Blood stored at 4 °C</td>
<td>18 months</td>
<td>Technical disease cards of Iowa State University, 2006</td>
</tr>
<tr>
<td>Blood on wooden bars</td>
<td>70 days</td>
<td>USDA, 1997</td>
</tr>
<tr>
<td>Putrefied blood</td>
<td>15 weeks</td>
<td>USDA, 1997</td>
</tr>
<tr>
<td>Faeces held at room temperature</td>
<td>11 days</td>
<td>Technical disease cards of Iowa State University, 2006</td>
</tr>
<tr>
<td>Contaminated pig pens</td>
<td>1 month</td>
<td>Technical disease cards of Iowa State University, 2006</td>
</tr>
<tr>
<td>Slurry at 65° C</td>
<td>1 month</td>
<td>Turner and Williams, 1997</td>
</tr>
</tbody>
</table>
The disease

- ASF is a reportable disease to the World Organization for Animal Health (OIE)
- Reported in Africa in 1928, Europe in 1957, South America in 1971, Georgia in 2007
- Haemorrhagic disease
  - CSF, Salmonella, Erysipelas, PDNS, PRRS
- Highly contagious with mortality up to 100%
The disease

- Transmission by direct contact with infected animals, ticks, fomites or consumption of infected meat
- Incubation period of 4-19 days
- Virus can be shed during the incubation period
- No vaccine available
  - No neutralizing antibodies
African Swine Fever

How do wild boars become infected?

Materials
Contaminated materials, of hunters for example

Carcass
Carcass or possibly blood from an infected wild boar

How do pigs become infected?

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

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

Boar
Direct contact with infected wild boar

Materials
Contaminated materials and livestock transport trucks
Russian regulations

- PCR testing for tissues of dead pigs and blood of animals in the farm (Monthly)
- All pig movements require approval by state veterinarians
- PCR and ELISA
- All feed needs to be pelletized
- All farms need to have a fence and a disinfection barrier
ASF situation in the Russian Federation

Source: Veterinary department of federal service for veterinary surveillance, Russian Federation
1st Outbreak

- Fully integrated large Russian pork producer
- 80k~ sows, 3-site production system
- 3 multiplier herds, 12 commercial sow farms with reasonable biosecurity in place
- In December 2014 ASFv was detected in a multiplier finisher site
- This was the first case of ASFv reported in Russia in a large commercial system
Multiplier module
Site description

- Finisher with 16 rooms (hotel style)
- Each room with capacity for 2,000 pigs
- Weekly delivery of gilts to the GDU
- Non-selected gilts and barrows sold to 3rd party customers
- Gilts were tested for PRRSv and ASFv before shipping
Finisher site
Clinical description of ASFv outbreak

- Clinical signs of fever, purple ears and mild scouring in a few pens of one room (~5 pigs affected at day 0)
- 3% increase of mortality was reported in one room of the finisher at day 3
- Shipments of gilts were halted until negative results of ASF were obtained at day 6
- Gilts were sent from another room without clinical signs to the GDU at day 7
Clinical description of ASFv outbreak

- Clinical signs in the affected room worsened and affected more pens at day 10
- GDU reported similar clinical signs on the received gilts
- Second diagnostic investigation (10 days from initial case) by PCR confirmed the presence of ASFv at the finisher site and GDU
Clinical description of ASFv outbreak

Clinical signs
Day 0

Negative results to ASFv
Day 3

Gilt movements to GDU
Day 7

Worsening of clinical signs
Day 10

Positive results to ASFv
Day 11

Quarantine measures established
Day 11
Clinical description of ASFv outbreak

Multiplier sow farm → Multiplier nursery → Multiplier finisher → Gilt developer unit (GDU) → Commercial sow farms quarantine (within the sow farm)
ASF containment protocol

- 5 km radius quarantine zone was established on both farms
- Forbidden movement of pigs in or out of quarantine zone
- Restricted movement of people and vehicles
- Euthanasia of all pigs on site
- Burial and burning of all carcasses
- Exhaustive washing and disinfection protocols
- One year without pigs on the farm
- Bioassay for 60 days
Post-break

- The affected room closed with 15% mortality
- Only 4 out of 16 rooms tested positive for ASFv until depopulation
- Sow farm and nursery of the multiplier remained negative for ASFv until depopulation

ASF can be contained
Routes of transmission

African Swine Fever

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

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

Boar
- Direct contact with infected wild boar

Photo: Wageningen University
Lessons learned

• Need for reliable diagnostic laboratory
• Active surveillance on all farms
• Biosecurity audits
• Purchase of more live haul trucks
• Daily updated maps with ASF outbreaks
• Transport transfer station in all farms
• Cremators on site
• Spraying for ticks in the farm areas
• Disinfection barriers
• Strict shower-in shower-out rules
• Compartmentalization
• Truck wash
• No food or personal items allowed
2\textsuperscript{nd} outbreak

- September 2016
- 6,000 commercial sow farm
- ASFv detected in the on-site quarantine
- No clinical signs
- 2 dead gilts in one pen
- Immediate quarantine measures taken
Outcome

- All animals were euthanized in the affected farm
- No sows or piglets tested positive for ASFv
- The nursery of the module remained negative
- ASFv was contained in 1 farm
- Investigations led to worker having infected pigs at home
Take home message

- Active surveillance to detect infection early is imperative
- Reliable test and fast results are key
- Strict biosecurity measures and quick removal of the source of infection are necessary to limit ASFv transmission
- Compartmentalization may save your farm(s)
- People, acting as fomites, were most likely responsible for ASFv introduction into farms
Acknowledgment

- Brad Heron
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