Epidemiology of ASF in wild boar

Prague, Czech Republic 25-27 October 2017
Tracing the origin

Georgia
June 2007
ASF: 0-70 km/year since 2007
Few certainties

Wild boar CAN ACT AS the true epidemiological reservoir of the virus;

The virus is maintained by the wild boars independently from the infection in domestic pigs and ticks

Infected Wild boar contaminate the environment making more likely secondary outbreaks in domestic pigs (non commercial and commercial farms)
How the virus spreads

Direct e contacts (nose to nose)

Contaminated environment (infected material)

Feeding infected wild boar carcasses
Virus prevalence in infected wild boar population: **1-4,5%**

Sero-prevalence in hunted WB: **0,5-2%**

Incubation **3-5 days**

Lethality **90-95%**

70-80% found dead wild boar are virus

≈ **50 km/year** is the average speed, but the virus lasts also in old infected areas

The virus **spreads** through the **geographical continuity of the wild boar population** RATHER THAN of wild boar migration
Monthly incidence of ASF in domestic pigs and wild boar

January

2007-2012

2007-2015

Domestic  Wild

Дикие  Домашние
Higher prevalence in summer: new born animals, insectes?
Lower prevalence in winter: virus survives in carcasses
Increasing prevalence: rutting period?
A directly transmitted virus which transmission is complicated by infected maggots, insects and carcasses.
+ 19 wild boar approaches without contact
Role of insects and caracasses no ticks

Maggots could increase contacts between wild boar and infected carcasses but they have been never positive to the virus (only DNA presence but no virus): enhanced summer transmission

Scavenging insects: long attraction for wild boar, increased probability of direct contact with infected carcasses

Carcasses: virus maintenance in the environment; direct transmission to the susceptible animals
Risk of spread after introduction of the virus

Delayed diagnosis
Wild boar population size and density
Forest connectivity
Inappropriate hunting methodologies
Lack of biosecurity measures applied during hunting
Infected wild boar carcasses available for healthy wild boars
Poaching
Geographical continuity

180 km
60 km
Winter feeding increases densities

\[ y = 0.414 + 0.033x \]
Hunting and wild boar movement

*Drive hunting with dogs: increase of range size during the hunting season*

<table>
<thead>
<tr>
<th>Season</th>
<th>100% MCP</th>
<th>95% kernel</th>
<th>50% kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>Q3–Q1</td>
<td>Mean</td>
</tr>
<tr>
<td>Pre-hunting</td>
<td>80</td>
<td>104</td>
<td>88</td>
</tr>
<tr>
<td>Hunting</td>
<td>428</td>
<td>1360</td>
<td>825</td>
</tr>
<tr>
<td>Post-hunting</td>
<td>195</td>
<td>544</td>
<td>358</td>
</tr>
</tbody>
</table>

*Home range displacements during the hunting season (up to 15 km)*

Do intensive drive hunts affect wild boar (*Sus scrofa*) spatial behaviour in Italy? Some evidences and management implications

Laura Scillitani - Andrea Monaco - Silvano Toso
Driven hunt with dogs – effective method to reduce the population density
How many wild boars?
Density dependent spread

The number of NEW INFECTED wild boar is proportional to the wild boar population size.

The duration of the epidemic is proportional to the wild boar population size.
Poland: tendency to spread within areas with wild boar density > 1 individual/km²

2014 – 30 cases  
2015 – 53 cases  
2016 – 28 cases
Density of wild boars (individuals per 10 km² of hunting ground) in hunting districts by hunters estimations (census) in spring 2016.

0.15-0.3 WB/km²
Can we define the threshold density?

The threshold density (nt) is that wild boar density at which an infectious wild boar does not encounter any susceptible wild boar in due time to spread the infection.

Duration of infectiousness
Density/availability of susceptible hosts

If the wild boar population size is decreased till a certain density, the infection fade out through a density dependent mechanism.

NO WILD BOARS = NO DISEASE
CLASSICAL SWINE FEVER in WILD BOAR

1000 wild boars

1 year persistence

ln(Population size)

ln(Epidemic Persistence in Months)

R Sq Linear = 0.935
Density dependence of ASF

![Graph showing the relationship between wild boar density and duration (weeks). The x-axis represents wild boar density, the y-axis represents duration (weeks), and the graph displays peaks and troughs indicating density dependence.]
Apparently: not a density dependent spread

N. Cases

WB density
ASF in wild boar

A density dependent transmission during summer-autumn (new born and adult animals)....insects?

Virus survival during winter with few (or many) **infected carcasses** according to the local ecological situation

A mixed transmission: density dependent and frequency dependent => **NO THRESHOLD**
The question is:

Which is the wild boar density that prevent the contact between a susceptible wild boar with an infected carcass?

An ASF virus will overwinter in a infected carcass......3-4 months...and the virus will appear again during the late spring in alive susceptible individuals.
CSF: a density dependent disease

Wild boar threshold density at which ASF fade out through a density dependent process.
ASF is not a truly density dependent infection. The final tail of the infection is determined by carcasses.
Practically

ASF in wild boar eradication is PROBABILISTIC EVENT (stochastic) NOT a DETERMINISTIC one;

Eradication probability increases when: wild boar population size is **reduced** (as much as possible); carcasses are safely **disposed** (as much as possible); hunting is carried out under **bio-security**
Since the infection is not entirely transmitted through density dependent mechanism we have to shift to:

**The reduction of the environmental contamination of the virus**

The problem then is not purely addressed in the mechanistic reduction of the wild boar density but in reducing the viral load of the environment.
Wild boar population reduction should be considered, in combination with other control measures, within the framework of a wild boar management strategy aimed at reducing ASF virus contamination of the environment.
EU strategy
(see EFSA, 2015)

- Reduce the wild boar population size through targeted hunting of adult females
- Detection of – at least - 50% infected carcasses and their safe disposal
- Ban of winter/sustaining artificial feeding

Strategy applied - for at least - 100 km in front of the detected case

It is a medium term strategy that accepts the presence of the virus for a certain number of years
Thanks for the attention

Questions, comments?
This presentation is delivered under contract with the Consumers, Health, Agriculture and Food Executive Agency (http://ec.europa.eu/chafea). The content of this presentation is the sole responsibility of Opera, the Istituto Zooprofilattico Sperimentale Lombardia e Emilia Romagna and the State Food and Veterinary Service of Latvia and it can in no way be taken to reflect the views of the Consumers, Health, Agriculture and Food Executive Agency or any other body of the European Union. The Consumers, Health, Agriculture and Food Executive Agency or any other body of the European Union will not be responsible under any circumstances for the contents of communication items prepared by the contractors.

© Copyright holder: European Commission (2018)