EPIDEMIOLOGY OF ASF IN WILD BOAR

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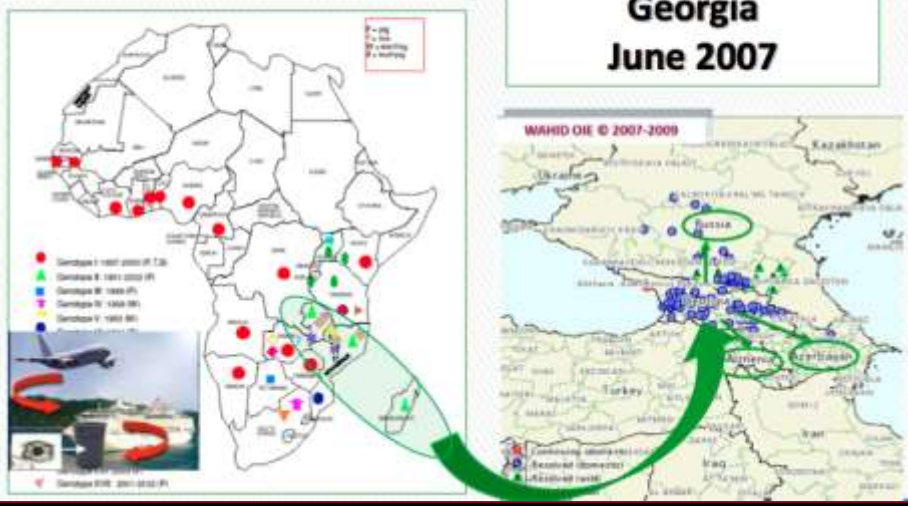
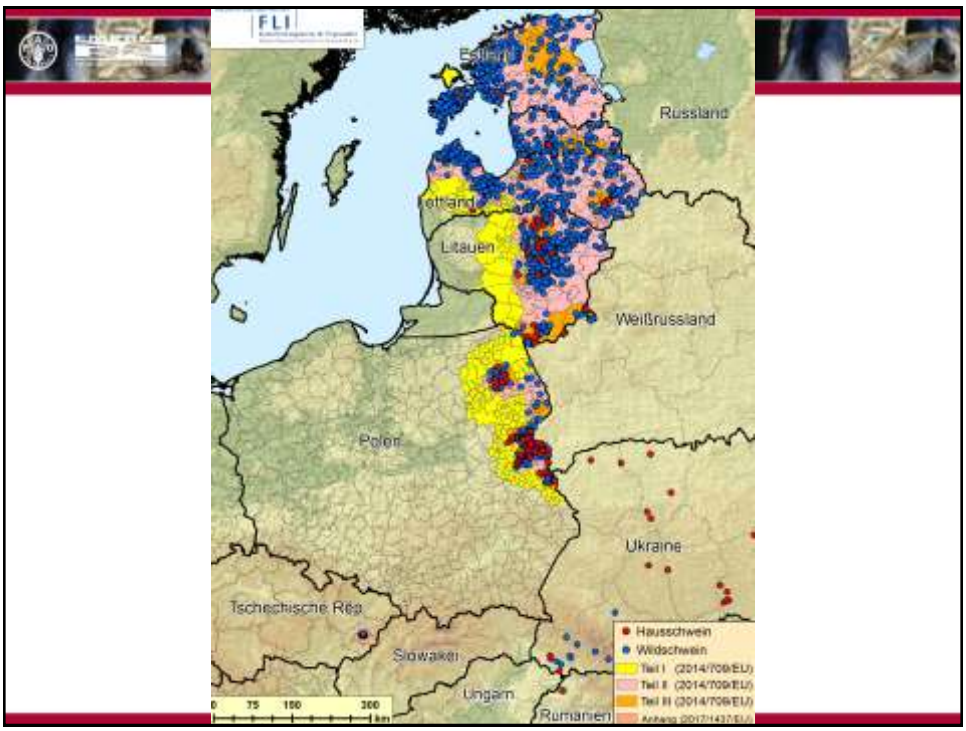
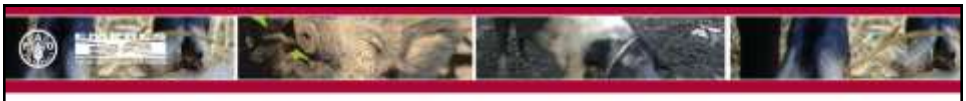
Tracing the origin




Europe
SVALBARD
JAN MAYEN
ICELAND
FAROE ISLANDS
Atlantic Ocean
North Sea
NORWAY
SWEDEN
FINLAND
RUSSIA
ESTONIA
LATVIA
BELARUS
UNITED KINGDOM
ISLE OF MAN
IRELAND
DENMARK
NETHERLANDS
GERMANY
POLAND
UKRAINE
BELGIUM
GUERNSEY
JERSEY
SLOVAKIA
MOLDOVA
SWITZERLAND
AUSTRIA
HUNGARY
ROMANIA
SLOVENIA
FRANCE
CROATIA
BULGARIA
Black Sea
AZERBAIJAN
GEORGIA
ARMENIA
Caspian Sea
ITALY
SAN MARINO
TURKEY
MACEDONIA
VATICAN CITY
GREECE
ALBANIA
Mediterranean Sea
GIBRALTAR
MALTA
1. LITHUANIA
2. LUXEMBOURG
3. LIECHTENSTEIN
4. CZECH REPUBLIC
5. BOSNIA & HERZEGOVINA
6. SERBIA
7. MONTENEGRO
8. KOSOVO
70°
60°
50°
40°
5°
0°
5°
15°
25°
35°
45°
ASF:0-70 km/year
since 2007


FLI
Estland
Russland
Lettland
Litauen
Weißrussland
Polen
Ukraine
Tschechische Rep.
Slowakei
Ungarn
Rumänien
Hausschwein
Wildschwein
Teil I (2014/709/EU)
Teil II (2014/709/EU)
Teil III (2014/709/EU)
0 75 150 300 km



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)

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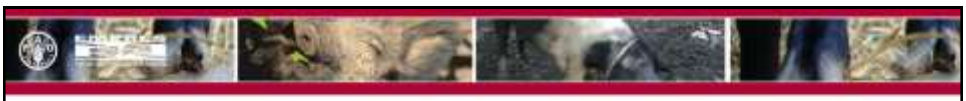

How the virus spreads

Direct e contacts (nose to nose)

Contaminated environment (infected material)

Feeding infected wild boar carcasses

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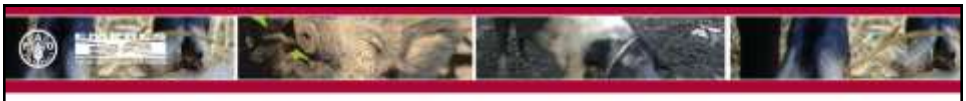

Virus prevalence in infected wild boar population: **1-4,5%**

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

Incubation **3-5 days**

Lethality **90-95%**

70-80% found dead wild boar are virus positive

≈ 30-50 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

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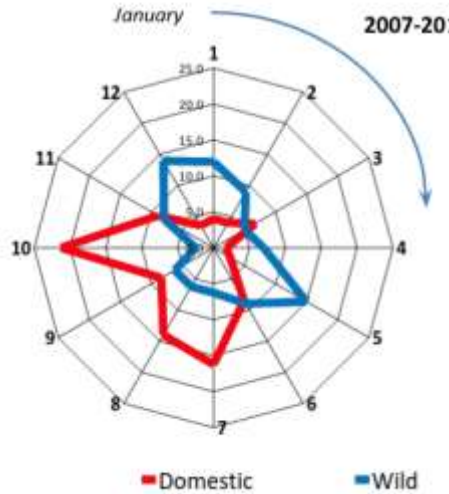
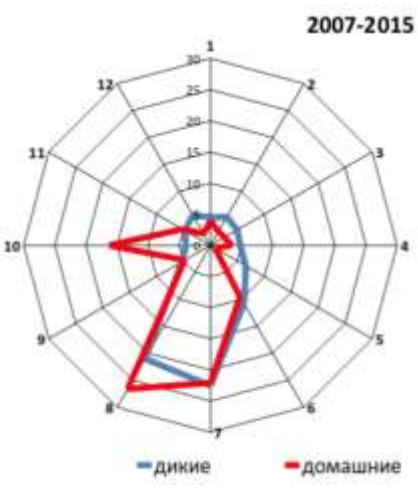
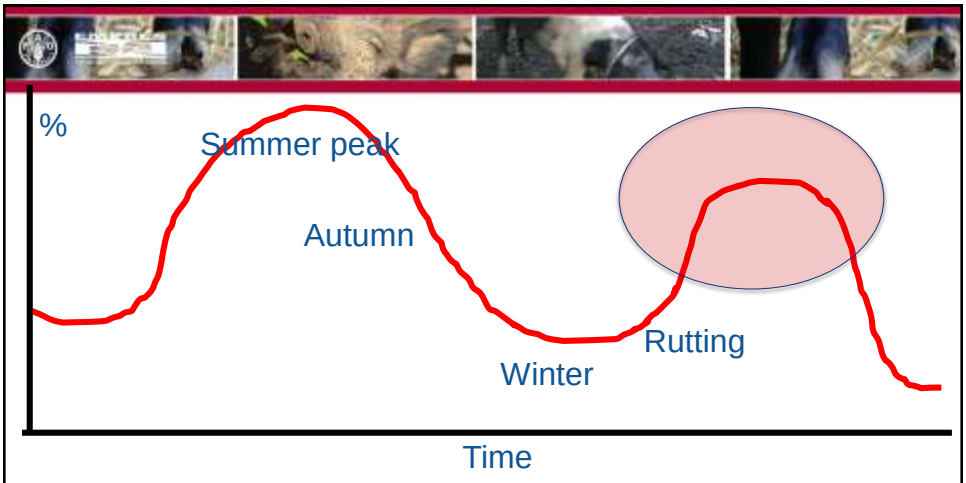
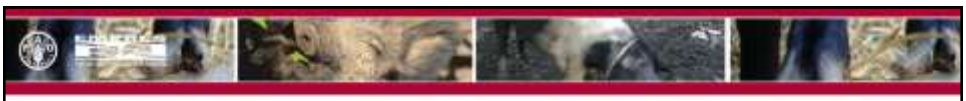
Monthly incidence of ASF in domestic pigs and wild boar







Higher prevalence in summer: new born animals, insectes?
Lower prevalence in winter: virus survives in carcasses
Increasing prevalence: rutting period ?



EPIDEMIOLOGICAL ROLE PLAYED BY INFECTED CARCASSES AND INSECTS (NO TICKS)

Maggots could increase contacts between wild boar and infected carcasses ut 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

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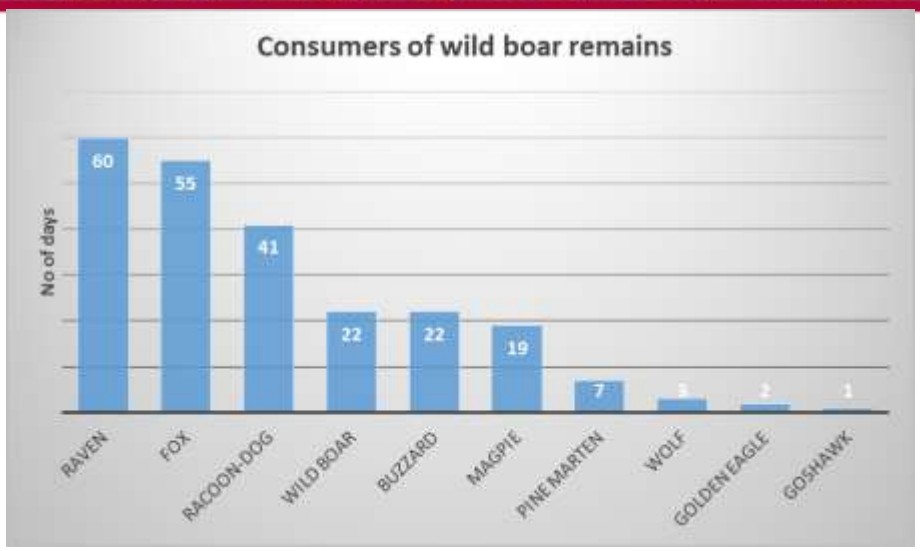

+ 19 wild boar approaches without contact

ASF epidemiology: the general picture

1) The virus is introduced by neighbouring infected wild boar;

2) The virus spread into the local wild boar population;

3) Infected carcasses play the role of virus maintenance in the environment even at a very low wild boar density;

4) The virus spread geographically: 30-50 km/year;

5) Due to human mistakes the virus is likely to be transported to domestic pigs or and to distant areas where the local cycle starts again in the local wild boar populations;

This pattern could even be without end!!!!

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

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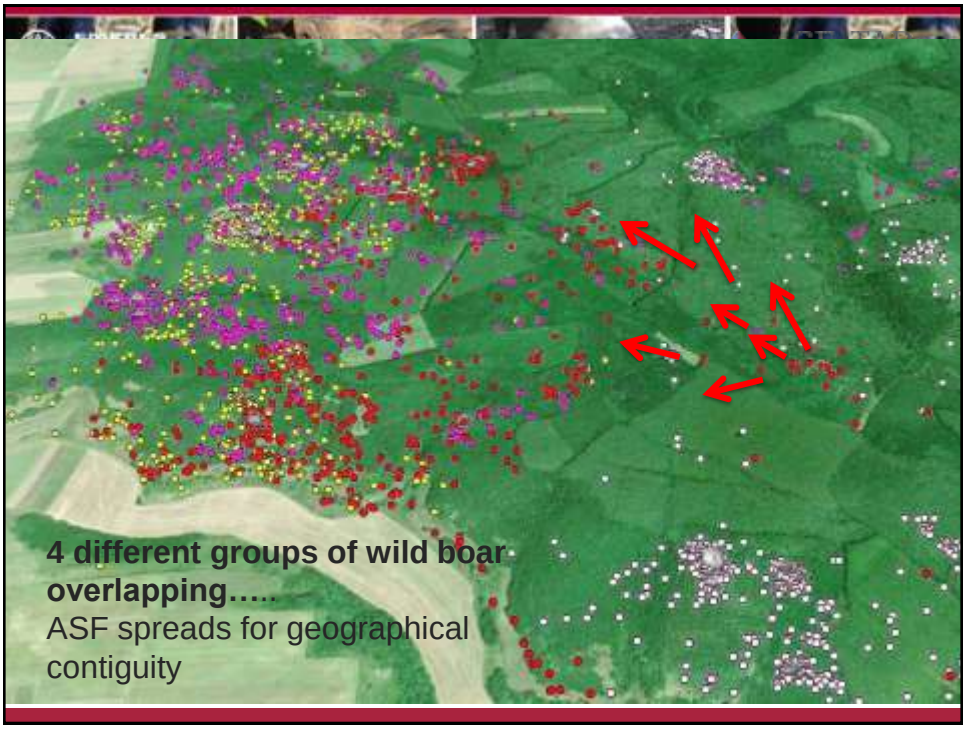
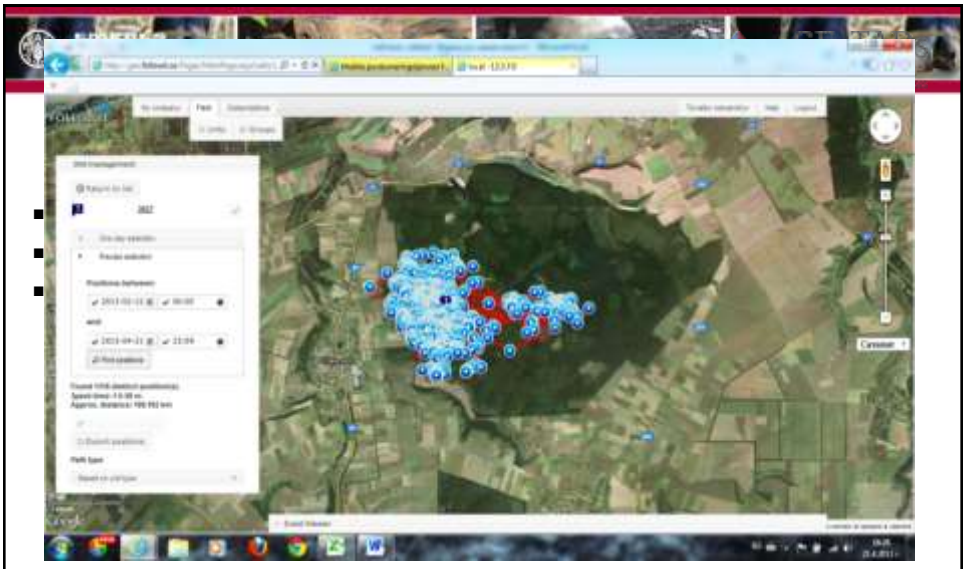
Geographical continuity



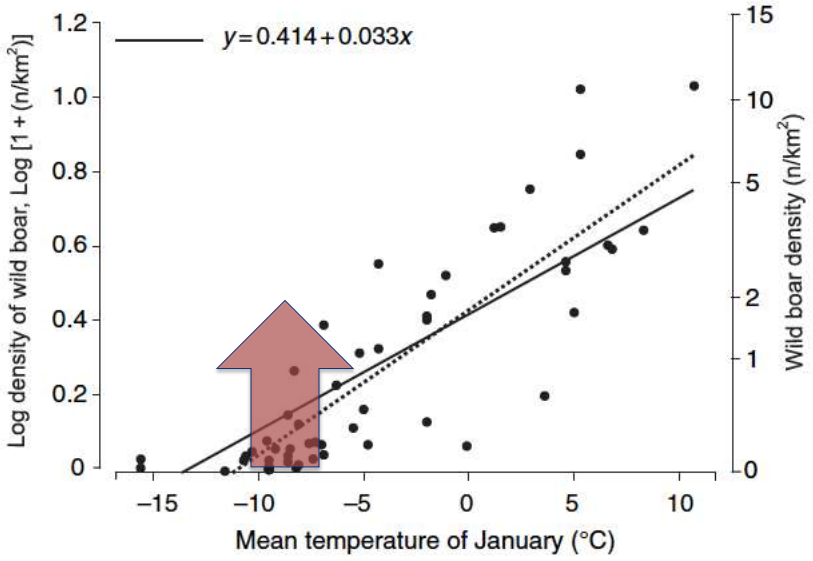
4 different groups of wild boar overlapping…..
ASF spreads for geographical contiguity



Wild boar movements: Home range: 7 km^2

Hunting management

Winter feeding increases densities



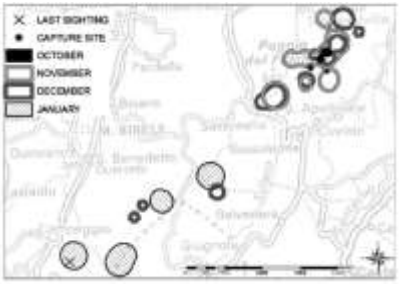
Hunting and wild boar movement

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

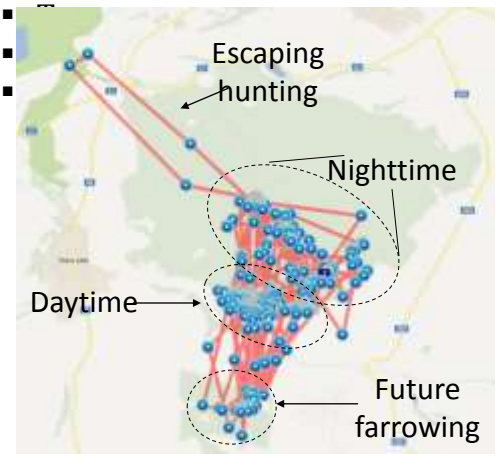
Season	100% MCP				95% kernel				50% kernel			
	Median	Q_3-Q_1	Mean	SE	Median	Q_3-Q_1	Mean	SE	Median	Q_3-Q_1	Mean	SE
Pre-hunting	80	104	88	25	66	150	98	39	4	14	10	3
Hunting	428	1360	825	358	221	696	457	192	23	68	45	16
Post-hunting	195	544	358	151	189	488	284	99	20	88	45	20

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



Wild boar long distance movements

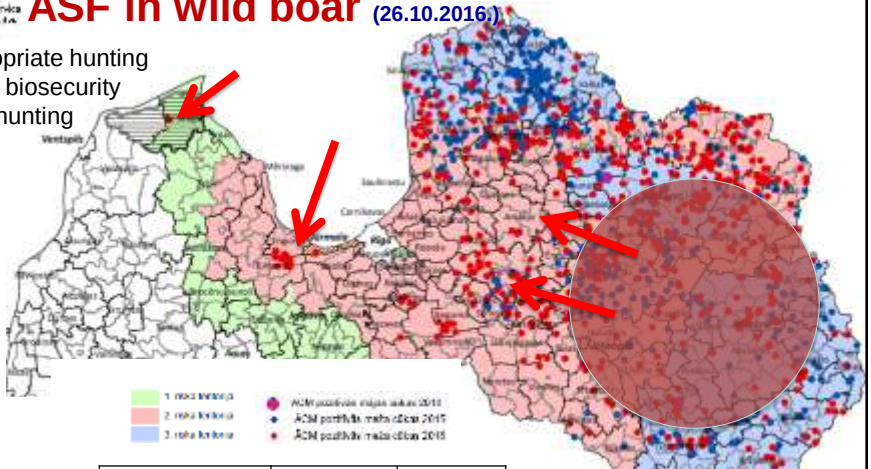


FAO data on FMD in wild boars

LACK OF BIOSECURITY DURING HUNTING

ASF in wild boar (26.10.2016.)

Inappropriate hunting
Lack of biosecurity
during hunting



	2016 (26.10.)	2015
Cases	**893**	1048
Hunted	447	422
Found dead	446	626

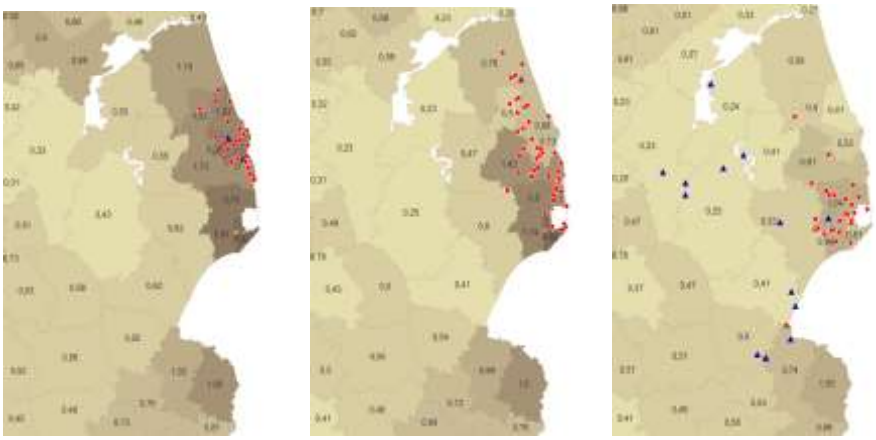
Carcasses removal
and wild boar density

DENSITY DEPENDENT SPREAD

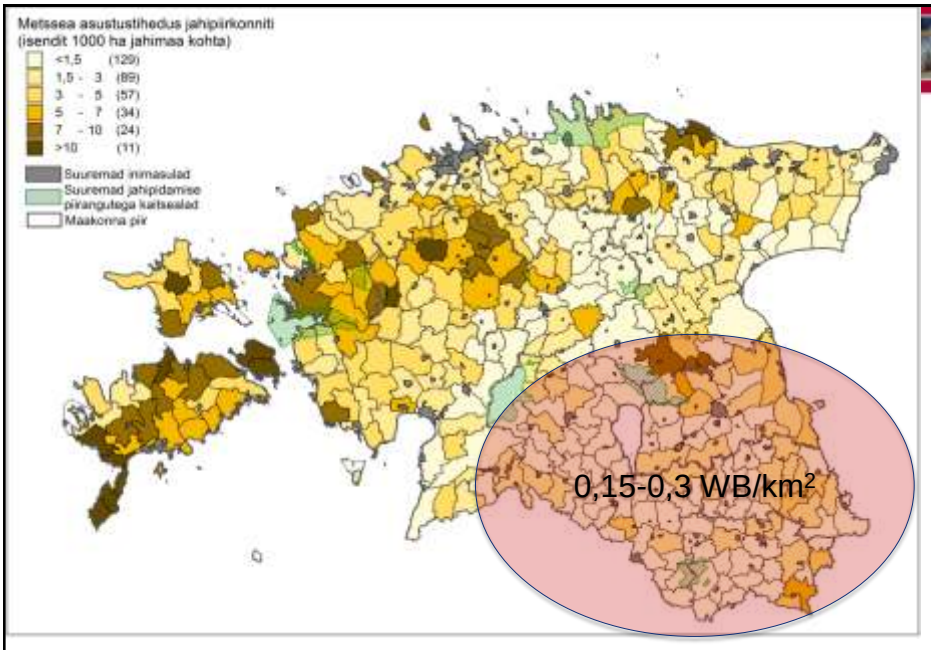
The number of NEW INFECTED wild boar is proportional to the wild boar population size

The duration of the epidemic is proportional to the wild boar population size

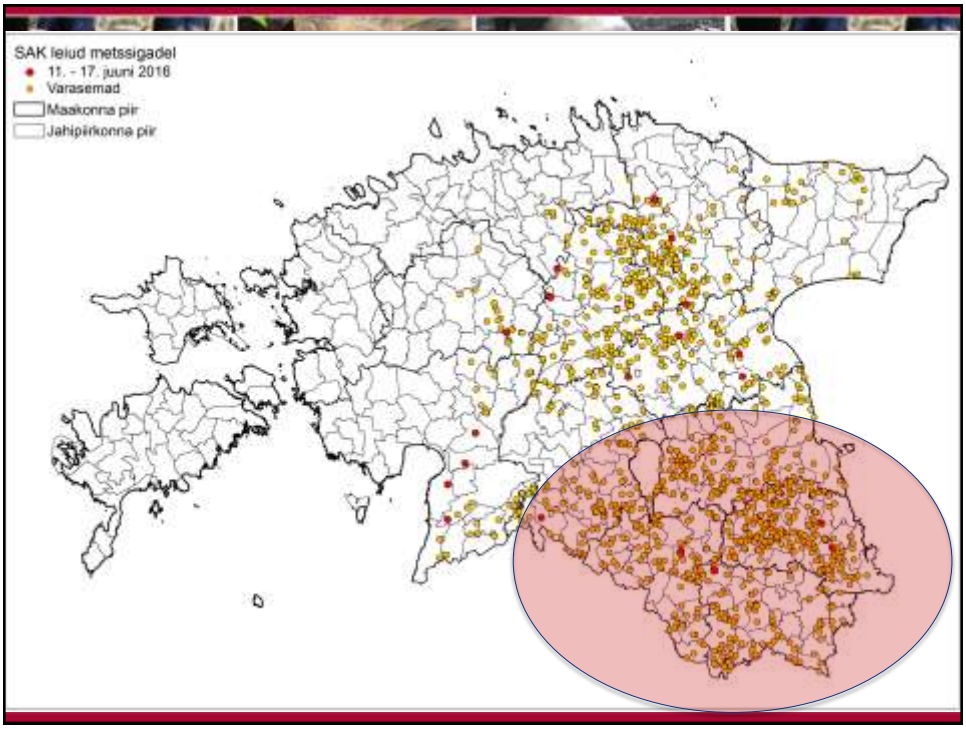
Poland: tendency to spread within areas with wild boar density > 1 individual/km^2



2014 – 30 cases **2015 – 53 cases** **2016 – 28 cases**



Density of wild boars (individuals per 10 km^2 of hunting ground) in hunting districts by hunters estimations (census) in spring 2016.



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

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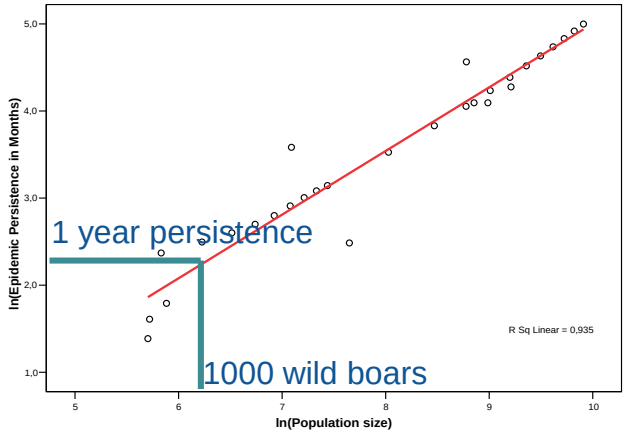
CLASSICAL SWINE FEVER in WILD BOAR



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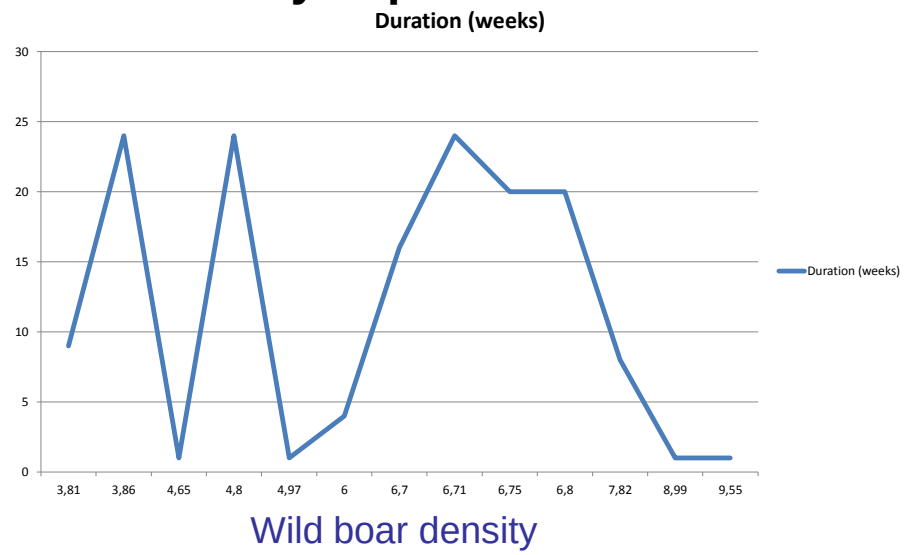
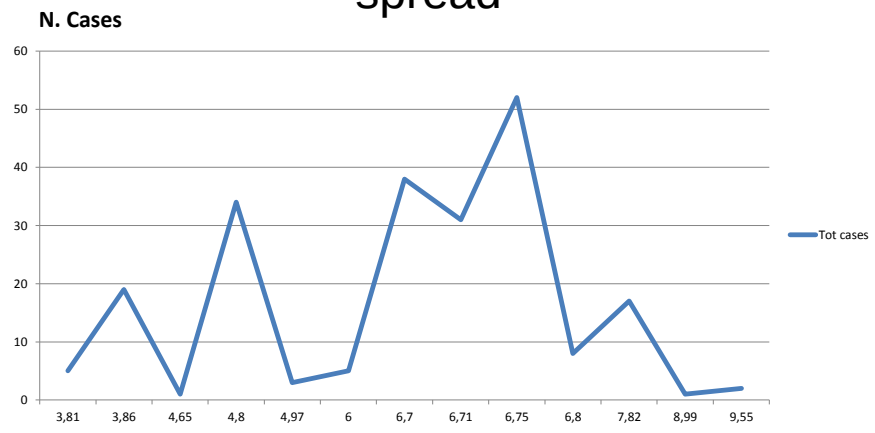
Density dependence of ASF



Apparently: not a density dependent spread



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

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ASF IN WILD BOAR

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

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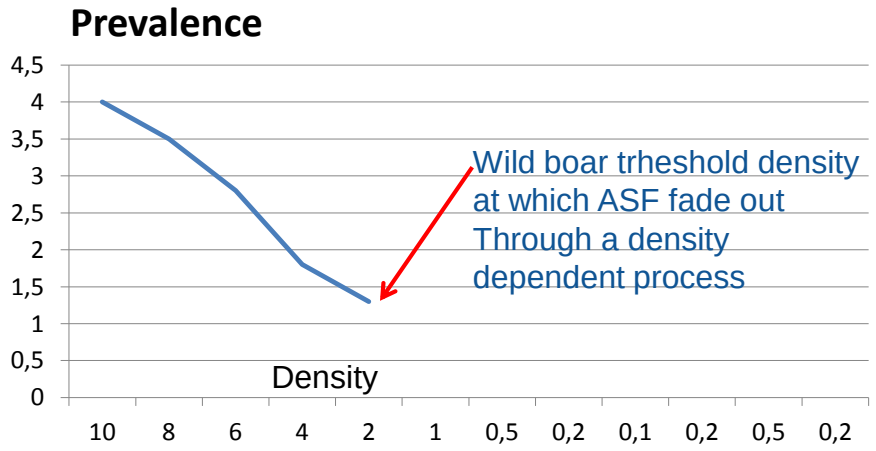
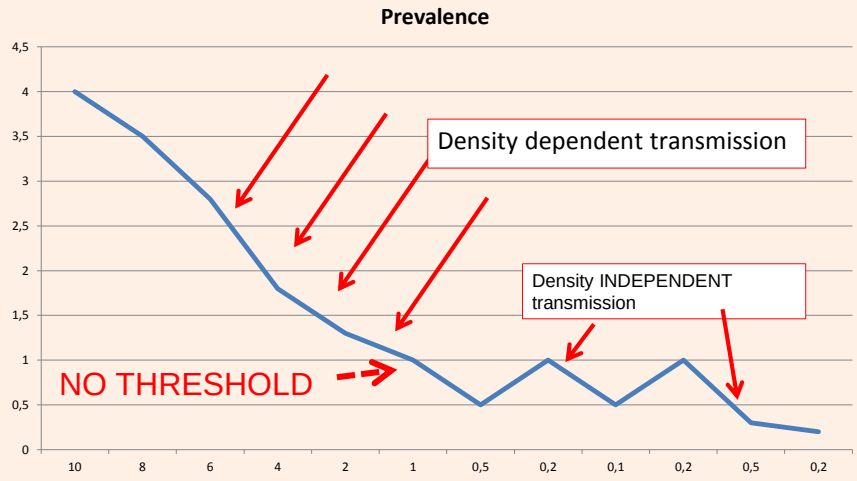
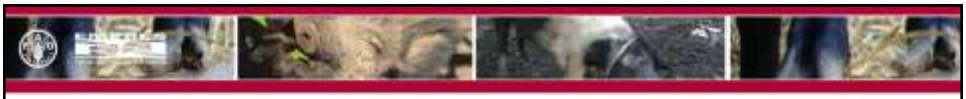
CSF: a density dependent disease



ASF in 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**

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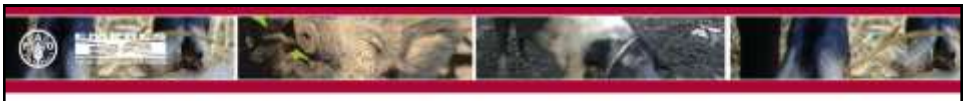

ASF: THE VIRUS AND THE ENVIRONMENT

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

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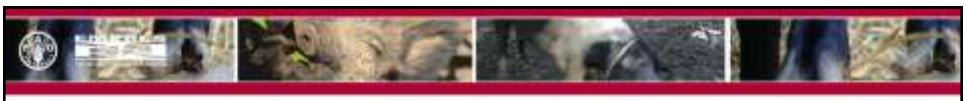

Standing Group of Experts on African swine fever in the Baltic and Eastern Europe region under the GF-TADs umbrella

SGE ASF3: Moscow, Russia, 15-16 March 2016

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.**

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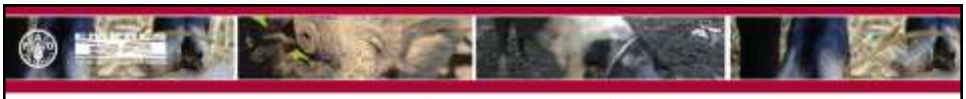

TAKE AT HOME MESSAGE

1. In ASF epidemiology, infected carcasses maintains the virus in the environment for a very long time;
2. Due to the presence of infected carcasses, there is no a minimum number of wild boar at which the virus fade out;
3. A very low number of wild boars together with infected carcasses can maintain the virus in the forest
4. Improper hunting techniques together lack of biosecurity during hunting are the most relevant factors enabling the long distance spread (jumps) of ASF virus in wild boars.

THANKS FOR THE ATTENTION

QUESTIONS, COMMENTS?

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