Early disease detection
Surveillance

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What's all about?

A: Early detection >>> Passive / Active surveillance ????

B: Disease control and eradication
Hunting strategy, biosecurity, feeding strategy, etc...

• B works only when A works
• A can only be successful if based on a proper risk assessment
Risk Assessment Germany

- Assessment for import risk through
  - Legal import of pigs and products
  - Contaminated vehicles and clothes
  - Wild boar

- Qualitative not quantitative
  - Negligible / low / medium / likely / high

- With confidence level
  - Low, medium, high

Carola Sauter-Louis
Risk assessment on local level (district)

Risk areas: "urban" WB; high WB density; resting areas on highways, etc...

Introduction/release
Contact/primary infection
Secondary infection/perpetuation
Endemicity/spread

ASF - CSF - FMD

FMD
Prevalence: 100%
Mortality: 2%
Lethality: 2%
Contagiousity: +++

100 infected; 2 dead

ASF
P: 10%
M: 9%
L: 90%
Contagiousity: +

10 infected; 9 dead

CSF
P: 50%
M: 25%
L: 50%
Contagiousity: ++

50 infected; 25 dead

Legend
- Cattle
- Sheep
- Pigs
- Horses
- Water
- Forest
- Oils
- Border
- Motorway
- Lanes
- Lanes
- Rivers
- Woods

100 infected; 2 dead

50 infected; 25 dead

Infectected  dead
Farm mortality/morbidity threshold

High Risk Period (HRP)

Low contagiousity $\Rightarrow$ low (initial) mortality
ASF remains undetected in large pig farms (below the normal mortality threshold)

HRP $\Rightarrow$ farm size
- back yard: rather short
- large farm: rather long

Surveillance

Surveillance can be:
- to prove freedom of disease
- to detect new cases
- to determine the prevalence
- to monitor the evolution of the disease
- to calm down trade partners and neighbours
- to show activity....
Surveillance can be based:

...on books and legislation, telling you how many animals you have to test/examine in the case of a particular disease during a particular period of time

...on knowledge about
• Biology of the disease
• Laboratory diagnosis
• Epidemiology
• Socio-economical factors
• Human resources
• Political constrains

Never perfect compromise

Surveillance:

• on farm level (backyard ↔ commercial)
• in the village (epidemiological unit???)
• in the area (backyard ↔ commercial)
• in the country/region

• Clinical examination
• Sampling for laboratory tests
The preconditions for the design of surveillance activities are based on the epidemiology of the disease.

The following basic knowledge about the disease enables the planning of surveillance programmes:
- Clinical disease (clinical course and clinical signs)
- Contagiousness
- Laboratory tests
- Ways of transmissions
- Biosecurity “factor”
- Human factors

=> Commercial farms
=> Non-commercial farms
=> Outdoor farms

Traditionally
- Surveillance based on “5/95” (ASF diagnostic manual)

Period during which a WB can be hunted

5/95-Concept

On the day of sampling, 5 out of 100 WB (5%) are incubating ASFV. To find at least 1 positive WB, 45 have to be sampled same day (95% confidence)!

(Prevalence of 2% -> 78 WB have to be sampled (1% ... 96 WB...)}
Early detection of ASF in wild boar

*Passive surveillance vs. active surveillance*

<table>
<thead>
<tr>
<th></th>
<th>tested</th>
<th>positive</th>
<th>% positive</th>
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</thead>
<tbody>
<tr>
<td><strong>Passive</strong></td>
<td>245</td>
<td>177</td>
<td><strong>72.24</strong></td>
</tr>
<tr>
<td><em>(found dead)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Active</strong></td>
<td>2765</td>
<td>40</td>
<td><strong>1.45</strong></td>
</tr>
<tr>
<td><em>(hunted)</em></td>
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**Passive / Active:** 72.24 / 1.45 = 49,82

The probability to detect an ASF positive animal 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

\[
\frac{177}{217} \times 100 = 81
\]
ASF outbreaks in Latvia in 2014

- 32 outbreaks in total
  - 28 primary
  - 4 secondary
    - 16 swill
    - 12 WB
    - 4 humans
  - 12 sick
  - 1 activ
  - 31 passiv

Experimental studies
(Pietschmann et al., 2015)

- 8% 
  - 2 / 24 = 0.08 (8%)

Field observations
(Oļševskis et al., 2015)

- 12%
  - 69 / 585 = 0.12 (12%)