



General principles of surveillance and sampling

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Definition of surveillance

- **Surveillance:** activities addressed to detect a virus that is not yet present or diagnosed in the population at risk.



What does it mean

ASF is not in Ukraine. A surveillance system has to be developed in order to detect the virus as soon as it (and if) it will be introduced in the Country



Passive (primary) surveillance: activities addressed to directly detect the disease agent in sick or dead animals retrieved by stakeholders during their usual activities. The efficacy (and the efficiency) of the primary surveillance increases when a clear definition of “suspect case” is available and shared with the stakeholders.



What does it mean

Pig owners, field Veterinarians, Inspectors are obliged to declare pigs that die or show ASF clinical symptoms in order to test if the virus has been introduced in the Country



Active surveillance: surveillance is actively performed by checking directly the disease status of the animal group at risk. Disease status can be checked using different techniques such as clinic investigation, laboratory testing etc. Active surveillance is – in general – performed through random sampling.



What does it mean

- The Veterinary Service starts to take samples and test them in order to detect the virus or detect its introduction



Monitoring: activities addressed in measuring an epidemiological parameter related to a defined parasite. The parameter to be measured might be prevalence, incidence, basic reproductive number R_0 etc. The value of the parameter to be monitored is known or, at least, expected (even guessed) from information indicated from available studies. Monitoring foresees always an active approach, mainly based on sampling.



What does it mean

Once ASF is in the Country, The Veterinary Service starts to monitor the epidemiological evolution of the infection. Monitoring could be addressed in evaluating the decrease of the outbreak number, of dead pigs, of the prevalence etc.



INVESTIGATION

A number of activities addressed to clarify an unclear epidemiological situation.



EXAMPLE

African Swine Fever is in the back yard sector and sometime has been detected in wild boars.

Epidemiological investigation is needed to understand the role played by the local wild boar population.

Answer to the question: are wild boars relevant for the presence of the infection? Or the infection will fade out from the wild boar population when eradicated from the back yard sector?



RANDOM SAMPLING

Active surveillance

Monitoring

Investigation

Are all base on sampling

Sampling means to investigate a relatively small number of animals in respect to the whole herd/flock

If the sample design is correct, the sample is **REPRESENTATIVE** of the population

The result obtained by sampling is **equal** to the one obtained by testing all the animals



Random sampling is representative of the population when:

- The value of the parameter to be estimated is known or educated guessed
- The size of the population at risk is known
- The sampling unit is correctly identified
- Sampling is performed in due time (short)



ASF EXAMPLE

Passive or active surveillance?



An epidemiological approach: measure the speed of the actions per day

- ASF Lethality: 50-80% of infected animals will die in 5 days (genotype II)
- Lethality rate = $0.5/5 = \mathbf{0,1/day}$
- Sampling rate = a very good sampling team samples 5% of the entire at risk pig population of Ukraine, laboratory tests are completed in 3 days = $0.05/4 = \mathbf{0.0125/day}$



Active surveillance through serology

Again the sampling team can sample 5%/day of the Ukrainian pig population and the lab needs three day to test all the samples. Antibodies are detectable after 10 days.

- **No lethality $\Rightarrow 0.05/10+4 = 0,0036/\text{day}$**
- **With lethality $0.05*0,1/10+4 = 0,00036/\text{day}$**



Probabilities

- (lethality vs. sampling) $0.1/0.0125 = 8 \Rightarrow$ **88.8%**
- (Lethality vs. serology) $0.1/0.0036 = 27.8 \Rightarrow$ **96.5%**
- (Lethality vs. survived serology)
- $0,1/0.00036 = 278 \Rightarrow$ **99,6%**

- You have **88,8%** more chance to detect the virus in dead animals in respect to alive, sampled animals

- You have **96,5%** more probability o detect the virus in dead animals in respect to detect antibodies if infected animals not dye

- If they dye because ASF **you cannot** find antibodies



Passive works better

In any situation where:

- An official “suspect case” definition is available and well known among stakeholders
- Evident Clinical Symptoms
- High lethality rate
- High animal owners awareness
- High Veterinary Service awareness



Designing a surveillance system (Case definition)

- **PASSIVE** surveillance

Any individual (back yard) or cluster (commercial farms) of swine that show:

1. **CLINICAL SIGNS:**
 - high fever ($>41.5^{\circ}$ C)
 - nervous disorders
 - high lethality rate ($> 30\%$ affecting all age classes)
 - sudden death without any prior clinical signs; and
2. **PATHOLOGY**
 - Hemorrhagic lymph nodes
 - Enlarged and congested spleen;
3. **EPIDEMIOLOGY**
 - recent pig introduction to the holding or the practice of swill feeding or allowing scavenging to rubbish dumps.



Active surveillance works better

- No evident clinical symptoms are present
- Low/null lethality rate
- Low animal owners awareness



A short summary

- **Passive surveillance** is the primary tool to detect the introduction of Africa Swine fever in Ukraine
- Once the virus has been confirmed, **active surveillance** can be applied in the infected areas, in the contact farms, and based on clinical symptoms: random sample of animals and test them for fever
- **Monitoring** should be performed in order to assess the efficacy of interventions



Thanks for the
attention