



Wild boar surveillance and how improve reporting

Vittorio Guberti
FAO Consultant
FAO Regional Office for Europe and Central
Asia



Overview

- Aim of surveillance
- Definitions
- High risk periods during an epidemic
- Wildlife
- Passive surveillance in practice
- Critical points
- ASF example
- A final message



Aim of surveillance

EARLY DETECTION OF A SPECIFIC ANIMAL DISEASES

Has the infection been introduced?

DEFINE THE EVOLUTION OF THE INFECTION

Is the infection increasing in the population, is geographically spreading, is it fading out?

ASSESS EFFECTIVENESS OF THE APPLIED STRATEGY

Is the applied control/eradication strategy effective?



Broad “official” definitions

DISEASE SURVEILLANCE IN ANIMAL HEALTH IS THE **ON-GOING** SYSTEMATIC COLLECTION, ANALYSIS AND INTERPRETATION OF DATA AND THE **DISSEMINATION OF INFORMATION TO THOSE WHO NEED TO KNOW** *IN ORDER TO TAKE ACTION*

MONITORING MAY SHARE COMMON FEATURES WITH SURVEILLANCE PROGRAMS WITH THE MAIN DIFFERENCE BEING THAT MONITORING ACTIVITIES DO NOT REQUIRE A PRE-SPECIFIED ACTION TO BE TAKEN *ALTHOUGH SIGNIFICANT CHANGES ARE LIKELY TO LEAD ACTION*

SURVEYS usually directed to identify a specific problem (for instance a preliminary survey carried out to have an estimate of prevalence before implementing a surveillance system for a specific disease) and surveys are usually limited in time. Surveys may be one component of a surveillance system as a whole



SURVEILLANCE IN PRACTICE

Surveillance: to develop a strategy that **maximize the cost benefit ratio**

Highest probability **to detect** the introduction of emergent or re-emergent infection in a free area (**early detection**);

Highest precision **in measuring** epidemiological parameters (i.e. prevalence, n. of seropositive animals etc.);

Sustainable from both **implementation and economical** terms;

Have a **practical approach** (actions are foreseen)



HIGH RISK PERIODS IN EPIDEMICS

FIRST	SECOND
<p>The period between the introduction of an infection into a Country and the first detection of the infection</p> <p>How much time we need to detect the infection?</p> <p>How much the infection was present before to be detected?</p>	<p>The period between the first animal has been detected as infected and the establishment of measures to prevent virus spreading</p> <p>How much time we need to put in place control measures ?</p>
<p>The length of the 1st HRP depends on: the efficacy and efficiency of the surveillance scheme in place</p>	<p>Outbreak management</p>
<p>Surveillance strategy</p>	



Passive surveillance (reactive)	Active active (proactive)
<p>Stakeholders are requested to report the presence SPECIFIC HEALTH PROBLEMS to the Veterinary Service</p> <p>The specific problems to be reported are defined/described in a SUSPECT CASE DEFINITION</p> <p>Animals belonging to the "Suspect case definition" are investigated/tested</p> <p>Stakeholders are aware of the Suspect case definition</p>	<p>The Veterinarians directly collect animal health data using a defined protocol that has been decided in advance (sampling, tests etc.)</p> <p>A population or a part of it (risk based) is actively investigated to detect an infection</p> <p>Vets, go in the farm and take samples, check the animals</p> <p>Vets known what they are looking for...</p>



PASSIVE OR ACTIVE: WHICH IS BETTER?

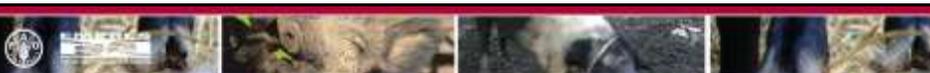
Passive is better when	Active is better when
<p>An official "suspect case" definition is available and well known among stakeholders</p> <p>Evident Clinical Symptoms</p> <p>High lethality rate</p> <p>High animal owners awareness</p> <p>High Veterinary Service awareness</p>	<p>Clinical symptoms are not evident, episodic or short lasting</p> <p>Low/null lethality rate</p> <p>Low animal owners awareness</p>



THE SUSPECT CASE DEFINITION

1. Does not define the clinical signs of the infection we are interested on;
2. Does not define the population at risk;
3. It defines which are the **characteristics of the animals that will be actively selected** by the surveillance program (investigated, inspected, tested etc.)
i.e High fever, sudden death etc.

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BROAD SUSPECT CASE DEFINITION

BROAD DEFINITION: means that we define of interest ANY ANIMAL THAT COULD BE INFECTED, even if the shown clinical signs are not totally overlapping the typical signs of the infection we are dealing on;

*All the sick animals in any farm **independently from their clinical signs***

BROAD DEFINITION: implies that a large number of animals will be tested/investigated; high number of negative test; higher costs;

BUT increased probability to early detect the infection

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NARROW SUSPECT CASE DEFINITION

NARROW DEFINITION: means that we define of interest ANY ANIMAL showing **clinical signs** overlapping the main characteristics of the disease we are dealing on;

Any animals showing fever (>40°C) inappetence, diarrhoea, pneumonia, cyanotic skin, pneumonia etc.

NARROW DEFINITION: implies that a relatively limited number of animals will be tested/investigated; all tested animals have a high probability to be infected; Low number of negative test; Reduced costs;

BUT reduced probability to (early) detect the infection

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DETECTION OF ASF IN WILD BOAR USING TWO DIFFERENT SUSPECT CASE DEFINITIONS

A) All individuals found dead => broad suspect case definition

B) All individuals shot showing clinical sign of the diseases => narrow suspect case definition

Expected number of cases?

Do we expect the same number of investigated cases?

Do we expect the same number of positive cases?

A) A BROAD SUSPECT CASE DEFINITION: high sensitivity of the surveillance system, but many laboratory investigations, material for field sampling, travels to the lab etc.

C) A NARROW SUSPECT CASE DEFINITION: low surveillance sensitivity (wild boars are rarely shot while showing clinical signs) but each animals has high probability to be Virus positive

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The use of broad or narrow suspect case definition is risk assessment oriented

BROAD CASE DEFINITION: to be applied in high risk areas;
We want test EVERY animal that could be infected

NARROW CASE DEFINITION: to be applied in low risk areas;
We want test ONLY animals that show the typical signs/lesions of the disease;

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EFFICENCY OF A SURVEILLANCE SYSTEM

The efficiency a surveillance system is modulated according to the characteristics of:

Disease: lethality, spread, clinical signs;

Susceptible host population: species, geographical distribution, size, breeding system; biosecurity etc.;

Risk of introduction/persistence: risk assessment

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PASSIVE SURVEILLANCE IN WILDLIFE

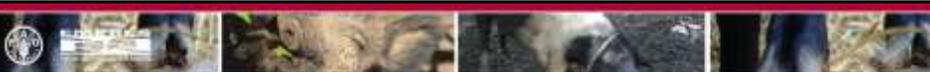
Role played by wildlife in the epidemiology of infection: reservoir, spill over...*the wild boar population is epidemiological reservoir of ASF virus;*

Area of interest: the area that has been identified at risk and that contains a wildlife metapopulation that lives in a continuous geographic distribution delimited by natural or artificial barriers

Suspect case definition: rarely clinical signs are seen, death is the obvious symptom (but how to survey low lethal diseases?)

Efficacy of the passive surveillance: difficult to assess: how many dead individuals are retrieved in peace time?

Sample collection: how to collect sample? Hunters, zoologists



EFFICACY OF THE PASSIVE SURVEILLANCE

No dead wild boar reported does not mean that wild boar do not die!
It means that nobody reports them and thus the passive surveillance is not working;

At present there are no magic recipes

From the experience gained in infected countries it appears that, in FREE AREAS

0,5-1% of the estimated wild boar population is found dead each year without any infection

Wild boar natural mortality is about 10% (excluding hunting)

The goal would be to find 10% of them

1% of the whole alive population



PASSIVE SURVEILLANCE: CRITICAL POINTS

I **Suspect case definition:**

Plays a pivotal role in determining the efficiency of any surveillance system

BROAD: many samples, much work (\$), more probability to detect the virus

NARROW: few samples, less work (\$), less probability to detect the virus

The suspect case definition could be adjusted according to the (perceived or assessed) risk of the area.

Low risk areas => narrow case definition (**possibly undetected positive cases**)

High risk areas => broad case definition (many negative animals investigated but **high probability to early detect the virus**)



PASSIVE SURVEILLANCE: CRITICAL POINTS II

Communication chain: passive surveillance is based on reporting, hence a person willing to report must know to whom to report and how (green lines, mobile of a responsible person, avoid reporting to "Veterinary Service")

To whom it should be reported the finding of a dead wild boar in the forest?

Awareness and acceptance: most important step of any passive surveillance. I.e. nobody will report what is unknown, or a disease for which a stamp out policy without compensation will be applied.

ASF in wild boar poses several restriction in hunting grounds: are hunters willing to participate? How to increase their participation and acceptance? have them



PASSIVE SURVEILLANCE: CRITICAL POINTS III

Evaluation of the passive surveillance efficiency: no reports does not mean no cases; the number of suspected cases to be investigated has to be estimated in advance, same figures should be used to evaluate the efficacy of the surveillance in place;

In peace time, how many dead wild boars should be found in at risk areas?

Duration: it is always difficult to maintain an high level of passive surveillance for any disease absents for a long period in an area or totally unexpected.

When France, Hungary, UK should put in place a efficient surveillance system for the early detection of ASF in wild boars and how long it should run?



ASF SURVEILLANCE IN WILD BOAR

FIELD EXAMPLE

Aim:

- a) Early detection
- b) evolution of the infection



SUSPECT CASE DEFINITION AND ASF DETECTION

BROADER CASE DEFINITION: ALL FOUND DEAD ANIMALS:
N. 227

178 DETECTED CASES (78,4%)

49 NEGATIVE INVESTIGATIONS

FIRST CASE DETECTED 25/07/2014

NARROW CASE DEFINITION: ANIMALS SHOT WHILE
SHOWING CLINICAL SIGNS: N. 1

1 DETECTED CASE (100%)

NO NEGATIVE INVESTIGATIONS

LOST 178 CASES

CASE DETECTED 20/08/2014

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Early detection of ASF in wild boars
Passive surveillance vs. active surveillance

**LATVIA: Summary of wild boar data (June-December, 2014)
within the infected areas (Part II and Part III)**

	Number of tested animals	Number of positive results
WB found dead	227	178
WB hunted	2733	39

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From a simulation model

Wild boar population size	Passive surveillance: day of first detection (Ag detection)	Passive surveillance: last day (Ag detection)	Passive surveillance: average detection period (days)	Active surveillance: day of first detection (Ag detection)	Active surveillance: last day (Ag detection)	Active surveillance: average detection (Period) (days)
100	30	335	60,7	Never	-	-
400	8	335	14,6	167	-	-
1000	4	363	5,7	53	226	91
3000	1	364	1,9	17	347	33,1



EFFICIENCY OF PASSIVE VS ACTIVE SURVEILLANCE: FIELD DATA

VIRUS DETECTION IN DEAD ANIMALS: $178/227 = 0,78$
 VIRUS DETECTION IN SHOT ANIMALS: $39/2733 = 0,014$

DETECTION IN DEAD/DETECTION IN SHOT
 $0,78/0,014 = 55,7$

THE PROBABILITY TO DETECTED A VIRUS IN DEAD ANIMALS IS 55 TIMES HIGHER THAN IN SHOT ANIMALS

$(55/(55+1))*100 = 98\%$

98 OUT OF 100 VIRUSES ARE LIKELY TO BE DETECTED IN DEAD WILD BOARS

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ASF prevalence estimation

Which is the true period prevalence?

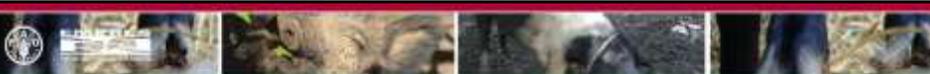
Is prevalence revealed by active or passive surveillance?

Which kind of data could be compared among different countries?

FOUND DEAD ANIMALS = 78%

SHOT ANIMALS = 1,4%

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ASF surveillance in wild boar

- **PASSIVE SURVEILLANCE:** aimed in early detection in at risk areas, in following the the evolution of the infection in already infected areas;
- **ACTIVE SURVEILLANCE:** for estimating prevalence using only the hunted wild boars and only in already infected areas



ASF in wild boar: suspect case definition

- Passive surveillance: all dead found wild boar; all shot showing abnormal behaviour; all road killed
- Active surveillance: all hunted wild boar
- Always virus test; serological test for shot only



Which needed data

Manage in wild boar ASF means to properly manage the whole infected population

WE MANAGE the infected population and not directly the disease or the diseased animals

Detailed data on sampled animals are needed in order to understand some epidemiological and wild boar population characteristics



Needed data

- Locality
- Shot/found dead
- Age and gender
- Fertility and fecundity
- Carcass status and age



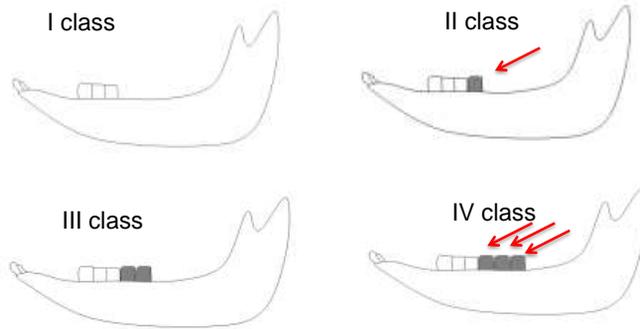
Locality....simply a mobile





Age and gender

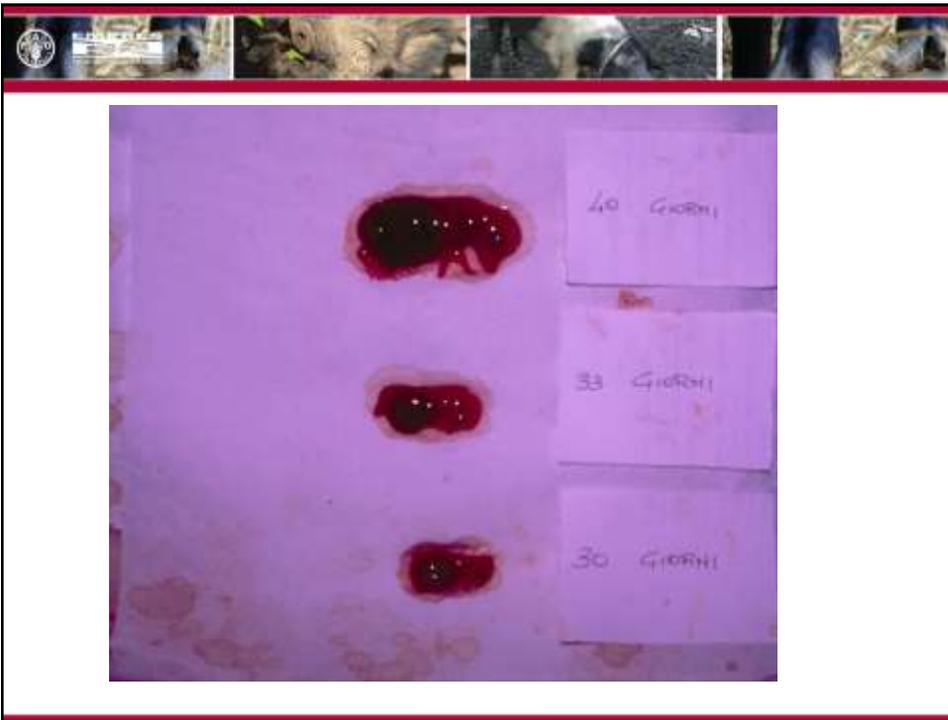
- Gender: easy => male or female
- Age: wild boar weight and color often misleading



FERTILITY and FECUNDITY

- Age and percentage of pregnant females
- Age and N. of foetus

N. LAB	SAMPLE INFORMATION	SEX	SAMPLED MATERIAL	
1	Found dead..... <input type="checkbox"/>	M <input type="checkbox"/>	Blood <input type="checkbox"/>	Spleen <input type="checkbox"/>
	Shot healthy..... <input type="checkbox"/>	F <input type="checkbox"/>		
	Shot with symptoms/lesions <input type="checkbox"/>	Pregnant <input type="checkbox"/>		
	AGE CLASS (see teeth eruption)	N. foetus _____		
	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/>			
2	Found dead..... <input type="checkbox"/>	M <input type="checkbox"/>	Blood <input type="checkbox"/>	Spleen <input type="checkbox"/>
	Shot healthy..... <input type="checkbox"/>	F <input type="checkbox"/>		
	Shot because of clinical signs..... <input type="checkbox"/>	Pregnant <input type="checkbox"/>		
	AGE CLASS (see teeth eruption)	N. foetus: _____		
	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/>			
3	Found dead..... <input type="checkbox"/>	M <input type="checkbox"/>	Blood <input type="checkbox"/>	Spleen <input type="checkbox"/>
	Shot healthy..... <input type="checkbox"/>	F <input type="checkbox"/>		
	Shot because of clinical signs..... <input type="checkbox"/>	Pregnant <input type="checkbox"/>		
	AGE CLASS (see teeth eruption)	N. foetus: _____		
	A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/>			

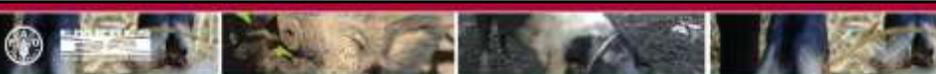




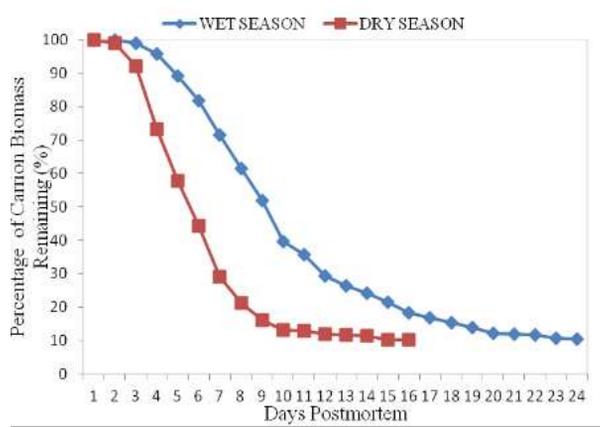


Carcass age

- The most difficult part to be approached
- How many days ago the wild boar died?



Season, temperature, age of the animals, soil chemistry all affect ageing of carcasses





Categories that could describe the decomposition of a wild boar carcass

Stage	Characteristics	Days post-mortem
Fresh	No odour, fresh	1-3
Bloated	Bloating in abdomen, maggots inside body, moderate odour	3-7
Active	Gas, maggots outside the carcass; liquefaction of tissue; black putrefaction; strong odour	>7 -14
Advance	Removal of flesh from bones, moderate odour, flesh is almost colliquate	15-30
Dry	Little or no odour, dried skin, exposed bones	>30



TAKE AT HOME MESSAGE

Surveillance is a strategy shaped by appropriate techniques

Passive surveillance: irreplaceable in the early detection of almost all infectious diseases and in particular for ASF in wild boars;

The suspect case definition is relatively easy to develop

The minimum number of animals that have to be tested must be planned and reached **≈ 1% of the whole alive wild boar population** at risk;

Active surveillance: epidemiological parameters, data derived only from hunted animals

Data collection: Complete sample collection with relevant data for better management of the infected wild boar population



THANKS.....