Session 2b - Risk Mitigation

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Acknowledgements

Thanks to many experts involved


Control and eradication of Classic Swine Fever in wild boar


Evaluation of possible mitigation measures to prevent introduction and spread of African swine fever virus through wild boar

• EWDA (European section of the WDA) workshop Uppsala 6-7th March 2014

Workshop: African swine fever in wild boar
https://sites.google.com/site/ewdawebsite/conferences-meetings

• OIE and CIC workshop Paris 30th June/1st July 2014

Early detection and prevention of African Swine Fever

• APHIS, OIE, UC workshop Fort Collins 18-20th November 2014

Early detection and prevention of African Swine Fever
1. Objectives & options of risk management
2. Managing the interface with target species
   ➔ Farms biosecurity, meat safety, public awareness
3. Managing pathogen dynamics
   ➔ Hunting hygiene/viscera, Vaccination
4. Managing wildlife populations
   ➔ Reducing Numbers: targeted culling, large scale
   ➔ Limiting the risk of spread: translocation, Feed, fencing
5. Conclusions & perspectives
OUTLINE

1. Objectives & options of risk management
2. Managing the interface with target species
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5. Conclusions & perspectives
1. Objectives & options of risk mitigation

- **CSF and ASF**
- **Aujeszky’s disease**
- **Brucellosis**
- **Trichinellosis, VHE**
- **Tuberculosis**

**Sus scrofa x sus scrofa**

Surveillance?  
Epidemiology?  
Spill over to target?  
Cost-efficacy?  
Other stakes?
1. Objectives & options of risk mitigation

**Population dynamics**
- Limit disease spread and persistence
- Reduce the number of susceptible in order to break the chain of transmission
- Population destruction: stamping out

**Pathogen dynamics**
- Mitigate spread, prevalence and persistence in wildlife (control/eradication)

**Interface**
- Reduce the risk of pathogen transmission to target species…
1. Objectives & options of risk mitigation

**Population dynamics**
- depopulation
- fencing
- feed ban

**Pathogen dynamics**
- viscera, carcass
- introduction of live animals or trophies
- vaccination

**Interface**
- Farms biosecurity
- Hygiene of carcasses
- Public, hunters, farmers awareness
1. Objectives & options of risk management

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5. Conclusions & perspectives
2. Managing the interface

Agricultural biosecurity

Brucella suis biovar 2 and Aujeszky in open air farms (France)

(Rossi et al. 2008, DGAL animal health services & ANSES)
2. Managing the interface

Agricultural biosecurity

- Compulsory screening of reproducers
- Fences as a condition of compensation in case of outbreaks (from 2005...limited efficacy)
- Questionnaires to farmers (DGAL) → fences of reproductive sows
Assessment of wild boar / domestic pig interactions through the use of questionnaires in Corsica

Role of wildlife in Uganda
(Suiform newsletter, C. Masembe pers com)

Understanding the dynamics and spread of African swine fever virus at the wildlife-livestock interface: insights into the potential role of the bushpig, *Potamochoerus larvatus*

K Stähli, Ogweng, Okoth, Aliro, Muhangi, LeBlanc, Atimnedi, Berg, Bishop, H.B. Rasmussen, and C. Masembe
2. Managing the interface

Agricultural biosecurity

Data shows a decreasing trend in cattle TB incidence, after separating cattle from wildlife at the waterholes.

2. Managing the interface

Agricultural biosecurity

- Operational program (regional vet services): pasture vulnerability (CIREV)

TB in France

(source: ONCFS)
2. Managing the interface

Meat & Hunting biosecurity

• Carcass inspection by vets (+trichinellosis)
• Hunters training to self protection and detection of abnormalities (TB)
• Public awareness (sanitary hazard, cook meat & viscera)
• Dogs / consumption of viscera & meat
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3. Managing pathogen dynamics

Viscera/carcass collection and destruction

To collect and destroy in specialized facilities

- Not easy to perform
- Safety of transportation and storage?
- Saturation of the local storage solutions
- Costly (who pays?)
3. Managing pathogen dynamics

Viscera/carcass collection and destruction

Local destruction/inactivation

- big initial investment (hunters)
- practicality studies running
- deployment in several regions

(Eva Faure, National French Hunters Federation)
3. Managing pathogen dynamics

Vaccination

CSF In Europe

- Impact on pig farming and trade
- Wild reservoir: low virulent strain and large populations
- Management in pig # wild boar

Oral mass vaccination (OMV)

- Old but efficient live-vaccine: C strain
- Oral baits and deployment (1-3*40 baits/ km²)
- Efficacy in theory and field
- Efficacy of baiting (food availability, age classes)
- Confusing effect on monitoring
3. Managing pathogen dynamics

Vaccination
Modelling during OMV

Hypotheses a priori

Bayesian model

- Average date of birth peaks
- Standard duration of birth
- Proportion of births of the year
- Survival of non-weaned young
- Annual survival of weaned animals

- Probability that a wild boar experiences sessions
- Probability that the animal is immunized at culling time
- Probability that a wild boar consumed the vaccine for the first time at session s
- Intercept
- Age effect
- Season effect
- Commune effect
- Clustering effect
- Heterogeneity

Iterative process between observed data and model

a posteriori distribution of the probability of 1st immunisation

Observed data: hunted wild boar (2007-2010) ~30,000

Seroconversion of piglets out of the vaccination periods
3. Managing pathogen dynamics

Vaccination

- **Questionnaire to hunters**
  - Number of questionnaires and participation: 8613 (559 hunters)
  - Major problems: cold in wintertime, no wild boar
  - Factors of heterogeneity: season*(crops + oak mast) \( \Rightarrow \) « border effect »

![Graph showing % uptake over seasons]

- **Managing pathogen dynamics**
3. Managing pathogen dynamics

Vaccination

- 56.37% Birds
- 39.26% Wild boar
- 1.65% Carnivores
- 1.65% Deer
- 1.07% Other

TB in Spain (C. Gortazar)

So what about the field results?
3. Managing pathogen dynamics

Vaccination

- Heat-inactivated vaccine better than BCG
- 89% reduction in lesion score (**)
- 88% reduction in *M. bovis* growth (**)

TB in Spain (C. Gortazar)

Díez Delgado et al. (this meeting)
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5. Conclusions & perspectives
4. Managing wildlife population

Reducing numbers

**Wildlife are not Domestic animals**

- WB # pig flocks = uncontrolled, unknown numbers
- Movements and dynamics are free and reactive
- Complex heterogeneous mixing (social, landscape)
- Management policy # livestock!!!

![Diagram showing wildlife and domestic pig interactions](image)
4. Managing wildlife population

Density-dependance
Frequency-dependance
Non-homogeneous mixing
4. Managing wildlife population

Reducing numbers

Reducing number through hunting/destruction

- Targeted culling or stamping out
- Threshold for disease eradication

Thresholds are not easy to determine

- Most of time threshold is unknown (ASF)
- Not a straightforward relation (CSF)
- Differences between diseases
- Differences between situations for a given disease

Should we expect population thresholds for wildlife disease?

James O. Lloyd-Smith, Paul C. Cross, Cheryl J. Briggs, Matt Daugherty, Wayne M. Getz, John Latto, Maria S. Sanchez, Adam B. Smith and Andrea Swihart
CSF persistence related to population size > density (~landscape dimension)

4. Managing wildlife population

Reducing numbers

Area at risk

- Old story running from at least 90’s
- Large area (>3000 km²)
- Landscape based monitoring and management
4. Managing wildlife population

Reducing numbers

Density-dependance: differences among diseases
Brucellosis << Aujeszky << Tuberculosis (Spain)

Threshold for diseases control depends on the disease
T_Aujeszky << T_Tuberculosis (Spain)
4. Managing wildlife population

Reducing numbers

Density-dependance: differences among areas and management: Aujeszky

ANSES 2011 scientific opinion proposed a threshold of wild boar density for TB maintenance

« 10 wild boar/km² before hunt »
4. Managing wildlife dynamics

Reducing numbers

Poor reliability of abundance indexes:

- **Large scale**
  - Hunting statistics: available at large scale, biased
  - Damages (crops, car): available at large scale, biased
  - Landscape modelling: on going research (validation)

- **Local (studies scale)**
  - Capture-mark-recapture estimates: small areas *
  - Distance-sampling: small scale, landscape limitation *
  - Scat counts: small scale, landscape limitation *
  - Census: variable, medium/small scale, biased
  - Camera-traps: on going research
  - Indirect/relative indexes: on going research

→ NO VALIDATED TOOL FOR ESTIMATING ABUNDANCE AND COMPARING AREAS OR TREATMENTS!!!
Limited tools for population control

• **Wild boar ecology**
  • Hunting disturbance & disease spread!
  • Immediate demographic response
  • Selection of most productive sows?

• **Hunting is not culling**
  • Limited hunting pressure (30-50%)
  • Hunters’ acceptance
Aerial shooting (B. Cowled)

- Effective in suitable habitat (semi-arid) and away from urban areas
- Relatively expensive
- Good for disease surveillance/ sampling as well
- Very humane if well regulated and training
4. Managing wildlife population

Reducing numbers

Poison baiting efficient (B. Cowled)

- Effective and inexpensive
- Manufactured baits or field prepared
- Meat or grain based
- Aerial or ground deployment
- Welfare a concern
- 1080 most common, sodium nitrite in development

Poison questionable in native ranges

Safety for non target species
Ethics and acceptance (native species, hunting economy)
4. Managing wildlife dynamics

Reducing numbers

**Contraceptive**
- Research programs (no deployment)
- Modelling
- Important effort and cost
- Safety to non target species
- Ethics and acceptance (hunting & public)

**Trapping efficacy is limited**
- Limited spatially and lower efficacy
- Trap-shyness & food availability
- Important effort and cost
4. Managing wildlife population

Feed ban

Feeding wild boar?

Baiting is helpful…

Protection of crops
Increasing Hunting efficacy
Deliver vaccines

…but feeding is a risk factor

Source of contamination
Aggregation increasing contacts
Intensive management/dynamics

Feeding ban?

Proposed inside infected areas
Not always satisfactory
Fencing wild boar

- **Fences may limit spread**
  - What is a fence for wild boar?
  - Fencing existing barriers

- **Fencing wildlife is questionable**
  - Never 100% efficient
  - Practicability of large scale fences?
  - Green corridors
4. Managing wildlife population

Fencing

Recent use of repellent, feeding, hunting ban, fences for preventing ASF spread

(Dr Masiulis, OIE, Paris, July 2014)
(Wahis, OIE, November 2014)
4. Managing wildlife population

Hunting enclosure, translocations, swill feeding

**Increased risk in hunting enclosures (#farms)**

- Number of enclosure is increasing
- Recent outbreak of TB in WB and RD
- Risk analysis ANSES SA-2014-0049 (in prep.)

(Saint-andrieux & al. 2012)
(Hars & al 2014)
(European Communities)
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Wild swine management

• Good management of population?

• NOT ALL DISEASES are DENSITY DEPENDENT
• THRESHOLD MOSTLY UNKNOWN
• Intensive culling through aerial shooting & poison (pest vertebrate)
• Targeted culling possible in closed/ small areas (Boadella et al. 2013)
• Hunting disturbance aggravating SPREAD during outbreaks
• To limit feeding and intensification ➔ “extensive” feeding
• Stabilizing populations ➔ through qualitative hunting (Gamelon & al 2012)

SOCIAL DIMENSION !!!!
5. Conclusions & perspectives

Pathogen management

- **How to prevent disease introduction & spread**
  - Hunters/ public/ farmers training
  - EARLY WARNING at a global scale
  - Notification/ awareness of translocations
  - Viscera and carcass hygiene
  - VACCINATION as possible additive tool
5. Conclusions & perspectives

Interface management

• How to live with wildlife diseases?
  • Public, farmers, hunters awareness
  • Biosecurity in farms: a recurrent TABOO topic
  • Good practices and integrative/ participative approaches

SOCIAL DIMENSION !!!!
Conclusions & perspectives
3. Research needs!

- **Research need**
  - NEW TOOLS for monitoring wild swine ABUNDANCE (#density)
  - MANAGEMENT of wild swine
  - QUANTIFYING INTERFACE with pastures/farms
  - Experimental approaches (ex: feed ban, pasture mgt)
  - Integrative/participative approaches ➔ NEW TOOLS
  - Social acceptance & collaboration with LOCAL stakeholders
Thanks for your attention!