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cost-effective risk-based animal health surveillance systems for the benefit of  
livestock producers, decision makers and consumers**

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## **Animal health surveillance: BEST PRACTICE WORKSHOP**

WP 7 – Training, dissemination and exploitation

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## Acronyms

|               |   |
|---------------|---|
| <b>CIRAD</b>  | Centre de Coopération International en Recherche Agronomique pour le Développement (France) |
| <b>EU</b>     | European Union  |
| <b>FAO</b>    | Food and Agriculture Organisation of the United Nations                                     |
| <b>GD</b>     | Gezondheidsdienst voor Dieren (The Netherlands)   |
| <b>RVC</b>    | Royal Veterinary College (UK)   |
| <b>SAFOSO</b> | Safe Food Solutions (Switzerland)   |
| <b>SVA</b>    | Swedish Veterinary Institute  |
| <b>UCM</b>    | Universidad Complutense de Madrid (Spain)   |

## Summary

This report summarizes the outcomes of the RISKSUR Best Practice Workshop on animal health surveillance, held on September 30 2014 at the Ministry of Economic Affairs of the Netherlands in The Hague. The outcomes of this workshop will be discussed by the RISKSUR consortium in order to decide on the scope, target group(s) and extent of the Best Practices for Animal Health Surveillance Document that will be an output from this project.

### **Goal RISKSUR TASK 7.3**

To develop and disseminate best-practice guidelines for animal health surveillance tailored to user needs

### **Objectives Best Practice Workshop (Task 7.3.1)**

To discuss existing guidelines and standards for surveillance  
To identify gaps in current practice  
To prioritize areas for improvements according to user needs

## 1 Introduction

Christianne Brusckke (Chief veterinary officer of the Netherlands) and Dirk Pfeiffer (Coordinator of the RISKSUR project) opened the workshop by highlighting the importance of international surveillance standards, including the need to take into account the many differences in countries, settings and animal production systems. European animal health regulations serve a common goal by promoting a common way of working to prevent the incursion and spread of animal diseases and reduce their impact. RISKSUR aims to extend the available guidance by investigating the role of risk-based surveillance to enhance cost-effectiveness for three animal health surveillance objectives: 1) Early detection of animal disease, 2) Freedom from animal disease, 3) Determination of disease frequency and detection of cases of endemic animal disease.

The overall goal of this Best Practice Workshop was to develop best-practice guidelines for animal health surveillance tailored to user needs. The workshop gathered animal health surveillance experts and different end-users from throughout Europe, to:

1. Discuss existing guidelines and standards for surveillance
2. Identify gaps in current practice
3. Prioritize areas for improvements according to user needs

## 2 Review of existing standards: available guidelines on animal health surveillance

Work package 7 of the RISKSUR project, led by Katharina Stärk (SAFOSO, CH) and under coordination of FAO, will elaborate a practical animal health surveillance best practice document for Europe. The document should aim to ensure a balance between the required level of detail versus international applicability. It is essential that this document will not only provide guidance on WHAT needs to be done, but also on HOW this should be done, following principles, guidance and practical advice. The document should also provide guidance on how surveillance can or should be funded.

Jorge Pinto Ferreira (SAFOSO, CH) presented the results of a review of 13 internationally available documents related to guidelines for surveillance published between 1999 and 2014, most focusing on animal health, some on public health. The review was not intended to be exhaustive and workshop members were invited to identify other documents that were missed. An overview of the results of this review is provided in Annex 7. Table 1 summarizes the features of the reviewed documents that were highlighted during the workshop.

In summary the review found that, currently no single document exists that covers all aspects of surveillance. The very recently published OIE Guidelines (OIE 2014 Guide to terrestrial animal health surveillance) can be considered as a potential reference document that needs to be complemented. In many documents guidance on communication with stakeholders, dissemination of information and funding of surveillance activities are not considered. In addition, useful features of the proposed document could include availability in multiple translations, resources embedded in the text to find additional information (i.e. in addition to the references usually provided), and the provision of generic e-mail addresses (for instance [rabies@who.org](mailto:rabies@who.org)) to act as sustainable points of contact.

Table 1 Summary of the highlighted features of 13 documents related to surveillance from 1999-2014, reviewed by Jorge Pinto Ferreira (SAFOSO, CH) for RISKSUR August-September 2014

| Policy  | Animal   |  | Human   |   |
|---|--|--|---|---|
|   | International  | National (best solutions presentations from this workshop as examples) | International   | National  |
| European Union Policy Framework <ul style="list-style-type: none"> <li>• Proposal: not yet enforced</li> <li>• Tone is SHOULD, not COULD</li> <li>• Complex document: 31 acts</li> <li>• Wide range of information</li> </ul> | FAO 1999 Livestock Surveillance Guidelines <ul style="list-style-type: none"> <li>• Slightly outdated</li> </ul>   | United Kingdom<br>Enhancing passive surveillance in the UK             | WHO/UNAIDS 1999   | Canada 2011 Health care associated practices <ul style="list-style-type: none"> <li>• Best practices</li> <li>• How to prevent</li> </ul> |
|   | FAO 2011 Challenges of Animal Health Surveillance<br><a href="http://www.fao.org/docrep/014/i2415e/i2415e00.htm">http://www.fao.org/docrep/014/i2415e/i2415e00.htm</a> <ul style="list-style-type: none"> <li>• Summary of conference discussions</li> <li>• Several country examples/cases</li> <li>• Networks</li> </ul> | Sweden<br>Surveillance prioritization and cost-effective delivery      | WHO Europe 2002, occupational health safety   | United Kingdom 2011 DH PHE transition team strategic document   |
|   | OIE 2008 diagnostic and vaccines manual  | Netherlands<br>Collaborative surveillance                              | WHO/CDC 2002 specific guidelines in 8 steps <ul style="list-style-type: none"> <li>• Very useful</li> <li>• Focus on African countries</li> </ul> |   |

|  |   |                                   |  |  |
|--|---|-----------------------------------|--|--|
|  |   |                                   | <ul style="list-style-type: none"> <li>• In English, French, Portuguese</li> </ul>   |  |
|  | OIE 2014 Guide to terrestrial animal health surveillance <ul style="list-style-type: none"> <li>• To be published</li> <li>• Will be the reference document</li> <li>• Covers what we are looking for</li> <li>• Topics: For instance on cost-benefit analysis</li> <li>• It tells WHAT but does not say HOW to do this</li> <li>• Needs to be complemented.</li> </ul> | Spain<br>The known but unexpected | WHO 2014 Early warning and event based surveillance <ul style="list-style-type: none"> <li>• Mentions veterinary services</li> </ul> |  |
|  | CDC2006 <ul style="list-style-type: none"> <li>• Very clear guidelines and standards</li> <li>• For instance on data concepts and classes</li> <li>• Lists guidelines per topic</li> <li>• Detailed</li> <li>• Harmonized guidelines.</li> </ul>  |                                   |  |  |

### 3 Strengths, weaknesses, opportunities and threats of existing standards – outcomes of group work

The RISKSUR team requested the contribution of the workshop participants to identify gaps in the existing standards for surveillance, through a Strengths Weaknesses Opportunities and Threats (SWOT) analysis. They were also asked to discuss whether guidelines were needed at all, if so what should be included, and how RISKSUR could contribute to improving on the existing guidance. Annex 3 explains the SWOT session plan and Annex 4 the division of the participants between five groups. All findings were presented and discussed in a plenary session.

SWOT is an analysis method developed to evaluate planning and functioning of businesses in a structured manner. Figure 1 shows a template of a SWOT analysis method. The idea is to assess in a brainstorm session which factors are helpful, the green column, and which are harmful, the red column, to reach the objectives of the system, and which of those factors stem from the system itself, the yellow row, or from its environment, blue horizontal row.

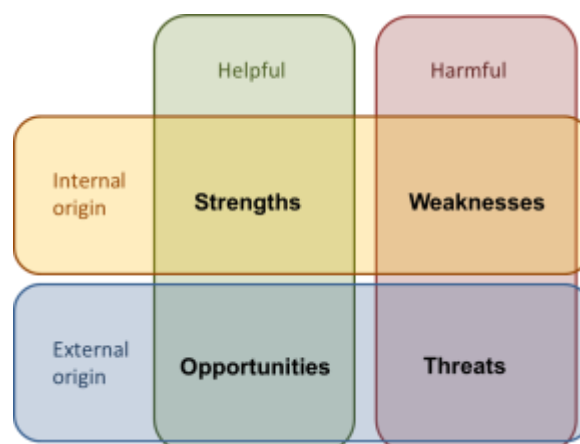


Figure 1 Template of Strengths Weaknesses Opportunities and Threats (SWOT) (from: Backx A., Jourdain F., Souarès Y. European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE), Lisbon, Portugal, 11-13 November 2010)

The workshop participants identified and discussed the following SWOT of the existing guidelines (transcript of what was originally written by the different groups in their flipcharts):

### Strengths

- The fact that guidelines exist and are available: existence of reference.
- They have been issued by international organizations: providing international recognition, even though they sometimes overlap.
- Targeted mainly at trade, notifiable diseases and those with Legislation.
- Promotes standardisation (EFSA).
- Many different topics have already been covered.
- Flexibility exists in approach: proportionality, not prescriptive.
- The fact that guidelines state WHAT to do and not HOW.
- Benefits to the industry, influence negative behaviour as well.
- Guidelines are directed at government sector rather than private.
- They offer independence from the “official veterinarians”, for instance for ante mortem inspection.

### Weaknesses

- There is a lack of standards for metrics.
- The degree of adoption varies between different countries.
- They are most of the time very generic: not universally applicable.
- Guidelines do not yet state that stakeholders should be identified and involved from the beginning and a communication strategy defined.
- There are no available guidelines on how to cross-bridge between human health and animal health (One Health).
- The allocation of funding to support surveillance is not often mentioned.
- The dissemination of guidelines to all countries is not achieved.
- Lack of in-country teams to discuss and implement them.
- The guidelines do not allow for the historic disease information to be taken into account when designing surveillance, should you continue doing the same thing.
- Not always targeted at the highest risk groups: often focused on the export animal group (politically/economically), but from animal health perspective this is probably not the most important disease or group.
- No clear cost-benefit perspective: the efforts made need to be justified.
- Guidance for surveillance of endemic or non-notifiable disease that impact production, are lacking.
- Proportionality
- Lack of standardization, but if too standardized too much of a straightjacket.
- No account taken of variation in surveillance needs for different production systems: small-holder/extensive, intensive.
- The guidelines are not dynamic: Iterative review of guidelines and feedback is needed.
- Variability between countries, not comparable
- Not focused on surveillance outcomes: Outcome-based surveillance options should be provided instead of tick-box surveillance.
- Differences between wildlife and domestic animals. No guidelines for wildlife disease surveillance.
- No guidelines exist for emerging rare very contagious diseases: cost-benefit difficult to estimate / recommendations for whether to use passive vs active (idea of matrix of characteristics of disease).
- Risk-based surveillance quite novel, paradoxes in European Commission (flexibility of choice vs sampling frame ty-own), also not always applicable: depends on what importers allow.

## Opportunities

- To involve the industries in prioritisation for endorsement and ownership.
- To apply surveillance as a marketing tool: as an incentive to show HEALTH STATUS of country rather than only focusing on ex-list A OIE diseases.
- To make use of existing sources of information: harvesting available data.
- To integrate tools, data sources, and data analyses results. Comparable results with different methods: flexible framework.
- To shift to Regional vs Centralized surveillance.
- To design communication plans with neighbours/partners particularly for disease not notifiable.
- To characterize risks: identify the at-risk population. To define what is your objective: the risk of missing it, or risk of detecting infection.
- To create a clear distinction between zoonotic and non-zoonotic diseases in guidelines.
- To bridge and harmonise human and animal health. One-Health surveillance guidelines.
- For international organizations to integrate and harmonize guidelines: communication between international organizations.
- To design guidelines that are easily updatable (to avoid becoming outdated too soon): potential use of Wiki format and links to documents for more information.
- To develop language versions (Spanish, French, English, very often in Russian).
- To provide training/communication: awareness of existence of difference surveillance approaches, methods and links to documents for information.
- To include parts on how to do compensation, hard to write down as guidelines.
- To ensure feedback loops between stakeholders on types and use of/ experience of surveillance programs.
- To create of a platform between stakeholders.
- To increase harmonization inside decentralized countries.
- To increase harmonization between countries.
- To prioritization: process of allocating funding to different programs/systems. (Focus on export or not).
- To ensure an increased sense of ownership (stakeholders).
- To define acceptable indicators (indicators for data): what will be accepted to call a country to be free of disease varies: recognition of the historical evidence based on surveillance and standards are needed.
- To share responsibility: in collaboration with all stakeholders.
- To include benefit-translation: risk of action defined should come with a benefit.
- To apply a system-based approach: from top to bottom: systems based evaluation.
- To include the detection of known unknowns and unknown knowns (completely novel and out of the blue versus known).
- To develop economic guidelines
- To bring together (multidisciplinary) systems in the livestock sphere.
- To develop guidelines which build on but do not overlap with the currently available documents

## Threats

- In many countries a gap exists between the extent of guidelines and the level of different competent bodies that should implement them.
- Gap between animal health and human health.
- Funding (not mentioned in guidelines).
- Non-use and adoption of the guidelines.
- Issues in in-country and between country harmonization.
- Different situations/countries.



- Easily get outdated.
- Too prescriptive description on how to do things for every disease, because then nobody wants to do anything.
- Politics
- Engagement
- Flexibility: Lack of confidence, Lack of standards, not risk based, “bilateral agreements”.

#### **Additional suggestions from the workshop participants:**

*Other guidelines not yet included in the review or under development are:*

- Triple-S Guidelines for designing and implementing a syndromic surveillance system (Published in Eurosurveillance as: First European Guidelines on Syndromic Surveillance in Human and Animal Health.)
- CDC Updated Guidelines for Evaluating Public Health Surveillance Systems
- ECDC is planning to write guidelines on infectious diseases and surveillance
- WHO Handbook for guideline development
- ECDC Risk assessment guidelines for diseases transmitted on aircraft
- EWGLI Technical guidelines for the Investigation, Control and Prevention of Travel Associated Legionnaires Disease
- Framework for Operations and Implementation Research in Health and Disease Control Programs
- Suggestion: to list existing disease specific guidance, for instance Foot-and Mouth Disease specific surveillance guidelines and EFSA guidelines for Campylobacter (this latter provides elements for comparison between countries)

#### *Drivers and Scope*

Often there are two different drivers for surveillance with a different view on guidelines:

- Those wanting to assess disease status and for whom comparability is important: for instance the EU and international organizations like the OIE.
- Those that want guidelines for cost-effective and targeted surveillance like national governments and industries.

For the three main objectives of surveillance, i.e. Freedom or absence from disease, Detection of endemic disease and Early warning of new or emerging disease, the level of detail in guidelines is inversely related to the scale: from a lower level of detail but more prescriptive at international level (International Organizations, EU), to a higher level of detail and more specific at national level and industry level. In addition the required health status differs depending on whether consumer society, trade, or food safety is to be protected. **The challenge for RISKSUR** will be to balance keeping a degree of flexibility while at the same time maintaining of the required level of standardization.

Guidelines on disease surveillance should cover topics including governance, design, implementation, communication, evaluation, and socio-economic guidelines: funding/cost-benefit/compensation. The objectives and purposes of disease surveillance differ widely. Flexibility is needed to act in different cultural and political contexts, but we need frameworks to guide and promote comparability.

#### *Target group*

The target group and scope of guidelines should be well defined. The level of detail included in the guidelines should be sufficient for the needs of each target group (for instance veterinary services, Chief Veterinary Officers, public health services, high profile technical level bodies), **RISKSUR should write for technical end-users** from competent authorities to private bodies.

**RISKSUR could focus on** a document for **risk-based surveillance**: the components needed for this (Animal ID, livestock systems, etc.) based on the surveillance design framework which is under

development within the project. The scope of these guidelines could be: being able to design and implement risk-based surveillance and knowing how this could be evaluated (the evaluation tool, EVA tool under development).

Another question raised by participants was: Do we want to find everything? What will we do if we find something? The importance of linking surveillance to action was emphasized.

**RISKSUR should consider the following** in the development of guidelines:

- Surveillance should be output based.
- Flexibility is needed in an EU targeted document.
- Data sources: how a surveillance plan can capture multitude of types of data available.
- Should set baseline of functioning: how to harvest data, criteria for improving surveillance systems: producing useful information from the data.
- Should recommend surveillance approaches which take into account the historical disease status of a country that will be recognized by other countries: adding power to the data: for instance over 10 years freedom of disease, vs country freedom of 1 year and one year survey.

#### *Performance indicators*

It was suggested that it would be good to include a set of standard performance indicators to monitor the performance of surveillance in any evaluation framework. RISKSUR could contribute to this task.

#### *Standardization and consistency of terminology and metrics*

Consistent and standardized use of terminology and also of nomenclature for specimen samples is important for sharing and comparison of information. **RISKSUR can contribute to standardization of terminology:** using and speaking the same surveillance language.

#### *Stakeholder involvement*

In order to ensure stakeholder compliance and sense of ownership, stakeholders should be involved from the start of the design of a surveillance program. Stakeholders include the whole range in the animal production industry, animal health services at all levels, laboratory bodies, etc. Discussions were held on how to take other stakeholder groups into account: consumers and retailers for instance?

Regular communication and feedback between and to stakeholder is important to build trust and engage with stakeholders.

Another topic to think about is: How to engage the private industry: proving the benefits, including non-monetary benefits: prove value and benefits.

#### *Proposals: steps similar to OIE PVS and matrix of characteristics of disease*

One group prepared a proposal for a template for the guidelines that follows the steps needed to design a surveillance system. From *understanding the context* (particular country or area, population distribution, individual identification, trade, production systems), the *surveillance objective* (for instance Effective early warning: system for case detection, diagnostic system), and the *data handling and analysis, reporting and epidemiology* (capability for conducting analysis and communication). This could include guidance about the design of *risk-based surveillance*. An *evaluation method* could be determined for each step. This would allow the status of disease surveillance in a specific country to be assessed to identify what is needed to take it further, including the resources needed and cost-benefit of implementing surveillance. This could be used, for example, to support trade but also for surveillance aimed at achieving other policy objectives. This also implies a cost-benefit analysis at each step.

This proposal follows the steps of the evaluation of performance of veterinary services (PVS) developed by the OIE. It could provide an assessment of the capability requirement in a particular country to do risk-based surveillance and how can this be evaluated.

During the discussion comments were made on how to use OIE PVS outcomes related to the status of surveillance: PVS is an assessment of the performance of veterinary services at high level, in principle seen as a useful approach, however more detailed guidelines are need for a country to walk these steps. RISKSUR has a capability to improve these steps on surveillance as a detailed framework in each country.

Another proposal was to start from a matrix of characteristics of disease: re-emergent diseases, endemic diseases, exotic emerging diseases. Such a matrix could be used to decide on how to design surveillance for different categorizations of disease.

## **4 Presentations (see [Annex 8](#) for PDFs)**

### **4.1 Surveillance landscape in Europe (Barbara Häsler, RVC, UK)**

In the presentation Barbara raised the issue of economics as a part of holistic surveillance. Surveillance includes producers, trade, consumers, animal welfare and more. Resource allocations can be based on optimization, acceptability, least-cost criteria, comparison of benefits or outcomes with costs of surveillance, prioritization, understanding of the system and human behavior (risk factors).

For RISKSUR a survey was carried out to characterize the context within which the development of animal health surveillance programs and evaluation frameworks are implemented in Europe. The presentation of the survey used turning point technology for the attendants to respond to interactive questions.

The data collection sources were surveillance data, population and economic data, and infrastructure data. The results revealed that 80-100% of surveillance activities is pathogen centered, with salmonella, brucellosis, avian influenza being among the most frequently recorded. The most frequent targeted animal species for surveillance are cattle, pigs and poultry (in order of frequency). The case definitions of these surveillance systems relied almost all on laboratory confirmation for pathogen, toxin or host response. This implies an impact on laboratory capacity. Funding for surveillance systems came largely from the public, 30% was private funded. Total animal health surveillance expenditure in UK per year: 4,3 million pounds per year; overall highest for cattle, and second for poultry disease. In comparison to economic value of the sector most was spend for cattle per 1000 pound of sector-value. In the UK, tuberculosis (TB) is a main influencer on this number.

The other information sources were decision maker interviews. One of the outcomes was that there are a multitude of private-public partnerships. Most important decision criteria influencing surveillance are international legal requirements, national legal requirements, cost-benefit measures, cost-effectiveness measures and expected costs, the disease situation in the country, and impact related criteria. The decision makers identified various needs for further information, e.g. epidemiological and economic information.

During the discussion a participant pointed out that bio-security standards will play a bigger role together with decision makers, implying that also private surveillance will become more important, for instance independent audits for pig herds. Another participant raised the point that in order to evaluate whether you make use of the surveillance data, you should look into the interventions linked to the surveillance system.

### **4.2 Solutions for Best Practice**

#### **4.2.1 Enhancing passive surveillance in the United Kingdom (Kate Sharpe, AHVLA, UK)**

The UK recently changed from a passive surveillance system to detect new and emerging diseases to one that is focusing on early warning through syndromic surveillance. One of the drivers for this

change is the continual change in budgets which has led to a number of reviews. Scanning surveillance (to detect the undefined or unexpected) should be improved to: improve coverage, to widen the network to include private practitioners and other Post-mortem examination (PME) providers, to increase intelligence, to improve exchange between government, vets, livestock industry for improved shared responsibility, to enable the development and maintenance of expertise of all those working with the surveillance system.

Key elements of the new model include focusing efforts, for instance laboratory and post-mortem access, to where the animals are, and improve the engagement and involvement of private veterinarians, fallen stock industry, and the industries. Improvement of communication and engagement is sought through the development of a Private Veterinary Services/Official (government) Veterinarian/Surveillance web gateway and the UK is looking into options to improve two-way communication flow including online forums and the use of social media. Stakeholder engagement is assessed using laboratory submissions as a measure of veterinary engagement and as a proxy for surveillance activity.

Key messages:

We need:

- To build networks so that we can better investigate
- To maintain capability to detect and respond
- To develop new methodologies and more risk-based approach
- To obtain agreement and understanding of roles, responsibilities and compliance

#### **4.2.2 Surveillance prioritization and cost-effective delivery: Sweden (Ann Lindberg, SVA, Sweden)**

Sweden is adapting its' animal health surveillance system approach and activities in response to current changes. Overall the animal health status in Sweden is favorable. The level of stakeholder collaboration is high and based on mutual trust. Centralized systems for the collection of samples from livestock exist. Exotic disease surveillance co-rides on endemic disease control activities. Prioritization has been pragmatic albeit not always transparent. But adaptation is needed as existing relationships are challenged due to increased competition. As the financial planning horizon is short, national eradication schemes have been downscaled and three strategic areas are now under evaluation:

- Methodological development
- Surveillance delivery
- Prioritization

Surveillance stakeholders in Sweden are:

- Payers (authorities, board of agriculture, Swedish civil contingencies agency)
- Producers (Industry, National Veterinary Institute)
- Users (Industry, National Veterinary institute, board of agriculture, other authorities, and also the public and academia)

Sweden allocates money to surveillance on the following grounds:

The Ministry of rural affairs decides whether the disease is a priority and if this is so, delegates the development to board of agriculture: what hazards and which developments are the priorities? At the end of this the surveillance producers, via a tender system, present how the prioritized hazards should be investigated and controlled.

The prioritization process does not only consider the hazards but also the maintenance of the system itself. There is a decision tree for active surveillance, obligatory for national or international legislation. But some of these are also up for evaluation to reassess the needs:

- The new stream of emerging (endemic or exotic) diseases: the priority will depend on how close they are to Sweden's country borders. For some of them no surveillance will be done.
- Categorization of disease is another option. Consequences of categorizations are that the need for surveillance for some diseases will now be re-assessed every 3 years, annually or ad hoc.

Categories and criteria for prioritization are determined with a pragmatic model scoring first based on risk and epidemiology, public health aspects, animal health and welfare, and societal and environmental aspects. An eventual scoring will then be carried out together with the stakeholders to produce factsheets. This is followed by a prioritization of development of surveillance, i.e. the many sub-processes like the collection and transportation of information/data, laboratory analysis and or secondary data, and decision making. The number of actors involved in the process reduces from data collection to decisions making. To reduce the costs involved in each step (sampling, laboratory analyses, and information management) the number of samples have been reduced through centralization, the use of surveillance synergies, and the use of formats for reproducible analysis and reporting in a timely manner.

All in all Sweden adheres to a lean surveillance philosophy through process management: you should not use your resources in any other way than for the direct benefit/creation of value for the end customer: focus on smoothness of processes, need driven learning to improve, plan, do, study, adjust, improvements identified and tested at the lowest possible level.

To ensure that surveillance is carried out in a cost-effective manner, Sweden developed a surveillance mapping toolbox to understand how surveillance processes work: identifying all the actors (roles, existing agreements, financing), address sampling (Sampling frame, species, coverage, accessibility, sample selection, type of samples) and information management (data collection, how what, communication, reporting what how and whom).

A SWOT analysis was performed on all this and the stakeholder group could give input on the final SWOT analysis, which was used to prioritize surveillance components and development depending on current performance.

Annual planning cycle: board of agriculture communicates the priority in May, if need for evaluation: enter in cycle for next year.

Final reflections:

- Clarifying priorities helps in planning.
- Resource allocation is usually more flexible at the lower levels.

#### **4.2.3 Collaborative surveillance: The Netherlands (Petra Kock, GD, Netherlands)**

The government and the agricultural industry of the Netherlands share the funding of animal health surveillance on a 50-50% basis. In terms of policy making the authorities deal with the EU regulations, mandatory disease requirements and public health, the industry deals with everything else through commodity or so-called agricultural boards. This system stems was set up in 2001 as a result of a collaboration between the industry and the authorities, because they both have an interest in public health and product safety, and the prevention or reduction of calamities.

This system allowed for a change from compulsory to voluntary based disease surveillance.

The agricultural industry includes the producers, the processing industry, and retail. Together with the private veterinary practitioners they form the first line in the Dutch veterinary infrastructure. They are, or are directly linked with, the agricultural boards. The second line is formed by the animal health services (*Gezondheidsdienst voor Dieren: GD*), the third by the reference laboratories from the Central Veterinary Institute (CVI), who both interact directly with the Ministries of Economic Affairs and Public Health and the Food Safety Authorities.

The Netherlands obtain information on the three surveillance objectives, early detection of outbreaks, early detection of new diseases, and trends in animal health and diseases, through proactive and reactive surveillance, pilots, aggregation and interpretation of data. The main sources of information are the farmers and practitioners.

Proactive methods used to obtain information are prevalence studies and the regular observation and collection of health indicators. The methods used for the latter differ between animal sector/producer sector; they can be individual, combined and analyses can be linked to ID number or anonymized; for poultry and pig sectors information is collected through standardized farm visits: use of antibodies and good feedback to stakeholder network.

The reactive methods are voluntary: the first action is taken by the farmer and practitioner. To enhance engagement this action should be rewarding and attractive, for instance through the provision of free specialist advice, diagnosis on individual problems, and feedback on the national situation. The *GD-Veekijker* provides a telephone consultancy, watching for odd cases, meeting with various experts, farm visits and pilot studies are carried out if necessary.

The distribution of information is by e-mail or telephone call to the authorities or steering committee who meet four times a year (i.e. stakeholders including Ministry of Economic affairs, agricultural boards, food safety authority) for policy adjustments, feedback to farmers and practitioners on management and therapy, and during the zoonosis signaling meeting (monthly One Health meeting).

In terms of International Cooperation, several stakeholders are active in international veterinary surveillance networks, and in scanning surveillance. The aims are the exchange of surveillance expertise, information, and to enhance the critical mass.

#### **4.2.4 The known but unexpected: Spain (Marta Martinez, VISAVET, Spain)**

Usually notifiable diseases are under surveillance, but producers might be interested in other diseases. Currently there is a delay in detections of these diseases in the field (the reasons are listed in the slides). Increased field level participation and engagement to notify these diseases is important. Through risk assessment, Spain identified the farms at higher risk; the next step is to communicate that to them. Sentinel surveillance is usually also risk based. For risk based active surveillance, continuing education and training, and public-private partnerships are needed.

So instead of picking up on the unusual events as indication of an outbreak, one should also look for the usual and explicable, because the start of an outbreak most of the time follows a gradual build up with generic symptoms. The aim is to pick up on events and answer the questions about where it is circulating, the probability that it will spread further and the routes of spread.

While monitoring of sentinel farms can be costly (regular sampling for negative results most of the time, time gap), Spain is developing real-time monitoring of sentinel animals. This is done by continuous gathering of data by biosensors (recording changes on motion and temperature as indicators for onset of infection) through thresholds: an alarm to identify suspected cases more timely.

Another system to look for the usual is through the involvement of private labs. Some regions have more than others. Historically there are more submissions for animals privately owned, but now producers become more interested as well. These laboratories work like the GD in the Netherlands: the labs are officially recognized to diagnose notifiable disease, but are run by a network of veterinarians. Based on clinical information, data will be analyzed by the laboratory which can then be accessed by veterinarians, who can filter and monitor what is happening.

This way, atypical but also typical symptoms and typical patterns can be investigated.

Spain also makes use of risk-based contingency plans: this is done for West-Nile in areas with higher risk of introduction. Risk-assessment is also applied to Europe: probability of introduction of H5N1: related to sampling of animals, related to history.

Questions for thought:

- Is passive surveillance enough on its own or should this be enhanced?
- When is active surveillance a cost-effective option and when is it necessary?

## 5 Final workshop discussions

The participants of the workshop raised that together with clear objectives of surveillance an **exit strategy** should be included to decide when surveillance and the related interventions can be downscaled or stopped. Examples are the continued surveillance for Bovine Spongiform Encephalitis (BSE) and costs of Specific Risk Material (SRM) disposal. There is a need for very strong scientific evidence to support a decrease in the intensity of surveillance. The problem of decreasing surveillance for internationally regulated diseases which have a public health and society impact compared to diseases which are only controlled at National level was pointed out. In Sweden surveillance for Bovine Viral Diarrhoea BVD, which is not internationally regulated, has been downscaled and Sweden is developing the process of de-prioritisation and downscaling of surveillance programs. The parallels between the review of surveillance requirements and the review the OIE listed diseases was mentioned. Also the need to link surveillance with intervention was mentioned in this light, using the example of Scrapie where the objective of surveillance was not as clear as for BSE.

Another point of discussion was the need for (more involvement of) **public-private partnerships**. The participants discussed some of the limiting factors and their possible solutions. For example, the industry could be reluctant to increase costs by adding specific surveillance activities, but using existing data, such as submissions to rendering plants, could overcome this. Surveillance systems that do not require cash exchange, i.e. the industry provides low cost data and the government provides the analysis and interpretation, may be the way forward. Public-private partnerships should extend to the level where you use and apply the information that is obtained from surveillance activities. The impact of benefits to industry was also discussed: where surveillance information contributes to the maintenance of existing export markets it is more likely that they will be willing to participate in and share the expense of these surveillance activities. Small scale industries without an existing export market may need government support before they are in a position to share the cost of surveillance.

The need for **evidence** to support the use of different surveillance strategies was raised using the example of **sentinel surveillance**. The group noted that sentinel surveillance was currently being used in Spain for Bluetongue and West Nile disease and in Italy, and Barbara Häsler agreed to provide information about the use of sentinel surveillance from the RISKSUR mapping of surveillance activities in selected European countries. The use of sentinel herds for surveillance, for instance for Bluetongue and West-Nile in European countries is demanding on the **stakeholder**, they are collaborators and should therefore be involved continuously from the start of the design of the system.

For all surveillance systems communication with and the sense of ownership from the stakeholders are very important to reach **stakeholder engagement**. In order to provide feedback to the stakeholder it is important to understand what kind of information they need regularly.

The application of **animal health monitoring**, as it is applied in the Netherlands, i.e. the active and regular collection of a broad range of information, that includes clinical symptoms and production information follow-ups, can serve to assess the health of a herd or population and to monitor the impact of changes in agricultural practices on animal health. It can reassure the producer and other stakeholders that all is well. It also serves as method for early detection; it allowed for example the

identification of Schmallenberg before the causative agent had been identified. The participants highlighted the need for **evidence** about the sensitivity and specificity of passive surveillance to assess whether active health monitoring can enhance early detection.

The participants highlighted that **evaluation of surveillance systems** is not systematically carried out. Both the UK and Sweden were planning to incorporate evaluation into their routine surveillance systems but there was no routine evaluation of surveillance activities carried out presently.

## 6 Conclusions – implications for the development of Best Practice Guidelines

- Avoid duplication of information provided in existing documents (e.g. the new OIE Guide and the RISKSUR design and evaluation frameworks), provide links to these documents when appropriate.
- Consider technical issues including, providing multiple translations, how guidelines will be maintained and updated, embedding links to additional information and providing generic contact e-mail addresses.
- Consider how the guidelines will be disseminated to all countries, how their adoption will be encouraged, the need for implementation teams and co-ordination between these teams.
- Promote the use of surveillance as a marketing tool to demonstrate health status.
- Consider the need for one health guidelines.
- Consider how to achieve a balance between standardization of approaches and flexibility and also between level of detail and international applicability to meet the needs of both international organizations requiring standardization and national authorities in both government and private industry requiring individually tailored cost-effective surveillance strategies.
- Ensure that guidelines cover a range of notifiable, zoonotic, endemic and emerging diseases in a range of different animal production systems and wildlife.
- Clarify the target audience for different parts of the guidelines, one possibility would be a short high level summary focusing on the context and what needs to be done aimed at surveillance policy makers with links to information about how to design, implement, disseminate and evaluate surveillance activities which is aimed at their technical support staff.
- Clarify the content which could include material on the prioritization, design, implementation, dissemination, evaluation and performance monitoring of surveillance including the context, purpose, funding, compensation and governance of surveillance and the importance of linking surveillance with action.
- Include guidance on how to design or evaluate surveillance as well as what needs to be done in order to design or evaluate these activities.
- Consider the importance of stakeholder engagement, establishing private-public partnerships that capitalize on existing data sources, the creation of a multidisciplinary team, including all of those in the livestock sphere and reaching agreement on roles and responsibilities.
- Ensure that the guidelines consider a range of effective surveillance strategies including flexible, output-based strategies, risk-based surveillance and targeting of high risk groups, surveillance approaches to take into account historical disease information.
- Ensure that guidance for the economic evaluation to justify surveillance effort is included, evaluation of the use of different strategies including when animal health monitoring, sentinel or other active surveillance are cost-effective options for early detection, and evidence to support decisions for downscaling or stopping surveillance.
- Consider the need for standardized metrics and terminology and definition of acceptable indicators (e.g. definition of freedom from disease).
- Capitalize on available data sources and tools.



## ANNEXES

### Annex 1 - Program

| Topic  | Format  | Speakers/Facilitators   |
|--|---|---|
| Arrival, coffee  |   |   |
| Welcome, introduction, objectives  | Presentation  | Dirk Pfeiffer<br>Christianne Brusckke<br>Katharina Stärk  |
| Presentation review of existing standards  | Presentation  | Jorge Pinto Ferreira  |
| Strengths, weaknesses, opportunities, threats (SWOT) in existing standards   | Group work  | Facilitators:<br>Ann Lindberg, Barbara Häslér, Katharina Stärk, Dirk Pfeiffer, Gerdien van Schaik |
| Presentations and discussion   | Plenary   | Gerdien van Schaik  |
| Working lunch  |   |   |
| Surveillance landscape in Europe   | Presentation and interactive voting (Turning Point) | Barbara Häslér  |
| Solutions for best practice <ul style="list-style-type: none"> <li>• Enhancing passive surveillance in the UK</li> <li>• Surveillance prioritization and cost-effective delivery: SW</li> <li>• Collaborative surveillance NL</li> <li>• The known but unexpected</li> </ul> | Presentations                                       | Kate Sharpe<br><br>Ann Lindberg<br><br>Petra Kock<br>Marta Martinez                               |
| Discussion   | Plenary   | Katharina Stärk   |
| Closing remarks, next steps  |   | Dirk Pfeiffer   |
| End  |   |   |

### Annex 2 - Participants

| First name  | Family name   | Organisation/Country   |
|-------------|---------------|--|
| Tamás       | Abonyi        | National Food Chain Safety Office, Veterinary Diagnostic Directorate, Hungary                |
| Lis         | Alban         | Danish Agriculture and Food Council, Denmark   |
| Derek       | Armstrong     | Agriculture and Horticulture Development Board, UK   |
| Anoek       | Backx         | Food and Agricultural Organization of the United Nations, Italy                              |
| Silke       | Bruhn         | Bundesamt für Lebensmittelsicherheit und Veterinärwesen, Switzerland                         |
| Christianne | Brusckke*     | Chief Veterinary Officer, The Netherlands  |
| Paolo       | Calistri      | Istituto Zooprofilattico Sperimentale/FAO, Italy   |
| Alain       | Cantaloube    | Fédération Européenne Pour la Santé Animale et la Sécurité Sanitaire, France                 |
| Arianna     | Comin         | Statens Veterinärmedicinska Anstalt, Sweden  |
| Franz       | Conraths      | Friedrich Löffler Institut, Germany  |
| Victor      | del Rio Vilas | Pan American Health Organization   |
| Fernanda    | Dórea         | Statens Veterinärmedicinska Anstalt, Sweden  |
| Christine   | Fourichon     | Nantes Atlantic College of Veterinary Medicine, Food Science and Engineering, ONIRIS, France |
| Nigel       | Gibbens       | Chief Veterinary Officer, United Kingdom   |

| First name     | Family name            | Organisation/Country  |
|----------------|------------------------|---|
| Celine         | Gossner                | European Centre for Disease Prevention and Control, Sweden                |
| John           | Griffin                | Department of Agriculture, Food and the Marine, Ireland                   |
| Barbara        | Haesler*; **           | Royal Veterinary College, United Kingdom                                  |
| Linda          | Hoinville              | Royal Veterinary College, United Kingdom                                  |
| Petra          | Kock                   | GD Animal Health, The Netherlands   |
| Richard        | Irvine                 | Animal and Plant Health Agency, United Kingdom                            |
| Jorun          | Jarp                   | Veterinaerinstitutet, Norway  |
| Bengt          | Larsson                | Swedish Board of Agriculture, Sweden                                      |
| Ann            | Lindberg*; **          | The National Veterinary Institute, SVA, Uppsala                           |
| Caryl          | Lockhart**             | Food and Agricultural Organization of the United Nations, Italy           |
| Kitty          | Maassen                | National Institute for Public Health and the Environment, The Netherlands |
| Marta          | Martinez*; **          | Complutense University of Madrid, UCM, Spain                              |
| Peter          | Melens                 | Animal and Plant Health Agency, United Kingdom                            |
| Christine      | Middlemiss             | Department for Environment, Food and Rural Affairs, United Kingdom        |
| Jarlath        | Oconnor                | Department of Agriculture, Food and the Marine, Ireland                   |
| Julio          | Pinto**                | Food and Agricultural Organization of the United Nations, Italy           |
| Jorge          | Pinto<br>Ferreira*; ** | SAFOSO AG, Switzerland  |
| Marie-Isabelle | Peyre**                | CIRAD, France   |
| Dirk           | Pfeiffer*; **          | Royal Veterinary College, London  |
| Francesco      | Proscia                | Federation of Veterinarians of Europe, Belgium                            |
| Stefaan        | Ribbens                | Dierengezondheidszorg Vlaanderen, Belgium                                 |
| Jolianne       | Rijks                  | Utrecht University, The Netherlands                                       |
| Kate           | Sharpe*                | Department for Environment, Food & Rural Affairs, DEFRA, UK               |
| Katharina      | Stärk**                | SAFOSO AG, Switzerland  |
| Gregorio       | Torres                 | World Organisation for Animal Health                                      |
| Gerdien        | Van Schaik**           | DG Animal Health, The Netherlands   |
| Stephan        | Zips                   | Bundesministerium für Ernährung und Landwirtschaft, Germany               |

(\*=Speaker; \*\*=Facilitator)

### Annex 3 - Detailed SWOT session plan

#### Detailed SWOT session plan

**10:45-12:00** Strengths, weaknesses, opportunities, threats (SWOT) in existing standards

Format: Participants are grouped to maximize diversity, groups should have 6-8 members each; 5-8 groups, each group has a facilitator (Facilitators are: Ann Lindberg, Barbara Häsler, Katharina Stärk, Dirk Pfeiffer, Gerdien van Schaik)

Material: Flip-charts and pens for each group (to be provided locally)

Task: Groups to discuss and agree on

**S**trengths

**W**eaknesses

**O**pportunities

**T**hreats

of current surveillance standards as presented earlier (e.g. OIE, FAO) or others that they use in their own work.

Role of facilitators:

- 0) Agree with co-facilitator on roles (who will take notes?)
- 1) Welcome to group
- 2) Assure confidentiality, i.e. nobody will be personally quoted but all statements can be used
- 3) Initiate round of brief introductions so everybody knows who is present. Specifically: What is their role in relation to surveillance?
- 4) Assure that a presenter is selected before time is over
- 5) Encourage discussion, ask for clarifications if statements are unclear, and ask provocative questions if discussion is not moving. Possible questions to ask are:
  - Have you used any of the existing standards before?
  - If yes, in what way? What was the experience?
  - What are the key challenges in the surveillance programmes they are involved in? Are these addressed in the standards?
  - What are the strengths, weaknesses?
  - How could they be improved? (Opportunities)
  - Are there any negative aspects? (Threats)
- 6) Encourage people who do not say anything to contribute, ask them directly if needed
- 7) Manage dominating personalities, if needed
- 8) Monitor time
- 9) Assure output from group is captured on flip chart and/or other format and prepare for reporting back to plenary

## Annex 4 - Group division

|                      |                             |
|----------------------|-----------------------------|
| <b>Group # 1</b>     |                             |
| <b>Facilitators:</b> | Barbara <b>Häsler</b>       |
|                      | Julio <b>Pinto</b>          |
| <b>Members:</b>      | Lis <b>Alban</b>            |
|                      | Victor <b>del Rio Vilas</b> |
|                      | Peter <b>Melens</b>         |
|                      | Christine <b>Middlemiss</b> |
|                      | Stefaan <b>Ribbens</b>      |
|                      | Stephan <b>Zips</b>         |

|                      |                             |
|----------------------|-----------------------------|
| <b>Group # 2</b>     |                             |
| <b>Facilitators:</b> | Ann <b>Lindberg</b>         |
|                      | Jorge <b>Pinto Ferreira</b> |
| <b>Members:</b>      | Tamás <b>Abonyi</b>         |
|                      | Derek <b>Armstrong</b>      |
|                      | Anoek <b>Backx</b>          |
|                      | Alain <b>Cantaloube</b>     |
|                      | Celine <b>Gossner</b>       |
|                      | Linda <b>Hoinville</b>      |
|                      | Bengt <b>Larsson</b>        |

|                      |                             |
|----------------------|-----------------------------|
| <b>Group # 3</b>     |                             |
| <b>Facilitators:</b> | Dirk <b>Pfeiffer</b>        |
|                      | Marie-Isabelle <b>Peyre</b> |
| <b>Members:</b>      | Fernanda <b>Dorea</b>       |
|                      | John <b>Griffin</b>         |
|                      | Richard <b>Irvine</b>       |
|                      | Jorun <b>Jarp</b>           |
|                      | Jolianne <b>Rijks</b>       |

|                      |                          |
|----------------------|--------------------------|
| <b>Group # 4</b>     |                          |
| <b>Facilitators:</b> | Katharina <b>Stärk</b>   |
|                      | Caryl <b>Lockhart</b>    |
| <b>Members:</b>      | Silke <b>Bruhn</b>       |
|                      | Paolo <b>Calistri</b>    |
|                      | Nigel <b>Gibbens</b>     |
|                      | Francesco <b>Proscia</b> |
|                      | Kate <b>Sharpe</b>       |
|                      | Gregorio <b>Torres</b>   |

|                      |                              |
|----------------------|------------------------------|
| <b>Group # 5</b>     |                              |
| <b>Facilitators:</b> | Gerdien <b>van Schaik</b>    |
|                      | Marta <b>Martinez Aviles</b> |
| <b>Members:</b>      | Franz <b>Conraths</b>        |
|                      | Christine <b>Fourichon</b>   |
|                      | Kitty <b>Maassen</b>         |
|                      | Jarlath <b>Oconnor</b>       |

Annex 5 - Flyer Best Practice Workshop



**best practice**   
**WORKSHOP**  
**animal health surveillance**  
**30 SEPTEMBER 2014**

**WORKSHOP OBJECTIVES**

- To discuss existing **guidelines and standards** for surveillance
- To draft a set of **best practice** guidelines for animal health surveillance
- To **prioritize areas** for improvements according to user needs

**KEYNOTE SPEAKERS**

- Christianne Bruschke CVO (NL)
- Katharina Stärk SAFOSO (CH)
- Kate Sharpe AHVLA (UK)
- Barbara Häsler RVC (UK)
- Ann Lindberg SVA (SE)
- Dirk Pfeiffer RVC (UK)
- Petra Kock GD (NL)



**VENUE**

The Hague, Netherlands  
**Ministerie van Economische Zaken**  
 Bezuidenhoutseweg 73  
 2594 AC Den Haag

For further information and registration, please contact Jorge Pinto Ferreira at [jorge.pinto-ferreira@safoso.ch](mailto:jorge.pinto-ferreira@safoso.ch).



the RISKSUR consortium

Royal Veterinary College (UK) – Norwegian AG CVH – Animal Health and Veterinary Laboratories Agency (UK)  
 Istituto Nazionale di Zooprofilattica (Italy) – Wageningen University (The Netherlands)  
 Food and Agriculture Organization of the United Nations (FAO) – Institut für Tierhygiene (Germany)  
 Swedish Institute for Food and Safety (Sweden) – Swiss Federal Institute for Agricultural and Fisheries Research (Switzerland)



supported by 

## **Annex 6 - Evaluation forms summary (PDF)**

Directly after the workshop the participants were asked to fill out a 1-page evaluation form about the contents and organization of the workshop. Fourteen filled forms were returned. A summary of the evaluation was presented the next day on the Second Annual Meeting of the RISKSUR consortium, held at the premises of GD Animal Health in Deventer, The Netherlands. The presented summary was:

Evaluation form (n=14):

- Overall assessment? Good (7); Very good (4); excellent (3)
- Most useful? Group discussions
- Met your expectations? Yes (7); Somewhat (7)
- Will it be useful? Yes (13)
- Organization? Good (4); Very good (5); Excellent (5)
- Suggestions?
  1. RISKSUR to develop tools for design and evaluation of surveillance programs
  2. RISKSUR to develop guidelines about data security/privacy

Best Practice Workshop  
September 30, 2014  
The Hague, Netherlands



## Evaluation form

1) What is your overall assessment of the workshop?

insufficient   sufficient   good   very good   excellent

2) Which topics or aspects of the workshop did you find most interesting or useful

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

3) Did the workshop meet your expectations?

Yes                      No                      Somewhat

If no, why?

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4) Will the knowledge gained from participation at this workshop be useful/applicable to your work?

Yes                      No                      Somewhat

If no, why?

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5) Please comment on the organization of the workshop

insufficient   sufficient   good   very good   excellent

6) Comments and suggestions

(Including activities or initiatives you think would be useful, for the future)

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**THANK YOU!**



## **Annex 7 - Overview of Review of existing and available guidelines (PDF)**

Presentation by Jorge Pinto Ferreira (SAFOSO, CH), *Pages 25-34*

## **Annex 8 – Presentations (PDFs)**

- Surveillance landscape in Europe (Barbara Häsler, RVC, UK), *Pages 35-57*

### **Solutions for Best Practice:**

- Enhancing passive surveillance in the United Kingdom (Kate Sharpe, AHVLA, UK), *Pages 58-80*
- Surveillance prioritization and cost-effective delivery: Sweden (Ann Lindberg, SVA, Sweden), *Pages 81-97*
- Collaborative surveillance: The Netherlands (Petra Kock, GD, Netherlands), *Pages 98-119*
- The known but unexpected: Spain (Marta Martinez, VISAVET, Spain), *Pages 120-135*



## *The CVO called me and wants a surveillance plan – where do I start?*

### Review of existing standards

Jorge Pinto Ferreira, SAFOSO

#### **Abstract**

In preparation for the Best Practice Workshop, organized by the RISKSUR consortium, on September 30, in Den Haag (NL) a review of existing international animal health surveillance guidelines and standards was performed. The review was conducted based on a practical scenario, imagining that someone would be interested in developing a specific national animal surveillance plan...where to start looking for information?

#### **Materials and Methods**

After consultation with the different RISKSUR consortium members, 13 documents were reviewed, covering a temporal range from 1999-2014 (annex I, table 2). The majority (10/13) of the references were published by different international organizations (OIE, FAO, European Commission, WHO), but some countries (UK, US, Canada) specific guidelines were also considered. Books partially or entirely dedicated to surveillance were beyond the scope of our analysis. Seven of the documents were focused on animal health, and the remaining six on human health.

#### **Results and Discussion**

Different aspects of animal health surveillance are covered in different documents, with each one of them having its own strengths. The “Proposal for a regulation of the European Parliament and the Council of Animal Health” provides the (European) policy framework. The OIE is finalizing a “Guide to Terrestrial Animal Health Surveillance” which can be considered the current key reference document. It needs to be complemented with the other two OIE references (“Terrestrial Animal Health Code”, 2014, and “Manual of Diagnostic Tests and Vaccines for Terrestrial Animals”, 2008). Supplementary guidelines about database design, data storage, data security, data confidentiality and data quality can be found in “Surveillance and Data standards for USDA/APHIS/Veterinary Services” (2006). Topics like, for example, sampling or cost-benefit analysis, are mentioned in different documents (please refer to table 1), but additional references have to be consulted for detailed technical guidance. While a general introduction about surveillance can be found in different references, specific topics such as, for example, risk-based surveillance are only briefly covered. There is a lack of information on how to disseminate the surveillance results. Also, none of the documents addresses the fundamental question of how a surveillance system can or should be funded.

#### **Conclusion**

At the moment, there is not a single document, that can, by itself, provide all the guidelines and standards that someone interested in developing an animal health surveillance plan would be looking for. The specific issue of funding/cost-sharing is not covered by any of the documents.

**Table 1:** Different topics to be considered when developing a surveillance plan, and overview of where in the reviewed references they are covered.

| Topics                           | References |   |   |   |   |   |   |   |   |   |   |   |   |
|----------------------------------|------------|---|---|---|---|---|---|---|---|---|---|---|---|
|                                  | a          | b | c | d | e | f | g | h | i | j | k | l | m |
| <b>Design and Implementation</b> |            |   |   |   |   |   |   |   |   |   |   |   |   |
| • General intro.                 |            | ✓ | ✓ |   |   | ✓ | ✓ |   | ✓ | ✓ |   |   | ✓ |
| • Policy framework               |            |   |   |   |   |   |   |   |   |   |   | ✓ |   |
| • Sampling                       |            |   |   | ✓ |   |   |   |   |   | ✓ |   |   | ✓ |
| • Data collection and proces     |            |   |   | ✓ |   | ✓ | ✓ |   | ✓ |   |   |   | ✓ |
| • Early warning                  | ✓          |   |   |   |   |   |   |   |   |   |   | ✓ |   |
| • Event-based                    |            |   |   |   |   |   |   |   |   |   |   | ✓ |   |
| • Risk-based                     |            |   |   |   |   |   |   |   |   |   |   |   | ✓ |
| • Terminology                    |            | ✓ |   | ✓ |   |   |   |   | ✓ |   |   |   | ✓ |
| • Case examples                  |            | ✓ |   |   | ✓ | ✓ |   | ✓ |   |   |   |   |   |
| • Modelling                      |            |   |   |   |   |   |   |   |   |   |   |   | ✓ |
| • Funding                        |            |   |   |   |   |   |   |   |   |   |   |   |   |
| <b>Assessment and Evaluation</b> |            |   |   |   |   |   |   |   |   |   |   |   |   |
| • Quality attributes             |            |   | ✓ |   |   |   |   |   |   |   |   | ✓ | ✓ |
| • Cost-effectiveness/benefit     |            |   |   |   |   |   |   |   |   |   |   |   | ✓ |
| <b>Dissemination</b>             |            |   |   |   |   |   |   |   |   |   |   |   |   |
| • Stakeholders mapping           |            |   |   |   |   | ✓ |   |   |   |   |   |   | ✓ |
| • Communication of results       |            |   |   |   |   | ✓ |   |   |   |   | ✓ |   | ✓ |

<sup>a</sup> Manual on the preparation of national disease emergency plans (FAO, 1999); <sup>b</sup> WHO recommended Surveillance Standards (WHO, 1999); <sup>c</sup> Good Practice in Occupation Health Services: A contribution to Workplace Health (WHO Europe, 2002); <sup>d</sup> Surveillance and Data Standards for USDA/APHIS/Veterinary Services (Centers for Epidemiology and Animal Health, 2006); <sup>e</sup> Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (OIE, 2008); <sup>f</sup> Technical Guidelines for Integrated Disease Surveillance and Response in the African Region (WHO, CDC, 2010) <sup>g</sup> Best Practices for surveillance of health care-associated infections in patient and resident populations (Ontario Agency for Health Protection and Promotion, 2011); <sup>h</sup> Challenges of animal health information systems and surveillance for animal diseases and zoonoses (FAO, 2011); <sup>i</sup> Public Health Surveillance – Towards a Strategy for Public Health England (DH PHE Transition Team, 2012); <sup>j</sup> Terrestrial Animal Health Code: Volumes I & II (OIE, 2014); <sup>k</sup> Early detection, assessment and response to acute public health events: Implementation of Early Warning and Response with a focus on Event-Based Surveillance (WHO, 2014); <sup>l</sup> Proposal for a regulation of the European Parliament and of the Council on Animal Health (EC, 2014); <sup>m</sup> Guide to Terrestrial Animal Health Surveillance (OIE, 2014)



## ANNEX I

### TABLE 2: OVERVIEW OF THE STRENGTHS AND LIMITATIONS OF THE REVIEWED DOCUMENTS



| Year | Author (s) | Title  | Description/Contents  | Strengths                               | Limitations   |
|------|------------|--|---|---|---|
| 1999 | FAO        | <b>Manual on the preparation of national animal disease emergency preparedness plans</b> | <p>Introduction</p> <p>Chapter 1: A coordinated national approach to animal disease emergency preparedness planning</p> <p>Chapter 2: Organization of veterinary services during an animal disease emergency programme</p> <p>Chapter 3: Risk Analysis as a component of animal disease emergency preparedness planning</p> <p>Chapter 4: Early warning contingency planning (inc. <i>disease surveillance</i>)</p> <p>Chapter 5: Early reaction contingency planning – principles and strategies</p> <p>Chapter 6: Contingency plans</p> <p>Chapter 7: International Collaboration</p> |   | <p>Very small section on “disease surveillance”, only mentioning active and passive surveillance</p> <p>Outdated (1999)</p> |
| 1999 | WHO        | <b>WHO Recommended Surveillance</b>  | Brings together WHO recommended standards for the   | Provides specific guidelines for a wide | Human oriented  |



| Year | Author (s)                                      | Title  | Description/Contents   | Strengths  | Limitations  |
|------|---|--|--|--|--|
|      |   | <b>Standards. Second edition</b>   | surveillance of communicable diseases  | variety of (human) diseases  | Outdated (1999)  |
| 2002 | WHO Regional Office for Europe                  | <b>Good Practice in Occupation Health Services: A Contribution to Workplace Health</b> | Provides guidance for good practice in performance of Occupational Health Services and for quality performance in contribution of occupational health professionals to occupational health objectives in clinical enterprises and organizations. It is with the aim to address primarily the perspective of safety.                                |  | Human oriented<br>Health surveillance is only very briefly mentioned |
| 2006 | Centers for Epidemiology and Animal Health (US) | <b>Surveillance and Data Standards for USDA/APHIS/Veterinary Services</b>              | Roadmap towards achieving, through standardization, the accurate, valid and representative surveillance data required for a comprehensive and integrated surveillance system<br><br>- Chapter 1: standards and guidelines<br><br>- Chapter 2: standards for data categories and classes<br><br>- Chapter 3: standards for data storage and quality | Provides very clear actual guidelines<br><br>Has an entire chapter about data concepts and data classes and another one about database design, data storage, data security, data confidentiality, data quality | US oriented<br><br>Small glossary section                            |



| Year | Author (s)  | Title  | Description/Contents   | Strengths   | Limitations  |
|------|---|--|--|---|--|
| 2008 | OIE   | <b>Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (mammals, birds and bees), 6<sup>th</sup> edition, vol. 1</b> | Provides detailed information about the diagnostic tests and vaccines available for a wide range of diseases   | Useful complement resource for someone developing surveillance systems, looking for guidance on diagnosis   | The sampling chapter is not available<br><br>Does not provide surveillance guidelines or standards |
| 2010 | WHO, CDC  | <b>Technical guidelines for Integrated Disease Surveillance and Response in the African Region</b>                               | Updates existing information, includes other priority diseases, conditions and public health events and incorporates aspects of the International Health Regulations (IHR) that deal with disease surveillance | Provides specific guidelines, with the info divided in 9 logical sequential sections<br><br>Available in English, French and Portuguese<br><br>Zoonotic and Food Safety threats are mentioned (p. 27) | Limited to Africa  |
| 2011 | Ontario Agency for Health Protection and Promotion, Provincial Infectious Diseases Advisory Committee | <b>Best practices for surveillance of health care-associated infections in patient and resident populations</b>                  | Provides hospitals and long-term care homes with recommended best practices for the establishment of a surveillance system to detect health care-associated infections (HAIs) within their facility.           | Provides guidance for each of the building blocks of a surveillance system including planning, data collection, interpretation, analysis and communication  | Human oriented, without reference to animal health/zoonosis  |



| Year | Author (s)             | Title  | Description/Contents  | Strengths   | Limitations   |
|------|------------------------|--|---|---|---|
| 2011 | FAO                    | <b>Challenges of animal health information systems and surveillance for animal diseases and zoonoses (Proceedings of the international workshop organized by FAO, 23-26 November 2010)</b> | Summarizes the conference participants`discussions on surveillance and information systems, and explores issues raised in the presentations. The focus is on the operation, characteristics, objectives, conceptual design, needs and future directions for national, regional and global animal health surveillance and information systems. | Several (successful) surveillance case/country/network examples are presented | Only an overall description of the case examples is given, without getting into the details<br><br>"Participants recognized that an ongoing process to evaluate and improve objectives, standards and capacity-building for effective surveillance systems at every level is necessary" |
| 2012 | DH PHE Transition Team | <b>Public Health Surveillance- Towards a Strategy for Public Health England</b>  | Provides an overview of the vision, rationale and plans for delivery of a surveillance strategy for Public Health England, as part of Public Health England`s broader information strategy. It also sets out the key benefits and challenges in delivering such a strategy.<br><br>(similar to the 2011 Ontario doc.)                         | Several concepts of a surveillance framework are presented                    | Human oriented, without reference to animal health/zoonosis<br><br>Doesn`t necessarily provide guidelines or standards  |



| Year | Author (s) | Title  | Description/Contents   | Strengths   | Limitations   |
|------|------------|--|--|---|---|
| 2014 | OIE        | <b>Terrestrial Animal Health Code:<br/>Volume I (general provisions) &amp;<br/>Volume II (recommendations<br/>applicable to OIE listed diseases<br/>and other diseases of importance<br/>to international trade)</b> | <p>Sets out standards for the improvement of terrestrial animal health and welfare and vph worldwide, including through standards for safe international trade in terrestrial animals (mammals, birds and bees) and their products</p> <p>Section 1: Animal disease diagnosis, surveillance and notification</p> <p>Section 2: Risk analysis</p> <p>Section 3: Quality of veterinary services</p> <p>Section 4: General recommendations: Disease prevention and control</p> <p>Section 5: Trade measures, import/export procedures and veterinary certification</p> <p>Section 6: VPH</p> <p>Section 7: Animal Welfare</p> | <p>Reference document that provides international surveillance standards and guidelines.</p> <p>Vol. II specifically addresses diseases of different species: Apidae, Aves, Bovidae, Equidae, Leporidae, Caprinae, Suidae and “multiple species”.</p> | Some of the generic concepts/sections (eg. sampling) are only briefly mentioned, lack of detail |





| Year     | Author (s)          | Title  | Description/Contents   | Strengths  | Limitations   |
|----------|---------------------|--|--|--|---|
| 2014     | WHO                 | <b>Early detection, assessment and response to acute public health events: Implementation of Early Warning and Response with a focus on Event-Based Surveillance</b> | Goal of the document: to provide national health authorities, and stakeholders supporting them, with guidance for implementing or enhancing the all-hazards Early Warning and Response (EWAR) within national surveillance systems   | A brief reference is made to veterinary services   | Human oriented, specifically focused on event-based surveillance (EBS) and early warning and response (EWAR)                    |
| 2014 (?) | European Commission | <b>Proposal for a regulation of the European Parliament and of the Council on Animal Health</b>  | Part I: General Rules<br>Part II: Notification, Surveillance, Eradication Programs, Disease Freedom<br>Part III: Disease Preparedness, Awareness and Control<br>Part IV: Requirements Concerning Registration, Approval, Traceability and Movements<br>Part V: Entry into the Union and Export<br>Part VI: Emergency Measures<br>Part VII: Final and Transitional Provisions | Provides the "European Animal Surveillance Policy Framework"<br><br>Mentions the 25 Council Directives, 3 Council Decisions and 3 regulations that currently laid down the Union animal health rules | The surveillance section is only a small part of the 255 pages and specific standards and guidelines are not necessarily given. |
| 2014 (?) | OIE                 | <b>Guide to Terrestrial Animal Health Surveillance</b>   | "Intended to facilitate the appropriate design,  | Reference document, to be used in  | Small sections (2.15; 3.4.3) on cost-   |



| Year | Author (s) | Title | Description/Contents   | Strengths   | Limitations  |
|------|------------|-------|--|---|--|
|      |            |       | implementation and evaluation of animal health surveillance systems”<br><br>Chapter 1: Introduction<br><br>Chapter 2: Critical components in the design and implementation of a surveillance system<br><br>Chapter 3: Performance: assessment and evaluation of surveillance systems<br><br>Chapter 4: Data sources<br><br>Chapter 5: Tools and applications | conjugation with the OIE “Terrestrial Animal Health Code” and the OIE “Manual of Diagnostic Tests and Vaccines for Terrestrial Animals” | effectiveness and funding<br><br>Terminology<br><br>Attributes |

Additional bibliography:

- i. “Animal Disease Surveillance and Survey Systems: Methods and Applications”, M.D. Salman, 2003
- ii. “Surveillance épidémiologique en santé animale”, Barbara Dufour et Pascal Hendrikx, 3rd ed., 2011



# The surveillance landscape in Europe

Barbara Häslér, B. Bisdorff, A. Brouwer, A. Comin, F.C. Dórea, J. Drewe, J. Hardstaff, L. Hoinville, A. Lindberg, S. Molia, M. Peyre, J. Pinto-Ferreira, V. Rodríguez-Prieto, J. Rushton, G. van Schaik, B. Schauer, C. Staubach, N. Taylor, M. Vicente, G. Witteveen, other RISKSUR consortium members, D. Pfeiffer



One World, One Health, One Surveillance?

One Surveillance, One Budget?

Which surveillance option is the most **effective**?  
Which surveillance option is the most **cost-effective**?

**Who pays, who gains?** Who should bear the costs? Who benefits from surveillance? Is surveillance a public or private good?

## Questions often encountered

Is my surveillance **good** (enough)? How can I **improve** my surveillance?

Is surveillance **worth** it? Should we do surveillance?

**Where** should we focus our surveillance efforts?

## Economics of surveillance

- Economic efficiency – resource allocation
  - Optimisation, acceptability, least-cost criteria
- Comparison of benefits or outcomes (e.g. production losses avoided, human disease avoided, ability to trade, reputation) with costs of surveillance
- Prioritisation
- Understanding of the system and human behaviour (→ risk factors)

## Aim and objectives

To **characterise the context** within which **the development of animal health surveillance and evaluation frameworks and tools occurs**

By describing

- existing public and private surveillance systems (including sources of finance) for all species
- animal populations, trade flows and critical infrastructure
- how decisions about the allocation of resources to animal health surveillance are currently made

## Data collection

- **13 Countries:** Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Great Britain, Ireland, Italy, the Netherlands, Spain, Sweden, and Switzerland
- **Sources:**
  - Scientific literature, internet pages, government reports, national statistics
  - EU Trade Control and Expert System, Eurostat
  - Interviews with decision-makers in 7 countries
- **Surveillance data:**
  - Public and private surveillance systems, all threats, types and species
  - Data collated to characterise these systems
- **Population and economic data:** livestock and bee holdings in Europe, human and animal populations, gross domestic product, farm values
- **Infrastructure data:** slaughterhouses, livestock markets, traders, transporters, feedmills, laboratories, veterinarians



## Surveillance system components: Purpose and species

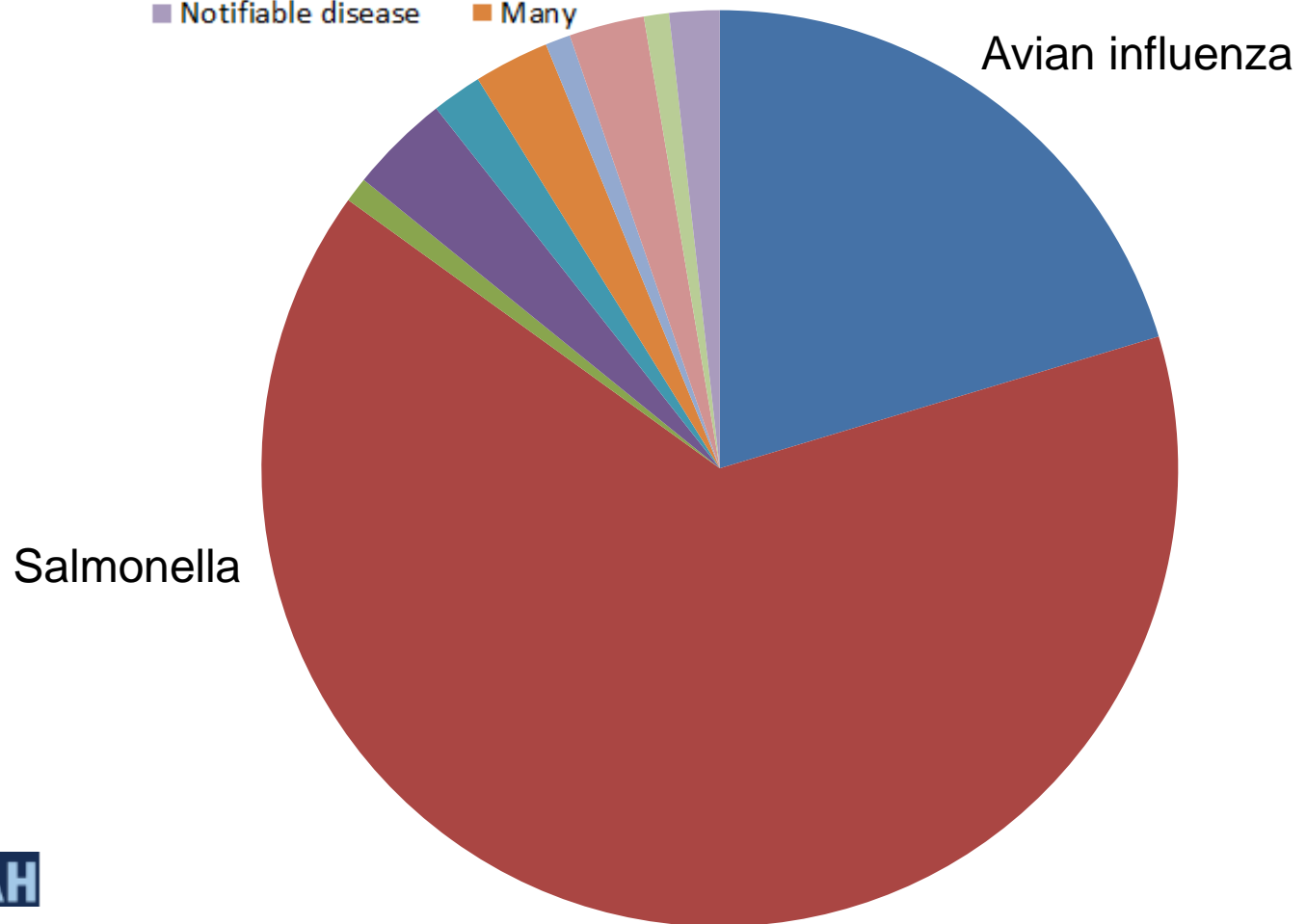
- 798 enhanced passive and active SSC recorded
- Main purposes:
  - 1) Early detection/warning
  - 2) To detect cases to allow specific action to be taken to facilitate control or eradication
  - 3) Surveillance to substantiate freedom from disease or infection
- Most frequently targeted species:
  - 1) Cattle (23%)
  - 2) Pigs (16%)
  - 3) Poultry (14%)

## Surveillance system components: hazards

- Most frequently recorded:
  - Salmonellosis (16%)
  - Brucellosis (10%)
  - Avian influenza (8%)
  - Classical swine fever (4%)
  - Bovine tuberculosis (4%)
  - Bluetongue (4%)
  - Bovine spongiform encephalitis (2.5%)

# Poultry components

- Mycoplasma
- Newcastle disease
- Emerging disease
- Notifiable disease
- Tuberculosis
- Campylobacter
- Coccidiosis and clostridiosis
- Many



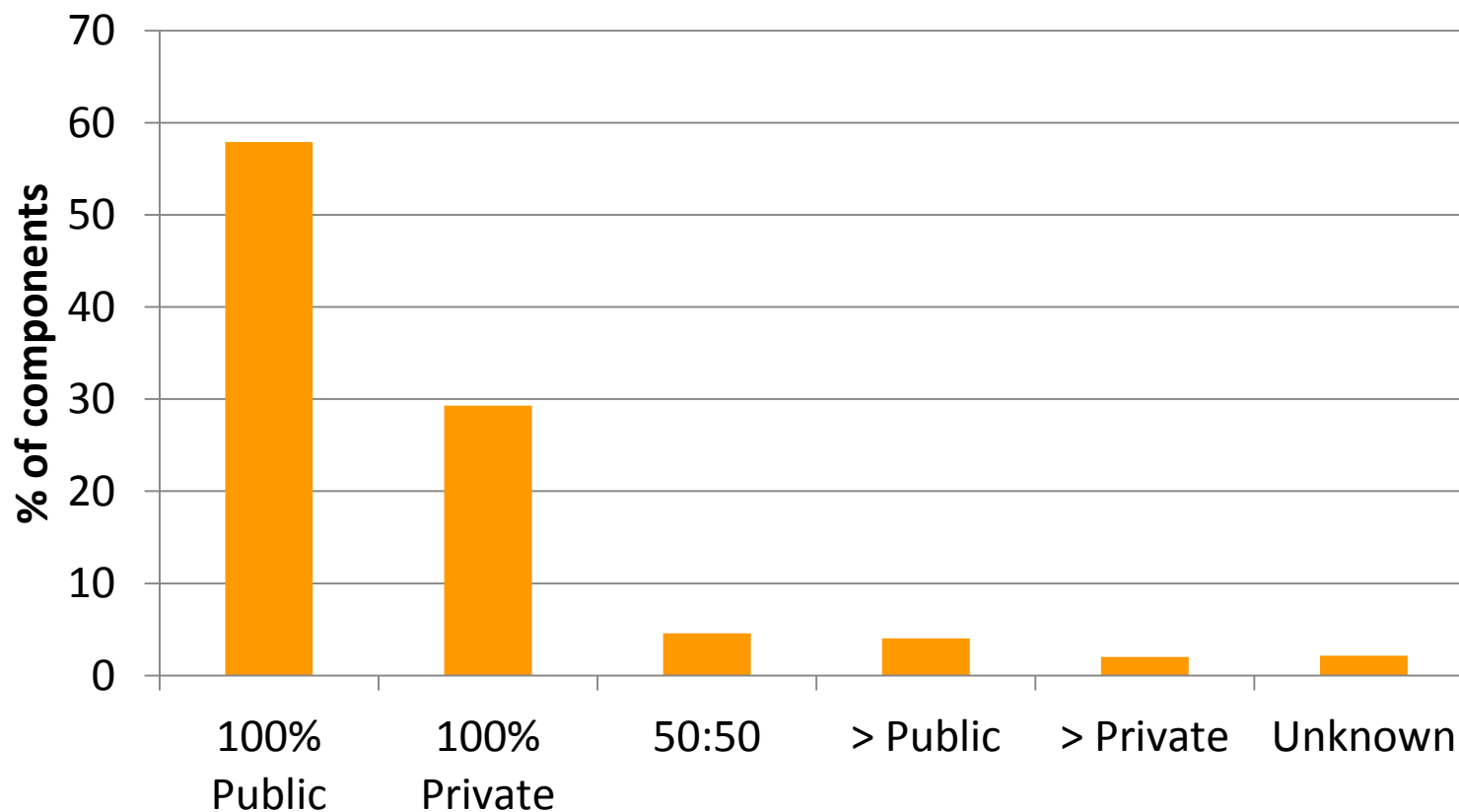
How much does  
surveillance cost in  
these countries?

## Surveillance system components: Expenditures

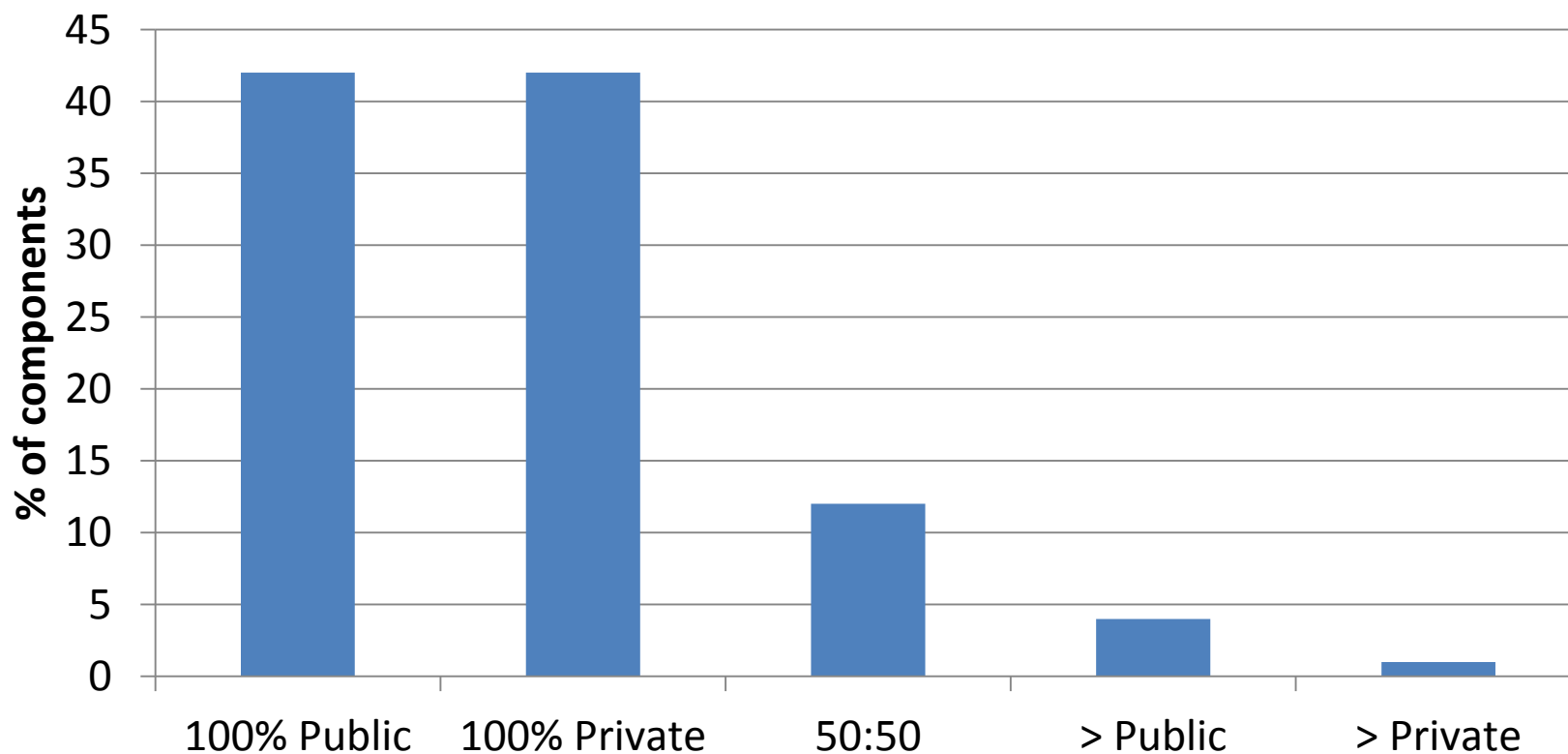
| Species            | C1          | C2            | C3            | C4           | C5           | C6           | C7           | C8         | C9         | C10         | C11           | C12          | C13         |
|--------------------|-------------|---------------|---------------|--------------|--------------|--------------|--------------|------------|------------|-------------|---------------|--------------|-------------|
| All species        |             | 0/1           | 0/1           |              |              |              | 1/6          |            |            | 0/2         | 0/1           | 0/1          |             |
| Avian <sup>a</sup> |             |               |               |              |              | 0/1          | 2/2          |            |            | 0/1         |               |              | 0/2         |
| Bees               |             | 0/1           |               |              |              |              |              |            |            |             | 1/2           |              |             |
| Cattle             | 2/7         | 1/20          | 8/28          | 7/12         | 5/11         | 12/23        | 7/29         | 0/1        | 3/4        | 0/13        | 1/11          | 2/13         | 0/15        |
| Equidae            |             | 0/7           | 0/6           | 1/3          |              | 0/2          |              |            |            |             | 2/11          | 0/6          |             |
| Fish               |             |               |               |              |              |              |              |            |            |             |               |              |             |
| Insect vectors     |             |               |               |              |              |              |              |            |            |             |               |              |             |
| Multi              |             |               |               |              |              |              |              |            |            |             |               |              |             |
| Other              |             |               | 0/10          | 0/1          |              | 2/2          |              |            |            |             | 4/26          | 3/12         |             |
| Pigs               | 0/2         | 2/24          | 0/12          | 2/7          | 0/6          | 6/18         | 6/14         |            | 0/1        | 0/2         | 0/15          | 3/16         | 0/11        |
| Poultry            | 0/8         | 5/18          | 5/10          | 0/1          | 0/4          | 3/16         | 6/9          |            | 0/1        | 0/12        | 0/14          | 4/10         | 0/9         |
| Ruminants          |             | 1/3           | 2/4           |              | 3/3          | 0/1          | 0/2          |            |            | 0/1         | 0/3           | 1/2          |             |
| Small Ruminants    | 0/2         | 2/10          | 8/17          | 2/6          | 2/4          | 7/8          | 4/8          |            | 1/1        | 0/8         | 2/17          | 5/10         | 0/3         |
| Wildlife           |             | 3/15          | 2/5           | 1/3          | 0/1          | 5/7          | 1/1          |            |            | 0/5         | 0/9           | 0/6          |             |
| <b>TOTAL</b>       | <b>2/19</b> | <b>15/121</b> | <b>26/109</b> | <b>14/37</b> | <b>10/32</b> | <b>38/88</b> | <b>32/78</b> | <b>0/3</b> | <b>5/8</b> | <b>0/52</b> | <b>11/117</b> | <b>18/94</b> | <b>0/40</b> |

171/798 components with cost estimate = 21%

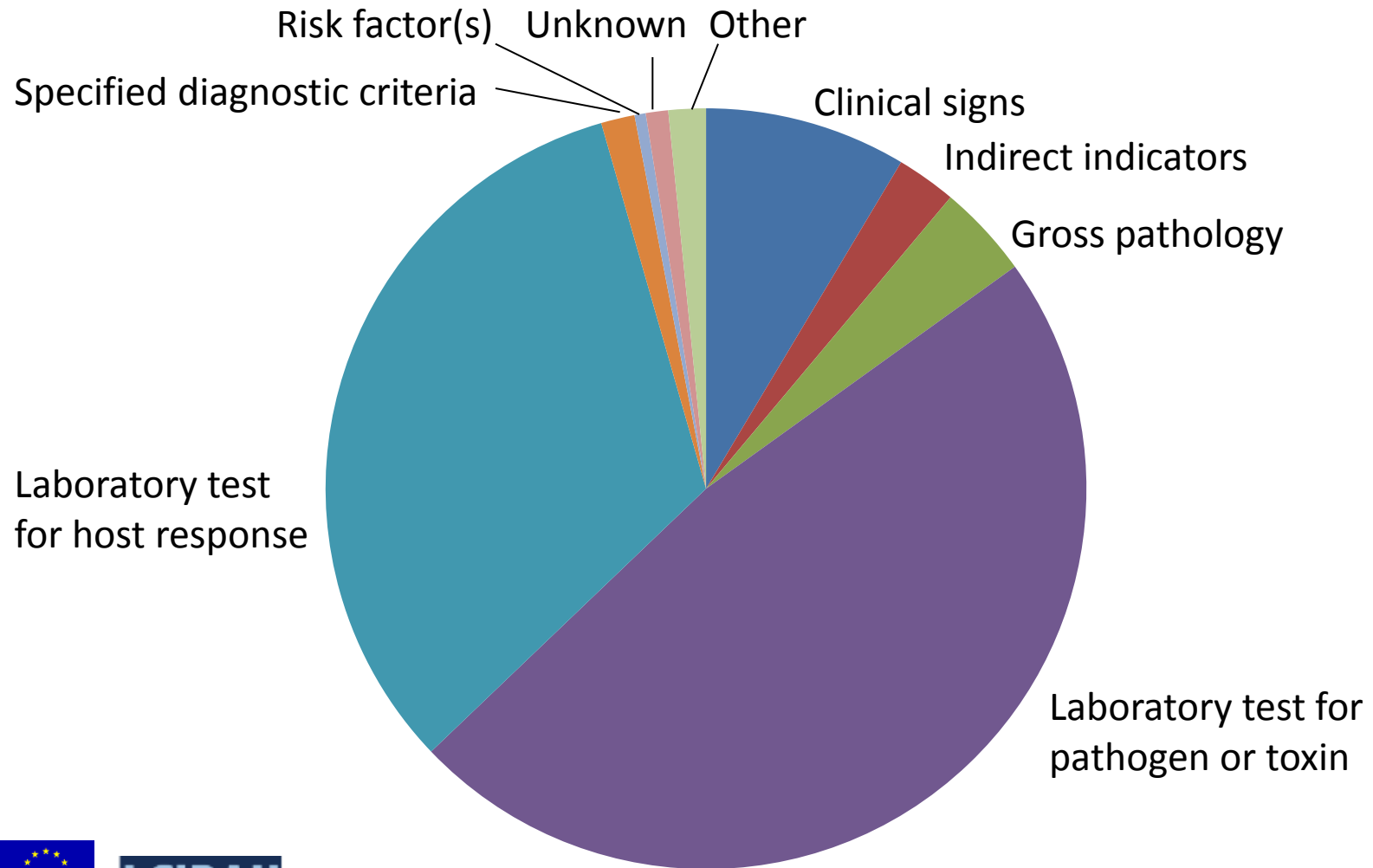
## Surveillance system components: Private or public funding



## Surveillance system components: Private or public funding – poultry only



## Surveillance system components: Case definition





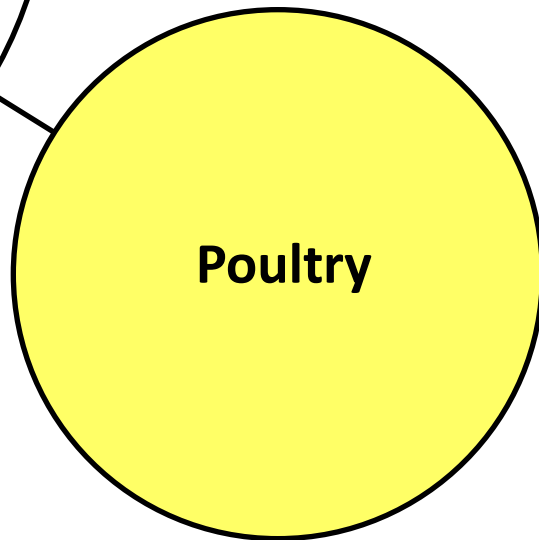
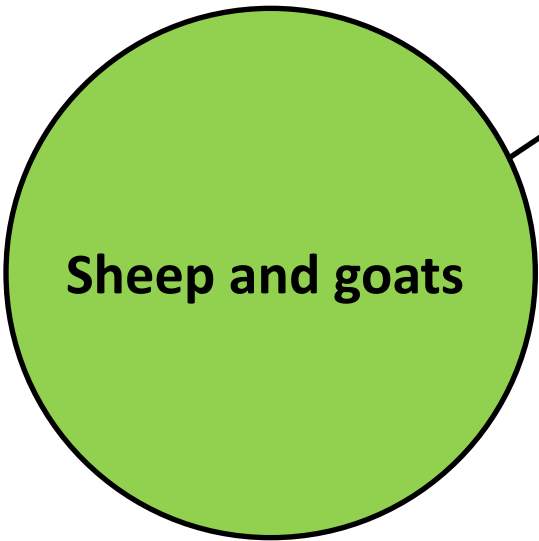
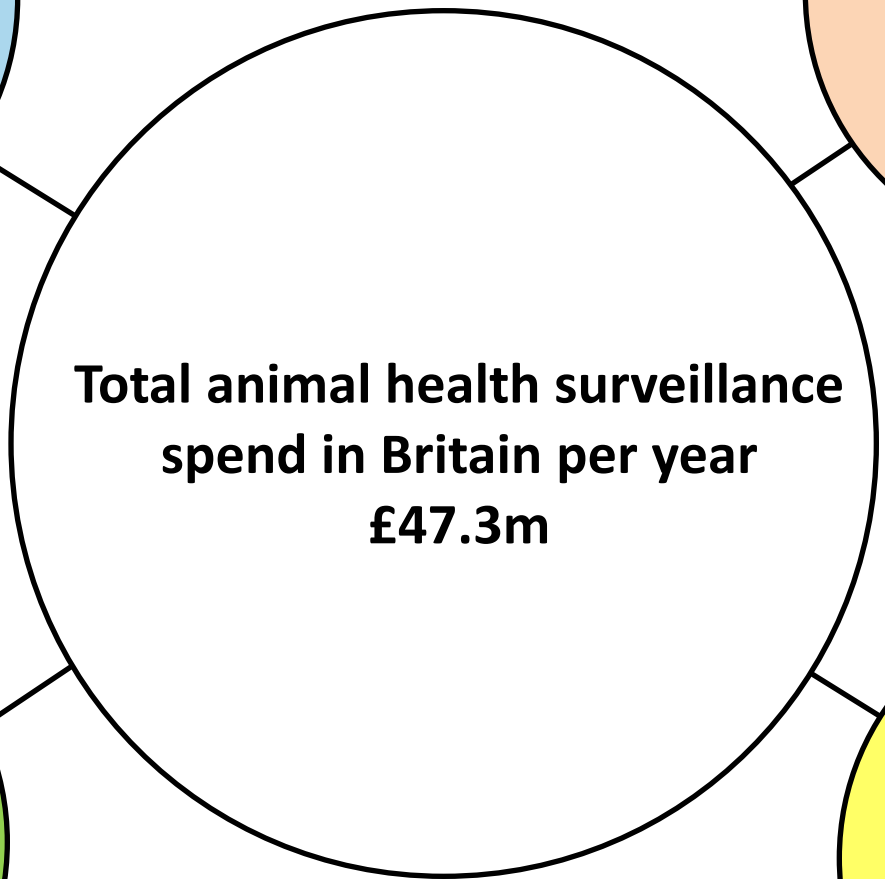
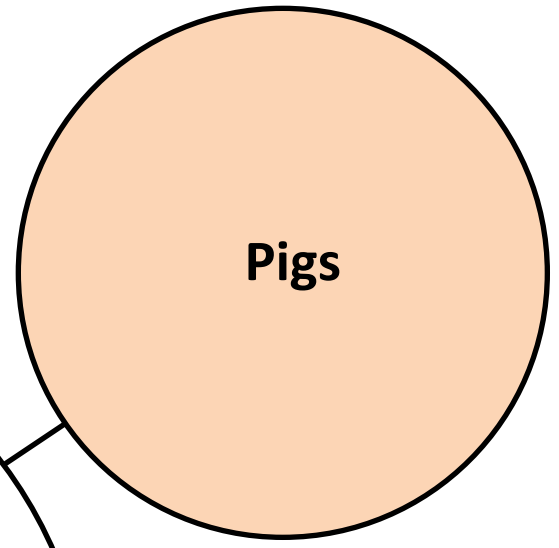
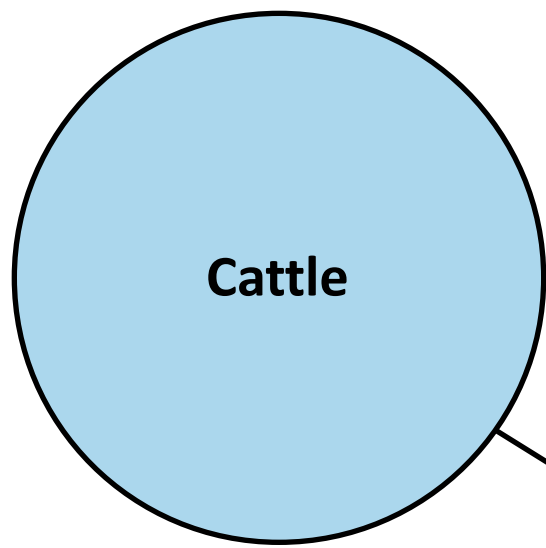
**Total animal health surveillance  
spend in Britain per year  
£47.3m**

## Paper

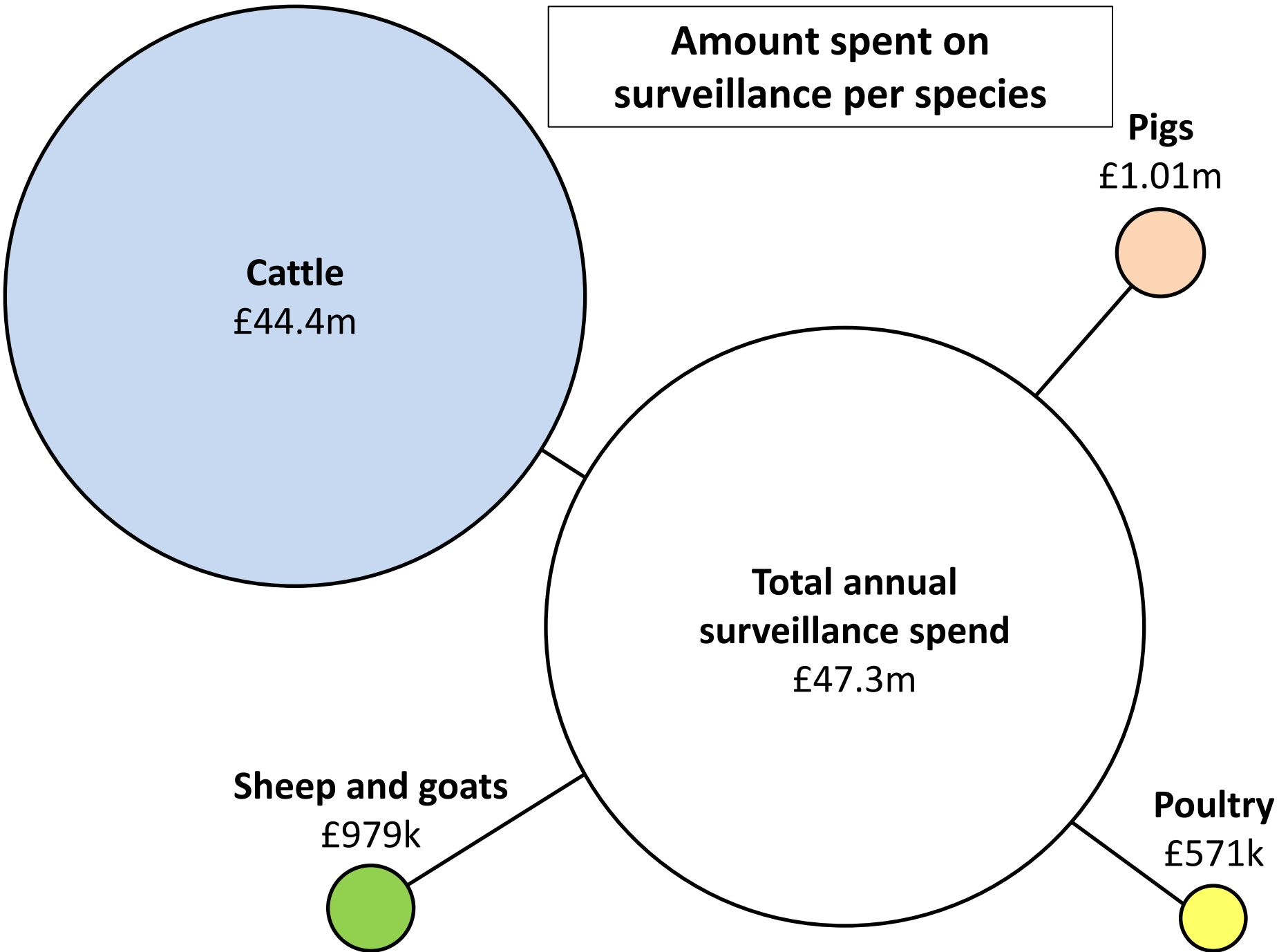
**Assessing the expenditure distribution of animal  
health surveillance: the case of Great Britain**

Veterinary Record  
(2014) 174, 16

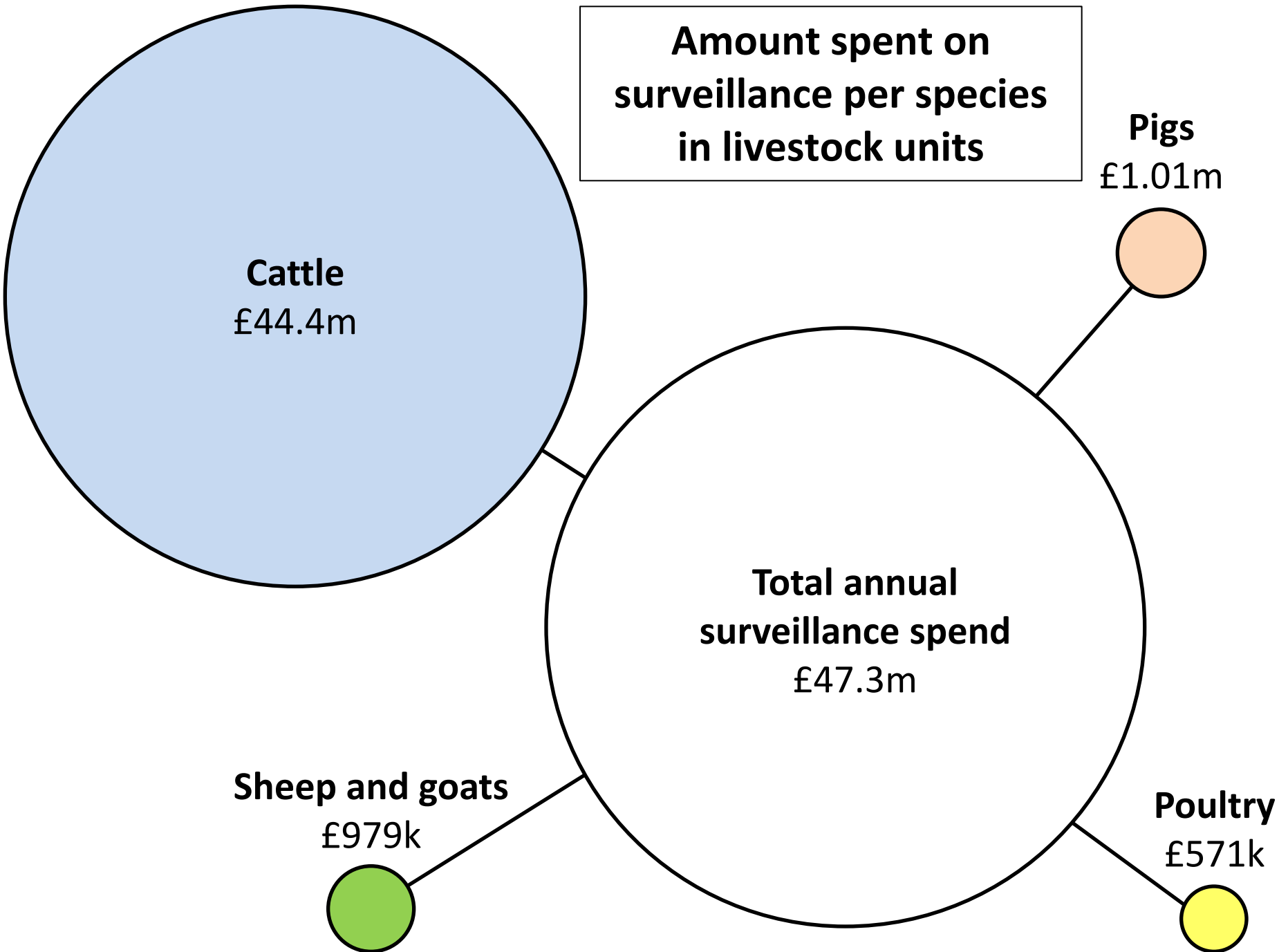
J.A. Drewe, B. Häsler, J. Rushton, K. D. C. Stärk



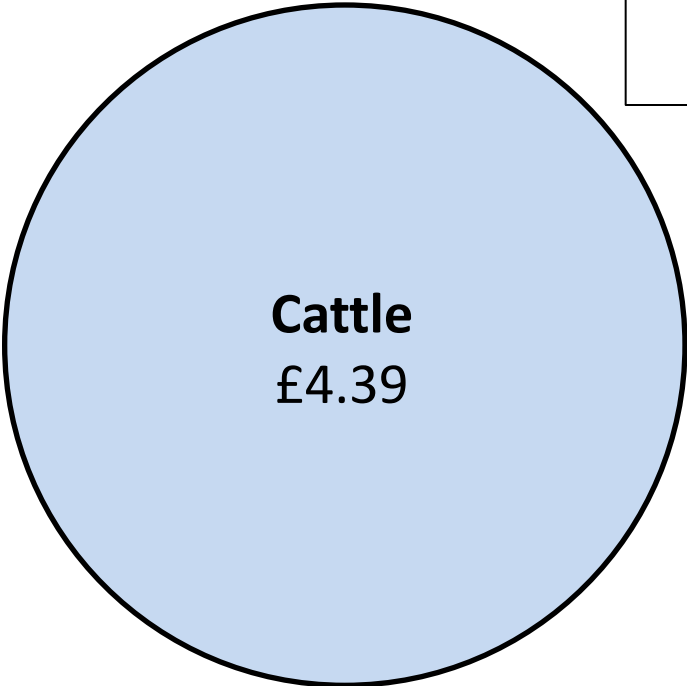
**Amount spent on surveillance per species**



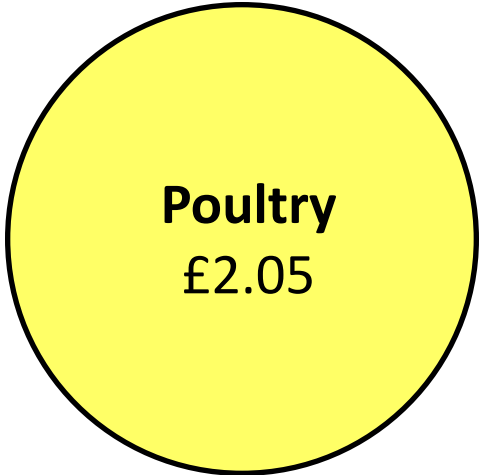
**Amount spent on  
surveillance per species  
in livestock units**



**Amount spent on surveillance per  
standardised livestock unit**



**Sheep and goats**



# Comparison to economic value

- Surveillance expenditure in proportion to the economic contribution of each species to the UK economy?
- Surveillance expenditure by species compared to the economic value of each livestock sector

| Livestock sector | UK population size<br>in 2011 |
|------------------|-------------------------------|
| Cattle           | 9,933,000                     |
| Sheep and goats  | 31,722,000                    |
| Pigs             | 4,441,000                     |
| Poultry          | 162,551,000                   |

## Decision-maker interviews

- Multitude of private-public partnerships
- Single most important decision criteria influencing surveillance
  - International legal requirement (including EU obligations)
  - National legal requirement
  - Cost-benefit measure, cost-effectiveness measure, and expected costs
  - Disease situation in the country
  - Impact related criteria
- Various needs for further information identified (e.g. epidemiological and economic information)

## Opportunities

- Cost data an important element in understanding and informing resource allocation
- Data not easily accessible or available
- Practical cost calculation tool for surveillance
- Comparison of the economic value of livestock units to on-going surveillance efforts and the associated resource use
- Surveillance focusing on novel areas, in particular health-event based surveillance
- Making use of private-public partnerships



## Acknowledgments

- This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No 310806
- Leverhulme Centre for Integrative Research on Agriculture and Health
- Data providers
- RISKSUR consortium

### **Royal Veterinary College [www.rvc.ac.uk](http://www.rvc.ac.uk)**

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# Enhancing passive surveillance in the UK

**Kate Sharpe**

BVetMed, MSc (VetEpi), MRCVS

Head of Surveillance Intelligence Unit

AHVLA

# Overview

## Background

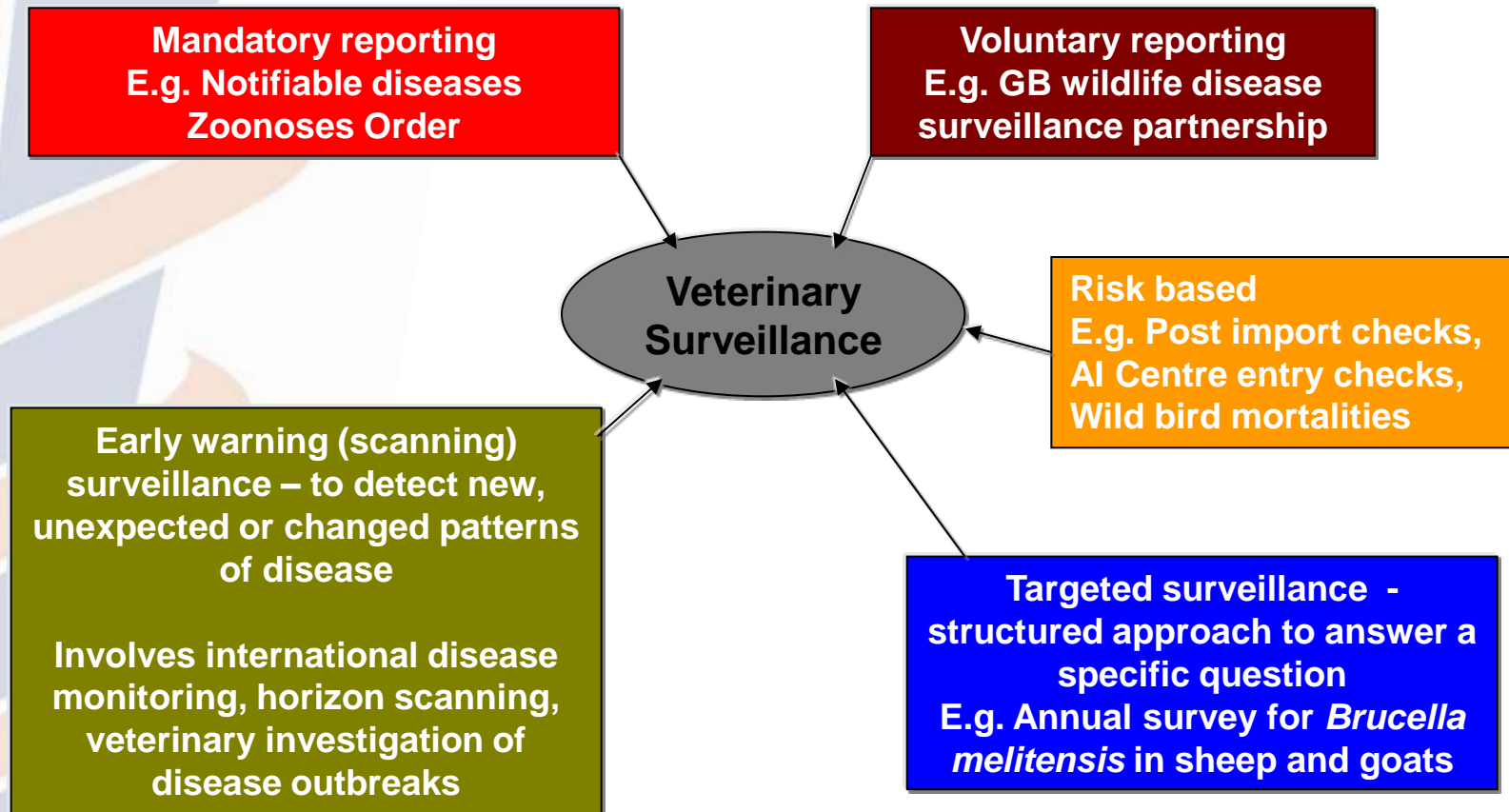
- Past surveillance system
- Drivers for change

## New surveillance model

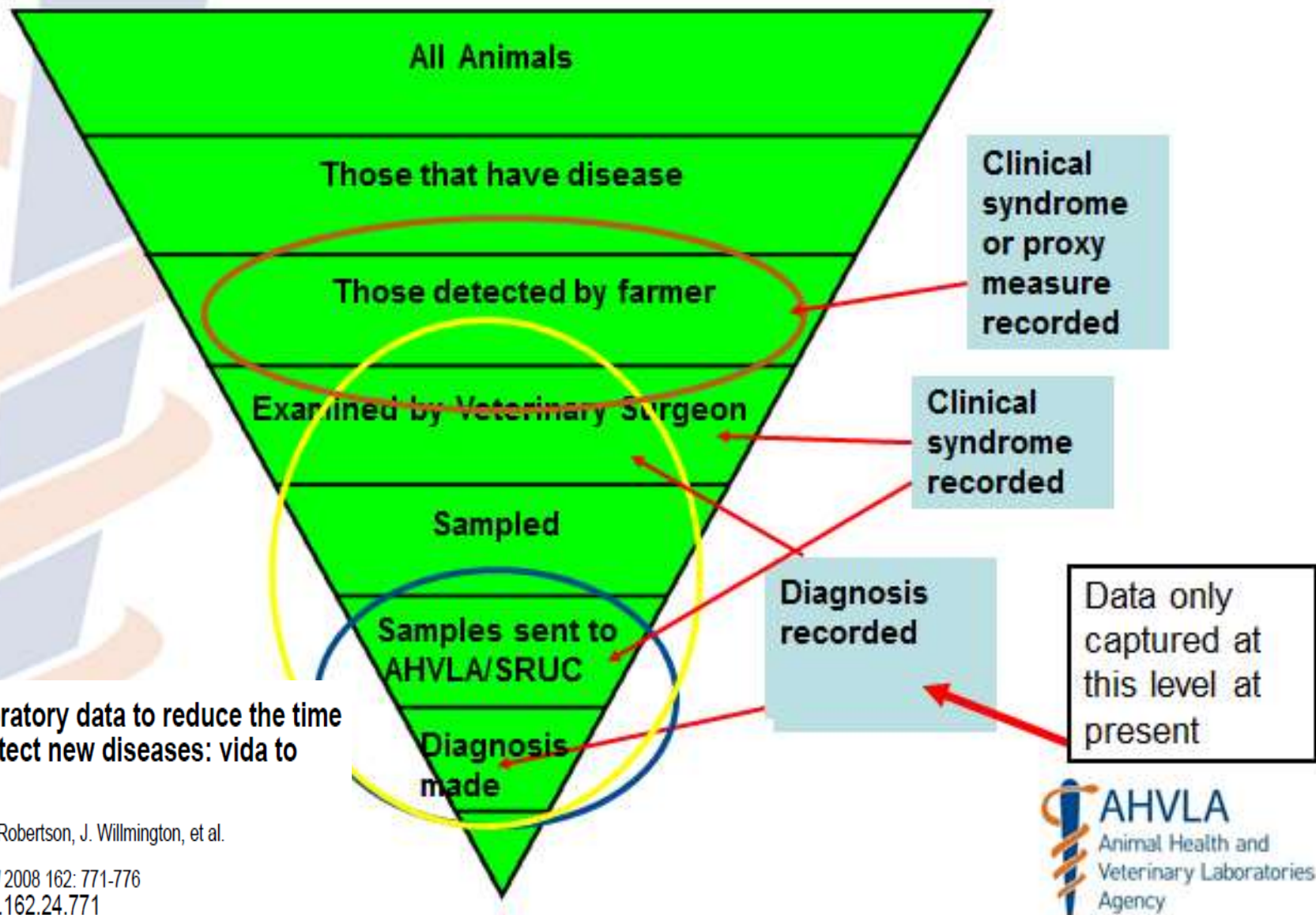
- Progress
- Challenges

## Future developments

# Surveillance in the UK



## Scanning Surveillance – the pyramid of surveillance



Use of laboratory data to reduce the time taken to detect new diseases: video to mFile

Gibbens, S. Robertson, J. Willmington, et al.

*Veterinary Record* 2008 162: 771-776  
10.1136/vr.162.24.771

# Opportunities to improve scanning surveillance

Identified through a number of reports

- To improve coverage and representativeness of the surveillance system
- To widen the surveillance network to include private practitioners and other PME providers
- To increase intelligence exchange between Government, vets and the livestock industry, with surveillance being seen as a shared responsibility.
- To enable the development and maintenance of expertise of all those working within the surveillance system.

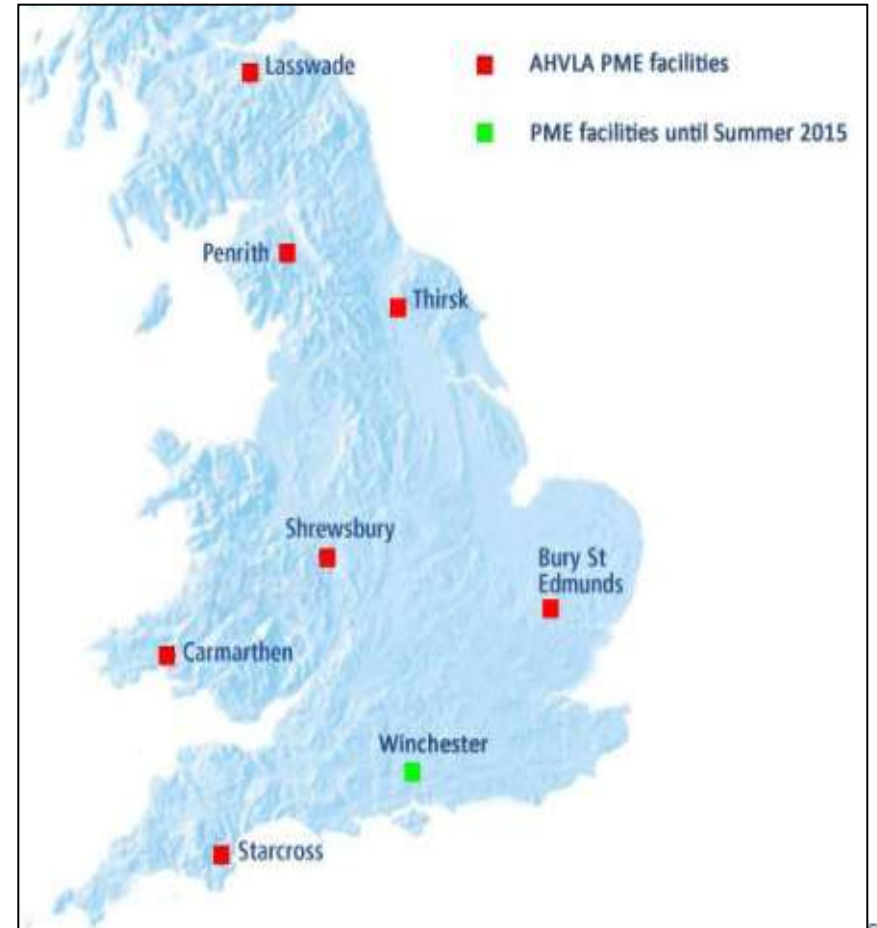
# Key elements of new model

- Network of AHVLA PME facilities (reduced in number)
- Carcase transport system introduced for 3 years from some areas
- Inclusion of other expert PME providers in the system
- Training and supporting private vets and fallen stock industry to carry out more diagnostic PMEs
- Surveillance Intelligence Unit

## Previous network of AHVLA PME facilities



## New network of AHVLA PME facilities



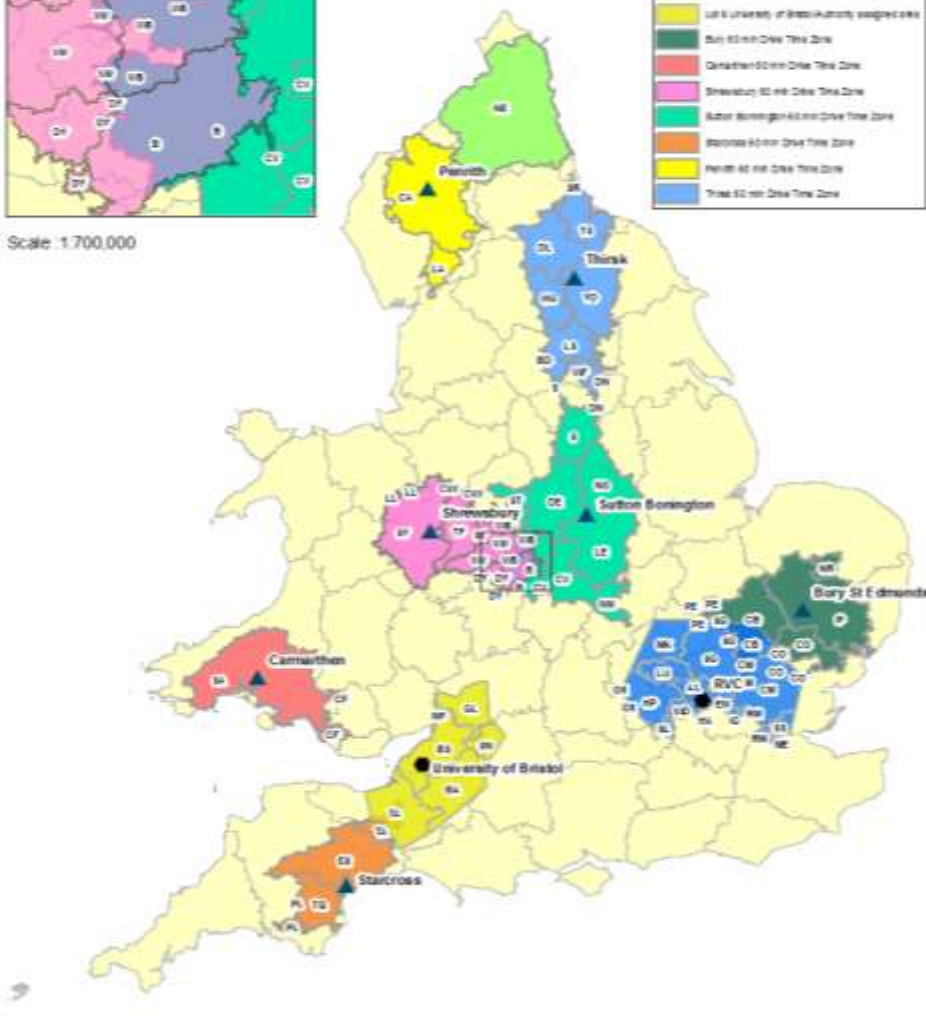


## AHVLA Locations, Drive Time Zones & Postcodes

**OFFICIAL**



Scale: 1:700,000

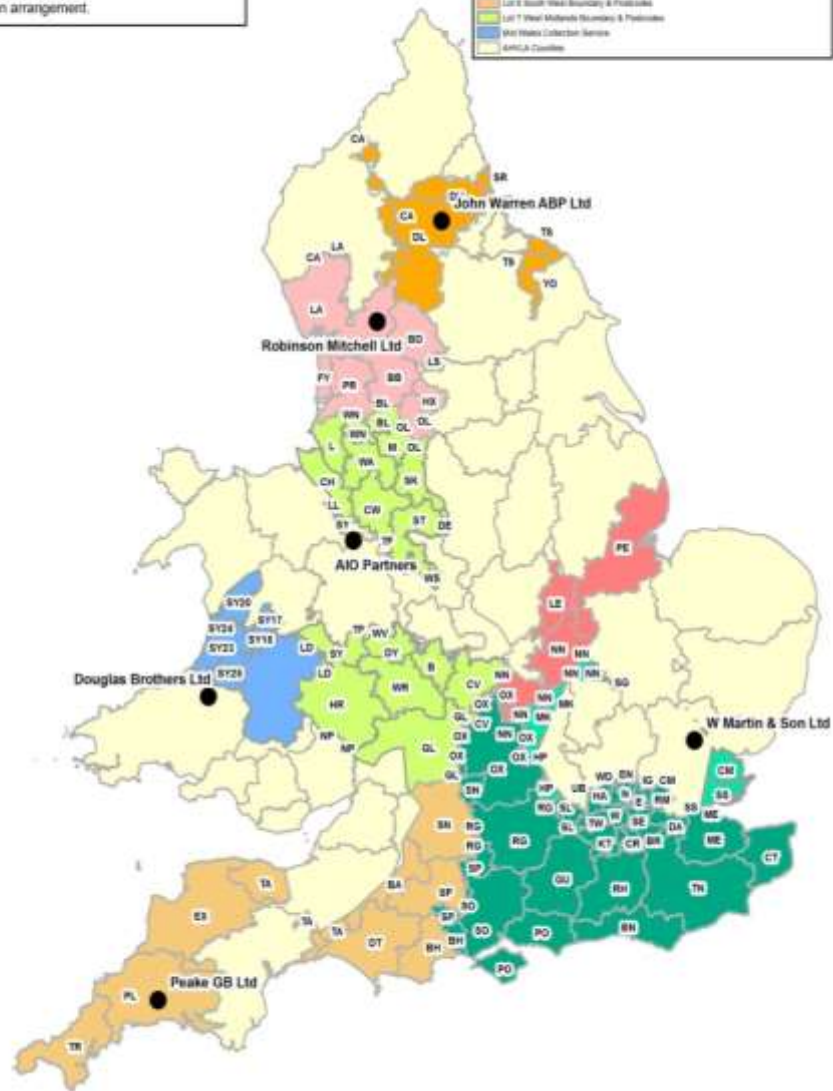


## External Collection Areas

**OFFICIAL**

Not Covered in Wales - excess of 1 hour of PME Provider or without access to subsidised of collection arrangement.

- Carcases Collection Sites
- Lut 1 East Midlands - University of Surrey Authority assigned area
- John Warren Collection Services
- Robinson & Mitchell Collection Services
- Lut 1 South East - University of Surrey Authority assigned area
- Lut 1 London - University of Surrey assigned Authority assigned area - from Lut 1 East
- Lut 1 South West Boundary & Postcodes
- Lut 1 West Midlands Boundary & Postcodes
- Mid Wales Collection Services
- AHVLA Counties



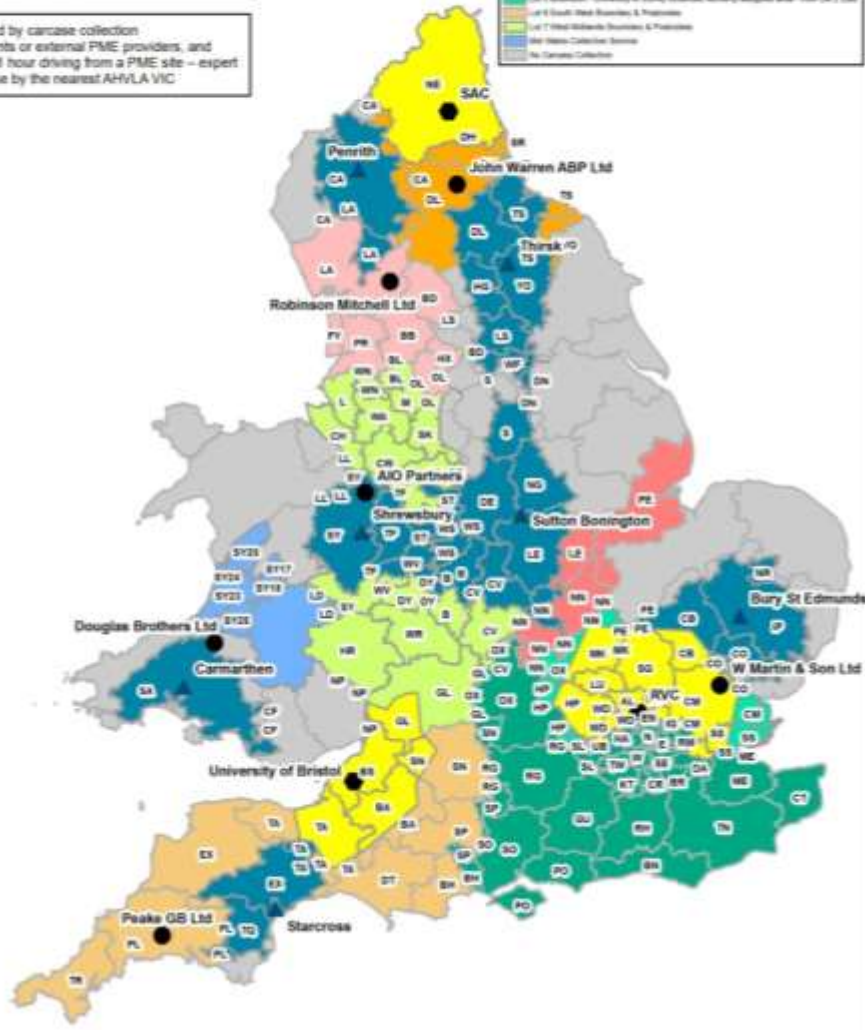
# AHVLA, External PME & Collection Areas

**OFFICIAL**

Not Covered in Wales - excess of 1 hour of PME Provider or without access to subsidies of collection arrangement.

Not covered by carcass collection arrangements or external PME providers, and more than 1 hour driving from a PME site – expert PME service by the nearest AHVLA VIC

- Carcass Collection Sites
- AHVLA Drive Thru Zones
- All Sites
- PME Sites
- LA 1 East Midlands - University of Derby Authority assigned area
- John Warren Collection Service
- Robinson & Mitchell Collection Service
- LA 2 South East - University of Derby Authority assigned area
- LA 3 Yorkshire - University of Derby Authority assigned area - Post LA2 East
- LA 4 South West Devonshire & Dorsetshire
- LA 5 West Midlands Devonshire & Dorsetshire
- LA 6 Wales Collection Service
- No Carcass Collection



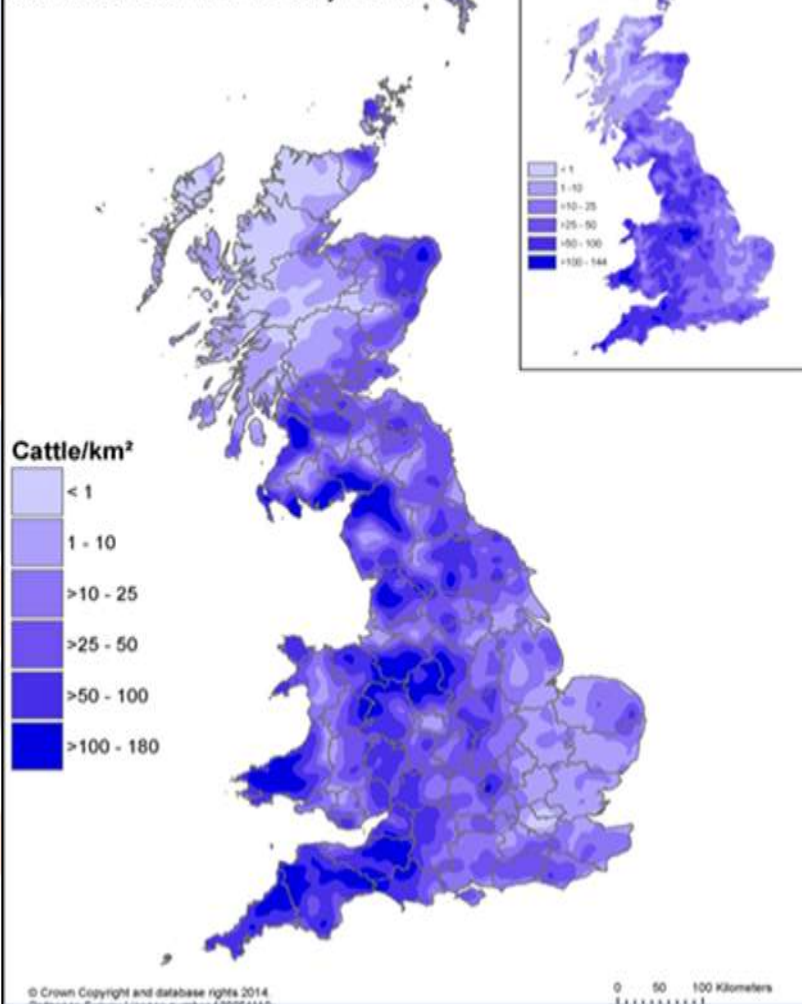
# Communication & engagement

- Development of PVS / OV / Surveillance web gateway
- Looking at options to improve two-way communication flow inc. online forums, use of social media
- Development of PVS user group for process & system changes
- Similar activities to engage with farmers and industry groups
- Improve pathology training for private vets to enable more first opinion PME's at fallen stock centres or elsewhere, speeding up the diagnosis of more common issues as well as providing surveillance data

# Surveillance Intelligence Unit

- Epidemiology and data analysis skills
- Species expert groups
- Engage with alternate data sources to improve coverage
  - Collate and analyse epidemiological, pathological and diagnostic testing results (from AHVLA and partner providers) & combine with knowledge of the livestock population and industry practices.
  - Explore other/new sources of data and intelligence to add value to the analyses to provide horizon scanning and reassurance of early warning of new and emerging threats.
  - Produce and publish reports that can be used to support evidence based decision making at all levels from farmers to Government

### GB Cattle Population Density as Recorded in CTS July 2013



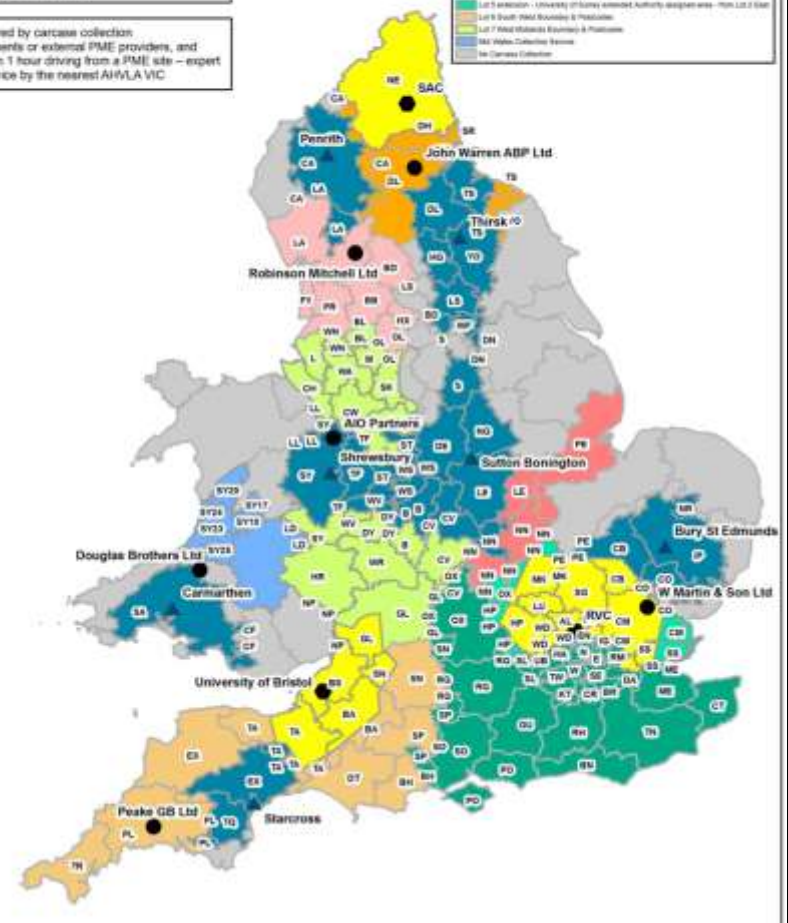
### AHVLA, External PME & Collection Areas

**OFFICIAL**

not covered in Wales - excess of 1 hour PME Provider or without access to subsidies collection arrangement.

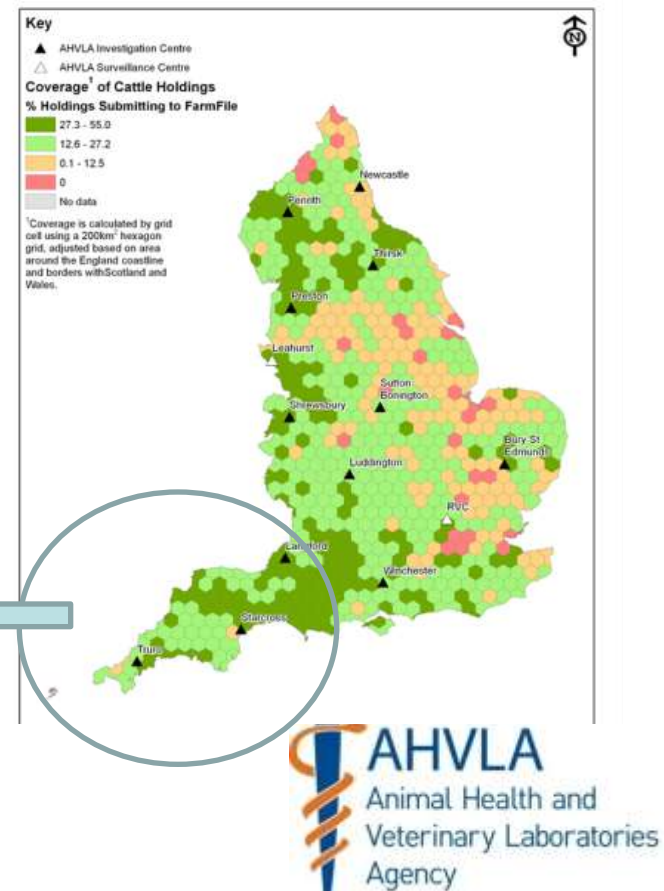
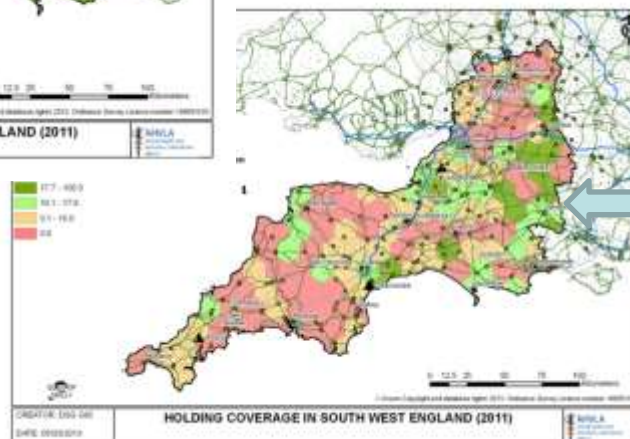
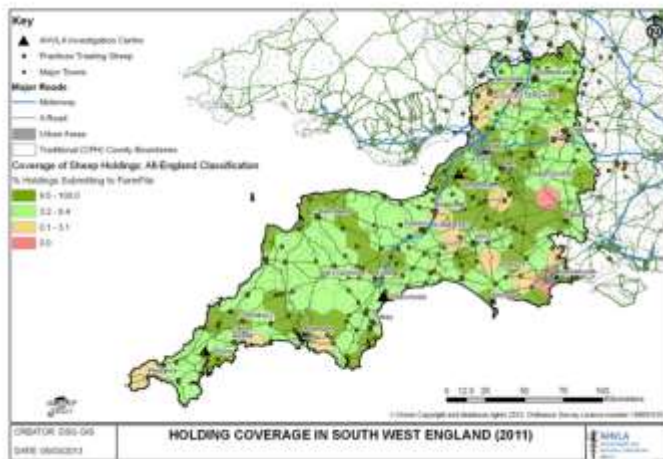
not covered by carcass collection arrangements or external PME providers, and are than 1 hour driving from a PME site - expert ME service by the nearest AHVLA VIC

- Carcass Collection Sites
- AHVLA Drive Thru Zones
- PME Sites
- PME Sites
- Lot 1 Road Stables - University of Surrey Authority designated area
- Lot 2 Horse Collection Services
- Robinson & Mitchell Collection Service
- Lot 3 South Gate - University of Surrey Authority designated area
- Lot 5 Collection - University of Surrey Authority designated area - from Lot 2 Gate
- Lot 6 South Field Boundary & Pastures
- Lot 7 Road Stables Equines & Poultry
- AHVLA Wales Collection Service
- No Carcass Collection

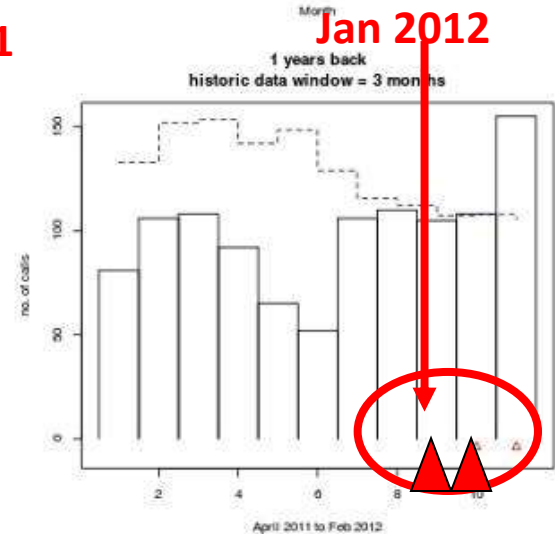
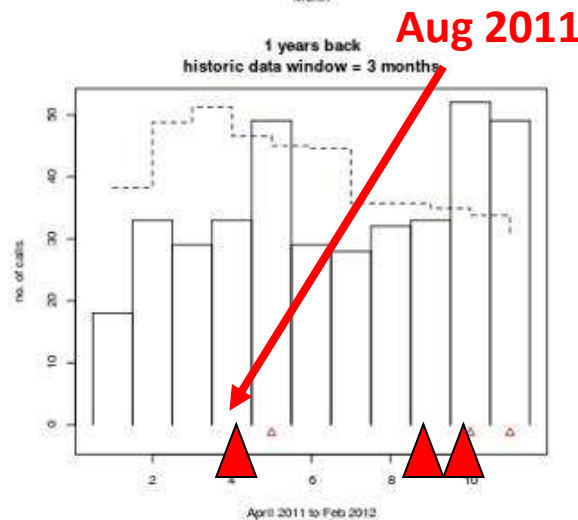
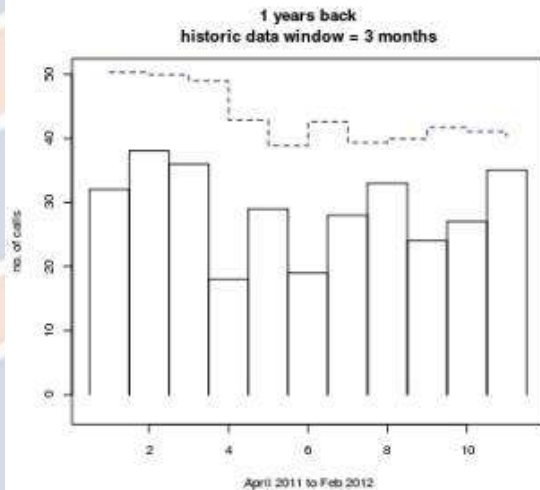
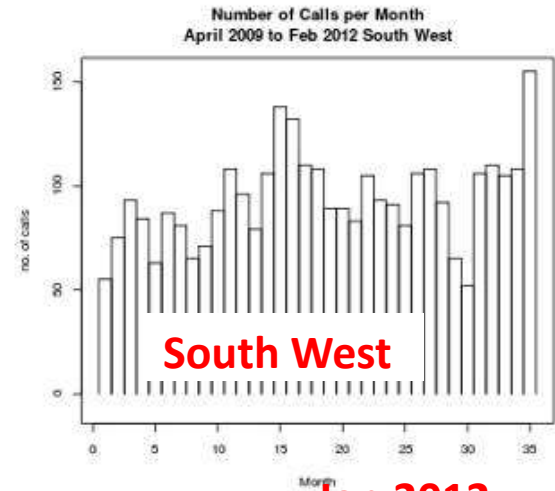
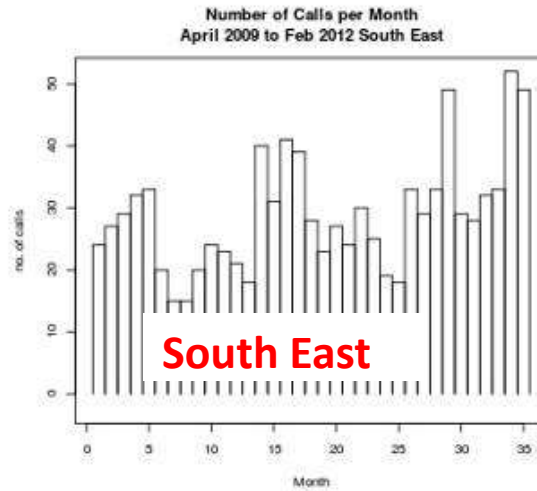
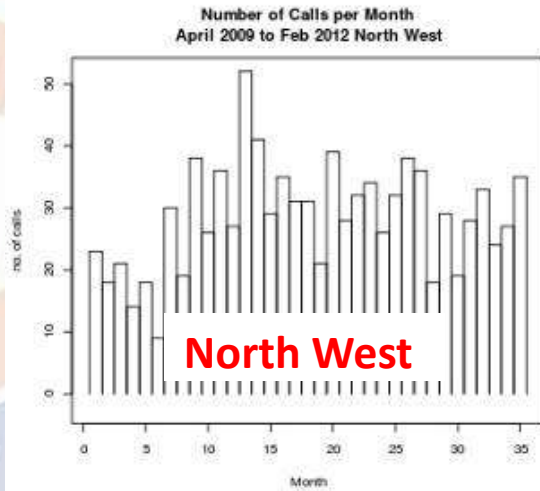


# Applied epidemiology - weak spots in surveillance?

- Using laboratory submissions as a measure of veterinary engagement and a proxy for surveillance activity



# Syndromic surveillance - exploiting unused data





# Surveillance Gap analysis

- 29 gaps; cattle (10), sheep (12), pigs (11) and poultry (11)
- Most gaps around 'engagement' and 'risky behaviour'
  - Disengaged farmers
  - Early adopters of unproven husbandry methods
  - Geographical areas
    - Non-TB areas with fewer vet visits
    - Distant from post mortem sites

1. Quick look up table of surveillance data sources

|   |    |   |   |
|---|----|---|---|
| Vet data                                      | 1  | <a href="#">Active collection direct from private vets (formal sentinel data collection)</a>              | Formal collection of electronic data about farm visits, likely to include clinical data, gross path and provisional diagnostic outcome (sentinel system)  |
|   | 2  | <a href="#">Active collection direct from private vets (informal data collection from key informants)</a> | Regular collection of information about animal health and unusual events from key informants  |
|   | 3  | <a href="#">OVS visits for inspection or testing</a>  | For example, Defra animal health and welfare visits, cross compliance visits on behalf of rural payments agency, TB testing. These visits currently collect specific information depending on the purpose of visit but may offer an opportunity to collect animal health data |
|   | 4  | <a href="#">Notifiable disease reports</a>  | Collection of information from statutory reports of suspect notifiable disease including information about investigatory visits, will include clinical information  |
|   | 5  | <a href="#">OVS visits to investigate disease occurrence</a>  | For example anthrax investigations. Information not currently recorded about clinical signs or likely cause of death but could provide an opportunity to do so  |
|   | 6  | <a href="#">Pharmaceutical sales information</a>  | Could be used as a health indicator   |
| Production data                               | 7  | <a href="#">Endemic disease recording</a>   | Information recorded by industry in <b>health schemes</b> , disease control initiatives or quality assurance schemes e.g. mastitis data and BPEX endemic disease records – outcomes may be based on clinical, laboratory or abattoir inspections                              |
|   | 8  | <a href="#">Performance / production indicators</a>   | Information collected by industry support bodies about production / performance of individual animal or farms e.g. dairyco performance index  |
|   | 9  | <a href="#">Active collection directly from farms</a>   | Sentinel farms could provide information about clinical disease and production  |
| Healthy culls to market or abattoir           | 10 | <a href="#">Ante-mortem abattoir data</a>   | Includes clinical information from ante-mortem inspections  |
|   | 11 | <a href="#">Post-mortem abattoir data</a>   | Includes gross pathology from post-mortem inspections, FSA data available via RADAR   |
|   | 12 | <a href="#">Market inspections</a>  | Could provide an opportunity to record clinical disease occurrence  |
| Pre-diagnostic and diagnostic laboratory data | 13 | <a href="#">AHVLA (SAC) laboratory network of sample submission data from private</a>                     | Collection of data about samples or carcasses voluntarily submitted by private vets including demographic, clinical, gross pathology, laboratory results including antimicrobial resistance, diagnostic outcome or non-diagnostic outcome                                     |
|   | 14 | <a href="#">AHVLA (SAC) laboratory network of carcass submission data from private vets</a>               | Collection of data about carcasses voluntarily submitted by private vets including demographic, clinical, gross pathology, laboratory results, diagnostic outcome or non-diagnostic outcome   |
|   | 15 | <a href="#">AHVLA (SAC) surveillance intelligence network of other data from private vets</a>             | Collection of data about clinical cases identified by private vets in telephone calls and web-based which includes demographic and clinical information   |
|   | 16 | <a href="#">Private veterinary laboratories</a>   | Collection of data with samples submitted to private laboratories, may include some clinical information, will include laboratory diagnostic outcome  |
| Fallen stock data                             | 17 | <a href="#">Mortality data (fallen stock)</a>   | Collected for TSE investigations in ruminants including cause of death in cattle, mortality data also available from cattle passport returns  |
|   | 18 | <a href="#">Animal movement data</a>  | For example CTS, AMLS. Also provides mortality information but without cause of death   |
| Other surveillance networks                   | 19 | <a href="#">University surveillance networks</a>  | Could include both information collected at university visits to farms and data collected from local PVS, likely to include clinical, gross pathology, provisional diagnostic outcome and possibly laboratory test information  |
|   | 20 | <a href="#">Media based</a>   | Event-based systems collect data from various electronic sources of media information to provide evidence about the occurrence of health events   |
|   | 21 | <a href="#">Livestock populations outside the population of interest</a>                                  | Horizon scanning information to identify threats to the population of interest e.g. information from surveillance networks in other countries or information about disease occurrence in other farmed species   |
| Surveys                                       | 22 | <a href="#">Repeated active surveys</a>   | Designed to collect data about the occurrence of specific diseases  |
|   | 23 | <a href="#">Vector surveillance</a>   | Designed to collect data about the distribution and density of insect vectors.  |
| Supporting data sources                       | 24 | <a href="#">Public health data</a>  | For zoonotic disease. Could be used to indicate the occurrence of disease in animal populations   |
|   | 25 | <a href="#">Wildlife population data</a>  | Could be used as an indicator of animal health issues   |
|   | 26 | <a href="#">Demographic data</a>  | For example census data which may provide information about changes in the population that may threaten health  |
|   | 27 | <a href="#">Economic indicators</a>   | For example changes in price structures which may impact on animal health   |
|   | 28 | <a href="#">General public</a>  |   |
|   | 29 | <a href="#">Supporting data</a>   |   |

Components 1-27 identified from previous work in ED1039  
Components 28-29 identified from Surveillance 2014 consultation

# Gap analysis

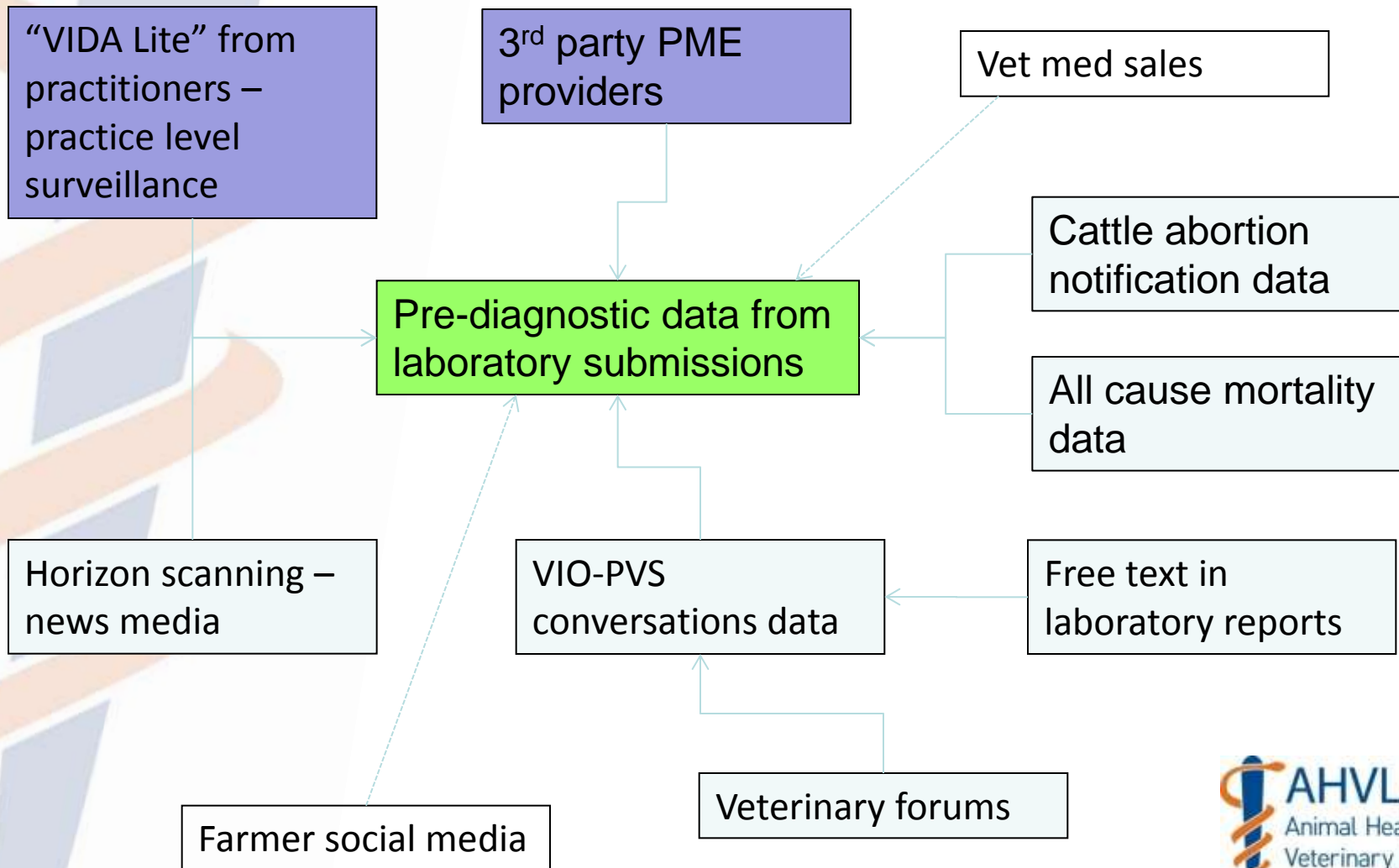
- 29 data sources
- Limited evaluation

[..\ED1039\2013-14\FINAL REPORTS\Annex 6 Document of surveillance data sources FINAL v1.0 310314.pdf](#)

# Horizon scanning

- News, media and internet items
- Collaborative work with the ***Defence Science and Technology Laboratory (Dstl)***
  - ensures that innovative science and technology contribute to the defence and security of the UK
  - “speech tagging”
  - “sentence graph”
  - “information fusing” ...

# Big data pilot



# New reporting

Across the range of scanning surveillance activities

Multiple sources

Multiple contributors

01 July 2014

Year: 2014 Weeks 27 & 28



Scanning surveillance  
national summary

Reporting weeks: 16 June to 29 June 2014

|                   |   |
|-------------------|---|
| Cattle            | Investigating alerts on increases in reproductive losses and early deaths in calves.                        |
| Small ruminant    | Investigating telephone reports of ill thrift and mortality in lambs presenting with an unusual wet fleece. |
| Pigs              | Enhanced testing for PED and continue to monitor the spread of PED in Europe. Information note produced.    |
| Avian             | Nothing to report.  |
| MEFS <sup>†</sup> | Nothing to report.  |
| Wildlife          | First case of Myxomatosis in hares reported in GB.  |

Conversations data

Multiple cases of lambs with unusual presentation of 'wet fleeces'.

Syndromic surveillance

The "herd early warning report identified increased cattle abortions in SE England.

The report on all cause cattle mortality for Jan-Mar 2014 has been published. It is noted that there is an increase in the number of deaths-on-farm in calves less than 6 months of age. The report is available here [\[link\]](#).

News monitor

Reports of PED continue to increase.

Scanning surveillance  
analytics

Analysis of VIDA data show an increase in non-diagnosed abortion in cattle. There was a significant increase in the incidents of Johnes and rumen fluke recorded in cattle reported in Scotland during March-May 2014. Investigation of an alert following an increase in non-diagnosed skin cases in cattle in January suggests that cases were due to trauma caused by poorly designed feed barriers. [Link to cattle report.](#)

<sup>†</sup> Miscellaneous Exotic Farmed Species.

# Responding to the novel

## Reporting

- No barriers - trust and transparency
- Open communication – Government, European partners, livestock industry and other stakeholders
- Establish common evidence base and understanding of risk
- Work to develop generic contingency plan for new disease threats

## Investigation and research

- Expertise to interpret alerts – investigate, monitor, negate?
- Collaboration – efficient, share skills & expertise
- Expertise – pathology, test development, new methods
- Capability across full range of threats – known and unknown
- Drawing on knowledge and resources of everyone that has an interest

## Key messages

- Maintain capability to detect and respond
- Look to improve by using new methodologies and developing a more risk based approach
- Need agreement and understanding of roles and responsibilities, and build on partnership working
- Breadth of capability and deep expertise with networks in UK and internationally to deal with new threats



- Thank you for your attention

my presentation



# Surveillance prioritisation and cost-effective delivery – the Swedish perspective

---

Ann Lindberg

*Swedish Zoonosis Centre*

*Dept. of Epidemiology and Disease Control*

*National Veterinary Institute*



# Outline

- Background
- How is surveillance paid for in Sweden, and on what grounds?
  - How money is allocated
  - The prioritisation process
- How do we ensure surveillance is carried out in a cost-effective manner?
  - Surveillance 'toolbox' mapping
  - Prioritisation of components, and their development
- Influence on how decisions are made
- Conclusions



# SE - strengths and weaknesses



- Favourable animal health status
- Longstanding collaborative tradition with a high degree of trust
- Centralised systems in place for collection of samples from livestock
- Ability to co-ride exotic disease surveillance on endemic disease control activities
- Cooperative structures are breaking up, the relationship between authorities and the industry is changing
- Access to efficient surveillance tools rests upon informal arrangements
- National eradication schemes concluded => downscaled
- Prioritisation pragmatic, but not very transparent
- More scrutiny of how governmental funds for animal health (in general) are used (O)
- Short financial planning horizon => difficult with developmental activities
- Evaluation not consistently a part of surveillance planning cycles

**National Surveillance Plan**

4000 km (équateur)  
2000 mi (equator)

# Three strategic areas



SVA

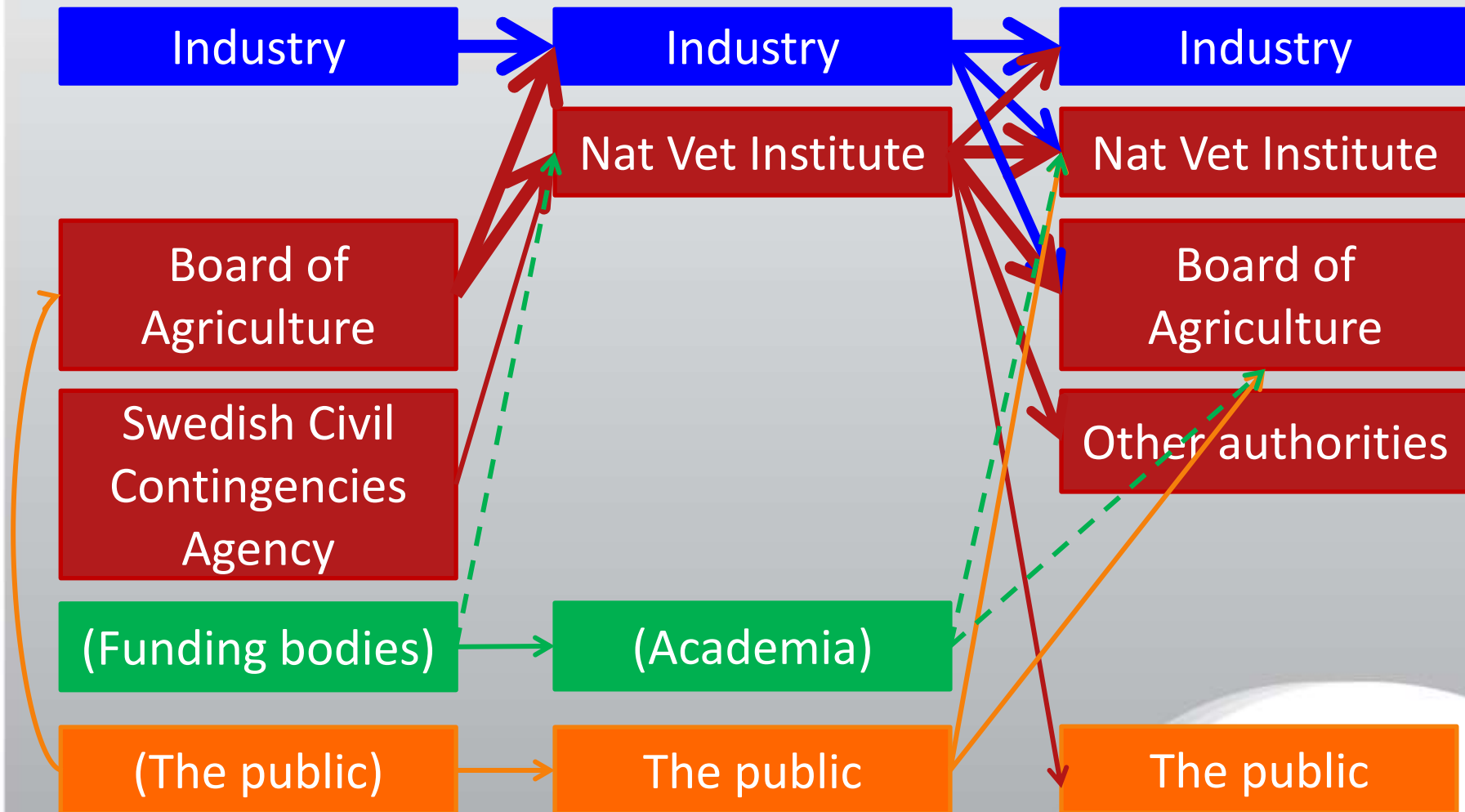
# Surveillance stakeholders



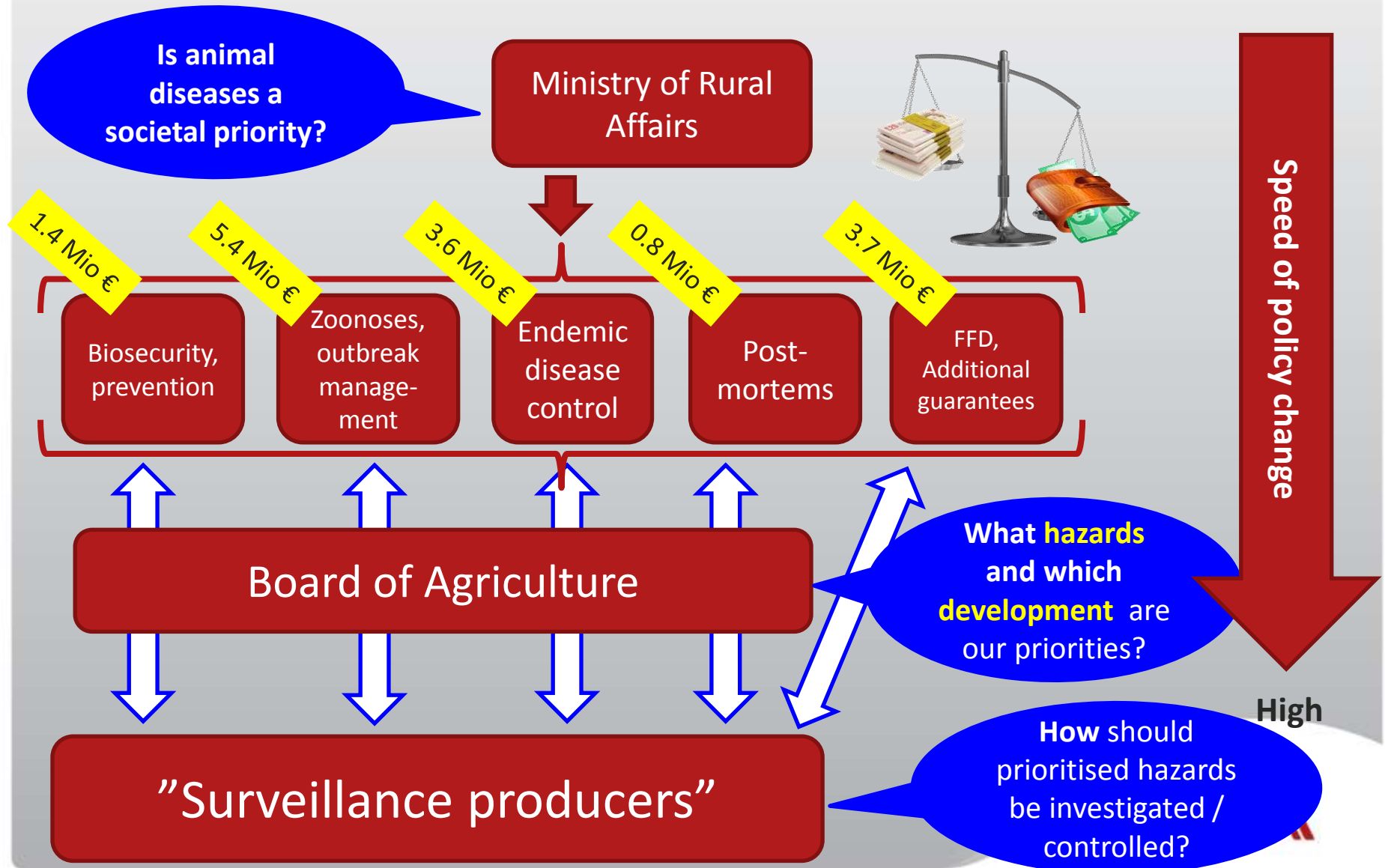
## Payers

## Producers

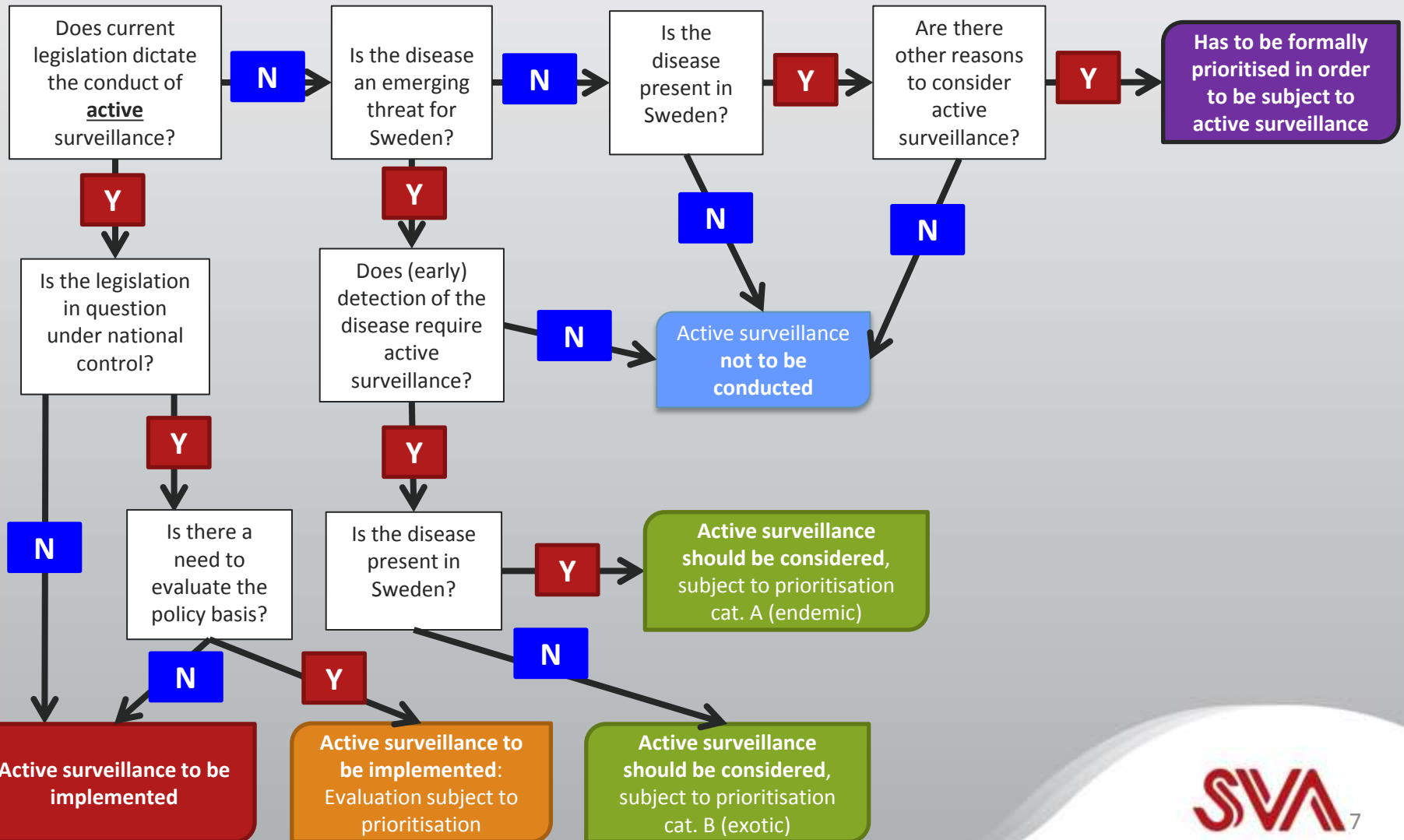
## Users



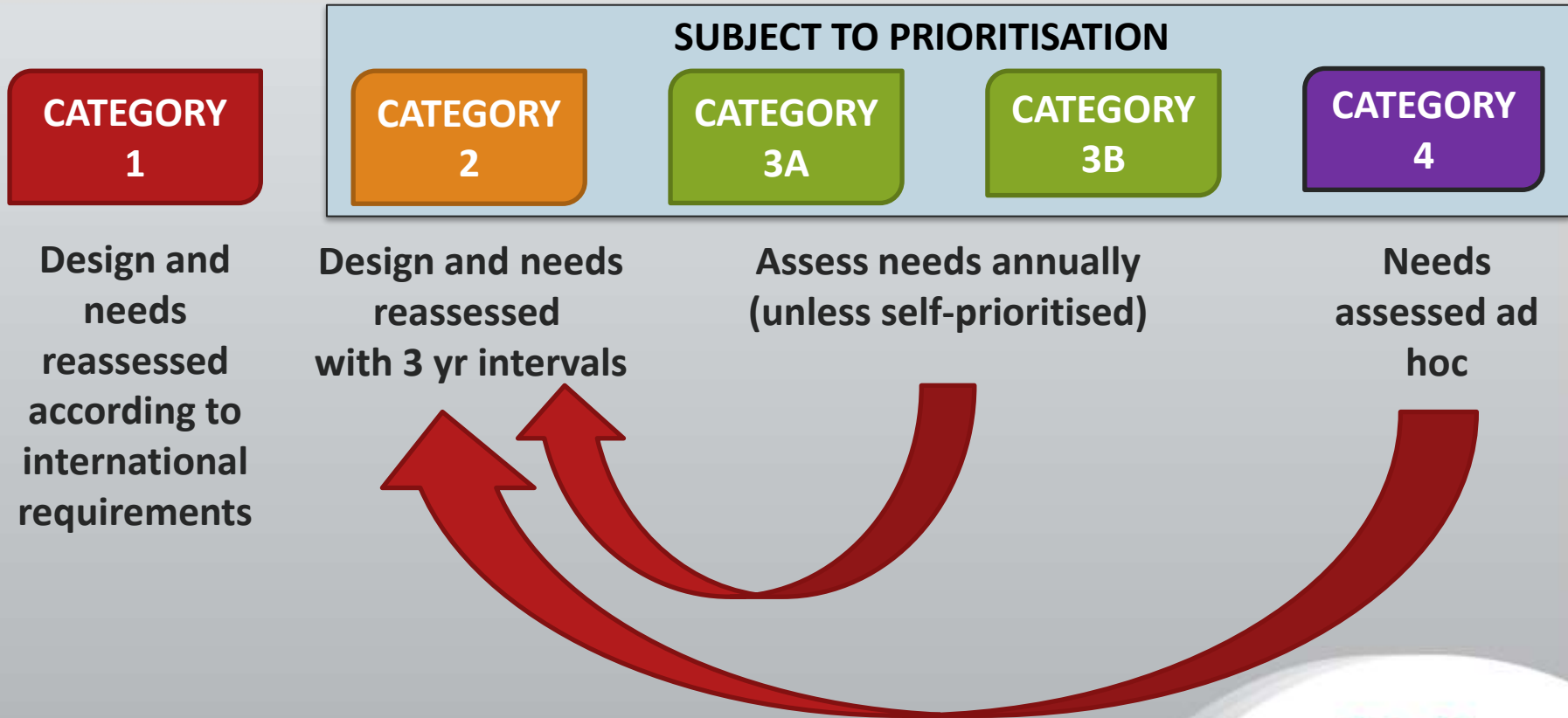
# What is the process for allocating resources to surveillance in Sweden?



# Pre-prioritisation decision tree for active surveillance efforts



# Consequence of categorisation





# Categories and criteria for prioritisation

- **Risk and epidemiology** (*trend, infectious pressure, ability to prevent introduction, risk of silent spread, wildlife reservoir, prospects for transmission*)
- **Public health** (*Incidence, nosocomial infections, healthcare needs, chronic sequelae, case-fatality, preventive measures, trends, public concerns, therapeutic needs, surveillance needs*)
- **Animal health and welfare** (*Case fatality rate, morbidity, severity of welfare hazard, duration of welfare hazard*)
- **Societal aspects incl. environmental** (*economic consequences: industry, economic consequences of control: government, other consequences for the animal holder, effect on trade, effect on environment and biodiversity, driver of antimicrobial resistance*)

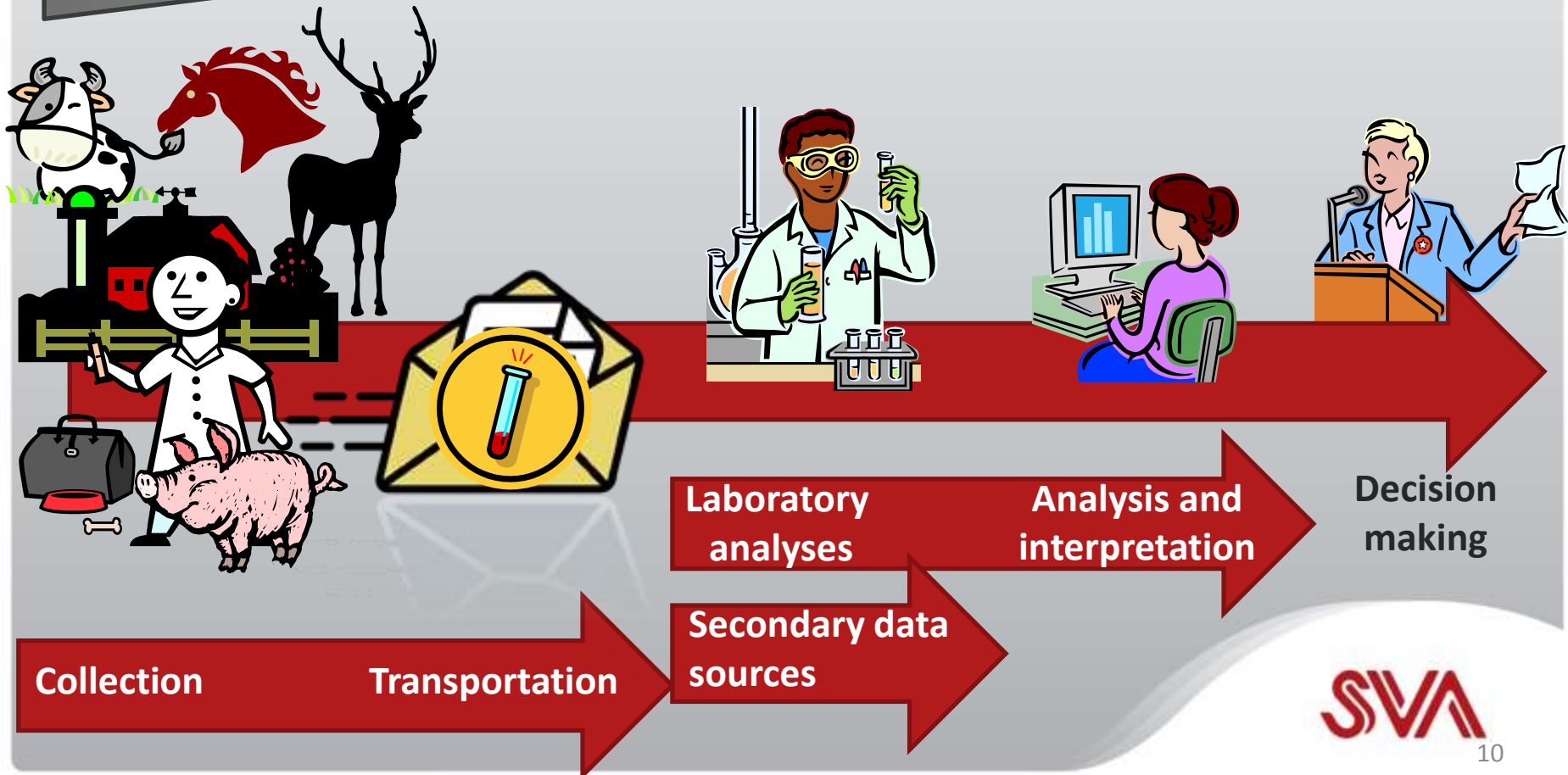
Work in progress



# Definition of surveillance

Number of actors involved

- ...the systematic ongoing collection, collation, and analysis of data related to animal health...



# “How’s” that cost

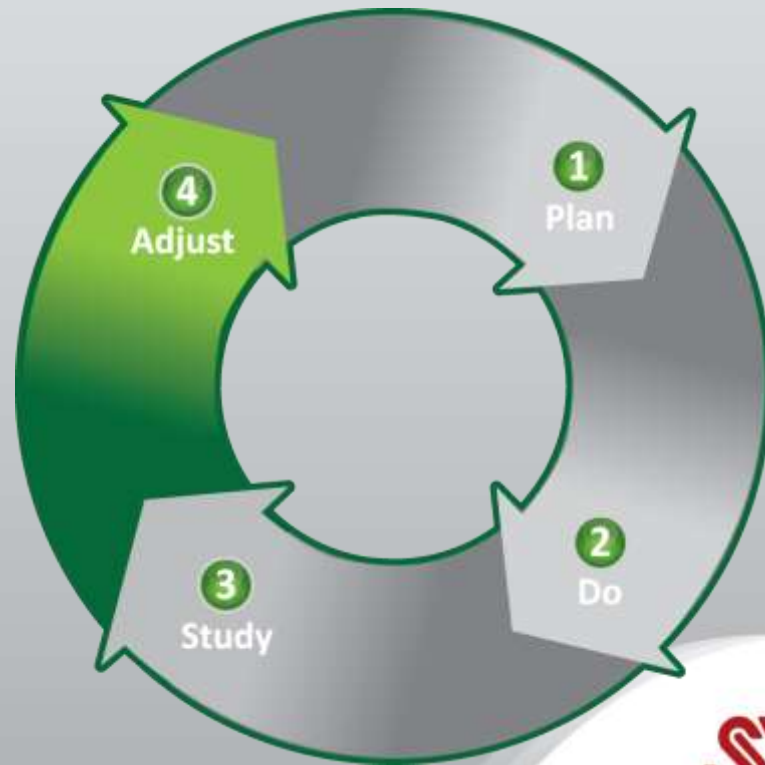
- Sampling – organising the data collection, sample material, visits to farms (labour + transportation), postal fees...
- Laboratory analyses – processing the samples, reporting, billing
- Information management – access to data, compilation of results, analysis, interpretation, dissemination and communication

- Reduce number of samples
- Smarter ways => centralisation
- Utilise surveillance synergies
- Reproducible analysis and reporting

# “Lean” surveillance philosophy

- “Expenditure of resources in any aspect other than the direct creation of value for the end customer is wasteful”

- Focus on smoothness of work processes
- ‘Need’ driven learning to improve
- Plan – Do – Study – Adjust
- Improvements identified and tested at the lowest possible level



# Surveillance component mapping



Stakeholder groups

## Actors

- Roles
- Existing agreements
- Financing

## Sampling

- Sampling frame, species, coverage, accessibility
- Sample selection, representativity
- Type of samples, quality, traceability

## Information management

- Data collection, how, what
- Communication
- Reporting, what, how and to whom

## Analysis

- Strengths
- Weaknesses
- "Wish list"
- Recommendations

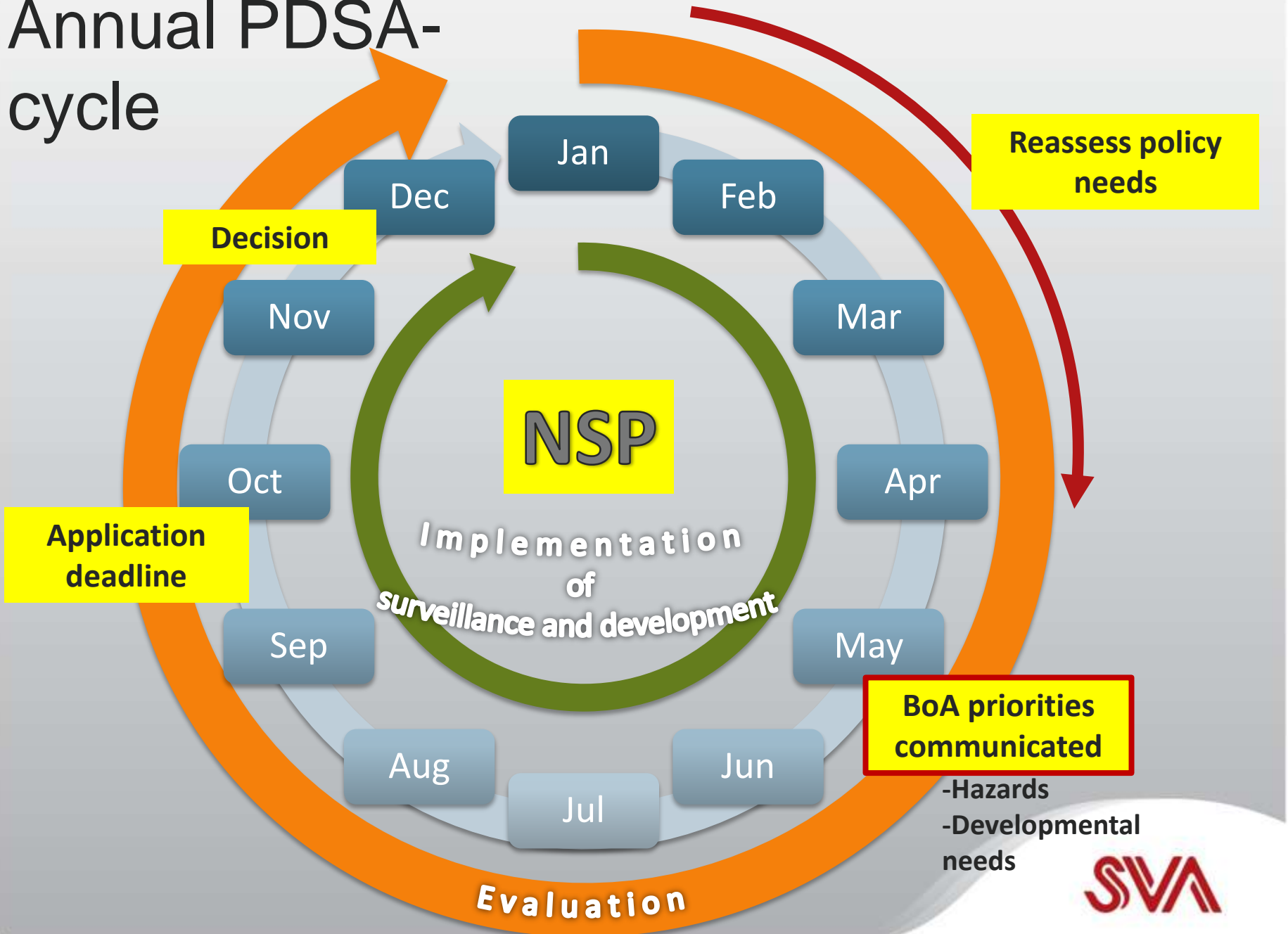
- ✓ Organisation and management
- ✓ Training needs
- ✓ Data quality and coverage
- ✓ Costs (per unit information)
- ✓ Representativeness

# Prioritisation of development



- **Prioritised development (depending on current performance)**
  - Components that covers more than one species and/or contribute information on more than one disease
  - Components covering farmed animals (incl aquaculture)
  - Components that contribute to internationally compulsory surveillance
  - Components that contribute to early detection of exotic diseases
  - Components that are lacking – populations not covered
- **Prioritised actions**
  - Inefficiencies that are repeated in several processes
    - Register issues (development, quality)
    - Needs for changes / updates in legislation
    - Clarification of data ownership
    - Formalisation of agreements and responsibilities
  - Components with a high cost/unit information

# Annual PDSA-cycle



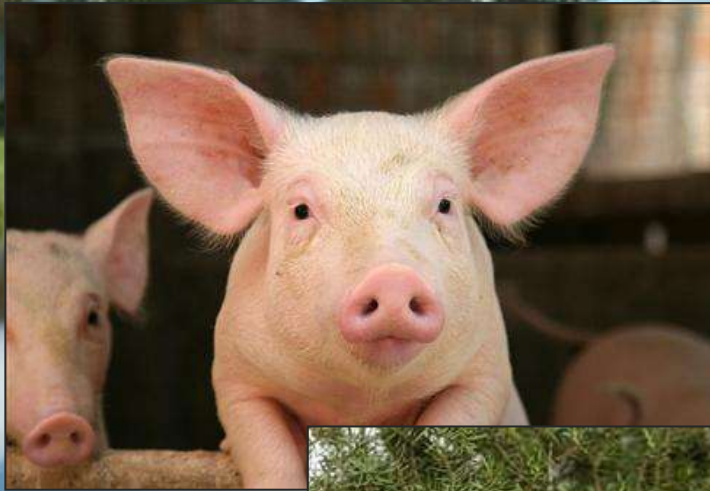
# Some reflections



- Clarifying priorities helps in long-term planning and preparedness; should be applied both to hazards and to development and maintenance of surveillance
- Analysing surveillance components from a lean perspective can help identifying inefficiencies such as work waste, overload and untimeliness, and subsequently help to reduce costs / quality loss
- Applying a system's perspective to the analysis of surveillance activities can help identifying reoccurring anomalies in the system, sometimes with the same source to solutions
- Surveillance resource allocation occurs at several levels and is usually more flexible at the lower levels. Reassessment of allocation policies should be integrated into planning cycles in order to improve quality, preparedness and work satisfaction



**Thank you  
for your  
attention!**





**Teaming up for  
animal health, in the  
interest of animals,  
their owners and  
society at large**

# Animal Health Surveillance in the Netherlands

*Petra Kock*

Date: 30 September 2014



**Voluntary**  
**4 species**  
**Since 2002**  
**Many partners**



## Funding agencies

- Government: Ministry of Economic Affairs
  - Agricultural Boards
- } 50/50
- Minor contributions by farmers





# Agricultural policy making:

## Authorities, “The Hague”

- EU regulations, TB, Brucellosis, Leucosis, FMD, BSE, etc.
- Public health

## Commodity board(s)

- Move from compulsory to voluntary

## Industry

- Retail
- Processing Industry
- Farmers & Farmer union('s)

## Consumers & consumer organisations.



# Dutch veterinary infrastructure

## First line:

- Farmer: 24 hours / 7 days
- Private practitioners

## Second line :

- GD-animal health service

## Third line:

- CVI (ref.), universities etc.

Agricultural  
boards

Authorities:

Ministries  
&  
FSA  
(NVWA)



# Stakeholders interests

## Government

Proving freedom of disease  
Compulsory reports

## Industry

Market position  
Continuity in production process

Public health  
Product safety

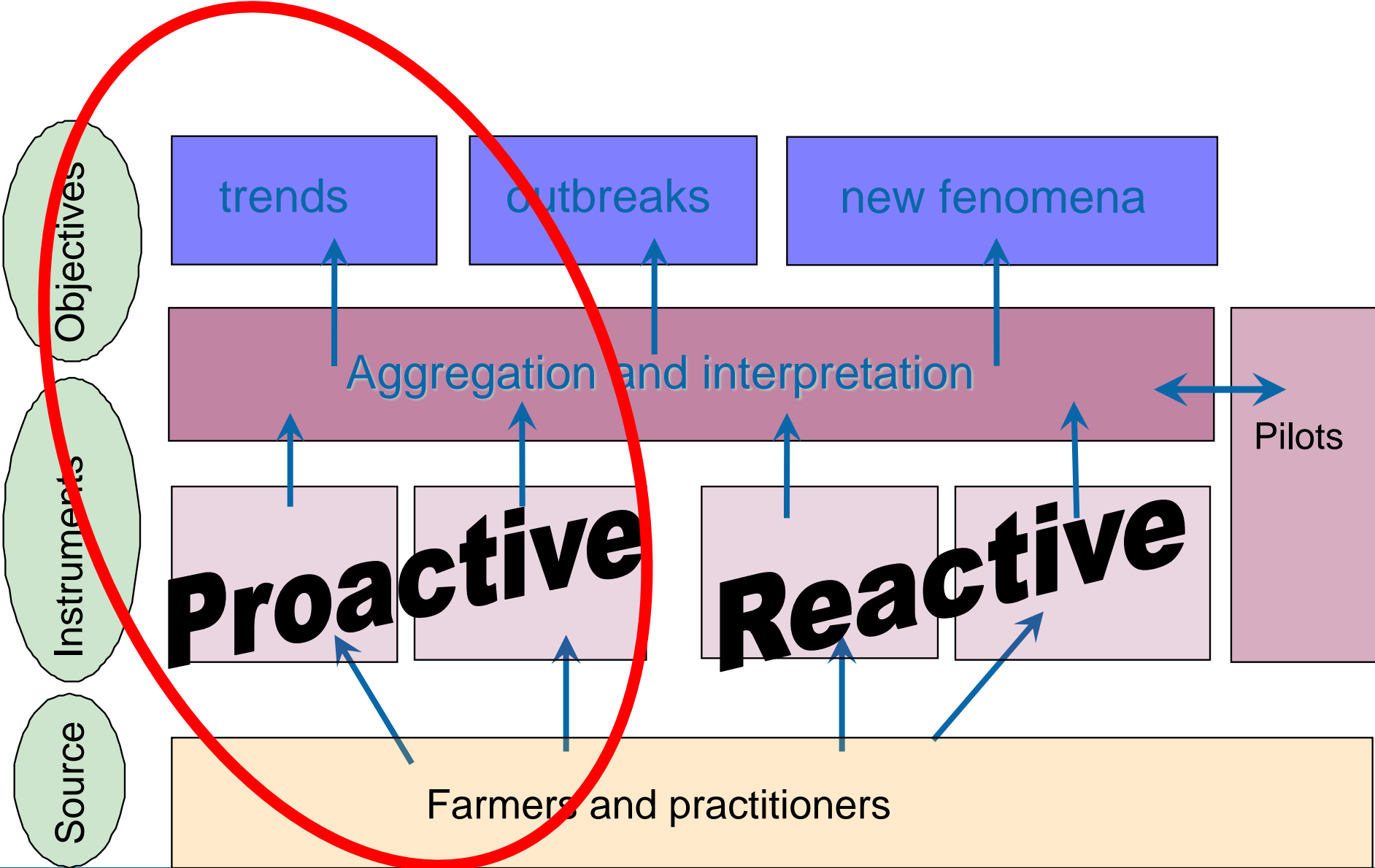
Prevent/reduce calamities  
Optimal protection and control



## Objectives

- **Early detection of outbreaks**
- **Early detection of new diseases**
- **Trends in animal health and diseases**

# Dutch animal health surveillance schematically



# Pro-active: prevalence studies



Ask farmers and practitioners to participate

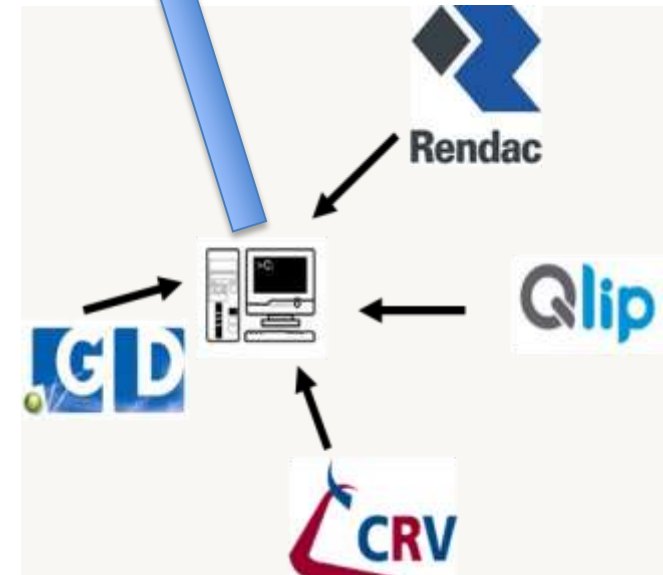
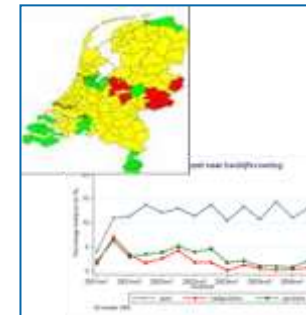
# Pro-active; health indicators

Information provided by:

- Rendering plant
- Milk control
- Breeding organization
- GD

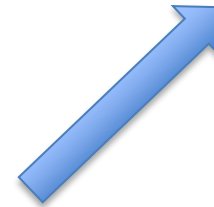
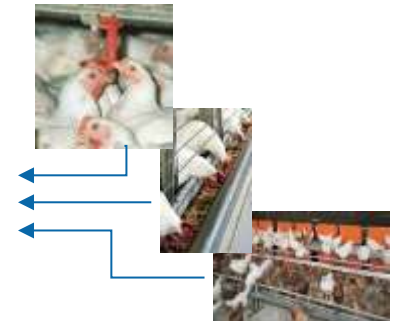
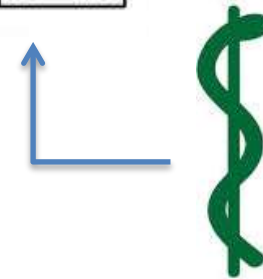
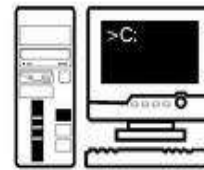
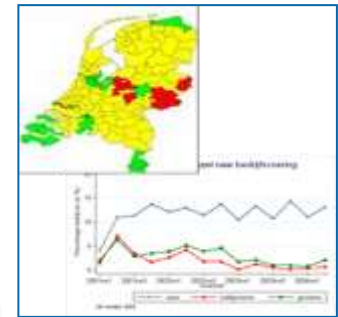
All use same farm number  
~98% of farms

Anonymized, then combined & analysed  
→ Sustainability, production, udder health,  
metabolic diseases etc.

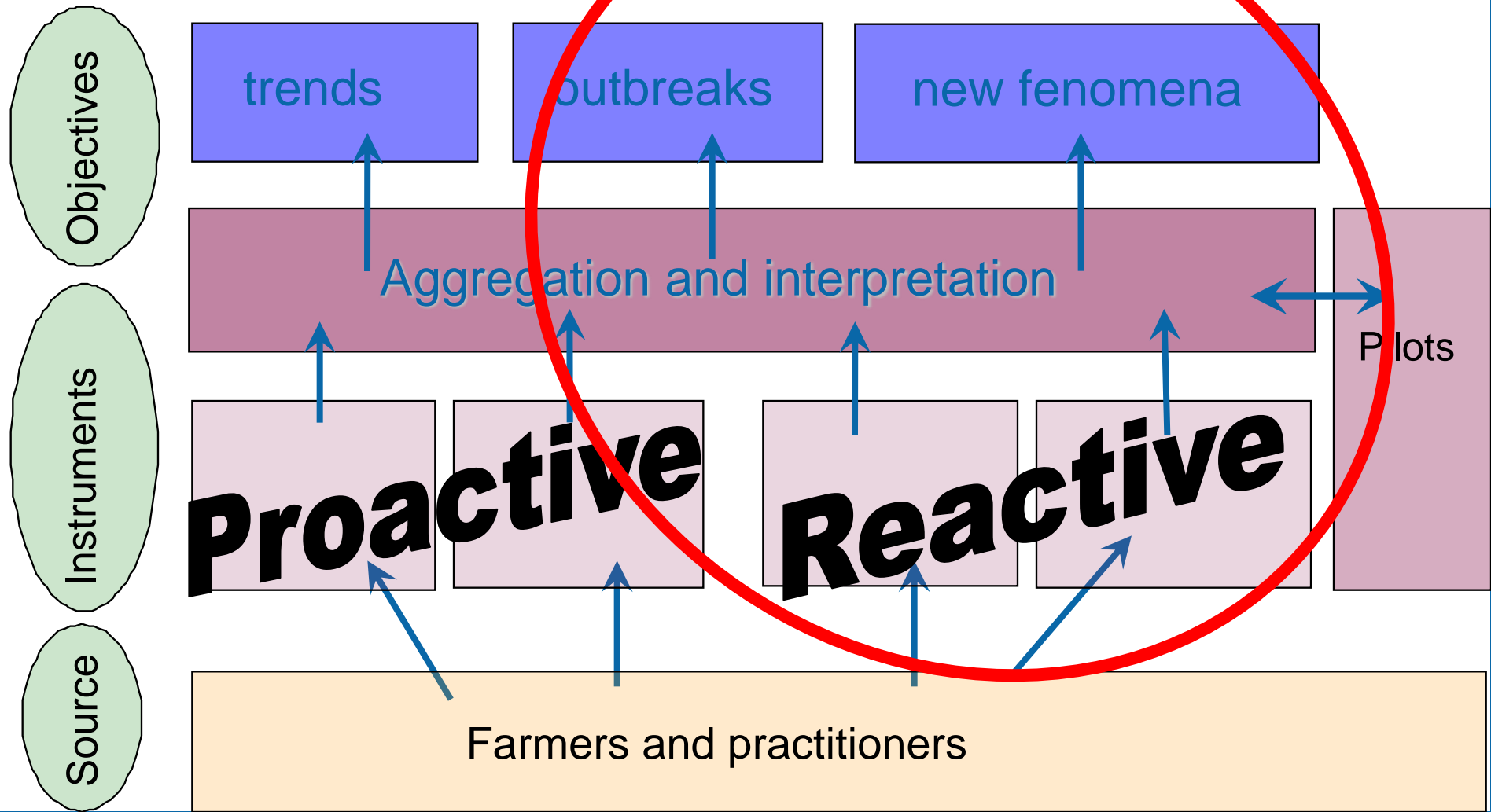


# Pro-active; health indicators

Network of practitioners and GD  
Standardised information per farm visit  
Production, organ system, use of AB  
Feed back to network



# Dutch animal health surveillance schematically



# Reactive surveillance

First action by farmer & practitioner

Rewarding & attractive:

free specialist advise

diagnosis on individual problems

feedback on national situation



Helpdesk 9000 calls/year



Pathology 9000 PM's/year

# GD-Veekijker

- Telephone consultancy for practitioners and farmers
- 9000 consults / year



- Watch for odd cases
- Meeting with various experts:  
every week / fortnight
- Farm visits and pilot studies if necessary





## Pathology & diagnostic laboratory

- Large post mortem facility  
9000 PM's / year
- Veterinary laboratory  
4,3 million submission / year
- Close collaboration with Veekijker
- Diagnosis for farmer
- Early detection national level





## Some findings:

AI

Bluetongue

Schmallenberg

Q-fever

BVD2

Mycobacterium avium

Salmonella gallinarum

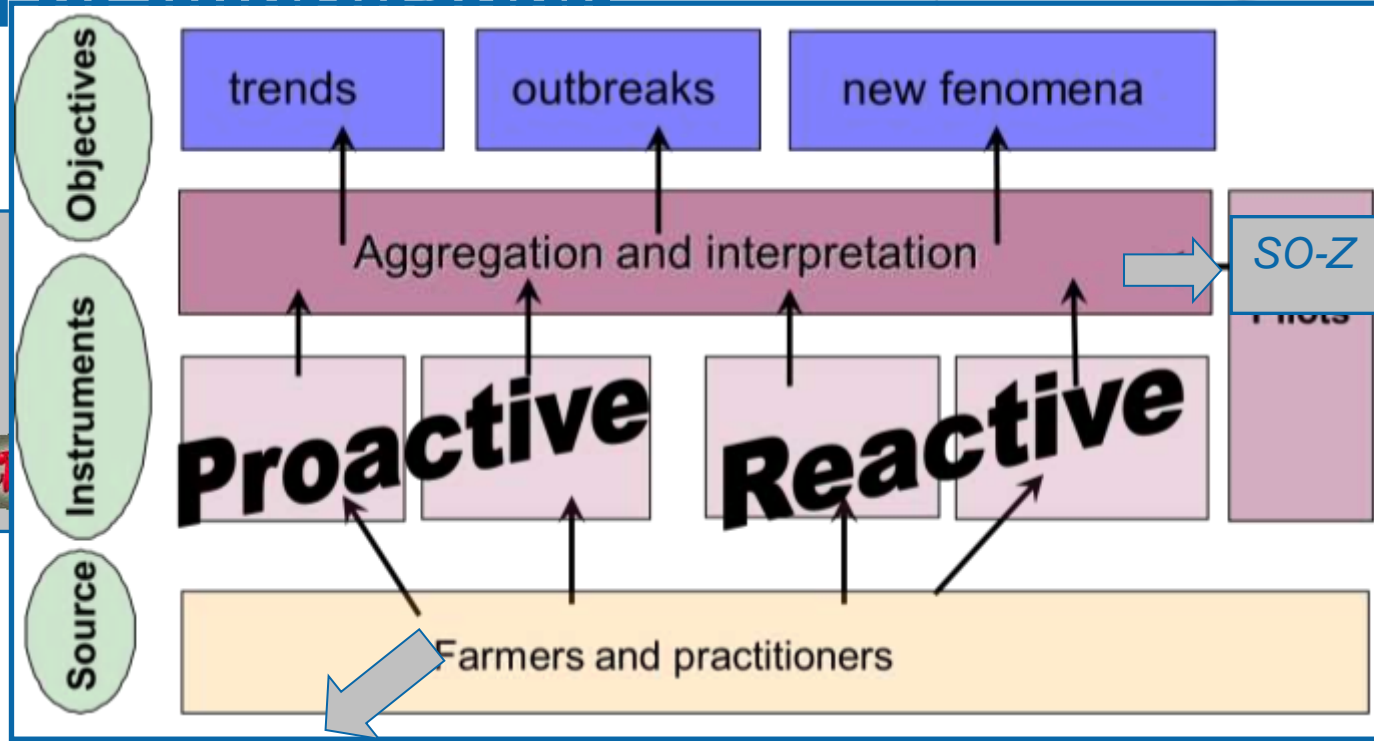
...

& genetic disorders, exotic parasitairy infections etc. etc.

But most of the time: “All is well”

# Distribution of information

*e-mail or telephone to authorities / steering committee  
immediate action*



*report to steering committee  
4x a year  
policy adjustments*

*feedback to farmers and practitioners  
management & therapy*



# Stakeholders in steering committee



Ministry of Agriculture,  
Ministry of Economic Affairs



Dutch Dairy Board  
Agricultural Boards



Dutch Board for  
Livestock, Meat &  
Eggs



Food Safety Authority (NVWA)  
Food Safety Authority



Farmer's organisations & Agricultural industry  
Farmers organisations & Industry



# Coöperating for one health



**ONEHEALTH**

Partners  
Experts  
Members

Home Agenda Actueel Diensten/Services Documenten Links Contact

**OneHealth portal**

Zoekwaaier kunnen een gezondheidsrisico vormen voor mensen en dieren. Signalering van een zoonose is dan ook belangrijk om tijdig maatregelen te kunnen nemen in zowel het humane als het veterinaire domein. Uitbraken van aviëre influenza en de Q-koorts hebben laten zien dat de gevolgen groot kunnen zijn voor de volks- en diergezondheid.

De OneHealth portal is bedoeld voor professionals uit het humane en het veterinaire domein. Het is een digitaal platform om human-veterinaire informatie-uitwisseling en samenwerking te faciliteren. Doelgroepen zijn dierenartsen, artsen, medewerkers van humane en veterinaire kennisinstellingen en ander professionals die werkzaam zijn op het gebied van zoonosen of de risico's hierop.

In de OneHealth portal zijn bestaande signaleringsservices ondergebracht, zoals veter@id, inf@id en EZPs (web-based Emerging Zoonosen Informatie en Proctering systeem). In de agenda vindt u actuele informatie over OneHealth activiteiten in Nederland en buitenland. Naast informatievoorziening zal het in de toekomst ook mogelijk zijn om informatie uit te wisselen of om de portal te gebruiken voor gezamenlijke projecten. Deze beveiligde membersite kan voor verschillende instellingen door professionals worden gebruikt.

De OneHealth portal is nog in ontwikkeling. Zodra de membersite openbaar is kunnen professionals zich hiervoor dan aanmelden.

Wat is de OneHealth portal?



**Universiteit Utrecht**

**GGD Nederland**

**knmvd**

**Nederlandse Voedsel- en Warenautoriteit**  
Ministerie van Economische Zaken

**National Institute for Public Health and the Environment**  
Ministry of Health, Welfare and Sport

**WAGENINGEN UR**  
For quality of life

# International coöperation

## International Veterinary Surveillance Network



Partners active in scanning surveillance

Aims:

- Exchange of surveillance expertise
- Exchange of surveillance information
- Enhanced critical mass

# Teaming up for one health



**Thank you for your attention**

# The known but unexpected

Best practice workshop by RiskSur

Early Detection of Emerging Diseases

Partner UCM



The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement N° 305169.





Unexpected diseases

NEW

KNOWN EMERGENCIES

- FMD
- CSF
- ASF
- AIV
- Etc

Never reported

Eradicated in the past

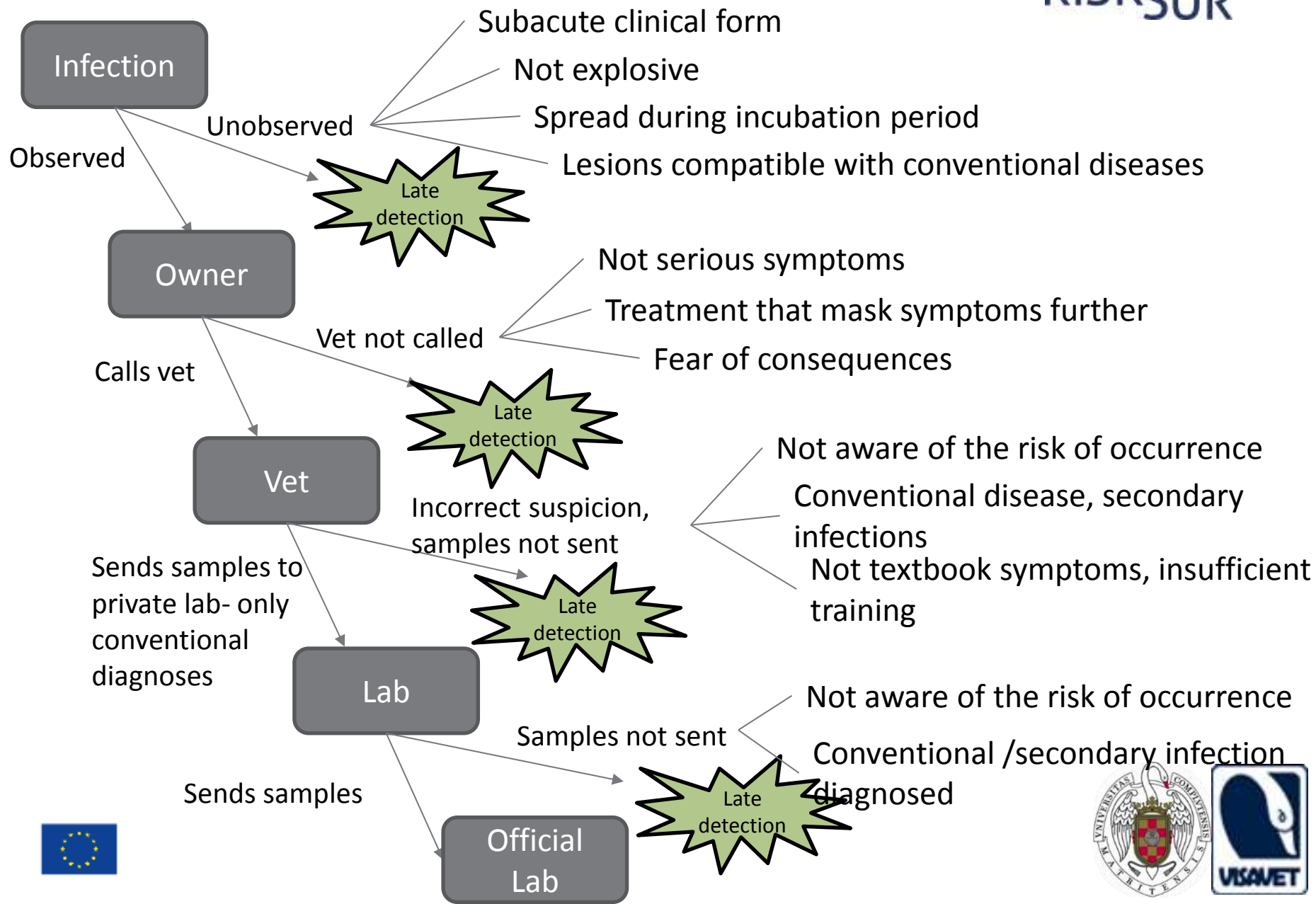
1-4 months detection in the field

Late detection

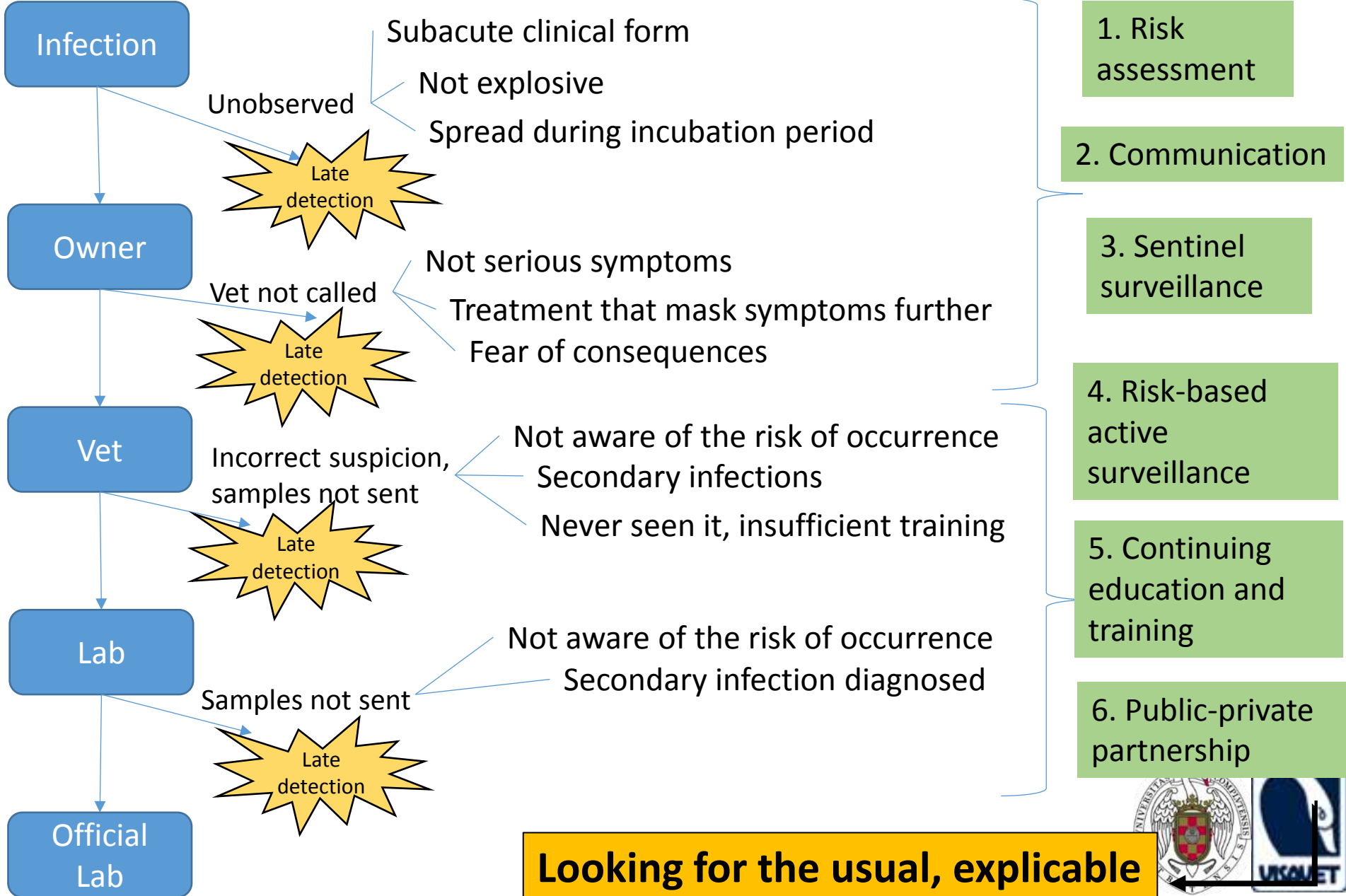
- Schmallenberg virus



# Late field detection

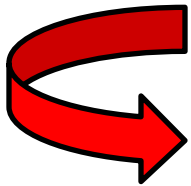


# Early field detection

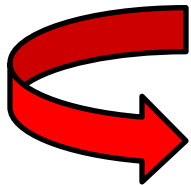


# WHAT CAN WE DO?

1. Good Risk analysis and Risk based surveillance program



2. Good Sentinel Farms model



3. Good Monitoring system (Real Time)

# Looking for the explicable

- Where is the disease of concern circulating and what probability is there that the disease spreads out of the affected region??
  
- By what routes can the disease spread into the unaffected region??
  
- What characteristics are there in the unaffected region that can complicate control??



# Monitoring of sentinel farms

Even if selected in high risk periods and areas, it can still be costly



## DISADVANTAGES

### High economic impact

- Sampling and analysis → Too many samples  
High number of samples from healthy animals
- High logistic needs (too many samples)
- Payment to farmers and technician

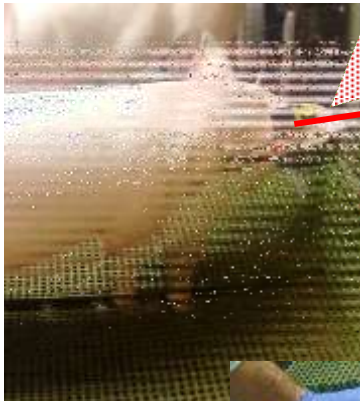


15-30 days without sanitary information??



# Looking for the usual I

## Real-time monitoring of sentinel animals



Fever + decreased movements



### Central computer

- Control, processing and real-time data analysis.
- System management
- Alert settings

### Notifications and alerts

- SMS/e-mail alerts
- Direct data control
- Warnings submitted to qualified staff.

# Looking for the usual II

Public-private partnerships: Private lab- Public oficial vet services

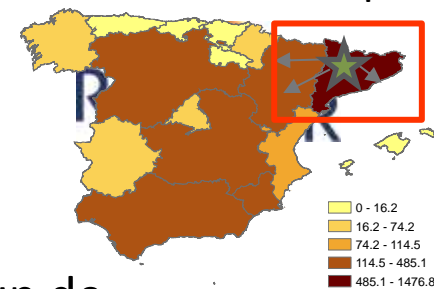
48 notifiable diseases are diagnosed by private labs in Spain, distributed across Spain (see map)

Around 30% of the notifiable diseases diagnosed by private labs are equine diseases (piroplasmosis, rhinoneumonitis, infectious anemia, viral arteritis, WNV)

Recently in Spain: also porcine







# Looking for the usual II

Public-private partnerships: the example of the laboratory Grup de Sanejament Porcí (Lleida, Spain)

User enters clinical cases filtered by symptomatology: Dermic; Digestive; Locomotive ; Nervous; Reproductive; Respiratory

**Casos clínicos** 1/4

Severity:  1  2  3  
*Debe seleccionar una opción*

Date: 07/05/2014

Official ID farm:

*\*No introducir ambos valores* *Debe introducir un valor correcto de Marca Oficial o REGA*

Type of animal:  Cerdos  Madres  
*Debe seleccionar una opción*

Production stage:  Maternidad  Destete  Engorde  
*Debe seleccionar una opción*

Symptomatology:  Dérmica  Digestiva  Locomotora  
 Nerviosa  Reproductiva  Respiratoria  
*Debe seleccionar una opción*

Siguiente

Also lesions at necropsy, vaccine information and a list of usual diseases that could be suspected

|                                     |                          |                          |
|-------------------------------------|--------------------------|--------------------------|
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| APP                                 | Aujeszky                 | Circovirus               |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Clostridios                         | Diarrea inespecífica     | Disentería               |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| EColi                               | Epidermitis              | Estreptos                |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Glasser                             | Gripe                    | Ileitis                  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Leptospira                          | Mycoplasma               | Parasitosis              |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Pasteurella                         | Prolapso Rectal          | Prolapso Matriz          |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| PRRS                                | Rinitis                  | Salmonella               |
| <input type="checkbox"/>            | <input type="checkbox"/> |                          |
|                                     | Ulceras                  |                          |

Radio de visualización

Filtros Activos

Filtrado de granjas #GRANJAS #CASOS

Filtrado por marca oficial #GRANJAS #CASOS

Filtrado por fechas #CASOS

Filtrado por gravedad #CASOS

Filtrado por animales #CASOS

Filtrado por ubicación #CASOS

Filtrado por clínica #CASOS

Filtrado por diagnóstico #CASOS

Filtrado por comarca #CASOS

Filtrado por población #CASOS

Filtrado por casos #GRANJAS #CASOS

Reset filtros

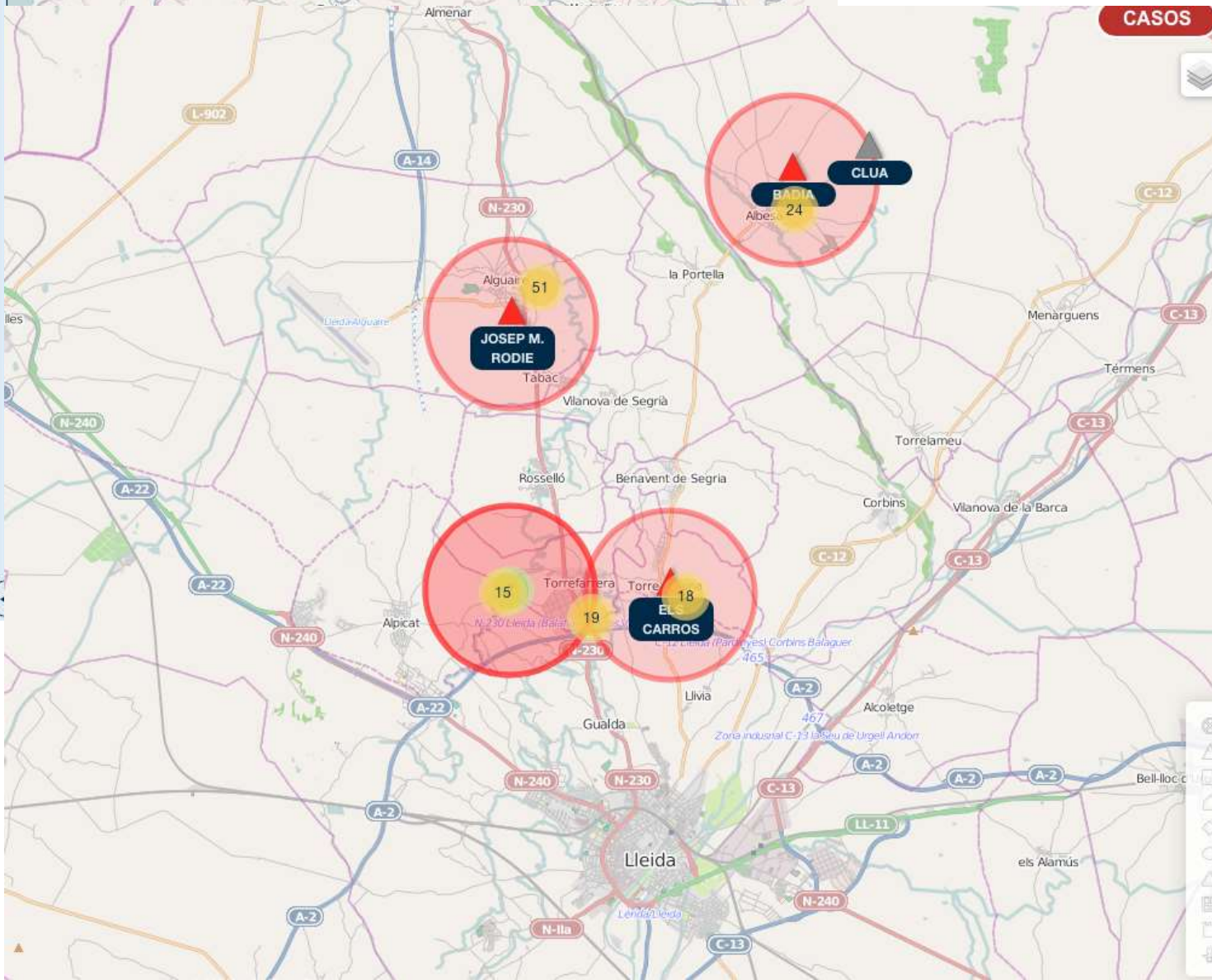
Aplica filtros

Ver todos los casos

Localizador de granjas



FILTERS



CASOS



# Known unexpected diseases

Identification of areas at high risk of introduction and exposure

AND

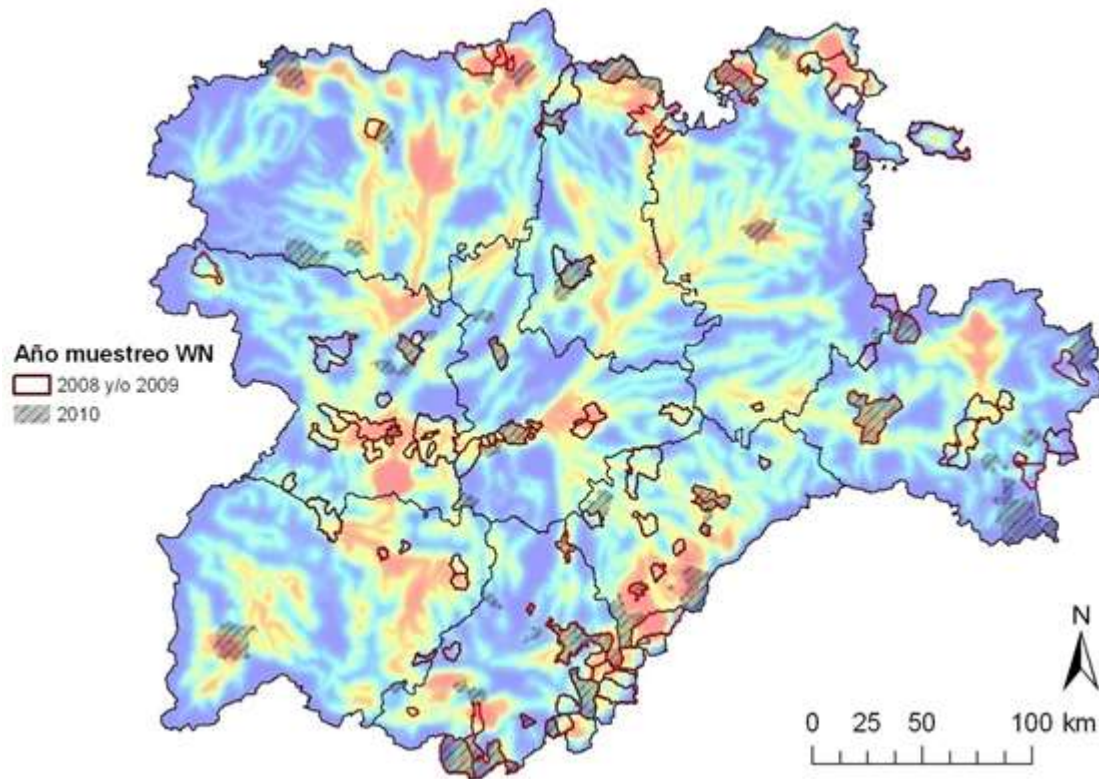
Investigating atypical symptoms with atypical patterns, i.e.  
clustered in time and space

OR

Investigating typical symptoms with typical patterns, i.e.  
changes (different from baseline levels) of early stage  
disease-related behaviour



# West Nile sampling in a region in Spain (Castile-Leon)



*Desarrollo de un Sistema Integral para la Mejora de la Vigilancia, Control y Gestión de Enfermedades Exóticas, Emergentes y Zoonóticas que afectan al Sector Ganadero en Castilla y León*

*Coordinadores: José Manuel Sánchez-Muñoz y Olga Míguez*



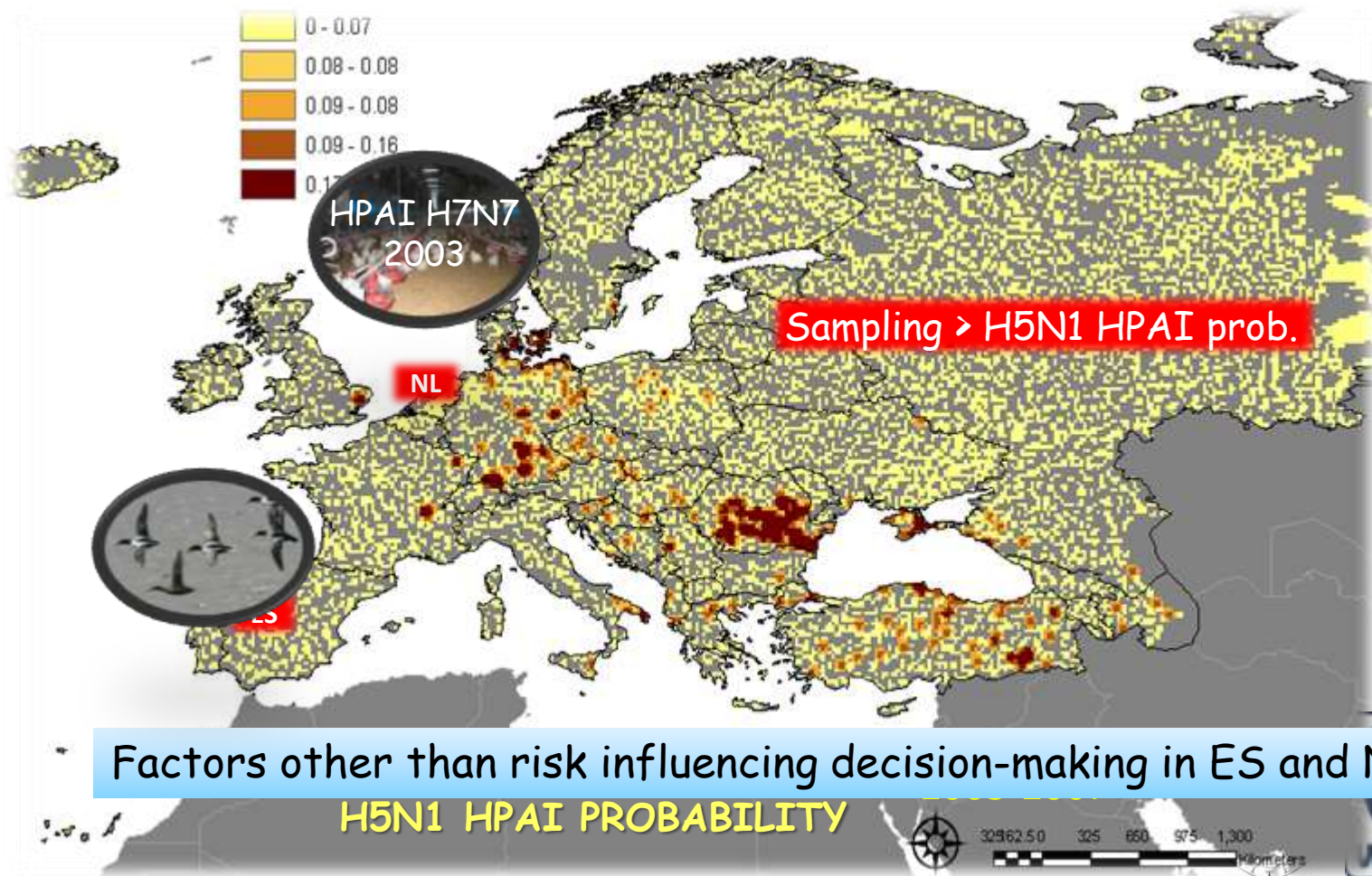
Risk-based contingency plans

# Association Between Number of Wild Birds Sampled for Identification of H5N1 Avian Influenza Virus and Incidence of the Disease in the European Union

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# Solutions for best practice

Early detection discussion:

- Is passive surveillance enough on its own ?
- How can passive surveillance be enhanced?
- Cost-effective active surveillance: when is it also necessary?



# Contact

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