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1 Introduction

The inventory of the veterinary syndromic surveillance (SyS) systems in Europe was one of the objectives of the Triple-S project (Syndromic Surveillance Systems in Europe). This project, co-financed by the European commission, involved twenty-four organizations from fourteen countries. The scope of the project was both human and animal health. A similar inventory of existing SyS systems has been conducted for human health. Anses\(^1\) was responsible for the implementation of the veterinary inventory. This document presents the methodology and results of the veterinary inventory of SyS systems and set it back in the context of the Triple-S project.

Syndromic surveillance was defined by Triple-S project as

"the rapid collection, analysis, interpretation and dissemination of health-related data to enable the early identification of the impact (or absence of impact) of potential human or veterinary public-health threats which require effective public health action.

Syndromic surveillance is based not on the laboratory confirmed diagnosis of a disease but on non-specific health indicators including clinical signs, symptoms or mortality as well as proxy measures (e.g. drug sales, production collapse, etc.).

The data are usually collected for purposes other than surveillance and, where possible, are automatically generated so as not to impose an additional burden on the data providers. This surveillance tends to be non specific yet sensitive and rapid, and can augment and complement the information provided by traditional test based surveillance systems."[1]

2 Objectives

The main objective of the Triple-S project was to develop guidelines to implement syndromic surveillance systems for human and animal health. The inventory of existing veterinary SyS systems in Europe was conducted to i) assess what was the actual use of syndromic surveillance in European countries in animal health and their potential linked with human health ii) identify partners to organize a veterinary meeting on SyS for knowledge exchange iii) provide practical examples to illustrate the guidelines.

The results of the inventory were also used to determine possible typologies of veterinary SyS systems.

Veterinary systems identified through this inventory were included in the WP 5 country visits.

3 Methodology

3.1 Identifying people involved in SyS projects

The inventory was based on a survey conducted in two steps.

The first step consisted in disseminating a brief questionnaire to people potentially involved in SyS, identified through a literature review (scientific articles on veterinary SyS) and using networks of contacts in animal health. Anses, in charge of the implementation of the inventory, was responsible of two French pilot SyS system that were included in the inventory from the beginning.

The second step consisted in sending the identified person a detailed questionnaire to collect information on the system or project.

We critically reviewed all relevant scientific literature (grey and white literature) pertaining to Vet SyS. The literature was searched on public scientific database (Pubmed and Sciednecdirect) as well as on Google, using advanced, customized search engine and food safety agencies websites (see appendix 1).

\(^1\) French Agency for Food, Environmental and Occupational Health and Safety
Moreover, a list of persons potentially involved or aware of syndromic surveillance was elaborated: EFSA focal points, Chief Veterinary Officers (CVO), members of the European college of veterinary public health, members of the EFSA Animal Health and Welfare scientific panel, informal contacts (contacts of the Triple-S project’s partners).

A brief questionnaire and a letter presenting the Triple-S project, the objectives of the inventory and defining what is SyS (appendix 3) were sent to all the contacts of the dissemination list.

Answers received from the brief questionnaires were analyzed to select only systems that fit with the definition of SyS.

3.2 Collection of data on existing SyS systems: long questionnaire

A long questionnaire was created to collect data on the existing veterinary SyS systems (appendix 4). As a similar inventory was conducted for human health, a harmonization of the questionnaire for both human and animal health was done to be able to compare results. The conception of the questionnaire was inspired by the one developed in the EuroMoMo project. The questionnaire was divided into eight parts: personal information, general characteristics of the system, data providers, data collected, data analysis, data dissemination, use and evaluation of the system, other comments.

This questionnaire was sent to the previous selected persons with a reminder on the Triple-S project (Triple-S flyer available on the project’s website) and a copy of the brief questionnaire already filled. Each person could fill in the questionnaire (word file) and sent it back via e-mail or fill in directly on the Triple-S website via a dedicated interface (https://voozanoo.invs.sante.fr//2006683906/scripts/aindex.php).

During the duration of the Triple-S project (until august 2013) new contact persons were searched by asking to each person previously identified if he/she knew other SyS systems and by promoting the project during scientific meetings.

3.3 Veterinary meeting on syndromic surveillance

A veterinary meeting was organized in Paris, September 12-14, 2011 in parallel to the Triple-S country visit in France. It allowed us to hold a common session on both human and animal health with regard to synergy between both sides. The objectives of this session were to i) share experience from both sides and encourage knowledge transfer, ii) discuss what and how information should be shared between both sides to improve respective performances.

Minutes of the meeting and a synthesis document on main ideas and issues discussed were elaborated and validated by all participants (see appendix 7).

An evaluation form was filled in by participants to have their feedback on this meeting (appendix 8). The meeting was very fruitful according to all participants. The synergy session was appreciated by 60% of the participants. The 40% that did not appreciate this session did not give comments except one participant that would have appreciated presentation on human health SyS.

3.4 Data analysis

The results of the questionnaires were registered into a MySQL database. A descriptive analysis was performed using R software. As the collection of data was ongoing for all the duration of the project, the descriptive analysis was performed using RODBC and OdfWeave packages to edit automatically an updated open office report.

As the questionnaire included a lot of questions that involved describing the results through a large number of variables, a multivariate data analysis was performed to reduce the dimensionality of the dataset. For some questions, more than one answer could be given (e.g. a system could have more than one objective or data provider). In this case each answer was considered as a binary variable and thus a group of binary variables corresponded to one question. Multiple factorial analysis (MFA) was performed. It is a principal axes method used to analyze individual observations described by several groups of variables. The principle of this method, as all factor analysis methods, is to reduce data to

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2 http://www.euromomo.eu/
their principal components [2, 3]. “Objectives of the systems”, “Data providers” and “Population targeted” were chosen as active groups of variables. Influence of these groups was balanced by MFA [3]. “Motivation for transmission of data”, “Status of the system” and “Source of funding” were used as illustrative variables/groups of variables. Modalities of low effectives were merged to avoid instability in the MFA. The analysis was performed using FactoMineR package [4] from R software (R Development Core Team (2010). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org).

4 Results

4.1 Identification of persons in charge of SyS systems

The literature review performed on October 2010 enabled to identify 14 authors of scientific papers about 10 distinct veterinary syndromic surveillance systems. Using networks of contacts in animal health, 234 persons were identified:

- EFSA focal points (36)
- Chief Veterinary Officers (27)
- Members of the european college of veterinary public health (140)
- Members of the EFSA Animal Health and Welfare scientific panel (21)
- Other informal contacts (10)

4.2 Questionnaires

A total of 248 e-mails (see appendix 2) were sent with brief questionnaire and associated letter on April 5, 2011. Destination errors were treated on April 7, 2011. Twenty two answers were received from 13 different countries (Austria(1), Belgium(3), Switzerland(1), Cyprus(1), Denmark(1), Spain(1), Finland(3), France(2), Greece(1), Italy(1), The Netherlands(3), Sweden(1), The United Kingdom(3)) among which 26 persons from 10 countries were selected to receive the long questionnaire (some answers involved more than one SyS system). The long questionnaires were sent on July 22, 2011 and a reminder on August 29, 2011. Eighteen persons answered (appendix 5). On August 2012, 2 other SyS systems were identified by contact during SVEPM congress (Society for Veterinary Epidemiology and Preventive Medicine congress) and the veterinary meeting organized by Triple-S project in September 2011.

4.3 Descriptive analysis

This section presents the main results from the descriptive analysis. All the results are available in appendix 6.

The different systems and their main characteristics are presented in Table 1. A list and short description of existing SyS systems was elaborated and presented on the public section of the Triple-S website (http://www.syndromicsurveillance.eu/systems-in-europe/vet-systems) after the agreement of all persons responsible of each system (Appendix 9).

Table 1: Table of European veterinary surveillance systems projects having a syndromic component identified through the Triple-S inventory process with their main characteristics
<table>
<thead>
<tr>
<th>System Name (country)</th>
<th>Status</th>
<th>C</th>
<th>A</th>
<th>P</th>
<th>W</th>
<th>H</th>
<th>Main Objectives</th>
<th>Main Data providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMON (AU)</td>
<td>ACTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance,</td>
<td>Veterinary clinics</td>
</tr>
<tr>
<td>VETSTAT (DA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Control of the usage of antimicrobials</td>
<td>Veterinary clinics, pharmacies</td>
</tr>
<tr>
<td>Sikava (FI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Veterinary services, Laboratories, Farms, Slaughterhouses,</td>
</tr>
<tr>
<td>Naseva FI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Veterinary Services, Laboratories, Farms, Slaughterhouses</td>
</tr>
<tr>
<td>REPAMO (FR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection</td>
<td>Laboratories</td>
</tr>
<tr>
<td>SAGIR (FR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Laboratories</td>
</tr>
<tr>
<td>GD Monitor (NL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Veterinary services and clinics, Telephone help lines</td>
</tr>
<tr>
<td>FarmFile (UK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance</td>
<td>Veterinary services</td>
</tr>
<tr>
<td>Equ. Surv. Reports UK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance</td>
<td>Veterinary services, clinics and school, Laboratories</td>
</tr>
<tr>
<td>VetCompass (UK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance</td>
<td>Veterinary clinics</td>
</tr>
<tr>
<td>Kodatabasen (SW)</td>
<td>ACTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Production management</td>
<td>Laboratories, Farms, Slaughterhouses</td>
</tr>
<tr>
<td>EPI (SI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Veterinary services and clinics, Pharmacies, Laboratories, Slaughterhouses, Rendering plants</td>
</tr>
<tr>
<td>Animal Health System (SZ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance</td>
<td>Veterinary services and clinics, Farms, Slaughterhouses, Rendering plants,</td>
</tr>
<tr>
<td>MoSS-Emergences 2 (BE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection</td>
<td>Veterinary services and clinics, Telephone help lines</td>
</tr>
<tr>
<td>Provimer (SP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Rendering plants</td>
</tr>
<tr>
<td>OMAR (FR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Rendering plants</td>
</tr>
<tr>
<td>NERGAL-abattoirs (FR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Slaughterhouses</td>
</tr>
<tr>
<td>VSD telephone log (UK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Veterinary clinics, Laboratories</td>
</tr>
<tr>
<td>Poultry practice data (UK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance</td>
<td>Veterinary clinics</td>
</tr>
<tr>
<td>Innova AM and PM (UK)</td>
<td>PILOTE PHASE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance</td>
<td>Slaughterhouses</td>
</tr>
<tr>
<td>O48M (UK)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>General health surveillance</td>
<td>Farms</td>
</tr>
<tr>
<td>Country/Code</td>
<td>Data Source</td>
<td>Description</td>
<td>Sectors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
<td>--------------------------------------------------</td>
<td>----------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAVSNET (UK)</td>
<td></td>
<td>Outbreaks detection, General health surveillance</td>
<td>Veterinary clinics, Laboratories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kuukausi-ilmoitus (FI)</td>
<td></td>
<td>General health surveillance</td>
<td>Veterinary services and clinics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDB (SW)</td>
<td>DATA BASE</td>
<td>Other: not define yet</td>
<td>Farms, Slaughterhouses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Djursjukdata (SW)</td>
<td>DATA BASE</td>
<td>General health surveillance</td>
<td>Veterinary clinics and school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SVALA (SW)</td>
<td></td>
<td>Management of the diagnostic process</td>
<td>Veterinary clinics Laboratories, Farms, Slaughterhouses, Rendering plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBL (IT)</td>
<td></td>
<td>Surveillance of other health threats, Other</td>
<td>Veterinary services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CA: companion animals (e.g. dogs, cats); PA: production animals (e.g. cattle, swine, small ruminants); W: wild animals (i.e. not tamed or domesticated); H: horses; C: Completed
Twelve different countries answered to the long questionnaire. A total of 27 different systems were identified among which eight were previously identified through literature review. Two systems identified through the literature review were not included in this study because no answers to the long questionnaire were received.

88% of the systems were declared as active or in pilot phase. We decided to keep systems that were at an early stage called “database only” because data are already available and there is already the project to implement a syndromic surveillance systems using these data (Figure 1).

![Figure 1: Number of systems according to the status](image1)

**Objectives**

56% of the systems had more than one objective. 44% of the veterinary SyS systems had an objective of detection of outbreaks, 22% an objective of surveillance of other threats, 70% an objective of general health surveillance and 52% another objective.

Among the other objectives there was the use of health indicator to classify farms according to health risk.

The main targeted population was livestock. 33% of the systems targeted more than one population (Figure 2).

![Figure 2: Number of systems according to the targeted population](image2)

**Data collection**

78% of the systems had more than one data provider. Veterinary clinics, veterinary services, laboratories and slaughterhouses were the most frequent (Figure 3).
The geographical coverage of the systems was national for 85% of the systems. 37% and 33% of the systems had coverage of respectively 100% of the data providers and animal population. All systems had at least one type of data collected on ongoing basis.

**Data transmission**

The reasons for data providers to transmit data were the fact that it was mandatory for 48% of the systems and thanks to access to output for 44% (e.g. communication of outputs through reports). Among the other motivations there were financial compensation, altruism and mutual benefit (Table 2).

Table 2: Number and proportion of systems according to the reason data providers transmit data to the system.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of systems</th>
<th>Proportion of total number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory</td>
<td>13</td>
<td>48.1</td>
</tr>
<tr>
<td>Other motivation</td>
<td>13</td>
<td>48.1</td>
</tr>
<tr>
<td>Access to output</td>
<td>12</td>
<td>44.4</td>
</tr>
<tr>
<td>Financial compensation</td>
<td>2</td>
<td>7.4</td>
</tr>
</tbody>
</table>

77% of the systems used data that were already collected (totally or partially) for other reasons than surveillance. There was no additional burden for data providers for 26% of the systems and the work needed to be organized differently to collect syndromic data for 48% of the systems.

The provision of data was totally or partially automated for respectively 22% and 48% of the systems.

Table 3: Number and proportion of systems according to the channel chosen by data provider to transmit data.

<table>
<thead>
<tr>
<th>Data transmission</th>
<th>Number of systems</th>
<th>Proportion of total number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>email</td>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>web portal</td>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>paper-mail</td>
<td>9</td>
<td>35</td>
</tr>
<tr>
<td>direct database</td>
<td>7</td>
<td>27</td>
</tr>
</tbody>
</table>
Some systems propose to data providers several ways of transmission of data. Most of the systems used at least one electronic way of transmission of data: 38% via email and webportal, 27% via direct database and 4% via ftp site (Table 3).

Table 4: Number and proportion of systems according to the frequency of transmission of data from data provider to the system.

<table>
<thead>
<tr>
<th>Transmission frequency</th>
<th>Number of systems</th>
<th>Proportion of total number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real time or near</td>
<td>13</td>
<td>48</td>
</tr>
<tr>
<td>Daily</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Weekly</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Monthly</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Quarterly</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

Real time in this questionnaire deals with immediate transmission and near real time with transmission in less than 24 hours. 48% of the systems transmitted data in real time or near real time, 19% daily and weekly. The reporting delay was real time or near real time for 19% of the systems (Table 4).

Individual data were transmitted by data providers for 85% of the systems. About 50% of these systems collected the date of observation or registration, owner residence, animal ID Number, age and breed and sex.

Data analysis

15% of the systems were not yet monitoring indicators. 67% of the systems were monitoring more than one indicator.

The most frequent indicators monitored were clinical signs or symptoms, mortality, syndromes and medical diagnoses (Table 5).

Table 5: Number and proportion of systems according to the type of indicator monitored.

<table>
<thead>
<tr>
<th>Number of systems</th>
<th>Proportion of total number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical signs or symptoms</td>
<td>14</td>
</tr>
<tr>
<td>Mortality</td>
<td>14</td>
</tr>
<tr>
<td>Syndromes</td>
<td>13</td>
</tr>
<tr>
<td>Medical diagnoses</td>
<td>12</td>
</tr>
<tr>
<td>Autopsy lesions</td>
<td>8</td>
</tr>
<tr>
<td>Laboratory test submissions</td>
<td>7</td>
</tr>
<tr>
<td>Production indicators</td>
<td>5</td>
</tr>
<tr>
<td>Other indicator</td>
<td>5</td>
</tr>
<tr>
<td>Drug prescriptions</td>
<td>4</td>
</tr>
<tr>
<td>Website hits / Help line calls</td>
<td>2</td>
</tr>
</tbody>
</table>
For the 23 systems using medical observation, 11(48%) did not have coding system. Among the 12(52%) systems which had a coding system 9 systems had their own coding system, one system used a national coding system and two did not transmit the information in the questionnaire.

Table 6: Number and proportion of systems according to the frequency of data analysis.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Number of systems</th>
<th>Proportion % (/total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other frequency</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>Real or near real time</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Quarterly</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Annually</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Weekly</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Monthly</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Semestrially</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Daily</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Among the 25 systems that performed analyses, 30% of the systems analyzed data in real time, near real time or daily (Table 6).

Table 7: Number and proportion of systems according to the statistical methods used.

<table>
<thead>
<tr>
<th>Statistical method</th>
<th>Number of systems</th>
<th>Proportion % (/total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No statistical method</td>
<td>9</td>
<td>33</td>
</tr>
<tr>
<td>Other methods¹</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Historical Mean</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Regression model</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Time-series methods</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Farrington method</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Control chart</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

¹ spatial aggregation, AHC (Ascendant hierarchical clustering), z-test.

The main methods used were historical mean, regression model and time-series methods (Table 7). Eight systems performed analysis automatically. Among the 23 systems that performed analyses and transmitted information on type of analysis used, 9(33%) of systems did not use statistical methods to detect aberration (only descriptive analysis was done).

From the alarm to the alert

The procedures to validate or not an alarm were quite similar for all systems concerned.

The alarm was transmitted to a relevant person (administrator or veterinarian) to validate it using statistical information. Then if the alarm was validated, an epidemiological investigation was requested to decide if the alarm was an alert or not.

The other procedure presented in questionnaires was to discuss the plausibility of the alarm through a group of experts.
Communication

Table 8: Number and proportion of systems according to the kind of addressee of the data.

| Kind of Addressee       | Number of systems | Proportion |%
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Data providers</td>
<td>18</td>
<td>67</td>
</tr>
<tr>
<td>Veterinary services</td>
<td>12</td>
<td>44</td>
</tr>
<tr>
<td>Authorities</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>Public</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Limited public</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Scientific community</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Professional organization</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Farmers</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

Outputs of the system were transmitted to data providers for 67% of the systems and to public for 26% of the systems (Table 8).

Source of funding

The major source of funding came from public sector. 33% of the systems had more than one source of funding and 7% declared not need any funding as the collection of data was mandatory (Figure 4).

![Figure 4: Number of systems according to the source of funding.](image)

Evaluation of the system

Nine systems had performed an evaluation but it was more an evaluation of data quality than a real evaluation of the performance of the system.

Synergy with human health

Seven systems already shared outputs of their systems with human health institute and three planned to.

The examples given were the transmission of information about alert, transmission of report with interpreted data, organization of common meetings.

4.4 Multiple Factorial Analysis

Table 9 suggested keeping three dimensions for MFA interpretation. Results of the test of the significance of the RV coefficients between each group of active variables showed a significant correlation between data providers and targeted population and no significant correlation between objectives and each of the two other groups (Table 11). The three groups of active variables (objectives of system, targeted species, data providers and indicators monitored) had contributed to the
construction of the first dimension of MFA for respectively 35.44%, 44.27% and 20.28%. The second dimension of MFA was mainly constructed by “objectives of system” and “data providers and indicators monitored” with respectively a contribution of 37.73% and 55.23%. The three groups of active variables had contributed to the construction of the third dimension of MFA for respectively 33.54%, 22.97% and 43.50% (Table 10).

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Percentage of variance</th>
<th>Cumulative percentage of variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>comp 1</td>
<td>1.58</td>
<td>18.21</td>
</tr>
<tr>
<td>comp 2</td>
<td>1.37</td>
<td>15.77</td>
</tr>
<tr>
<td>comp 3</td>
<td>1.19</td>
<td>13.70</td>
</tr>
<tr>
<td>comp 4</td>
<td>0.83</td>
<td>9.59</td>
</tr>
<tr>
<td>comp 5</td>
<td>0.77</td>
<td>8.89</td>
</tr>
<tr>
<td>comp 6</td>
<td>0.63</td>
<td>7.22</td>
</tr>
<tr>
<td>comp 7</td>
<td>0.53</td>
<td>6.06</td>
</tr>
<tr>
<td>comp 8</td>
<td>0.41</td>
<td>4.70</td>
</tr>
<tr>
<td>comp 9</td>
<td>0.31</td>
<td>3.55</td>
</tr>
<tr>
<td>comp 10</td>
<td>0.27</td>
<td>3.08</td>
</tr>
</tbody>
</table>

Table 9: Variance of the first ten factorial axes (right); Plot of eigen values of MFA (left).

<table>
<thead>
<tr>
<th>Group of active variables</th>
<th>Dim.1</th>
<th>Dim.2</th>
<th>Dim.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of system</td>
<td>35.44</td>
<td>37.73</td>
<td>33.54</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.77</td>
<td>0.79</td>
<td>0.66</td>
</tr>
<tr>
<td>Targeted species</td>
<td>44.27</td>
<td>7.04</td>
<td>22.97</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.85</td>
<td>0.41</td>
<td>0.57</td>
</tr>
<tr>
<td>Data providers</td>
<td>20.28</td>
<td>55.23</td>
<td>43.50</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.73</td>
<td>0.91</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Table 10: Contribution and correlation of each group of active variables with each of the third first factor of the MFA.

<table>
<thead>
<tr>
<th>Groups of active variables compared</th>
<th>RV</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives/Targeted species</td>
<td>0.10</td>
<td>0.55</td>
</tr>
<tr>
<td>Objectives/Data providers</td>
<td>0.24</td>
<td>0.085</td>
</tr>
<tr>
<td>Targeted species/Data providers</td>
<td>0.40</td>
<td>8.3 10^{-5}</td>
</tr>
</tbody>
</table>

Table 11: RV coefficient between the two groups of active variables and the p-value associated to the test of the significativity of the RV coefficient (with the Pearson type III approximation).

The first component of MFA made the distinction between two groups of data providers: the first one with farms, slaughterhouses, rendering plants, other professional organizations, veterinary services and the second one with veterinary clinics, laboratories, drug producers or pharmacies (Figure 5 and Figure 6). This first component also distinguished production animals on one hand and on the other hand wild and companion animals. Looking at illustrative variables, the first component opposed two groups of motivation for data providers to transmit information to the SyS system: mandatory motivation in one side and in other side financial compensation, access to output and other motivation. The third component opposed two different status of SyS system: database only on the right and active system on the left. These first two-dimension spaces of MFA showed two groups of variables presented in Table 12.
<table>
<thead>
<tr>
<th></th>
<th>First group of variables</th>
<th>Second group of variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data providers</td>
<td>Veterinary clinics</td>
<td>Slaughterhouses</td>
</tr>
<tr>
<td></td>
<td>Laboratories</td>
<td>Veterinary services</td>
</tr>
<tr>
<td></td>
<td>Drug producers or pharmacies</td>
<td>Rendering plants</td>
</tr>
<tr>
<td></td>
<td>Web sites</td>
<td>Other professional organizations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Farms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Telephone help lines</td>
</tr>
<tr>
<td>Active variables</td>
<td>Targeted population</td>
<td>Wild animals(^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Companion animals(^1)</td>
</tr>
<tr>
<td></td>
<td>Objectives</td>
<td>Outbreaks detection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General health surveillance</td>
</tr>
<tr>
<td>Illustrative</td>
<td>Motivation for transmission of data</td>
<td>Access to output</td>
</tr>
<tr>
<td>variables</td>
<td></td>
<td>Financial compensation</td>
</tr>
<tr>
<td></td>
<td>Funding</td>
<td>Laboratory</td>
</tr>
<tr>
<td></td>
<td>Status</td>
<td>Non-profit association</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Active</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data base only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completed</td>
</tr>
</tbody>
</table>

Table 12: Description of the two groups of active and illustrative variables separated in the two-dimension spaces of MFA. \(^1\)Companion animals (dogs, cats and horses); \(^2\)Production animals (e.g. cattle, swine, small ruminants); \(^3\)Wild animals (i.e. not tamed or domesticated)

Figure 5: Representation of modalities equal to 1 of variables of MFA in the first 2-dimensional space of MFA.
Figure 6: Representation of modalities equal to 1 of variables of MFA in the first and third factorial axis of MFA.

4.5 Veterinary meeting on syndromic surveillance

Nineteen persons (included four organizers from Anses) from eleven European countries participated to the veterinary session among which eight participants were funded by the Triple-S project.

Eleven existing and planned systems were presented followed by discussion on the different steps of the implementation of a syndromic surveillance system so as to gather information for writing guidelines for the implementation of syndromic surveillance systems.

5 Discussion

The discussion section is based on both results of the inventory of veterinary syndromic surveillance systems and on knowledge exchange between Triple-S partners and participants of the Triple-S veterinary meeting.

5.1 Importance of SyS in animal health

Among the 27 systems identified through the process of inventory presented in this document, only eight had been previously identified with literature review which showed the relevance of an active approach to perform this inventory (based on a dedicated questionnaire). As syndromic surveillance in animal health is quite recent, few publications on active systems exist making incomplete an inventory only based on literature review.

Even if most of the systems were declared as active or in pilot phase, not all the systems would be considered as SyS systems in regard to the Triple-S SyS definition (real time or near real time collection and data analysis automatically performed). There is a real interest in developing SyS systems using existing database but in animal health the implementation of such systems is at the beginning. The important amount of relevant and available data combine with the increasing interest...
for SyS (increasing of publications and meeting in Paris) is a good indicator of the emergence of new SyS systems in animal health during the following years.

We can notice that in animal health, some data are mandatory collected through European law to guarantee for example meat traceability. For instance all information on animal identification and movement must be registered at individual level for bovine which make data on bovine mortality available with 100% of the population covered for potential SyS.

5.2 Issues of SyS

5.2.1 Involving data providers

It was considered as particularly challenging to convince data providers to share the syndromic data they routinely collect since most of this data are of economical interests, e.g. reflect the activities of private vet clinics or animal production performances. However experiences of participants of the Triple-S veterinary meeting showed that there are many inexpensive and efficient ways to reward data providers and get them involved in such systems (e.g. access to aggregated data, rapid synthetic feedback, benchmarking, diagnosis aid, etc.).

It is advisable to use data already collected, in particular regulatory-based, data which is the situation of most SyS systems identified in the inventory. Implementation of SyS system should not lead to additional burden for data providers.

All participants of the Triple-S veterinary meetings agreed on the fact that feedback to data providers is a first step to maintain their motivation; 67% of the existing SyS systems in Europe already do this transmission of information back to data providers. Feedback to data providers is an accessible tool to improve syndromic surveillance system.

5.2.2 Data quality and standardization

Data quality and standardization were also identified as a key challenge. Indeed, most projects are based on existing data which were originally not collected for surveillance purpose, and which thus could be of low quality (bias, precision, etc.). Participants of veterinary meeting also reported the lack of standardization of clinical information (definition and name of clinical signs, syndromes, causes of death, etc.) in veterinary sciences which is a hindrance to harmonization and comparability among systems. The inventory showed that 41% of the systems did not use a coding system (i.e. predefined list of closed items).

5.2.3 Data analysis

Discussions during the veterinary meeting and results of the inventory showed that even if more and more syndromic data (from vet clinics, slaughterhouses, fallen plants or labs) are now collected or accessible to vet epidemiologists, they lack of tools and strategy to analyze them. Even when data analysis is carried out, few systems had defined protocol to interpret statistical alarms and answer them with adequate actions.

5.2.4 Real time issue

58% of the systems did not transmit data in real time or near real time. Most of the SyS definitions consider the real time collection and analysis of data as a main characteristic of syndromic surveillance systems [1, 5-7]. On one hand, many veterinary SyS systems are mixing different notification systems and are partly real time (online data transmission) and partly not (data transmission through paper forms, registered in a second time in the database). On another hand, some systems are collecting data in real time, but from events that are not frequent e.g. clinical signs observed during quarterly farm visits.

Defining syndromic surveillance according to the real-time collection of data is perhaps not adequate for veterinary SyS. Timeliness is a goal for all surveillance systems aiming at early detection and seems not specific to syndromic surveillance. The implementation of real-time process can cost a lot of money and its added value should be carefully evaluated. A balance between timeliness and costs has always to be found. Most survey respondents and meeting participants considered that real time
was more an objective than an obligation for animal health SyS systems. For most, what really defined SyS system was the nature of the indicators monitored.

5.3 Differences between animal and human health SyS

Carrying out surveillance based on not-diagnostic data is tempting especially in animal health. Indeed a formal diagnosis is probably less often reached in veterinary than in human medicine. Possibilities for carrying out further investigations are often very limited by the animal’s owner will and resources. Laboratory tests are generally used only in case of good cost-benefit ratio especially for livestock. Thus using SyS seems particularly relevant and cost effective in animal health as most information available is not diagnostic.

Differences between human and animal health SyS systems can be identified, notably regarding data sources which can be common to both human and animal health SyS (e.g. clinical information, consumption of medications, laboratories requests) but also specific to human (school and work absenteeism) or animal (rendering plants, slaughterhouses) health (Figure 7). The later the data are collected in the diagnosis process the more specific the SyS is and the lower is the proportion of the exposed population targeted (Figure 7).

There is a real interest in developing SyS using existing databases but contrary to human health, in animal health the implementation of such systems is at an initial stage compared to human health.

5.4 Synergies between human and animal health and between traditional and syndromic surveillance

Taking into account limits of traditional approaches to deal with infectious diseases, the Wildlife Conservation Society initiated since 2004 a global and preventive approach named One World-One Health. The objective is to strengthen the links between human health, animal health and environment as no one of these sectors has enough knowledge and resources to prevent the emergence or
resurgence of diseases in today’s globalized world [8, 9]. Syndromic surveillance, as traditional surveillance, has to be considered from the perspective of the One health initiative.

Human and animal health epidemiologists face common statistical and epidemiological issues when dealing with syndromic surveillance (e.g. use of data collected for other purpose than surveillance; standardization of clinical observations; syndrome definition; anomaly detection; interpretation of unspecific signals; response to alerts). Both sides have thus interest in sharing their experiences and knowledge to improve their respective systems.

The results of the inventory of veterinary SyS systems showed that 40% of the identified systems already shared or have planned to share information with human health sector. For these systems the collaboration between human and animal health sector was based on regular meeting to discuss about outputs of the systems e.g. GD – Veekijker (GD Animal health monitor) system in the Netherlands [10], Farmfile system in the UK [11]. Collaborations reported were mainly focused on zoonotic diseases certainly because zoonoses is a major concern nowadays since 75% of the emerging infectious diseases have been identified as zoonoses [8, 12].

It could be relevant to regularly share information to improve SyS systems performances on both sides in terms of timeliness, reactivity and awareness. Timeliness and sensitivity for detecting a threat common to human and animal can be better on one or the other side, depending on which species develop symptoms stronger and earlier after exposure (animal sentinel). West Nile disease is an interesting example because several countries had already implemented SyS systems with synergies between human and animal health. SyS of West Nile disease could be based on both surveillance of wild bird mortality, horses’ neurologic syndrome and human clinical suspected cases. In the Netherlands and France, the syndromic surveillance of West Nile is based on the notification by veterinarians of neurological syndrome associated with previous fever [13, 14].

Other types of health events having an impact on both animal and human population could theoretically worth synergies between the two sides. Synergies could help to evaluate the impact of an identified health event, or reassure on the absence of impact of environmental pollution accident.

SyS produces unspecific alarms that need to be investigated. Sharing results between animal and human SyS could help exclude some artifacts and limit the false alarm rate, if for example alarms are confirmed only when observed in animal and human populations which are similarly exposed. Concomitant alert from human and animal systems would add confidence in a signal suggesting the presence of a health threat.

6 Conclusion

This study showed the current state of veterinary SyS in Europe and its perspectives. The descriptive analysis distinguished two types of existing European SyS systems. The first type of systems, more advanced was identified in the private sector and focused on companion animals whereas the second type was at an early stage, based on data mandatory collected and targeted livestock sector.

Physicians are far more advanced in SyS than veterinarians. Currently, among the surveillance systems considered as syndromic by the veterinarian epidemiologists, there is none that fulfill all the requirements of the existing SyS definitions. The real or near real-time collection of data is not always carried out.

SyS systems are considered as complementary to other existing surveillance systems and are not meant to replace them. It is an additional tool to detect changes or events that would not be detected otherwise.

European regulation requires member states to collect many data to guarantee for example meat traceability. It could be an asset to improve comparability of SyS inputs and thus outputs in European countries. Looking at the data collected in European countries, systems developed or planned in animal health, it seems relevant to think about implementing a SyS system based on animal mortality data as an extension of the existing EUROMOMO project in human health.

Synergies between human and animal health SyS should be relevant in the same way as for traditional surveillance especially for zoonotic diseases detection but not only. Detection of environmental
incident and quantification of impact or reassurance on the absence of impact are other interesting fields for synergies. The transmission of outputs from both sides is the easiest way for such synergies even if the common collection and analysis of both human and animal health data is another option already chosen by American systems.

The statistical analysis was one of the weak points identified in most of the existing or planned veterinary SyS systems. A huge amount of data of interest for SyS is collected but few of them are analyzed properly. The guidelines for the implementation of SyS systems and network of people involved in SyS elaborated by the Triple-S project could provide a solution to enhance and spread veterinary SyS in European countries.

References

Appendix 1: Literature review methodology

This appendix presents the queries used for literature review on SyS systems according to the database. For each query the number of results is précised. A reference was considered relevant when the answers to the following questions were yes: Does this reference deal with veterinary syndromic surveillance? and is it a European SyS?

<table>
<thead>
<tr>
<th>Database</th>
<th>Query</th>
<th>Number of results (article or web page)</th>
<th>Number of relevant results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pubmed</td>
<td>veterinary[sb] AND (syndrom*[Title/Abstract]) AND (surveillance[Title/Abstract]) AND (« animal »[Title/Abstract] OR vet*[Title/Abstract])</td>
<td>44</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>veterinary[sb] AND (“surveillance”[Title] OR “monitoring”[Title] OR “early warning”[Title]) AND (syndrom*[Title] OR “non specific”[Title] OR “unspecific”[Title] OR “automated”[Title] OR “real time”[Title] OR “production”[Title] OR “prediagnostic”[Title] OR “mortality”[Title] OR “death”[Title])</td>
<td>200</td>
<td>17</td>
</tr>
<tr>
<td>Science Direct</td>
<td>TITLE-ABSTR-KEY((syndrom*) AND (surveillance) AND (animal OR vet*))</td>
<td>40</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(syndromic) AND (surveillance) AND (animal OR veterinarian*)[All Sources(Agricultural and Biological Sciences,Computer Science,Environmental Science,Veterinary Science and Veterinary Medicine)]</td>
<td>53</td>
<td>7</td>
</tr>
<tr>
<td>Google using the advanced search function</td>
<td>veterinary OR veterinarian OR animal “syndromic surveillance” filetype:pdf</td>
<td>112</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>veterinary OR veterinarian OR animal “syndromic surveillance” filetype:ppt</td>
<td>129</td>
<td>5</td>
</tr>
<tr>
<td>google (customized search engine search)³</td>
<td>&quot;animal health&quot; OR &quot;santé animale&quot; europe OR europa with “animal health” search engine</td>
<td>61</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>&quot;animal health&quot; OR &quot;santé animale&quot; europe OR europa with « epidemiosurveillance » search engine</td>
<td>216</td>
<td>12</td>
</tr>
<tr>
<td>Food safety agencies websites⁴</td>
<td>“Syndromic surveillance”</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The list of identified relevant articles is presented below:

³ search engines conceived by an expert of Ministry of Agriculture (Bruno Peiffer).


Berezowski, J., 2008. Systèmes de surveillance des maladies : bénéfices et défis pour les producteurs d'animaux de ferme. In, Congrès canadien, Quebec, Canada.


McIntyre, L. H., Davies, P. R., Alexander, G., O' Leary, B. D., Morris, R. S., Perkins, N. R., Jackson, R., Poland, R., 2003. VetPAD - Veterinary practitioner aided disease surveillance
system. In, Proceedings of the 10th international symposium on veterinary epidemiology and economics, Vina del Mar, Chile, 335.


Appendix 2: List of contacts for brief questionnaire
Appendix 3: Brief questionnaire and associated letter
Appendix 4: Long questionnaire
Appendix 5: List of contacts for long questionnaire
Appendix 6: Descriptive analysis
Appendix 7: Minutes and synthesis document of the veterinary meeting on SyS
Appendix 8: Results of the evaluation forms, Meeting on veterinary SyS
Appendix 9: List of veterinary syndromic surveillance systems as presented on Triple-S website

Austria

**GMON (Health Monitoring System for Cattle)**

GMON is a wide health monitoring project started in 2006. Veterinary diagnostic data, to be documented by law (law of animal drug control) is standardised, validated and recorded into a central cattle database. Besides the provision of reports for herd management and preventive measures, the assessment of breeding values for health traits and monitoring of health statuses are project objectives.

Contact: Walter Obritzhauser

Belgium

**MoSS: Monitoring and Surveillance System-Emergences2**

MoSS is a web application/multilingual website allowing for the time and geo-referenced descriptions of atypical syndromes, the clustering of similar cases, the onset of an alert signal sent to best-fitting Experts. The communication around the cases is organized on dedicated forum pages, leading to the early identification of the causative agent(s).

Contact: Marc Dispas

Denmark

**VETSTAT**

All data on purchase of medicine (antimicrobials and vaccines) to production animals are collected in Denmark (how much/which antimicrobials are subscribed by the veterinarian). Data can easily be amalgamated to look on the usage on e.g. specific animal species / disease syndromes / specific antimicrobials / some geographical areas or the entire country in the objective to control the usage of antimicrobials.

Contact: Kristian Moller

Finland

**Kuukausi-ilmoitus**

Kuukausi-ilmoitus is a Finnish program in which veterinarians must give a monthly report about certain notifiable diseases to the central veterinary authorities. The report also contains information about other animal diseases and syndromic illnesses. No statistical analyses are performed on these data at that stage.

**NASEVA**

Naseva is an online register for Finnish cattle farms. The system documents the history of the health care management on the farms at the national level.

Data is collected from veterinarians (farm visits, management plan), laboratories (sample results), slaughterhouses (meat inspection data) and veterinary or production surveillance databases (via interface; production data and medication data) and from the farms (medication data). Data are not used for syndromic surveillance at that stage.

Contact: Erja Tuunainen

**SIKAVA**

SIKAVA is an online register for health classification of Finnish pig farms. The system documents the history of the health care management on the farms at the national level.

Data is collected from veterinarians (farm visits, management plan), laboratories (sample results), slaughterhouses (meat inspection data) and veterinary or production surveillance databases (via interface; production data and medication data) and from the farms (medication data). Data are not used for syndromic surveillance at that stage.

Contact: Sanna Nikunen

France
NERGAL-Abattoir

NERGAL-Abattoir is a pilot data basis created in 2005 to collect data in ten bovine abattoirs in real time during the slaughtering process. A study will be conducted from 2011 to 2014 to evaluate the relevance of these data to implement a syndromic surveillance system. Propositions to improve the existing system will be noted and taken into account for the future version of Nergal-Abattoir which is provided to be developing in more abattoirs in France.

Contact: Céline Dupuy

OMAR

The OMAR project (Observatoire de la Mortalité des Animaux de Rente) was launched in 2009 with the aim to analyze data collected by fallen stock companies, and to design a monitoring system able to detect anomalies possibly associated with health events. Pick calls from farmers to rendering plants are daily registered (including number of animals, species, age group, farm location, date of call) and automatically transmitted to the system. About 1.2 million cattle death notifications are yearly collected. For now only retrospective analysis were conducted, the interest of these data for syndromic surveillance is still being evaluated.

Contact: Jean-Baptiste Perrin

REPAMO (French network for the surveillance of Mollusc diseases)

Since 1992, REPAMO is the French surveillance system dedicated to wild and farmed marine mollusc diseases. It is run by Ifremer on behalf of the Ministry of Agriculture and has 19 correspondents in 13 locations on the Channel, Atlantic and Mediterranean coasts of France. Data are collected from local competent authority, laboratories and REPAMO correspondents. The objectives of the system are the notifiable disease surveillance, the mortality outbreaks investigations and the implementation of 2-3 years surveys on targeted host-pathogen associations

Contact: Cyrille François

SAGIR

Since 50 years, SAGIR carries out epideimiobservance and epidemiolvigilance of wildlife fatal or disabling diseases, including toxicovigilance, in order to help the hunting managers and risk assessors and managers. SAGIR network is a participatory network of wildlife surveillance, which aims at conducting outbreak-based surveillance and when necessary, it also implements targeted surveillance. Three objectives guide the network: conservation, public and animal health. Data are collected from laboratories, hunter’s federation and public technician. There is no syndromic surveillance system in place at that stage.

Contact: Anouk Decors

Italy

MBL (Dairy cow mortality)

MBL is a survey conducted from 01/01/2002 to 31/12/2008 on dairy cattle more than 24 months so as to evaluate local patterns of mortality and to test data availability and reliability. Death notifications from veterinary services were used to model mortality and detect excess of mortality as an alert. This survey was a preliminary work for the future implementation of a syndromic surveillance system based on mortality data in Italy.

Contact: Ines Crescio

Slovenia

EPI (System for monitoring, reporting and notification of animal diseases)

EPI is a web based application which allows data transfer in real time. The system comprises three different parts. The first part covers an animal disease notification system of OIE listed diseases at our national level. The second part is used for the diagnostics, which includes all procedures; including sampling from the field, as well as examinations and results from the labs. The last part covers mandatory vaccinations on the national level. Currently we are developing a fourth part, which will be used for disease outbreak management and control.

Contact: Marko potocnik

Spain

PROVIMER
PROVIMER is a system developed by the Government of Catalonia for the surveillance of data from fallen stock collectors, with the aim of detecting possible outbreaks of animal diseases in its early stages. Routine weekly data transfer, for baseline mortality monitoring and detection of abnormal values, is complemented with immediate email notification of carcass collection requests exceeding acceptable limits (number of animals by specie, according to the insurance company criteria).

Contact: Lucas Arinero Aparicio

Sweden

Centrala Djurdbasen (CDB) Central Cattle Database
The central cattle registry, held by the Board of Agriculture, is a mandatory system for the identification and registration of bovine animals. It is primarily used in authority controls of stock numbers but it has/can also be used for contact tracing during outbreaks. The database is also a link in the national system for blood sampling of cattle at abattoirs (for surveillance purposes). Extracts from the database are regularly downloaded and used by abattoirs to check the age of animals slaughtered, to decide on BSE control measures. Information about animal movements and death with cause of death are registered in the data base. Data are currently not used for syndromic surveillance.

Contact: Ann Lindberg

Djursjukdata (National Animal Disease Recording System)
Djursjukdata is a central registry on veterinary treatments held by the Board of Agriculture that mainly concerns production animals. Data such as clinical diagnoses, treatment prescribed, drugs name and quantity are reported by veterinary practitioners in the field. Data are currently not used for syndromic surveillance.

Contact: Ann Lindberg

Kodatasbanen
Kodatasbanen is the dairy industry’s database. Information on all herds and cows affiliated to production recording (milk or meat), pedigree registration, AI services and any of the control programmes that the industry is responsible for are registered. Information from slaughterhouses and diagnostic laboratories are also registered. Certain herd health indicators are monitored on a regular basis, covering several areas such as calf and young stock health, udder health, claw health, metabolic disorders, culling and mortalities, reproduction etc. The data are currently not used for syndromic surveillance.

Contact: Ann Lindberg

SVAs system för Laboratorie Arbete (SVALA) (SVA’s system for Laboratory work)
SVALA is the LIMS system of the National Veterinary Institute (SVA), which is the major diagnostic lab for animal diseases (production, companion and wild animals) in Sweden, covering pathology, bacteriology, virology, parasitology as well as chemistry. Data are currently not used for syndromic surveillance.

Contact: Ann Lindberg

Switzerland

Animal Health System
The Animal Health System is a project still in its pilot phase whose objectives are general health surveillance and the early detection of new and re-emerging diseases in production and wild animals. The potential application of a syndromic surveillance system for livestock health is being investigated using data from the Federal Veterinary Office such as the national cattle registry, post-mortem inspection results (at the carcass-level) in the slaughterhouses, laboratory test requests by veterinarians and production indicators such as bulk milk sampling test results. Furthermore, we are looking into incorporating additional private data on fallen stock (held by rendering plants), milk production and reproduction indicators (held by breeding associations), post-mortem inspection results at the organ-level (held by slaughterhouses) and reports of equine neurological disorders to the Equinella network. Very little clinical or treatment data are currently centrally recorded in Switzerland but the project is considering ways to encourage data transmission from veterinary clinics and farmers. Passive monitoring of wildlife health is carried out by FIWI (the national reference laboratory).

Contact: Jürg Danuser

The Netherlands

GD Monitor/GD Animal Health Monitor
Since 2002, a telephone helpdesk has been implemented in the Netherlands for production animals. Farmers and veterinarians can contact the helpline and data on animal disease, symptoms or syndromes are collected in a database. Census data from other sources are used (rendering plant, Identification & registration system, breeding organizations, milk quality data, milk production data, farm voluntary health certification statuses, AHS laboratory results). Statistical analyses are performed and outputs are discussed within an experts group to interpret alert and determine relevant investigation. Quarterly reports for Government, levy boards and industry are produced.

Contact: Linda van Wuyckhuise

**United Kingdom**

**BEVA/AHT/Defra Equine Surveillance Reports**

The quarterly equine disease surveillance reports are produced by the Department for Environment, Food and Rural Affairs (Defra), the British Equine Veterinary Association (BEVA) and the Animal Health Trust (AHT). The report collates equine disease data arising from multiple diagnostic laboratories and veterinary practices throughout the United Kingdom giving an insight into equine disease occurrence on a national and international scale. Introduction of a syndromic surveillance component is planned on 2012/2013.

Contact: Andrew Paterson

**Farmfile**

The FarmFile database includes epidemiological data on all diagnostic submissions sent to AHVLA Regional Laboratories. The data are used to identify changes in the profile of endemic disease and the emergence of undefined disease. Scheduled reports include analyses of; disease trends, submissions where a diagnosis is not reached (DNR), syndromes and data quality.

Contact: Eamon Watson

**Innova AM (ante mortem) & PM (post mortem) Data Recording System**

Innova AM and PM is an electronic system to enable the collection of AM & PM inspection results at slaughterhouses for all species (currently used for poultry and pigs; in progress for cattle, sheep and other species). One of the objectives is that the system could create a data base for Great Britain and generates automatic reports to fulfil the requirements for the collection and communication of inspection results (CCIR). Data are not used for syndromic surveillance at that stage.

Contact: Alex Gonzalez

**Over 48 month (O48M) Fallen stock**

Data are collected from farmers and rendering plants on dead cattle over 48 months through surveillance for TSE (brain stem testing of older cattle). Information on date of death and reason for death (in a free text field) is available. “Reason for death” is only available for adult on-farm cattle deaths. Data are not used for syndromic surveillance at that stage.

Contact: Eamon Watson

**Poultry Practice Data**

Poultry practice Data is a database to record pathology data directly from poultry veterinarians. Data collected are simple data about husbandry, disease picture and post mortem observations from a standard list. Data are not used for syndromic surveillance at that stage.

Contact: Eamon Watson

**SAVSNET (Small Animal Veterinary Surveillance Network)**

SAVSNET is a national initiative to ethically collect data from companion small animals (Cats, dogs, rabbits etc) from two sources in the UK; Commercial diagnostic labs and veterinary surgeons in practice. The data will be analysed for temporal and spatial patterns, and risk factors for health and disease (eg age, sex, breed). Data analyses will be published on line for members of the public and vets, and in peer reviewed papers where appropriate. Scientists will be able to apply for access to data.

Contact: Alan Radford

**Vet. Surveillance Division (VSD) telephone log**

VSD telephone log is a database to record data from telephone discussions between AHVLA laboratories and vet practitioners about animal health for production animals. Data from individual laboratories are aggregated and analyzed to supplement routine surveillance activities.
Contact: Eamon Watson

**VetCompass (Veterinary Companion Animal Surveillance System)**

The Royal Veterinary College (RVC), in collaboration with the University of Sydney, is undertaking a nationwide survey of small animal disease. The aims of this project are to investigate the range and frequency of small animal health problems seen by veterinary surgeons working in general practice in the United Kingdom and highlight major risk factors for these conditions. We are doing this through the routine capture of first opinion clinical data via electronic patient records held with practices’ Practice Management Systems (PMSs).

Contact:
Evaluation form

You have participated in the Triple-S veterinary meeting

May we kindly ask you to give your feedback on organization, content and impact of the visit by filling this form

1. This meeting was useful :
   - Very true [9]
   - True [5]
   - Not true [1]
   - Not at all true [1]
   - No opinion [1]

2. Why?
   - Because I received relevant information on other European syndromic systems
     - Very true [9]
     - True [5]
     - Not true [1]
     - Not at all true [1]
     - No opinion [1]

   - Because I received relevant information that I can use for my own syndromic surveillance activities
     - Very true [6]
     - True [7]
     - Not true [1]
     - Not at all true [1]
     - No opinion [1]

   - Because I could do relevant connections to syndromic surveillance experts for potential future collaboration
     - Very true [6]
     - True [7]
     - Not true [1]
     - Not at all true [1]
     - No opinion [1]

   - Because I might have assisted to improve other syndromic surveillance systems
     - Very true [2]
     - True [7]
     - Not true [1]
     - Not at all true [1]
     - No opinion [1]

3. The following parts of the visit were of most use to me for knowledge exchange
   - General sessions (definition, inventory, typology, framework)
     - Very true [5]
     - True [9]
     - Not true [1]
     - Not at all true [1]
     - No opinion [1]

   - Presentations of particular systems – Discussions
     - Very true [7]
     - True [7]
     - Not true [1]
     - Not at all true [1]
     - No opinion [1]
Joint session human / animal syndromic surveillance  
1 Very true 8 True 4 Not true 1 Not at all true   no opinion

It would have been nice to hear some medical talks
Methodology session  
4 Very true 8 True 2 Not true   Not at all true   no opinion

4. The organization of the meeting was effective regarding the following aspects
Travel and local arrangements  
11 Very true 3 True   Not true   Not at all true   no opinion

Organisation on site/agenda  
10 Very true 4 True   Not true   Not at all true   no opinion

Some difficulty getting into room on day 1
Informal discussion/social events  
10 Very true 4 True   Not true   Not at all true   no opinion

Briefing documents  
11 Very true 3 True   Not true   Not at all true   no opinion

Communication/Information flow (before and during meeting)  
11 Very true 3 True   Not true   Not at all true   no opinion

REMARKS / SUGGESTIONS

- Let’s meet again next year!
- Very enjoyable, very rewarding and useful
- Hope next meeting will take place!
- Thank you, very well organized, pleasant people!
- Slightly disappointed by the turnout. There are clearly some people active in this area not present, and some countries absent
- Can I/We get the summary of your notes?
- Thank you very much! It was a great workshop!

Thank you very much!
**INVENTORY OF VETERINARY SYNDROMIC SURVEILLANCE SYSTEMS IN EUROPE - BRIEF QUESTIONNAIRE**

**COUNTRY:** .................................

Your name: .................................

Would you be willing to have your name listed on the Project’s web site?  □ Yes  □ No

*Please, note: if you know more than one system, please copy and paste the frame.*

<table>
<thead>
<tr>
<th><strong>Name and acronym of the system:</strong></th>
<th>.................................</th>
</tr>
</thead>
</table>

**Status:** .................................
(active, pilot phase, planned, completed or discontinued)

**Website:** .................................

**Brief description** (i.e., its main functions or objectives and period of activity, including data providers)

........................................................................................................................................................
........................................................................................................................................................
........................................................................................................................................................

**Institution coordinating the system:** .................................

**Contact person information**

| Name: | ................................. |
| Function: | ................................. |
| Telephone: | ................................. |
| Email: | ................................. |

**Alternate contact person information** (if available)

| Name: | ................................. |
| Function: | ................................. |
| Telephone: | ................................. |
| Email: | ................................. |

**Comments** (please provide any comments you may have for this system):

........................................................................................................................................................
........................................................................................................................................................
........................................................................................................................................................

Thank you very much indeed for your collaboration!
Dear colleague,

Anses (French Agency for Food, Environmental and Occupational Health & Safety) is conducting an inventory of veterinary syndromic surveillance systems in Europe (see definition below), as part of the Triple S Project (full name: Triple S-AGE, Syndromic Surveillance Survey, Assessment towards Guidelines for Europe), which covers human and animal health.

Triple S is being coordinated by the French Institute for Public Health Surveillance (InVS); it involves 24 organisations in 14 European countries and is co-financed by the Executive Agency for Health and Consumers, as a part of the EU Public Health Action Programme. The specific objectives of the project are to analyse syndromic surveillance systems throughout Europe and to provide guidance for improving existing systems and developing and implementing new ones, including the creation of a handbook on the development of systems.

We believe that you can provide us with information related to the veterinary syndromic surveillance systems in your country (characteristics, contact persons for detailed information...): please, could you complete and return us the brief questionnaire attached, before April 30, 2011?

The Triple S definition of syndromic surveillance is the following:

**Syndromic Surveillance** is the rapid collection, analysis, interpretation and dissemination of health-related data to enable the early identification of the impact (or absence of impact) of potential human or veterinary public-health threats which require effective public health action.

Syndromic surveillance is based not on the laboratory confirmed diagnosis of a disease but on non-specific health indicators including clinical signs, symptoms or mortality as well as proxy measures (e.g. drug sales, production collapse, etc.).

The data are usually collected for purposes other than surveillance and, where possible, are automatically generated so as not to impose an additional burden on the data providers. This surveillance tends to be non-specific yet sensitive and rapid, and can augment and complement the information provided by traditional test based surveillance systems.

If you have any doubts as to whether or not a system constitutes a syndromic surveillance system, please do not hesitate to contact us (e-mail: triple-s@anses.fr).
Once we have identified - with your precious help - these systems and the right contact person(s) for each system, we will send her/him a detailed questionnaire on how the system works.

For the purposes of the inventory, we wish to have information on the following:

i) **Currently active** systems;

ii) Systems in a **pilot phase** or **planned** for the future;

iii) Systems that were created for **an event with a predefined period of time**;

iv) Systems that have been **discontinued** (for example, because of lack of resources).

Finally, for more information on Triple S, you can consult the website:

[www.syndromicsurveillance.eu](http://www.syndromicsurveillance.eu)

We greatly appreciate your collaboration and you will be informed about the results of the inventory as well as of the whole Project, through the above mentioned website.

Sincerely,

Jean-Baptiste Perrin, Céline Dupuy, Didier Calavas and Pascal Hendrikx

Triple S Project WP4 (Inventory of Syndromic Surveillance in Europe) collaborators, in charge of the veterinary systems

*Please note, for systems that are not currently active, please include only those that were established in the year 2000 or later.*
# Questionnaire on syndromic surveillance

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
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<tbody>
<tr>
<td>1</td>
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<td>7</td>
<td>9</td>
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<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

## 1 YOUR PERSONAL INFORMATION

1.1 Your country: ..............................................

1.2 Your name: ..............................................

1.3 Your organisation: ..............................................

1.4 Your role in the surveillance system (e.g., coordinator): ..............................................

1.5 Your email: ..............................................

1.6 Would you be willing to have your name listed on our website?

- [ ] Yes
- [ ] No

1.7 Alternate contact person information (if available)

   Name: ..............................................

   Function: ..............................................

   Telephone: ..............................................

   Email: ..............................................
2 GENERAL CHARACTERISTICS OF THE SYSTEM

2.1 Name and acronym of the system (in original language and English)

2.2 Please provide a very brief description of the system (1 or 2 sentences) to be placed on the Project’s website.

2.3 Please indicate the system’s website address, and/or references of available materials presenting the system (technical reports, scientific papers, etc.)

2.4 What is the current status of the system?

☐ Currently active
☐ Pilot phase or planned for the future
☐ Completed or discontinued (specify the reason) ...........................................
☐ Other: ...........................................

Note, the rest of the questionnaire should be answered regardless of the status of the system

2.5 Indicate when was or will be the system started (and suspended, if so):
Start date (dd/mm/yyyy): ............
End date (dd/mm/yyyy): ............

2.6 What do you consider the main objectives or functions of the system?

☐ Outbreak detection
☐ Surveillance of other health threats (e.g. heat waves)
☐ General health surveillance
☐ Other: ...........................................

Specify: ........................................................................................................
........................................................................................................
........................................................................................................

2.7 What is the monitored population? please specify (e.g. age range, species, etc.)

☐ Companion animals ..................................................
☐ Production animals ..................................................
☐ Wild ..................................................

2.8 What institution/organisation coordinates the system?

........................................................................................................
........................................................................................................
2.9 If other institutions/organisations collaborate, please specify the organisation and its responsibilities (excluding data providers)

……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

2.10 How is the system funded? (please specify information about the durability of the funding)

……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

2.11 Indicate the date and nature of the expected developments, if any:

……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

3 DATA PROVIDERS

Please note: if a flow chart illustrating data collection exists, please send us a copy

3.1 Who provides data to the system (referred to as “data providers”)? Please note, some systems may have more than one data provider

<table>
<thead>
<tr>
<th>Data providers</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Veterinary services</td>
<td>..........................................................</td>
</tr>
<tr>
<td>B. Veterinary clinics</td>
<td>..........................................................</td>
</tr>
<tr>
<td>C. Veterinary schools</td>
<td>..........................................................</td>
</tr>
<tr>
<td>D. Drug producers or pharmacies</td>
<td>..........................................................</td>
</tr>
<tr>
<td>E. Analysis Laboratories</td>
<td>..........................................................</td>
</tr>
<tr>
<td>F. Poison control centres</td>
<td>..........................................................</td>
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<tr>
<td>G. Telephone help lines</td>
<td>..........................................................</td>
</tr>
<tr>
<td>H. Websites</td>
<td>..........................................................</td>
</tr>
<tr>
<td>I. Farms</td>
<td>..........................................................</td>
</tr>
<tr>
<td>J. Slaughterhouses</td>
<td>..........................................................</td>
</tr>
<tr>
<td>K. Rendering plants</td>
<td>..........................................................</td>
</tr>
<tr>
<td>L. Other professional organisations</td>
<td>..........................................................</td>
</tr>
<tr>
<td>M. Other surveillance systems*</td>
<td>..........................................................</td>
</tr>
<tr>
<td>N. Other facilities</td>
<td>..........................................................</td>
</tr>
</tbody>
</table>

* please provide contact information (name, telephone, e-mail) of the person responsible for this system
If you have more than one data provider, please answer to the following questions (section 3) for each of them. You can do it by copying and pasting the section for each data provider (please do not forget to indicate the corresponding LETTER).

3.2 What is the geographic coverage of the surveillance system?
- National
- Regional (specify) ……………………………………………
- Other (specify) ……………………………………………

3.3 What are the number of data providers out of the total number in the area covered by the surveillance system? (e.g. 5 of the 10 slaughterhouses in the country or 15 of the 100 veterinary clinics in the region, etc.)
……………………………………………………………………………………………

3.4 What is the total coverage of the population (in terms of percentage of animals or farms)?
……………………………………………………………………………………………

3.5 Are data collected year-round or only at specific times?
- Ongoing basis
- Specific events (such as ongoing public health threats) ……………………………
- Certain periods (e.g. wintertime) ……………………………………………

3.6 What is the reason data providers transmit data for? (please specify)
- Mandatory by regulation ……………………………………………
- Financial compensation ……………………………………………
- Access to outputs ……………………………………………
- Other ……………………………………………

3.7 Were these data collected by the data providers before the system was created?
- Yes
- No

3.8 Is the provision of the data to the system automated (electronic recording, automated transfer, etc.)?
- Yes (specify) ……………………………………………
- No
- Partially ……………………………………………

3.9 What is the additional burden for data providers in providing these data?
- None
- Additional personnel
- Additional costs
- Work organized differently
- Other (specify) ……………………………………………
3.10 What channels do data providers use to submit data to the system?
- Email
- Web portal
- Telephone
- Other  

3.11 How often do data providers submit these data?
- Real-time or near (specify)
- Daily
- Weekly
- Other  

3.12 What is the mean of the reporting delays (i.e. delay between observation and notification of a case)? (please give the 25th and 75th percentiles of the amount of time, if available)

4 DATA COLLECTED

4.1 What type of data is sent by data providers?
- Individual data
- Aggregated data (specify)

4.2 What demographic information is collected?
- Animal ID number
- Animal breed, production type
- Animal age / date of birth
- Animal sex
- Other:

4.3 Geographical information (please specify the geographic unit, e.g. geographical coordinates/address/zipcode/region...)
- Owner residence / farm location
- Place of observation or registration
- Other (specify)

4.4 Temporal information
- Date of observation or registration
- Week
- Other (specify)

4.5 What amount of data is routinely collected? (e.g., number of syndromes/deaths/calls per day)


4.6 Please describe the regulation on data privacy that applies on the data you collect

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………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# 5 DATA ANALYSIS

## 5.1 What are the indicators monitored? (Specify)
- Websites hits/Help line calls
- Clinical signs or symptoms
- Syndromes* 
- Medical diagnoses
- Drug prescriptions
- Laboratory test submissions
- Mortality
- Autopsy lesions
- Production indicators
- Other

## 5.2 If medical observations (clinical signs, syndromes, mortality or lesions) are monitored, is a system used to code them?
- No
- Yes (please specify)

## 5.3 Do you analyse data:
- At a national level
- At a regional level
- Other

## 5.4 How often are data analyses performed?
- Real or near real-time
- Daily
- Weekly
- Other

## 5.5 Are historical data available?
- Yes (specify the year the earliest data refer to)
- No

---

* i.e. defined groups of clinical signs or symptoms
5.6 What statistical methods are used for anomaly detection? (please provide brief description and bibliographic references, if available)

☐ None
☐ Historical mean
☐ Farrington method
☐ C-methods
☐ Control charts
☐ Regression model
☐ Time-series methods
☐ Other

5.7 Are these analyses performed automatically?

☐ Yes
☐ No

5.8 What is the definition of an alert in this surveillance system?

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5.9 Please explain what happens when the system comes up with an alarm, including information on who receives the data, how rapidly, actions that are taken: e.g. 1. negate (no action), 2. escalate (investigate) or 3. monitor (look out for similar alarms in future +/- in complementary data).

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6 DATA DISSEMINATION

Please note: if an example of outputs of your system is available, please send us a copy

6.1 What data are disseminated (raw data, aggregated data, interpretation, alert reports)

........................................................................................................................................
........................................................................................................................................

6.2 To who are the data disseminated?

☐ Public
☐ Limited public
☐ Veterinary services
☐ Data providers
☐ Other
6.3 How are the data disseminated?

- Website
- Email
- Other (specify)

6.4 How often are the data disseminated?

- Only when the system raises an alarm
- Real time or near
- Other (specify)

7 USES AND EVALUATION OF THE SYSTEM

7.1 What are the main users of the system?

- Ministry
- Regional authorities
- Agriculture industry
- Other (specify)

7.2 Do you share outputs of your system with human public health staffs?

- Yes
- No

7.3 If yes, describe how you collaborate public health agencies

7.4 Has the system been evaluated? (please provide any available materials)

- Yes
- No

7.5 If so, describe the types of analyses and its results

7.1 For what events has the system proven to be useful? (provide bibliographic references, if available)
7.2 Strengths and Weaknesses

To have an idea of how well the system functions, please describe what you feel are its strong points and weak points:

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8 OTHER COMMENTS

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Thank you very much indeed for your collaboration!
Results of questionnaires on syndromic surveillance

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1 General

Twelve different countries answered to the long questionnaire. A total of 27 different systems were identified. These 27 systems are coordinated by 21 different coordinators. The list of these coordinators is presented below:

The federation of Austria cattle breeders; The Belgian reference laboratory for the federal agency for the security of the food chain; The National veterinary institute of Denmark; The Subdirectorat-general for livestock; The Finnish food safety authority Evira; The association for animal disease prevention; Institut francais de recherche pour l’exploitation de la mer Ifremer; The French agency for food, Environmental and occupational health and safety Anses; Office national de la chasse et de la faune sauvage ONCFS; Istituto Zooprofilattico Sperimentale IZS; The animal health service; The animal health and veterinary laboratories agency AHVLA; The Food standards agency; The University of Liverpool; The animal health trust; The Royal veterinary college; The swedish dairy association; The Board of Agriculture; The national veterinary institute in Uppsala, Sweden; The federal veterinary office SFVO; VARS.

The following table presents for each system identified the status and population targeted.
Table 1: Systems identified for each country and population targeted.

<table>
<thead>
<tr>
<th>Country</th>
<th>Name of the system</th>
<th>Status</th>
<th>Companion animals</th>
<th>Production animals</th>
<th>Wild</th>
<th>Horses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>GMON</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td>MoSS-Emergences</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DA</td>
<td>VETSTAT</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>Provimer</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FI</td>
<td>Kuukausi-ilmoitus</td>
<td>database only</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FI</td>
<td>Sikava</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FI</td>
<td>Naseva</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>REPAMO</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>OMAR</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>NERGAL-abattoirs</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>SAGIR</td>
<td>active</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>completed</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NL</td>
<td>GD Monitor</td>
<td>active</td>
<td>0</td>
<td></td>
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<tr>
<td>UK</td>
<td>FarmFile</td>
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<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>VSD telephone log</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>UK</td>
<td>Poultry practice data</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>UK</td>
<td>Innova AM and PM</td>
<td>pilot phase</td>
<td>0</td>
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<tr>
<td>UK</td>
<td>O48M</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>UK</td>
<td>SAVSNET</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>UK</td>
<td>Equ. Surv. Reports</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
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<tr>
<td>UK</td>
<td>VetCompass</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW</td>
<td>Kodatabasen</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW</td>
<td>CDB</td>
<td>database only</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW</td>
<td>Djursjukdata</td>
<td>database only</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW</td>
<td>SVALA</td>
<td>database only</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SZ</td>
<td>Animal Health System</td>
<td>pilot phase</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>EPI</td>
<td>active</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The number of different systems for each country is presented below.

Table 2: Number of systems identified for each country.

<table>
<thead>
<tr>
<th>UK</th>
<th>FR</th>
<th>SW</th>
<th>FI</th>
<th>AU</th>
<th>BE</th>
<th>DA</th>
<th>IT</th>
<th>NL</th>
<th>SI</th>
<th>SP</th>
<th>SZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

3/24
Figure 1: Map of the number of European veterinary SyS systems identified through Triple-S inventory process.

The following table presents the number of systems according to the start date of the system.

Table 3: Number of systems identified according to the start date of the system.

<table>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NT=</td>
<td>not</td>
<td>transmitted</td>
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</tbody>
</table>

1.1 Status and objectives of systems

Systems presented in this inventory have very different status: some are operational systems, others are pilot projects, while some correspond to databases with syndromic information not yet used for surveillance.

Table 4: Number of systems according to the status.

<table>
<thead>
<tr>
<th>Status</th>
<th>Number of system (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>active</td>
<td>12 (44%)</td>
</tr>
<tr>
<td>pilot phase</td>
<td>10 (37%)</td>
</tr>
<tr>
<td>database only</td>
<td>4 (15%)</td>
</tr>
<tr>
<td>completed</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Sum</td>
<td>27 (100%)</td>
</tr>
</tbody>
</table>
Figure 2: Number of systems according to the status.

Each system can have more than one objective. Objectives are presented here according to the status of the systems.

Table 5: Number of systems according to their status and objective.

<table>
<thead>
<tr>
<th>Status</th>
<th>Outbreaks detection</th>
<th>Surveillance of other health threats</th>
<th>General health surveillance</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>active</td>
<td>6</td>
<td>1</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>completed</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>database only</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>pilot phase</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Sum</td>
<td>12</td>
<td>6</td>
<td>19</td>
<td>14</td>
</tr>
</tbody>
</table>

To date, all systems are still ongoing. Only one system is finished because it was a survey. There is no veterinary syndromic surveillance system for specific events.

44.44% of veterinary SyS have an objective of detection of outbreaks, 22.22% an objective of surveillance of other threats, 70.37% an objective of general health surveillance and 51.85% an other objective.

The mean number of different objectives per system is 1.9 [1, 4].

The "other objectives" are:

Calculation of breeding values for health traits; Control of the usage of antimicrobials; General hygiene and animal welfare official controls at primary production level; Classification of farms; Collecting and transferring production and medication data; Notifiable disease surveillance; Mortality outbreaks investigations; 2-3 years surveys on targeted hostpathogen associations; Classification of farms; Evaluating local mortality patterns; Estimation of prevalence endemic diseases; Production management; Disease control program administration; Information on stock number; Use of medical products; Management of the diagnostic process; Early detection of new or re-emerging diseases.

Table 6: Number of systems according to the number of different objectives.

<table>
<thead>
<tr>
<th>Number of different objective</th>
<th>Number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12(44%)</td>
</tr>
<tr>
<td>2</td>
<td>8(30%)</td>
</tr>
<tr>
<td>3</td>
<td>5(19%)</td>
</tr>
<tr>
<td>4</td>
<td>2(7%)</td>
</tr>
<tr>
<td>Sum</td>
<td>27(100%)</td>
</tr>
</tbody>
</table>

15(56%) systems have more than one objective.
1.2 Targeted population

The table 7 presents the proportion of system which targeted each type of population. Each SyS can target more than one type of population, that's why the sum of proportion is different than 100%.

Table 7: Number and proportion of systems according to the targeted population.

<table>
<thead>
<tr>
<th>Number of systems</th>
<th>Proportion (/total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production animals</td>
<td>23</td>
</tr>
<tr>
<td>Wild</td>
<td>7</td>
</tr>
<tr>
<td>Companion animals</td>
<td>6</td>
</tr>
<tr>
<td>Horses</td>
<td>2</td>
</tr>
</tbody>
</table>

![Figure 3: Number of systems according to the targeted population.]

18 (67%) systems targeted only one type of population.

1.3 Collaborating organisations

The distribution of the number of other organisations/institutions which collaborate in the SyS is presented below.

Table 9: Distribution of the number of other organisations collaborating in the SyS.

<table>
<thead>
<tr>
<th>Nb of other collaborating organisations</th>
<th>Number of systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

18 (67%) of the systems collaborate at least with one other organisation.

The other organisations were classified in four categories: research institutes, policy makers professionnal organisations and universities. For each categories, the number (and proportion) of systems having this type of collaboration is given. A system can have more than one type of collaborator.
Table 10: Number and proportion of systems according to the type of collaborating organisations.

<table>
<thead>
<tr>
<th>Type of collaborator</th>
<th>Number of systems</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research institute</td>
<td>9</td>
<td>33%</td>
</tr>
<tr>
<td>Professional organisation</td>
<td>8</td>
<td>30%</td>
</tr>
<tr>
<td>Policy maker</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>University</td>
<td>6</td>
<td>22%</td>
</tr>
</tbody>
</table>

1.4 **Funding**

Each system have one or more source of funding. The number of systems receiving this type of funding is presented below for each source of funding.

Table 11: Number and proportion of systems according to the source of funding.

<table>
<thead>
<tr>
<th>Kind of funding</th>
<th>Number of systems</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>22</td>
<td>81%</td>
</tr>
<tr>
<td>Professional organisation</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Laboratories</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Farmers</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>Non-profit association</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

Figure 4: Number of systems according to the source of funding.

22 (81%) systems have at least one of their funding sources which is public.

Table 12: Number of systems according to the number of sources of funding.

<table>
<thead>
<tr>
<th>Number of different sources of funding</th>
<th>Number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2(7%)</td>
</tr>
<tr>
<td>1</td>
<td>16(59%)</td>
</tr>
<tr>
<td>2</td>
<td>7(26%)</td>
</tr>
<tr>
<td>3</td>
<td>2(7%)</td>
</tr>
<tr>
<td>Sum</td>
<td>27(99%)</td>
</tr>
</tbody>
</table>

2(7%) SyS have no or do not need funding because data collection is mandatory.

1.5 **Planned evolution of system**

18 (66.67%) systems planned an evolution of the system in the future. The number of systems according to the kind of evolution planned is given in the table below. Some systems have planned more than one type of evolution.

Table 13: Number and proportion of systems according to the type of evolution planned.
2 Data provider

2.1 The different types of data providers

Table 14: Number and proportion of systems according to the type of data provider.

<table>
<thead>
<tr>
<th>Data Provider</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinary Clinics</td>
<td>14</td>
<td>52%</td>
</tr>
<tr>
<td>Veterinary Services</td>
<td>13</td>
<td>48%</td>
</tr>
<tr>
<td>Laboratories</td>
<td>11</td>
<td>41%</td>
</tr>
<tr>
<td>Slaughterhouses</td>
<td>10</td>
<td>37%</td>
</tr>
<tr>
<td>Other professional organizations</td>
<td>8</td>
<td>30%</td>
</tr>
<tr>
<td>Farms</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Rendering plants</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>Veterinary School</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Other facilities</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Drug producers or pharmacies</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>Telephone help lines</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>Websites</td>
<td>2</td>
<td>7%</td>
</tr>
</tbody>
</table>

Figure 5: Number of systems according to the type of data providers.

The other facilities are REPAMO correspondents, local competent authority; public technicians and hunter federations; Innovation and Research; transporters.

There is no system using Poison center and Other surveillance systems as data provider.
Table 15: Number and proportion of systems according to the number of different data providers.

<table>
<thead>
<tr>
<th>Number of different data provider</th>
<th>Number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6(22%)</td>
</tr>
<tr>
<td>2</td>
<td>11(41%)</td>
</tr>
<tr>
<td>3</td>
<td>1(4%)</td>
</tr>
<tr>
<td>4</td>
<td>2(7%)</td>
</tr>
<tr>
<td>5</td>
<td>2(7%)</td>
</tr>
<tr>
<td>6</td>
<td>2(7%)</td>
</tr>
<tr>
<td>7</td>
<td>2(7%)</td>
</tr>
<tr>
<td>9</td>
<td>1(4%)</td>
</tr>
<tr>
<td>Sum</td>
<td>27(99%)</td>
</tr>
</tbody>
</table>

21(78%) systems have more than one data provider. The average number of data providers by systems is 3.

2.2 Geographical coverage

The geographical coverage of the systems is presented below. Each system can have different level of coverage.

Table 16: Number and proportion of systems according to the geographical coverage of the system.

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Number of systems</th>
<th>Proportion (/total number of system)</th>
</tr>
</thead>
<tbody>
<tr>
<td>national</td>
<td>23</td>
<td>85%</td>
</tr>
<tr>
<td>regional</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>other level</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>international</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

2.3 Data provider/population coverage

It is possible to define for each system the coverage of data providers (number of data providers involved in the system/total number of potential data provider) and the coverage of the population targeted (number of animals included in the system/total number of animals in the whole population).

The table 17 presents the number and proportion of systems according to these coverages.

Table 17: Number and proportion of systems according to the proportion of data providers involved in the system and the proportion of population covered by the system.

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Number(%) of systems by coverage (data providers)</th>
<th>Number(%) of systems by coverage (population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0-25]</td>
<td>3(11%)</td>
<td>2(7%)</td>
</tr>
<tr>
<td>[25-50]</td>
<td>0(0%)</td>
<td>0(0%)</td>
</tr>
<tr>
<td>[50-75]</td>
<td>1(4%)</td>
<td>3(11%)</td>
</tr>
<tr>
<td>[75-100]</td>
<td>3(11%)</td>
<td>4(15%)</td>
</tr>
<tr>
<td>100</td>
<td>10(37%)</td>
<td>9(33%)</td>
</tr>
<tr>
<td>Not transmitted</td>
<td>4(15%)</td>
<td>3(11%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>6(22%)</td>
<td>6(22%)</td>
</tr>
</tbody>
</table>

2.4 Frequency of data collection

For each system the frequency data collection can differ depending on the data. Thus a system can have more than one type of frequency of data collection. 27(100%) have at least one type of data collected on ongoing basis.

Table 18: Number and proportion of systems according to the frequency of data collection.
### 2.5 Involvement of data providers and additional burden

Data providers transmit data for different reasons that are presented in Table 19.

**Table 19: Number and proportion of systems according to the reason data providers transmit data to the system.**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory</td>
<td>13</td>
<td>48%</td>
</tr>
<tr>
<td>Other motivation</td>
<td>13</td>
<td>48%</td>
</tr>
<tr>
<td>Access to output</td>
<td>12</td>
<td>44%</td>
</tr>
<tr>
<td>Financial compensation</td>
<td>2</td>
<td>7%</td>
</tr>
</tbody>
</table>

The other motivations are: Data provided by system is easy to handle and convenient in reporting; Completion of laboratory submission form; Confirm submission of a case ahead of laboratory examination; Completion of form statutory brain stem testing for TSE surveillance; Altruism; Mutual benefit; Willingness to contribute to animal welfare; Use of services; Diagnostics; Data and knowledge exchange in both directions.

The following table presents the number of systems for which the data used were already collected, partially collected or not collected before the implementation of the system.

**Table 20: Number and proportion of systems according to the fact that data were already collected or not.**

<table>
<thead>
<tr>
<th>Were the data already collected?</th>
<th>Number(%) of systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>12(44%)</td>
</tr>
<tr>
<td>Partially</td>
<td>9(33%)</td>
</tr>
<tr>
<td>No</td>
<td>5(19%)</td>
</tr>
<tr>
<td>Not transmitted</td>
<td>1(4%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>0(0%)</td>
</tr>
</tbody>
</table>

The table 21 presents the number of systems according to the fact that the provision of data was automated or not.

**Table 21: Number and proportion of systems according to the fact that the provision of data were automated or not.**

<table>
<thead>
<tr>
<th>Were data provision automated?</th>
<th>Number(%) of systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6(22%)</td>
</tr>
<tr>
<td>Partially</td>
<td>13(48%)</td>
</tr>
<tr>
<td>No</td>
<td>8(30%)</td>
</tr>
</tbody>
</table>

Each system can generate different kind (one or more) of additional burden for data providers. These additional burdens are presented below:

**Table 22: Number and proportion of systems according to the addition burden for data providers.**

<table>
<thead>
<tr>
<th>Additional burden</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work organized differently</td>
<td>13</td>
<td>48%</td>
</tr>
<tr>
<td>Additional costs</td>
<td>9</td>
<td>33%</td>
</tr>
<tr>
<td>None</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Additional personnel</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Other burden</td>
<td>5</td>
<td>19%</td>
</tr>
</tbody>
</table>
The "other burden" are: Reduction of burden because instead of calling many people at different places, and telling the same story many times, the collection of information is done once; Additional work; Additional time; Sent selection of 5 years data once/quarter.

7(26%) systems did not create any additional burden for data providers.

2.6 Transmission of data

We did not have the answer for the question on the way of transmission of data for 1 system, thus the following table concerns only 26 systems. For each system, data provider can use more than one channel.

Table 23: Number and proportion of systems according to the channel chosen by data provider to transmit data.

<table>
<thead>
<tr>
<th>Data transmission</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>email</td>
<td>10</td>
<td>38%</td>
</tr>
<tr>
<td>web portal</td>
<td>10</td>
<td>38%</td>
</tr>
<tr>
<td>paper-mail</td>
<td>9</td>
<td>35%</td>
</tr>
<tr>
<td>direct database</td>
<td>7</td>
<td>27%</td>
</tr>
<tr>
<td>telephone</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>ftp site</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

For each system different type of frequency of transmission of data can exist. Results are presented in table 24.

Table 24: Number and proportion of systems according to the frequency of transmission of data from data provider to the system.

<table>
<thead>
<tr>
<th>Transmission frequency</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real time or near</td>
<td>13</td>
<td>48%</td>
</tr>
<tr>
<td>Daily</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Weekly</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Monthly</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>Quarterly</td>
<td>2</td>
<td>7%</td>
</tr>
</tbody>
</table>

The "other" frequencies are: when case occurs; on demand; semestrially; depending on issue.

The mean of the reporting delays (i.e. delay between observation and notification of a case) is presenting in the following table.

Table 25: Number and proportion of systems according to the mean of the reporting delays.

<table>
<thead>
<tr>
<th>Reporting delays</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not transmitted</td>
<td>8</td>
<td>30%</td>
</tr>
<tr>
<td>[1-7]days</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>Real time or near</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Unknown</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>[8-30]days</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>&gt;30 days</td>
<td>2</td>
<td>7%</td>
</tr>
</tbody>
</table>

The delay between observation and notification is real time or near real time for 5(19%) systems.
3 Data collected

3.1 Type of data

The data transmitted by data providers are individual data for 23(85%) systems and aggregated data for 10(37%) systems.

There is no system which collect Date of call for help line;Reason for calling for help line;Clinical data;Tentative diagnosis.

The nature of data collected by the veterinary SyS are presented below.

Table 26: Number and proportion of systems according to the nature of data collected.

<table>
<thead>
<tr>
<th>Data collected</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of observation or registration</td>
<td>24</td>
<td>89%</td>
</tr>
<tr>
<td>Owner residence</td>
<td>23</td>
<td>85%</td>
</tr>
<tr>
<td>Animal ID Number</td>
<td>17</td>
<td>63%</td>
</tr>
<tr>
<td>Animal age</td>
<td>16</td>
<td>59%</td>
</tr>
<tr>
<td>Animal Breed</td>
<td>15</td>
<td>56%</td>
</tr>
<tr>
<td>Animal sex</td>
<td>13</td>
<td>48%</td>
</tr>
<tr>
<td>reason for submission of sample</td>
<td>12</td>
<td>44%</td>
</tr>
<tr>
<td>Clinical diagnosis</td>
<td>11</td>
<td>41%</td>
</tr>
<tr>
<td>Place of observation</td>
<td>10</td>
<td>37%</td>
</tr>
<tr>
<td>type of sample for analysis</td>
<td>10</td>
<td>37%</td>
</tr>
<tr>
<td>Clinical signs</td>
<td>9</td>
<td>33%</td>
</tr>
<tr>
<td>Number of affected animals</td>
<td>9</td>
<td>33%</td>
</tr>
<tr>
<td>date of submission of sample</td>
<td>9</td>
<td>33%</td>
</tr>
<tr>
<td>Date of disease onset</td>
<td>8</td>
<td>30%</td>
</tr>
<tr>
<td>Treatment prescribed</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Post mortem inspection results</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>Chief complaint</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Laboratory tests submitted</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Condemnation rate</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Condemnation motives</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Production data</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Drug name</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Death notification</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Drug quantity</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Associated clinical signs</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Date and time of pick up call</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Date and time of carcass collect</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Cause of death</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Ante mortem inspection results</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Meat quality</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Reproduction data</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Abortion notification</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>Route of administration of drug</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>Week of observation or registration</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Feed-water consumption</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

Other data are collected such as:

Data from livestock production business official register Centroid of the zipcode of lambert coordinates
collected with google map Month of observation Idfarm; Idvet; Code of diagnosis; Batch number; Wild-hatchery origin; Animal size Municipality Date of transfer on the leasing ground; Date of latest handling Number of dead animals; Farm ID code Place of origin; Previously occupied leasing ground Month of observation Mortality declaration by shellfish farmer; Housing; Husbandary Address where animals kept if different from farm location Date of transfer on the leasing ground; Date of latest handling Simple data about husbandry; Post mortem observations; Species; Neuter status; Colour; Weight Country Month of observation Result of the laboratory test; ID of mother Partial postcode Date of transfer on the leasing ground; Date of latest handling Species; Data from livestock production business official register zip code Month of observation Idfarm; Idvet; Code of diagnosis.

The nature of data collected is linked to the nature of data provider, thus the following table presents the proportion of system using each kind of data for each kind of data providers.

Systems using more than one data providers are taken into account more than one time.

*Table 27: Proportion of systems for each kind of data providers concerned by each type of data collected.*
<table>
<thead>
<tr>
<th></th>
<th>Veterinary Services</th>
<th>Veterinary Clinics</th>
<th>Veterinary School</th>
<th>Drug producers or pharmacie s</th>
<th>Laboratorie Telephone help lines</th>
<th>Websites</th>
<th>Farms</th>
<th>Slaughterhouses</th>
<th>Rendering plants</th>
<th>Other professional organizations</th>
<th>Other professional organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal ID Number</td>
<td>69</td>
<td>57</td>
<td>80</td>
<td>50</td>
<td>45</td>
<td>50</td>
<td>0</td>
<td>86</td>
<td>80</td>
<td>67</td>
<td>62</td>
</tr>
<tr>
<td>Animal Breed</td>
<td>62</td>
<td>50</td>
<td>40</td>
<td>50</td>
<td>55</td>
<td>50</td>
<td>0</td>
<td>43</td>
<td>60</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Animal age</td>
<td>62</td>
<td>57</td>
<td>60</td>
<td>50</td>
<td>64</td>
<td>50</td>
<td>0</td>
<td>57</td>
<td>60</td>
<td>67</td>
<td>38</td>
</tr>
<tr>
<td>Animal sex</td>
<td>54</td>
<td>43</td>
<td>40</td>
<td>50</td>
<td>55</td>
<td>50</td>
<td>0</td>
<td>43</td>
<td>50</td>
<td>50</td>
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</tr>
<tr>
<td>Owner</td>
<td>85</td>
<td>79</td>
<td>80</td>
<td>100</td>
<td>82</td>
<td>100</td>
<td>50</td>
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<td>100</td>
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</tr>
<tr>
<td>Place of observation</td>
<td>54</td>
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<td>60</td>
<td>50</td>
<td>45</td>
<td>50</td>
<td>0</td>
<td>43</td>
<td>60</td>
<td>67</td>
<td>38</td>
</tr>
<tr>
<td>Date of observation or registration</td>
<td>92</td>
<td>79</td>
<td>80</td>
<td>50</td>
<td>91</td>
<td>100</td>
<td>100</td>
<td>86</td>
<td>90</td>
<td>83</td>
<td>88</td>
</tr>
<tr>
<td>Week of observation or registration</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>17</td>
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</tr>
<tr>
<td>Chief complaint</td>
<td>23</td>
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<td>40</td>
<td>0</td>
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<td>0</td>
<td>29</td>
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<td>25</td>
</tr>
<tr>
<td>Date of disease onset</td>
<td>38</td>
<td>43</td>
<td>40</td>
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<td>27</td>
<td>50</td>
<td>0</td>
<td>29</td>
<td>30</td>
<td>33</td>
<td>25</td>
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<td>Clinical signs</td>
<td>54</td>
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<td>60</td>
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<td>38</td>
</tr>
<tr>
<td>Clinical diagnosis</td>
<td>46</td>
<td>57</td>
<td>80</td>
<td>50</td>
<td>36</td>
<td>50</td>
<td>50</td>
<td>57</td>
<td>40</td>
<td>17</td>
<td>75</td>
</tr>
<tr>
<td>Treatment prescribed</td>
<td>23</td>
<td>29</td>
<td>40</td>
<td>50</td>
<td>36</td>
<td>50</td>
<td>0</td>
<td>43</td>
<td>30</td>
<td>0</td>
<td>38</td>
</tr>
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<td>Laboratory tests submitted</td>
<td>38</td>
<td>29</td>
<td>60</td>
<td>50</td>
<td>27</td>
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<td>50</td>
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<td>33</td>
<td>38</td>
</tr>
<tr>
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<td>54</td>
<td>36</td>
<td>80</td>
<td>0</td>
<td>36</td>
<td>50</td>
<td>50</td>
<td>57</td>
<td>40</td>
<td>17</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Veterinary Services</td>
<td>Veterinary Clinics</td>
<td>Veterinary School</td>
<td>Drug producers or pharmacies</td>
<td>Laboratorie help lines</td>
<td>Telephone help lines</td>
<td>Websites</td>
<td>Farms</td>
<td>Slaughterhouses</td>
<td>Rendering plants</td>
<td>Other professional organizations</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>-----------------------------</td>
<td>------------------------</td>
<td>----------------------</td>
<td>---------</td>
<td>------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>affected animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug name</td>
<td>8</td>
<td>21</td>
<td>20</td>
<td>100</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>20</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Drug quantity</td>
<td>0</td>
<td>14</td>
<td>20</td>
<td>50</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>10</td>
<td>0</td>
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</tr>
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<td>0</td>
<td>7</td>
<td>20</td>
<td>0</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>10</td>
<td>0</td>
<td>12</td>
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<td>type of drug</td>
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<td>36</td>
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<td>50</td>
<td>73</td>
<td>0</td>
<td>50</td>
<td>57</td>
<td>50</td>
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<td>43</td>
<td>60</td>
<td>50</td>
<td>91</td>
<td>0</td>
<td>50</td>
<td>71</td>
<td>60</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>reason for submission</td>
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<td>29</td>
<td>60</td>
<td>50</td>
<td>64</td>
<td>0</td>
<td>50</td>
<td>71</td>
<td>60</td>
<td>50</td>
<td>75</td>
</tr>
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<td>64</td>
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<td>50</td>
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<td>60</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>Associated clinical signs</td>
<td>15</td>
<td>7</td>
<td>20</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Date and time of pick up call</td>
<td>15</td>
<td>7</td>
<td>0</td>
<td>50</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>Date and time of carcass collect</td>
<td>15</td>
<td>7</td>
<td>0</td>
<td>50</td>
<td>9</td>
<td>0</td>
<td>0</td>
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<td>10</td>
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<tr>
<td>Cause of death</td>
<td>8</td>
<td>7</td>
<td>0</td>
<td>50</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>10</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Ante mortem inspection results</td>
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<td>7</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>30</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Post</td>
<td>38</td>
<td>7</td>
<td>20</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>57</td>
<td>60</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Veterinary Services</td>
<td>Veterinary Clinics</td>
<td>Veterinary School</td>
<td>Drug producers or pharmacie s</td>
<td>Laboratorie</td>
<td>Telephone help lines</td>
<td>Websites</td>
<td>Farms</td>
<td>Slaughterhouses</td>
<td>Rendering plants</td>
<td>Other professional organizations</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>-----------------------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>---------</td>
<td>------</td>
<td>----------------</td>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>mortem inspection results</td>
<td>Condemnation rate</td>
<td>7</td>
<td>20</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>57</td>
<td>50</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>ion motives</td>
<td>Condemnation rate</td>
<td>7</td>
<td>20</td>
<td>0</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>57</td>
<td>50</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>Meat quality</td>
<td>Production data</td>
<td>15</td>
<td>7</td>
<td>20</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>43</td>
<td>30</td>
<td>17</td>
</tr>
<tr>
<td>Production data</td>
<td>Reproduction data</td>
<td>31</td>
<td>14</td>
<td>20</td>
<td>0</td>
<td>36</td>
<td>50</td>
<td>50</td>
<td>57</td>
<td>50</td>
<td>33</td>
</tr>
<tr>
<td>Feed-water consumption</td>
<td>Date of call for help line</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Date of call for help line</td>
<td>Reason for calling for help line</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Clinical data</td>
<td>Tentative diagnosis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tentative diagnosis</td>
<td>Death notification</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Death notification</td>
<td>Abortion notification</td>
<td>31</td>
<td>14</td>
<td>20</td>
<td>50</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>29</td>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>Abortion notification</td>
<td>Number of systems</td>
<td>23</td>
<td>14</td>
<td>20</td>
<td>50</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>29</td>
<td>30</td>
<td>33</td>
</tr>
</tbody>
</table>

Number of systems: 13, 14, 5, 2, 11, 2, 2, 7, 10, 6, 8, 4
### 3.2 Amount of data

The amount of data collected by year is different for each system.

16 systems did not transmit this information in the questionnaire and 2 did not have this information.

For systems which transmitted us the information, the amount of data collected by year are 61200 animals;217677 calls;4000 animals;22 millions animals;1.2 million animals;43800 animals;9000 telephone calls;180000;146000 consults.

### 3.3 Data privacy

The data privacy issue is handled differently by each system. Here is a list of examples extracted from questionnaires:

- Restricted access to data (different access depending on type of data users).
- Previous agreement of data providers to allow or not the transmission of data to each type of data user (convention can be written between partners).
- Individual ID for data providers without a link to the person (anonymous data).
- Limitation of the zooming on maps for representation of data so as to preserve confidentiality.
- No personal information can be seen by other users. Data are anonymised.
- Communication of results only with aggregated data.
- Data privacy guaranteed by a specific national law.
- No personal information are collected in the system.

### 4 Data analysis

#### 4.1 Indicators monitored

Each system monitored one or more indicators. The number and proportion of systems concerned by each kind of indicator is presented in table 28.

*Table 28: Number and proportion of systems according to the type of indicator monitored.*

<table>
<thead>
<tr>
<th>Number of systems</th>
<th>Proportion (/total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical signs or symptoms</td>
<td>14</td>
</tr>
<tr>
<td>Mortality</td>
<td>14</td>
</tr>
<tr>
<td>Syndromes</td>
<td>13</td>
</tr>
<tr>
<td>Medical diagnoses</td>
<td>12</td>
</tr>
<tr>
<td>Autopsy lesions</td>
<td>8</td>
</tr>
<tr>
<td>Laboratory test submissions</td>
<td>7</td>
</tr>
<tr>
<td>Production indicators</td>
<td>5</td>
</tr>
<tr>
<td>Other indicator</td>
<td>5</td>
</tr>
<tr>
<td>Drug prescriptions</td>
<td>4</td>
</tr>
<tr>
<td>Website hits / Help line calls</td>
<td>2</td>
</tr>
</tbody>
</table>

5 systems are using other indicators which are Pathogens or aetiologies; Carcass suitable or unsuitable for post mortem examination; International trade testing; Welfare indicator; Diagnoses.
4.2 Coding system

For systems using medical observation, we asked if they used a coding system.

Table 30: Number and proportion of systems according to the fact that a coding system were used or not.

<table>
<thead>
<tr>
<th>Number of systems according to the fact that they used a coding system or not</th>
<th>Number(%) of system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding system used</td>
<td>12 (44%)</td>
</tr>
<tr>
<td>No coding system</td>
<td>11 (41%)</td>
</tr>
<tr>
<td>System not concerned</td>
<td>2 (7%)</td>
</tr>
<tr>
<td>Information not transmitted</td>
<td>2 (7%)</td>
</tr>
</tbody>
</table>

Among the 12 (44%) systems which have a coding system, 9 systems have their own coding system, 1 system uses a national coding system, and 2 did not transmit the information in the questionnaire.

Specifications about the coding systems used are: Two-digit code, 65 diagnoses; Online questionnaire with scroll down list; System database internal code; National list of lesions and own definition of syndromes; Adapted from AHVLAsVIDA system.

4.3 Level of data analysis

Among the 27 veterinary systems of this inventory, 1 is not concerned by this question because analysis are not yet performed. Thus the following table concerns only 26 systems.

Table 31: Number and proportion of systems according to the level of data analysis.

<table>
<thead>
<tr>
<th>Level of data analysis</th>
<th>Number of systems</th>
<th>Proportion (total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National level</td>
<td>24</td>
<td>89%</td>
</tr>
<tr>
<td>Regional level</td>
<td>17</td>
<td>63%</td>
</tr>
<tr>
<td>Farm level</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Department level</td>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>International level</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Other level</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

The other levels are: Vet level.
4.4 Frequency of analysis

Among the 27 veterinary systems of this inventory, 2 are not concerned by this question because no analysis are yet performed or information have not been transmitted through the questionnaire. Thus the following table concerns only 25 systems.

Table 32: Number and proportion of systems according to the frequency of data analysis.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Number of systems</th>
<th>Proportion (/total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other frequency</td>
<td>8</td>
<td>30%</td>
</tr>
<tr>
<td>Real or near real time</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Quarterly</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>Annually</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>Weekly</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Monthly</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Semestrially</td>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>Daily</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

The other levels are Some reports; Twice a month; When needed; Once on the whole dataset; One off look at 2 years worth of data; For research and statistics; Depends on issue.

4.5 Historical data

Among the 27 veterinary systems of this inventory, 1 did not transmit information on this subject in the questionnaire, 24 (92.31%) have historical data and 2 (7.69%) did not have historical data.

4.6 Statistical methods

Among the 27 veterinary systems of this inventory, 4 are not concerned because these systems did not yet analyse data or did not transmit information on this subject in the questionnaire, thus the following data concerned only 23 systems. Each system can use one or mode statistical methods.

Table 33: Number and proportion of systems according to the statistical methods used.

<table>
<thead>
<tr>
<th>Statistical method</th>
<th>Number of systems</th>
<th>Proportion (/total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No statistical method</td>
<td>9</td>
<td>33%</td>
</tr>
<tr>
<td>Other method</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Historical Mean</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Regression model</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Time-series methods</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Farrington method</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>Control chart</td>
<td>1</td>
<td>4%</td>
</tr>
</tbody>
</table>

No system used these methods:.

The other methods used are Graphical method; AHCP; Spatial aggregation indexes; Bayesian smoothing; Z test; Descriptive analysis (prevalence); Use of a herd barometer where certain health indicators are monitored covering several areas.

The following table presents the number of different statistical methods used by systems.

Table 34: Number of systems according to the number of different statistical methods used.
The average number of different statistical methods used by system is $1[0,3]$.

**4.7 Automation of analysis**

Among the 27 veterinary systems of this inventory, 12 did not transmit information on this subject in the questionnaire or are not concerned by this question, 8(53.33%) analysed data automatically and 7(46.67%) did not.

**4.8 Alert definition**

Among the 27 veterinary systems of this inventory, 8 did not transmit information on this subject in the questionnaire or were not concerned by this question, 10(52.63%) had a definition of an alert and 9(47.37%) did not have.

The alert definitions collected through the questionnaire are: 3 records showing a similarity of at least 55%; when the limit of usage of antimicrobials is exceeded for a particular farm; fallen stock collection upper than a specific number of animals by specie defined by the insurance company of farmers; any shellfish mortality notification; exceed of a specific threshold defined by historical data; apparent increase of case according to an alert procedure; excess of mortality; Deviation from prevalence, deviation from trendline; using regression model, the significance of exceeds of the threshold value is tested by z test; the alert definition is based on a herd barometer.

**4.9 From the alarm to the alert**

The procedure to validate or not an alarm were quite similar for all systems concerned.

The alarm is transmitted to a relevant person (administrator or veterinarian) to validate or not the alarm using statistical information. Then if the alarm is validated, an epidemiological investigation is requested to decide if the alarm is an alert or not.

The other procedure presented in questionnaires is to discuss the plausibility of the alarm through a group of experts.

**5 Data dissemination**

**5.1 What data**

Among the 27 veterinary systems of this inventory, 9 were not concerned by this question or information have not been transmitted through the questionnaire. Thus the following table concerns only 18 systems. Each system can disseminate more than one type of data.

<table>
<thead>
<tr>
<th>Number of different statistical methods used</th>
<th>Number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1(4%)</td>
</tr>
<tr>
<td>1</td>
<td>16(70%)</td>
</tr>
<tr>
<td>2</td>
<td>4(17%)</td>
</tr>
<tr>
<td>3</td>
<td>2(9%)</td>
</tr>
<tr>
<td>Sum</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 35: Number and proportion of systems according to the type of data disseminated.
5.2 To who

Among the 27 veterinary systems of this inventory, 4 were not concerned by this question or information have not been transmitted through the questionnaire. Thus the following table concerns only 23 systems. Each system can transmit data of more than one addressee.

Table 36: Number and proportion of systems according to the kind of addressee of the data.

<table>
<thead>
<tr>
<th>Kind of addressee</th>
<th>Number of systems</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data providers</td>
<td>18</td>
<td>67%</td>
</tr>
<tr>
<td>Veterinary services</td>
<td>12</td>
<td>44%</td>
</tr>
<tr>
<td>Authorities</td>
<td>8</td>
<td>30%</td>
</tr>
<tr>
<td>Public</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Limited public</td>
<td>6</td>
<td>22%</td>
</tr>
<tr>
<td>Scientific community</td>
<td>5</td>
<td>19%</td>
</tr>
<tr>
<td>Professional organization</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>Farmers</td>
<td>3</td>
<td>11%</td>
</tr>
</tbody>
</table>

18 (67%) systems transmit data to Data providers.

The following table presents the number of different type of recipients by system.

Table 37: Number of systems according to the number of different addressee of the data.

<table>
<thead>
<tr>
<th>Number of different type of recipients of the data</th>
<th>Number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 (17%)</td>
</tr>
<tr>
<td>2</td>
<td>6 (26%)</td>
</tr>
<tr>
<td>3</td>
<td>9 (39%)</td>
</tr>
<tr>
<td>4</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>5</td>
<td>2 (9%)</td>
</tr>
<tr>
<td>6</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Sum</td>
<td>23 (99%)</td>
</tr>
</tbody>
</table>

The average number of different addressee of the data by system is 2.74[1,6].

5.3 How

Among the 27 veterinary systems of this inventory, 4 were not concerned by this question or information have not been transmitted through the questionnaire. Thus the following table concerns only 23 systems. Each system can transmit data by more than one way of transmission.

Table 38: Number and proportion of systems according to the way of transmission of data.

<table>
<thead>
<tr>
<th>Way of transmission</th>
<th>Number of systems</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td>16</td>
<td>59%</td>
</tr>
<tr>
<td>Email</td>
<td>13</td>
<td>48%</td>
</tr>
<tr>
<td>Scientific or professional article</td>
<td>7</td>
<td>26%</td>
</tr>
<tr>
<td>Paper</td>
<td>4</td>
<td>15%</td>
</tr>
<tr>
<td>phone - SMS</td>
<td>2</td>
<td>7%</td>
</tr>
</tbody>
</table>

21/24
16 (59%) systems transmit data to Website.

The following table presents the number of different statistical methods used by systems.

Table 39: Number of systems according to the number of different way of transmission of data.

<table>
<thead>
<tr>
<th>Number of different type of way of transmission of data</th>
<th>Number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>1</td>
<td>9 (39%)</td>
</tr>
<tr>
<td>2</td>
<td>6 (26%)</td>
</tr>
<tr>
<td>3</td>
<td>7 (30%)</td>
</tr>
<tr>
<td>Sum</td>
<td>23 (99%)</td>
</tr>
</tbody>
</table>

The average number of different way of transmission of the data by system is 1.83 [0,3].

5.4 How often

Among the 27 veterinary systems of this inventory, 3 were not concerned by this question because no analysis was yet performed or information have not been transmitted through the questionnaire. Thus the following table concerns only 24 systems.

Table 40: Number and proportion of systems according to the frequency of data dissemination.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Number of systems</th>
<th>Proportion (/total number of systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>13</td>
<td>48.15%</td>
</tr>
<tr>
<td>Monthly</td>
<td>9</td>
<td>33.33%</td>
</tr>
<tr>
<td>Weekly</td>
<td>7</td>
<td>25.93%</td>
</tr>
<tr>
<td>Other frequency</td>
<td>6</td>
<td>22.22%</td>
</tr>
<tr>
<td>Real or near real time</td>
<td>5</td>
<td>18.52%</td>
</tr>
<tr>
<td>Semestrially</td>
<td>5</td>
<td>18.52%</td>
</tr>
<tr>
<td>Quaterly</td>
<td>4</td>
<td>14.81%</td>
</tr>
<tr>
<td>Annually</td>
<td>4</td>
<td>14.81%</td>
</tr>
</tbody>
</table>

The other levels are Twice a month; According to the needs; Only for survey at that stage; Once, at the end of the project; As results become available; Whenever people want, using his/her login.

6 Users of the system

6.1 Type of users

Among the 27 veterinary systems of this inventory, 1 was not concerned by this question or information have not been transmitted through the questionnaire. Thus the following table concerns only 26 systems. Each system can have more than one user.

Table 41: Number and proportion of systems according to the type of users of the system.
17(63%) systems had Ministry as user.

The following table presents the number of different types of users by system.

<table>
<thead>
<tr>
<th>Number of different type of users of the system</th>
<th>Number of systems (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8(30.77%)</td>
</tr>
<tr>
<td>2</td>
<td>9(34.62%)</td>
</tr>
<tr>
<td>3</td>
<td>2(7.69%)</td>
</tr>
<tr>
<td>4</td>
<td>4(15.38%)</td>
</tr>
<tr>
<td>5</td>
<td>2(7.69%)</td>
</tr>
<tr>
<td>7</td>
<td>1(3.85%)</td>
</tr>
<tr>
<td>Sum</td>
<td>26(100%)</td>
</tr>
</tbody>
</table>

The average number of different kind of users by system is 2[1,7].

6.2 Synergy with human health

Among the 27 veterinary systems of this inventory, 2 did not transmit information on this subject in the questionnaire or was not concerned by this question, 7(28%) shared outputs of their system with human public health agencies and 14(56%) did not. Finally 3(12%) did not share yet information with human side but have planned to.

The examples of collaboration with human public health staffs are: transmission of information about alarms; Interpreted data are diffused to InVS, when the alert is confirmed by the epidemiologist and concerns public health; monthly meeting on zoonosis (RIVM, Vet Faculty, Food- and safety authority (government) and CVI-Lelystad). If deemed relevant info is brought into human surveillance meeting; there is a dedicated group that meet to review animal and human threats. This is known as HAIRS Human Animal Infections and Risk Surveillance. The joint Human Animal Infections and Risk Surveillance (HAIRS) group is a multi-agency and cross-disciplinary horizon scanning group with members from the Health Protection Agency, Defra, VLA and the Department of Health (DH). It is chaired by the HPA’s Department of Emerging Infections and Zoonoses (EIZ) at the Centre for Infections (CFI). The Chair of the NEPNEI and representatives from National Public Health Service for Wales (for the devolved administration of Wales) and the Food Standards Agency also attend; potential zoonotic threats are reviewed by joint animal health and public health advisory board; We are writing a grant to allow for the animal and human surveillance data for our region to be analysed within the same statistics group; Pass on the links to relevant HPA and DH staff; There is an ongoing project on data sharing and joint surveillance between five central authorities. Board of Agriculture, National Veterinary Institute, National Board of Health and Welfare, Swedish Institute for Communicable Disease Control and National Food Administration; We continuously share typing data for Salmonella and VTEC with our counterparts on the human health side and in the Food Administration; cases of zoonosis (animals or animal products) are reported to the public health sector.

The list of systems concerned by this collaboration between animal and human health are: SAGiR;GD
Monitor;FarmFile ;Poultry practice data;Equ. Surv. Reports;SVALA;EPI. The list of systems that have planned a future collaboration between animal and human health are: OMAR;SAVSNET ;CDB.

7 Evaluation of the system

Among the 27 veterinary systems of this inventory, 3 did not transmit information on this subject in the questionnaire or were not concerned by this question, 9(37.5%) have evaluated their system and 15(62.5%) have not.

The examples of evaluation are: Data validation. Additionally to plausibility checks before recording data into the database, the use of health reports by farmers and veterinarians is an important contribution to data quality as incorrect documentation and recording of diagnostic data may be recognised. Therefore also from the point of data validity the backflow of information is essential. In general the differentiation of farms with incomplete diagnoses data from farms with very low incidence rates is a challenge. Only data from farms fulfilling criteria concerning continuous and complete registration of diagnoses are included in genetic analyses. A minimum of 0.1 course diagnoses per cow and year is required. For the calculation of incidence rates used to monitor the animal health status diagnostic data are restricted to electronically transmitted diagnoses; a manuscript is in preparation: the system have been checked using historical data transposed in time to this year in a period where several records were already existing; a simulation study will be done in 2012; Coverage of the nation of this system (telephone helpdesk and necropsies). Importance of the signals found for the sector; work in progress to evaluate; system of ongoing evaluation within the RVC; evaluation based on the data transferred to the dairy association; the evaluation is described in PhD thesis by Maria Noremark (Infection Through the Farm Gate Studies on Movements of Livestock and On-farm Biosecurity).

The list of systems which have evaluated their system are: GMON;MoSS-Emergences 2;OMAR;GD Monitor;O48M;VetCompass;Kodatabasen;CDB;Djursjukdata.

Among the 27 veterinary systems of this inventory, 15 did not transmit information on this subject in the questionnaire or are not concerned by this question, the other 12 systems have proven their usefulness.

The examples of proof of usefulness are: Creating reports for herd management and preventive measures. Calculating breeding values for health traits. Monitoring of the health status; scientific evaluation of the usefulness of the system during FCO outbreak; Heat mortality; Exotic diseases (Bluetongue, parafilariosis, echinococcosis, AI). Intoxications (botulism, lead (Pb)). Change in number of euthanized animals on farm due to new welfare regulations. Results on milkquality of national program for prevention of mastitis; Support investigation of new disease (e.g. cases of allergic skin disease in cattle). Support evidence of freedom of disease; clinical research relating to small animal disorders; The Cattle Database at the Dairy Association has been used for numerous epidemiological and genetic studies since the 80s. It is the major national resource for research in dairy cattle; Preparing of annual surveillance in the country; qualitative risk assessments (in Slovene); early detection (quick notification) of positive results; good overview of general animal health situation.

The list of systems which have proven their usefulness are: GMON;Sikava;Naseva;REPAMO;OMAR;MBL;GD Monitor;FarmFile ;SAVSNET ;VetCompass;Kodatabasen;EPI.
Minute of Day 2, 13/06/2011

(no records available for the morning sessions)

Session 4: Mortality data

Presentation of OMAR by Jean-Baptiste PERRIN
Presentation of PROVIMER by Lucas ARINERO

Is denominator really useful? Perhaps the denominator is not as useful as that, because there is a
difference, a delay between the notification by the farmers so the numerator is real time adjust but
not the denominator. There can be a lag between numerator and denominator.

It is difficult to have information on age of animals for swine because carcasses are all put into a
container and that is all.

It would be interesting to have the cause of death but there is issue of standardization. In Finland
people are analyzing death data and they have codification for death reasons. In Italy they started
with BSE to check if there was a gap between fallen stock and notifications from farms.

For neonatal mortality in calves, data are available but not officially. It is important to split data in
age groups because there is a big influence on the baseline (ex of cattle death in France and Italy).

In Switzerland, cattle breeding association have some data, mortality and general health of animals.
They have the data but do not analyze it for the moment. I would be interesting to include
slaughterhouses information and market prices because it can influence farmer decision.

The question is to know what mortality stands for? The first case of FCO was identified in August but
an increasing mortality was observed in February.

In Spain it was difficult to disseminate results on website or for public information because of
political aspects, mortality data can be used for sensationalism.

Session 5: Production indicators

Presentation of NERGAL by Céline DUPUY
Presentation of GD KMI/CCMH by Linda van WUYCKHUISE

The baseline for slaughterhouse data is heavily influenced by the regulation, UE or national
economical subsides, meat price, regulation law on the farmer strategy (decision to send or not
cattle to abattoir), etc.

In KMI, the confidentiality of the system is very important. The output are made for dairy industry
and for farmers so that they can compare themselves to others farmers.
GD does not monitor drug yet.

The feedbacks given to data providers influence the quality of the data, as for example the drug use
in Denmark. People started to better share data on pig population when the estimate on the use per
pig were calculate and to high because of the underestimate data on pig population.
Session 6: Human / animal health joint session

Presentation on synergies A. FOUILLET / JB PERRIN

Presentation of VETSTAT by Claes ENOE

Questions
- Do you get problem with double counting if many people can report antimicrobial to you?
  C. Enoe
  No because there is thing in the control system that can prevent that. Over the years they have seen all the problems that you can have. With a system like this it should not be possible to change data recording.

- Do you target other species than livestock?
  C. Enoe
  Companion animals are also in the system but there is no focus on it for the moment but it will change.

- Do you think that farmers have the threshold for intervention in mind, e.g. if I report one more case, I get a visit and a bill tonight?
  C. Enoe
  They definitely do that because we saw a decrease of 20% of consumption after this yellow card program. But it is a real decrease of consumption and not a decrease of report because it is very difficult not reporting with this system.

- Could you collect and analyze the data in a timelier manner?
  C. Enoe
  We depend heavily on the human drug consumption agency and even if there is a contract that they should supply us each month and preferably more often, they don’t do it. So we do it per month. The pharmacies have to enter the data within 3 days, so if we could convince them that it is important, we could get the data and analyze them more rapidly.

- Do you have specific staff, dedicated to get that information on the vet side?
  C. Enoe
  We had but no more.

Presentation of SAVSNET by Alan RADFORD

Questions
- Dogs and cats have to be registered in the UK?
  A. Radford
  No, we used to have to, but no more.

- You use sometimes a syndromic questionnaire, so don’t have a constant data stream for that data?
  A. Radford
  No

- Do you use free text for syndromic surveillance?
  A. Radford
We are increasingly looking at doing that. When we started we thought the free text would be almost useless but I think that there is a huge amount of information in free text that could be used. Insulin can be a good marker for diabetic for instance. Epilepsy is a clear term...

- What do you do with the data? What can be the reason for someone to fund the system?  
  A. Radford  
  Most of what we do is driven by scientist publications because we are a university. We could produce report for laboratories, but they should give us more data but they don’t want.

- Has HPA from the UK ever considered using information like that? Any data from animals?  
  HPA representative  
  It is something we would like to explore.  
  A. Radford  
  There are projects going on to bring together the human surveillance of vomiting and diarrhea with the SAVSNET data on vomiting and diarrhea.

Presentation of Farmfile by Eamon WATSON

Questions

- Can you remind me who pays? Is it subsidized?  
  E. Watson  
  Yes, the testing is subsidized. If you are sending a diagnostic sample it is subsidized through the government through DEFRA. The level of subsides is very depending on your test and species. The cost for post mortem on a cow, including disposal, is about 300 Euros, over which just half is the disposal cost. The typical cost for doing all the testing and the time for post mortem on a cow is probably the double or three times that cost.

- You said you detected thanks to the monitoring of “diagnosis not reached” a skin disease in livestock. Has this disease not been notified through other channels, directly from the field?  
  E. Watson  
  No, the disease was not notified through other channels. Each practitioner had only few cases and could not put the cases together to see it is an unusual situation. It is when we saw the number of diagnosis not reached related to skin disease that we identified the problem. We had 10 clinical cases.

- For BSE you said you could reduce the detection time from 18 months down to 6 months with this simulation. In terms of public health intervention, food security, etc. is it already really helpful or would you need to go much beyond this and having a much earlier detection?  
  E. Watson  
  We focused on syndromic surveillance system, the data available to it and the statistical analysis that are done for it. But I think it is important to keep in mind that it is only one component of the surveillance system. The data will produce this alert, but I think with your network of reporting, your communication between your expert groups etc. they may flag it sooner than the data system. In isolation it is perhaps wrong but considers that it is a tool, a useful tool for the surveillance for an emerging disease.
Working groups outputs

QUESTION 1

Group 1
Every kind of health events having a common etiology could theatrically worth synergies between the two sides. For example, every zoonosis and zoonotic agents, environmental hazards, poison exposure, bioterrorist attacks, etc.
That is the first condition. The second condition is that the health event must change a health parameters in human and in animals.

Another idea is that the animal side would be useful for human side if the animal would be more sensitive to the disease or earlier affected than humans. The point is that it is a little bit theoretical. Because often detection is first on human side (e.g. Q fever).
It is also theoretical that data is easier in animal than in human, because we have very few that are centralized for animals, but the death. Many times we do not have the indicator that could be useful for humans.

Group 2
Yes we think synergies can be useful. They can increase reactivity and increase the awareness.
If one system in animal detects something then we will have more sensitivity on the human side.
A better performance about the location, because it was found it can be easier to have precise location for animals because they are more related to a specific location than humans that travel more.
About what kind of health events: any kind of health disease related problems, infectious diseases. Sometimes there is not enough knowledge about zoonosis and relation between animal and human health.
When the same signs occurred in human and animal it could help to have synergies.
I could be interesting in some cases to have exchanges between animal syndromic surveillance and human specific surveillance and vice versa. It could be interesting to have synergies for vectorial diseases, for animal syndromes that could be factors for human disease. For example for the monitoring of ticks collars that veterinarians are selling to people. That could be an indicator of the risk of tick bites in human.

Additional remarks
- I think we share part of the conclusion of group 2 about specific events and syndromic surveillance. But we were not sure about the syndromic signals in both animal and human health. In your own system you are not sure of signals. We could not really figure out how it could help you.
- Regarding unspecific signals in the two population, maybe if you have unspecific signals in the two population could confirm the reality of the signals, that allow you to exclude some artifacts
- Interest of synergies was more about sharing methodology and approach than data or alerts. Vet side can for example learn from human about data privacy and confidentiality. Human side said they were interested by the benchmarking that is used in veterinary systems to reward data providers.
- We do not agree it is always more informative what comes from the human side than vice versa. Especially in case of environmental contamination where they are many species that
are very susceptible (fish, birds) and they can produce unspecific signals (death, teratogeny, malformations, drops in reproduction).

**QUESTION 2**

**Group 3**
No raw data should be shared because we have enough data. What public health needs is analysis and interpretation from the vets, done properly and vice versa. Provide suggestions. It should go in the two directions

**Group 4**
You cannot dissociate unspecific and specific data. Non specific animal data is more interesting for human than vice versa. However when you use specific data, both directions are really important.

**Additional remarks**
- We agreed that we should not share raw data but more bulletins, results, alerts that have already an interpretation because we do not know the background of the data, context, etc.
- We should not wait to think that it is useful to share, but make it automatically because we are dealing with unexpected events, so we cannot know before what is relevant
- Human side is more interested by specific data from veterinary science than by unspecific.
- People should know with who they should share the data, need to define contacts, names of people

**QUESTION 3**

**Group 5**
There is a lack of knowledge about the same syndromes in vet and human systems, the relationship between the indicators. It is a challenge to try to combine two syndromic surveillance systems. It must be more useful to use specific events for the other syndromic surveillance systems. We might be sharing very unusual and big syndromic signals. Case by case.
A lot of signals are compromising by the timeliness. Veterinary systems are not so timely like human ones. On the vet side we can use human outputs to help investigation.

**Group 6**
Most things have been said. We stressed out the necessity for contact points. Clear communication between human health and animal health is needed. Before sharing data, it should be very important that veterinary and physician come together and speak about which are syndromes that can be interesting for us, for you. Which link exists between syndromes and specific diseases.

Something that was said is that you need to share the alerts and not the raw data. But in a second time, you may share the raw data, after a risk assessment.

You need to be proactive. Animal health authorities do not need to wait for human health asking them to communicate information and vice versa.

**Conclusion**
Before sharing data, experts in both sides should know each other, communicate and share information on their systems. Realize that they are working on the same topic, the same kind of data and can share methodology and approach.
To make a list of focal contact in each country on both sides can be an interesting output for the project. Experts on both side could thus share their information, unspecific alerts when they think it is useful.
Minute of Day 3, 14/06/2011

Presentation of Sikava (and Naseva) by Sanna NIKUNEN

Naseva and Sikava are databases gathering information about Finnish cattle and pigs farms respectively. In the interfaces you can have access to basic knowledge on farms (address and telephone number), health plan, production parameters by year (for example in Naseva: fat protein in the milk, urea, number and reason for culling number of births, etc. are registered from 2007). Vets cannot read the amount of animal farmers have on the farm: it goes to authorities every 4 months.

In Sikava, there is a classification of the farm with 3 levels: basic, national, and breeding farms. Evolution of the classification is recorded. If we need some warning (enzootic pneumonia (Mycoplasma hyopneumoniae), salmonella etc.) it can appear on the front page. Slaughterhouse reports (condemnation) are recorded in Sikava, as well as what medicines farmers have used, how many animals were in the group treated, etc. Veterinarian visit reports are also recorded. When the vet does the contract, he has to go to the farm 4-6 times a year and has to record information on the building, on the cleanliness of different departments, the presence of activity material (for the pigs to play with), and the disease or the symptoms he observes on animals. There is free text field for veterinarians to write what he thinks about the situation. Mortality on the farm since last visit is also asked to the farmers.

Vets have to look for 5 diseases that farmers must be free from to be at the national level (enzootic pneumonia, scabies, atrophic rhinitis, dysentery, salmonella), and also at other important diseases for breeding farms that might cause restrictions of movements (APP, swine influenza, erysipelas). Symptoms (mastitis, metritis, agalactia, abortion, arthritis, etc.) are recorded according to different age groups.

Questions

M. Jonsson
Do you have statistics for the whole country?

S. Nikunen
We use this system for the whole country but we haven’t done much statistics.

L. van Wuijckhuise
You are working for a private organization. What the purpose of the system for the farmers, for the vets, for your organization?

S. Nikunen
If the farmer participates in the program, he gets more money out of his animals, when he sells them to the slaughterhouse. The slaughterhouse has information about the farm. It is free for the farmer, the slaughterhouses pay for everything. We try to keep it in a way that farmers and slaughterhouses like to use it. They can use it for food chain information. In Finland they have decided that food chain information must concern all medicines used during the previous 3 months.

The vets can see all his farms and the reports of the previous visits. He can either put all the visits by himself on internet, or he sends a form to us and we will do it.
U. Carlsson
Which percent of farms are participating in the program?

S. Nikunen
Over 90% of pig farms are in the database. There are in Finland 2 big, 2 middle-sized, about 15 small slaughterhouses. Even 3 of 4 the small are participating. 95% of the production is covered by the system.
Only 70% on the cattle farms are participating in Naseva. It is very different yet but will be very similar to Sikava next year. They are renewing the system and the form to resemble Sikava.

D. Calavas
How long does it take for a farmer or a vet to enter this data?

S. Nikunen
It takes about 2 or 3 minutes to register the data for the data provider. Much information comes automatically. Information from slaughterhouses comes automatically from the interface.

JB. Perrin
How long does the vet visits take? Who pay for that?

S. Nikunen
The visits are mandatory if you want more money from slaughterhouses. The farmer pay for the visits, and the time and content for each visit depends on the farmer and the vet. 1-3 hours can be used. So far there isn’t a similar convention with slaughterhouses or dairy for cattle, that’s why they haven’t got so much people for cattle side.

A. Radford
Have you got some example of how data have been used?

S. Nikunen
It’s the week point. We have not really done much with the data yet. We give information to universities if they want to do some researches. We should start to analyze the data in the future. After this meeting, I think we really have to start analyzing further the data, maybe look at the amount of cough when we started program against enzootic pneumonia and when we eradicated it, or when we got swine influenza.

C. Dupuy
Have the veterinary services access to the data?

S. Nikunen
When the farmer makes a contract with the veterinarian he also allows access to certain parties: official veterinarian at the slaughterhouse, Sikava managers and the contract veterinarian. Nothing else. The farmer can say who he wishes can see the information.
Session 7 : Methodology

Presentation of anomaly detection tools by Koen MINTIENS

Questions

A. Radford
My worry with the stand alone system is that you get best values when you have someone like you looking at the data. I could feel unqualified to use it. Giving a powerful tool like that to a person that does not understand it very well, cannot it be dangerous?

K. Mintiens
I think it is only about who receive the signal. If you have a full automated system it just follows your data, it will give a signal on an event that is outside your prediction limits. Of course you need to have someone who receives the signal. But that is the same for any kind of suspicion you get from your disease control management system.

JB. Perrin
Some tools are already implemented in user-friendly software and are not complicated to understand. You just have to check the conditions to use them. But of course in syndromic surveillance at one point you will need to have a statistical resource to make analysis and detect abnormal signals.

M. Jonsson
I think that also space is important. It is crucial to have spatial post analysis in the system.

K. Minitiens
Now we look at information at a province level. But for all farms we have postal codes or geographical coordinates. The next step is to see if there is signal at a municipal level. But then municipality borders will mess up stuffs. We are only looking time clusters but we should really look for space time clusters to be more accurate.

C. Enoe
The speed should be taken into account: it will give us an idea if an event is not only clustering but also spreading. I don’t know how to do that.

K. Mintiens
It’s what you do when you count for serial correlation. You get the speed from that.

JB. Perrin
As presented here, most of the tools and algorithms used for surveillance are meant to detect time clusters. But there exist also tools to detect cluster in space and time like SatScan but it’s not very user friendly.

K. Mintiens
I think that it can be uses automatically.

JB. Perrin
Even when you monitor time series you have to make choice about the spatial aggregation. Multiple testing becomes an issue when many temporal models are run in each spatial unit. What is the best scale to run these temporal anomaly detection tools? Do you look at all levels at the same time?

K. Mintiens
It depends of the data you have. For mortality, you have probably enough information to go on a small level.

JB Perrin
But if you keep going with temporal models, the smallest scale you go, the fewer events you have, and the more models you run.

S. Widgren
Is it possible to script SaTScan and automate it? I automated a whole process in R to produce every day charts and maps when we were monitoring echinococcus multilocularis in foxes. The whole process can be scheduled.

C. Enoe
I have one question about the validation of the approach. We probably need to convince, whoever is going to use it, that syndromic surveillance works. If you take the example of the increased mortality in March and the Bluetongue in August 2006: in the beginning of the program at least, don’t you have to do retrospective studies to prove that there is a high probability these two events are linked, e.g. by looking at blood sample taken at some pointed time... How on earth are you going with sensitivity/specificity of your system? You trace back signals and look what it was? You need to prove that’s it’s not a coincidence.

K. Mintiens
It’s very difficult to find hard evidence on that. You can do retrospective study to see if veterinary services or veterinarians saw more things at this time... compare your signal with data from the field. The selection of your algorithm will both influence your sensitivity and specificity. We can investigate what happened with signals. For some this is clear. For the early signals (February) it is more complicated. There are smaller, we don’t know if they are true of false positives... These signals are very difficult to track.

The only way to handle that is to look at the signals prospectively and have a system running at different sensitivity levels and see what signals you will see with different sensitivity and investigate all of them. And see what kind a level you cant to use here to have a good sensitivity and specificity for the system.

C. Enoe
Do you know how many animals represent the little signals?

K. Mintiens
No we have not yet. It is maybe ten more than the maximum expected, which is not a lot.

A. Radford
The big difference between the little and the big signals is that the little one is a single peak. Perhaps if you have a single event you do not investigate but If you have several consecutive alarms (like 3 following events ) you will investigate it. That could be a criteria.

K. Mintiens
That is an option. You can choose all kind of criteria to validate your signals.
A Radford
Did you take into account human events that just happen once (world cup, royal wedding, etc.) that can influence the baseline?

JB. Perrin
It is only a trouble at daily scale. But there are tools to take that fluctuations into account. If it’s a bank holiday you can adjust you have tools to adjust for this kind of day in you model, but at a weekly scale perhaps it’s not an issue.

K. Mintiens
We also looked at laboratory data, there you can see the laboratory was closed between Christmas and new-year and that had an impact: increase of sample tested the week after.

L. van Wuyckhuise
We found once in a while, large power break down that can kill all the animals in a stable.

C. Enoe
I can give you story of real life. When we were working in the pig industry, there was an increase of 5-7% in salmonella seropositivity. Authorities said you have to take action. Data was recorded on a weekly basis, but when we looked on a daily scale we saw that the change happened in one night. The question was what happens that night. After investigation, there had been a power break that night that had an impact on the dish washing machine.

JB. Perrin
These examples show how important it is to know very well the background to estimate your baseline and the “normal” fluctuation of the baseline. You really have to study and understand the “normal” fluctuations of you indicators and factors of variation.

JB. Perrin
Whatever the tool you choose for detecting anomalies, you have to choose a threshold. There are different ways to choose the threshold. You can do it according to logistic limits: you can choose alpha so that you produce a sustainable number of alerts in peace time.

K. Mintiens
You have to be careful. Of course you have to take into account the work load but for early detection it must be worthwhile.

E. Watson
We have to speak about communication of results. We have produced almost the same type of charts. But decision makers or non scientists are interested in it, they can see that but they ask for more graphical thing. We hang on those charts the results of the investigation that have been done with bubbles. Directly understandable digestibly for non scientists. And we communicate with it. It has a very high impact, very high visuals.

K. Mintiens
I agree. You have to really screen pops interface that people can follow what is happening and be as clear as possible otherwise people lose interest.
E. Watson
You want to continue the expertise. Often these signals are interpreted by small group of people, which sometimes is stable and sometimes not. So it is useful to keep archives of what was historically observed not only for your current experience but also for assisting people in the future.

JB. Perrin
Do you think that some of these tools are more useful for particular signals?
For example the regression models may for example not detect a continuous change of trend: when observed values are systematically above the average but below the upper limit of predicted value, you have a change in the trend that your model does not detect.

K. Mintiens
I am sure the algorithm to use depends on your data. We were using control charts for quality control of diagnosis test on reference samples in a laboratory. There, you can use this tool because it is very stable. It is assumed that your signal is completely random, and always goes up and down your mean. This can give a good alert. But these are extremely precise data and you have to find very accurate signals. I do not think that this can apply to other data. That might be good for slight increase but I will first bet on just keep it simple. Mortality data was quite stable, but for other dataset as the number of sample submitted for BVD, it is another story. There is hardly seasonality, increases come all the sudden... I would keep exploring according to the dataset and see what tool fits the best.

A. Radford
Lancaster University has a unit that just works on this. The system is called AEGISS. But I do not understand exactly the details.

JB. Perrin
Another question was how to define syndromes? Is it better with statistical methods or with expert definition?

C. Enoe
Why should we not be looking at all the lesion? What if it is a new disease that does not fit?

JB. Perrin
But when you have hundred different lesions or clinical signs, it’s difficult to look at all signals of each of them? You can sometimes see a signal in cluster of signs, and not in the total number of signs observed. Clustering signs can bring you more information.

K. Mintiens
It’s not impossible to look at all single lesion if you computerize that automatically.

C. Dupuy
It depends on the purpose of surveillance. If you want to follow generic syndromes it is to do the surveillance of not specific disease. If you group your lesions you have more events for your model.

G. Ru
When we started to study scrapie in Italy, there was a very low awareness among farmers about what scrapie was. We provide list of symptoms and try to put together something that could be consistent with scrapie. And that it was very helpful not to look at a single signs but a group. It’s helpful when for a disease there are different symptoms possible and that each animal can have different symptoms for the same disease. You are looking at a group of things that have something in common.
Session 8: Conclusions and perspectives

Summary of the discussions presented by Eamon WATSON and Martin REIST

We had a lot of exchange, of discussions. We have a lot of question marks and unknowns.

Definition
What struck is the real/near real time issue. The differences in how we interpret it (human versus veterinarian). Should we have a single definition among human and animal health? I am not sure whether we need a full agreement on the definition.

Certain key attributes of syndromic surveillance that we could define were: a continuous statistical monitoring proxy data/non specific data. The early detection of an unusual events and the confidence that you haven’t detected something is also very important.

The definition is to have a list of criteria. If your system does not fill all the criteria it doesn’t mean that it is not syndromic surveillance. It can be used as an evaluation tool.

Purpose
The purpose of syndromic surveillance is the detection of the unknown, of changes in the pattern, infectious disease.

Involvement of data providers
What is the value for data providers?

You should make an inventory of your data sources to be able to build your syndromic surveillance system.

Standardization
Standardized data set is a challenge. The challenge is even higher if we want to share our data at an international level. Standardization is not all the time achievable because of differences between country (ex: help line call well accepted by vet in Netherland but would certainly have been more difficult in France). Is standardization of data that important? Perhaps just have to draw out outputs, ability to share output which is more important.

Methodology
How can you have a very timely signal that is good enough to act on without having a specially refined process to produce the signal?

Economic aspects
The less you spend building a complex system so you can have something relatively robust and low cost which may be preferable to implement that something that is very robust but high cost and that hasn’t got the resource to sustain it over longer term.

In public health a lot of data is already and freely available which is different in animal where you have to fund/paid data providers they have to be rewarded (have data back, use outputs...).

Can you have a vet syndromic system that is not subsidized? Everything need to be funded in animal health whereas it’s not necessary the case in human health.

We need to use a friendly interface to collect data.

Knowledge transfer
We have to do it on the veterinary part. And with human health we could share outputs, investigation findings and methods. Multilanguage can be a challenge

Data confidentiality is also an issue. It’s a b

There are legal, ethics aspects and impact on trade to take into account.
Round table

U. Carlsson
In Sweden we have to persuade the competent authority that this is a good idea to do syndromic surveillance and now I have arguments to do it.
I think that it is important to remember that syndromic surveillance is just another part of the whole surveillance system.

S. Widgren
This was a very interesting meeting but that raised a lot of questions. After this meeting I am maybe more unsure on what syndromic surveillance really is. But I think I can bring home the discussions.
We are having a project where we want to share raw data between public and animal health.
We should look more into data and try to visualize data, even if you cannot get signals. It is important to be prepared to look at data and use them. It’s important to automate the analysis of data.

A. Radford
I am intrigue by the attempt to come up with a definition. I am intrigue by the facts that it is all about detecting new events because new events are very rare so it could be difficult to justify a system on this purpose... so we must find other purposes. We should be more imaginative on how we use the data, on a daily basis.
The more common thing seems to be mortality data and it would be interesting to see in some weeks, months and years how people can join together and be a bit more uniform about how data is produced and shared. The methods do not have to be the same but the important is to share outputs. All systems are funded, in human or veterinary side. Human partners they have achieve funding. Back home I will try to be more real time. I would like to look at new things... like mortality, ticks, and heat...We should be able to do that.

K. Mintiens
Perhaps the definition of syndromic surveillance is not an issue at all, we are doing surveillance whenever you name it syndromic surveillance or not. We do surveillance, and the syndromic part is that we look at proxies. That is it. We should not look too much at the human definitions because human are far more advanced in syndromic surveillance. This meeting shows that they are a lot of initiatives taken in Europe. It could be interesting to do other meetings in coming years.  
I learnt many cases were syndromic surveillance was used. I am confident we can use this tool even it is unclear how we can link the signal to something. I was more concern of the availability of data to work with this kind of algorithms, but apparently many are available.

G. Ru
It was very exciting to participate to this meeting because syndromic surveillance is like a baby, it is a new born. It is hard to identify the best purposes. How to make the syndromic surveillance a value in practical terms, what we collect must have a value in very practical terms. This is challenging. In the future I would like to work on potential biases; we initiate to speak about the quality of data used. We must be careful with the biases impact because data can be produced for other aims than surveillance. I was very happy to work on developing the one health concept and have opportunity to cooperate with the human side of medicine.

M. Crescio
As Stefan I have a lot of questions now about syndromic surveillance. I noticed that perhaps a better definition of the purpose of the system has to be set before the system is implemented. Sometimes
we have the temptation to say that since we have a lot of data, we should use it... somehow. It brings a lot of phantasy. We must start from the need (also scientifically), nor from the data we have. I think the response to alert is an important aspect. It raises an alert, then what do we do after? How to act after a signal? Regarding automation, I think that is feasible but not necessary. I think human have to, at least periodically, to verify the system.

L. Arinero
The meeting gave a lot of information and ideas for improving the surveillance of the fallen stock in Catalunya. I will try to make a list of possible data sources and possible system we can apply in my country. We will try to follow your recommendations for better performances. I will share the knowledge acquired here with my colleagues in the Ministry.

S. Nikunen
I have learned a lot. I have got ideas how to use data. Now I know that we should write an article to get our database known.

L. van Wuyckhuise
The inventory is very interesting because some years ago there were not much to be found. We will have a look at the possibilities to have more automated, more real time analysis (currently it is done quarterly). I have a lot of possibilities from different people. We can ask to the rendering plant (there is only one in the country) to give information if animal were euthanized and about death causes. We can try to have information from food and safety institute, try to have information from the two major cattle abattoirs of the country. We will try to communicate more about the results, and if we pick up a signal we are trying to have a protocol to handle it, and I think that is important.

C. Enoe
I hope we will have further collaboration. It was interesting for me to discuss on my own project from syndromic point of view. I discover that our system did not fit strictly syndromic surveillance even if I thought it did. It also gave me possibility to think about new projects. Authorities, industry are interested. I also realize that data we have do not always have the quality requested (mortality in pigs). We need to make pressure on data providers to improve data quality, and to make them transmit it more rapidly. More real time data can be useful for better detection. I will have elements to encourage people to work more real-time. It was interesting to have discussion with public health people even if it was not easy to come up with a common syndromic surveillance system. But there must be possibilities, overlapping areas. I have to think more about that.

M. Dispas
Networking was really nice, to meet people that face the same problem that I do. Regarding mortality or diagnosis not reached, I am not sure it is an indicator that would be timely enough for detection. For early warning, I think it is more efficient to look for signs or symptoms on the field because they come earlier in the evolution of the disease. But to look at this kind of data is something I want to do now. I have a better idea of the limitation of modeling and can try to refine the models that can be used for my system. The weak point of the meeting I think was economics. It would have been interesting to have more information on economics, maybe by modeling the impact on animal health but also on economics. Perhaps we can do that for the next meeting.

S. Kiviruusu
I will take home the concept of syndromic surveillance. We can have discussion in Finland about data available, who should collect them, what is the best way for collecting them, who should react to the alerts, etc. We can have discussion with the human sectors as well, what are their projects and
wishes. I will look at the ruminant’s data we have. Further study should be done with rendering plants data.

M. Reist
There is none of the systems that really fit the definition. We should not be to dogmatic with the definition and just implementing systems that make sense. We are currently developing method and algorithms to analysis data that we are collecting, from slaughterhouses, rendering plants, etc. There is a gap to answer to what can we do with an alert. The answer of this question must be clear when we implement our system. We would like to include clinical data in our syndromic surveillance systems. This data are really difficult to obtain, we do not see possibility to get this data only for the detection of events happening every 5-10 years. So they have to give a real use to veterinarians or farmers, giving data. So we will try to detect change in patterns of epidemic disease, that would have an impact of farmers, even of economical point of view. We want to implement a system that could be used in the routine.

E. Watson
It is interesting that it is a new approach. We considered not syndromic surveillance in isolation. For the moment we are looking at one system and how to react to one indicator. But actually we are looking at multiple surveillance systems, multiple signals that can help us being more confident on alert. That will be the next step to work on.

End of the meeting
1 Definition of syndromic surveillance

1.1 Design

1.1.1 Automation and timeliness
Most of the existing definitions state that syndromic surveillance systems should collect and analyze data in “real time” or “near real time”. This statement was discussed by the group since it seems difficult to do so in animal health. Timeliness is a goal for all surveillance systems; this is not specific to syndromic surveillance. What means real or near real time is not clear and should be better defined. The implementation of real-time process costs a lot. It is thus important to evaluate the impact of real time on the efficiency of the surveillance system according to its purpose. A balance between timeliness and costs should be found.

Many systems are mixing different notification systems and are partly real time (online data transmission) and partly not (data transmission through paper forms, registered in a second time in the database). On another hand, some systems are collecting data in real time, but from events that are not frequent: e.g. clinical signs observed during quarterly farm visits. In these cases, there is consequently no constant data stream feeding the system.

The group was finally not convinced that the real-time is what defines syndromic surveillance.

The automation was also considered as a way to make a system timelier and more sustainable, rather than something defining syndromic surveillance.

1.1.2 Event-based or programmed notifications
Some programs presented were based on the notification of atypical syndromes. The question was to know if these systems fitted properly the definition of syndromic systems. Indeed the existing definitions do not clearly state if the collection of data should be exclusively programmed (passive) or can also be event-based (active).

1.1.3 Nature of the indicator
For participants the nature of the indicators monitored (proxys, unspecific health-related data) was what really defined syndromic surveillance.

1.2 Purposes

1.2.1 Detection
In animal health, specific surveillance systems already exist for some exotic diseases, and they are pretty efficient. Thus syndromic surveillance may be of no use for this kind of diseases. Syndromic surveillance may however be relevant for the early detection of unknown diseases; it could be useful to detect something we could not detect otherwise.

1.2.2 Impact assessment
Syndromic surveillance can be useful to have rapidly information on the impact or the absence of impact of an identified disease. This information could greatly help decision makers, help them to decide whether control actions should be displayed, or at contrary give them communication elements to reinsurance stakeholders and the population. The syndromic data collected can also be useful to evaluate retrospectively the impact of events, even if it is difficult to prove the correlation between unspecific signals observed and a particular event.
1.2.3 Others

Many of the veterinary syndromic systems identified were also be used for general health surveillance (monitoring trends of endemic diseases), or for other particular purpose (surveillance of antimicrobial use, animal welfare, management, etc.).

Syndromic systems can also produce interesting information to feed risk based analysis for official controls planning.

*Ex: a farm could be considered at risk when unspecific indicators (mortality, drop of production, etc.) abnormally rise or at contrary when there are an abnormally low number of events reported.*

1.3 Conclusion on definition

Physicians are far more advanced in syndromic surveillance than veterinarians. Currently among the surveillance systems considered as syndromic by the veterinarian epidemiologists, there is none that fulfill all the requirements of the existing definitions. The real- or near real-time collection of data is notably often not possible. Thus syndromic surveillance was understood by most of the participants as the “continuous statistical monitoring of unspecific / proxy / health-related data to identify change that may be due to a disease”. Real time was considered more as an objective than as an obligation: the collection and analysis should be done in a delay “as short as possible”.

Syndromic surveillance systems can be used for different purpose, what impacts their design. It is thus importance to well define the objectives of the syndromic surveillance system as a first stage of their implementation. Producing alerts is notably meaningful only if you know how to deal with it and can take adequate action.

Syndromic surveillance systems complement other existing surveillance system and are not meant to replace them. It is an additional tool to detect changes or events that would not have been detected otherwise.

2 Guidelines

2.1 Objectives

WP6 of the Triple-S project describes the expectations of the European Commission regarding the guidelines.

2.1.1 Help implementation of new systems

Guidelines could be considered as “good practice rules” for implementing a syndromic surveillance system. They should offer a toolbox gathering different experiences regarding veterinary syndromic surveillance. There are currently a lot of systems which are pilots or first experiences, and there is not a lot of background information yet available.

2.1.2 Minimal requirements at EU level for reporting comparable results

Some systems exist already and for those, stakeholders will not easily accept to change their systems according to new guidelines. It will be difficult to harmonize existing systems, but it seems possible for completely new systems.
2.2 Customer and format

There are a lot of potential customers for veterinary syndromic surveillance system guidelines: scientific agencies, authorities, private organizations (e.g. breeding associations), etc. The guidelines should address the whole veterinarian community working on animal surveillance.

It is important not to duplicate the works that have already been done (e.g. chapter on syndromic surveillance in the “Handbook of biosurveillance”). Guidelines for veterinary systems should be written in connection with the human guidelines.

Different guidelines could be written according to the type of systems or purposes, but it would be more appreciable to have general guidelines. Guidelines should be illustrated by examples and could be completed by fact sheets on existing systems, which would describe the particular design and purposes of each system.

3 Data collection

3.1 Possible data sources

Veterinary syndromic systems presented were based on different data providers and used different data. Some examples are represented on Figure 1. Most of the systems run by the participants use (or plan to use) more than one data source.

Figure 1 : Possible data providers and indicators for veterinary syndromic surveillance

Owner observations
Automated (milk production) or voluntary (clinical signs) notifications

Help seeking
Help line calls, website hits

Veterinary consultations
Signs and symptoms, syndromes, clinical diagnosis

Other health activities
Drug purchase, lab test requests

Death notification & investigation
Rendering & slaughter data, wild mortality, autopsy data

3.2 Involvement of data providers

To ensure a good participation of data providers, the data collection should be simple, provide benefit to the data providers, and ensure the confidentiality of data that are shared.
3.2.1 Simplicity

For data providers, recording data should not be time-consuming. Duplication, i.e. notifications of the same event in two different channels, should be avoided. An interface with the software that stakeholders already use for the management of their herd or practice is a simple and efficient way to collect data. Adequate softwares could also be directly provided by the manager of the syndromic surveillance system. Any threshold in the recording of the data should be avoided.

Ex: SAVSNET and Sikava use an interface with software used by veterinarians for their practice management. This was possible because few different software were developed and used in the vet clinics of the same country.

3.2.2 Mutual benefits

Veterinary syndromic surveillance systems are usually based on data which transmission is not mandatory by law. Other way to involve data providers should thus be found.

Data providers should be rewarded for the work that represents the recording of the data, especially if they are private stakeholders. It is important, before starting the implementation of the system, to take into account what data providers want, what they expect from the system. A questionnaire can be used to ask future data providers their expectations, and also what they are not ready to do.

There are different ways to reward data providers for their work. It is important to be imaginative on this point. In every case, it is important that data providers have more benefit in notifying an event than in not notifying it.

Examples of rewards

- Feedback / access to outputs (personal or aggregated data)
- Advice, help for diagnosis (GD-Veekijker telephone help desk)
- Contact with experts (Moss emergencies 2)
- Access to reference records (Moss emergencies 2)
- Edition of condemnation certificates and report for slaughter houses (Nergal-Abattoir)
- Benchmarking, feedback on data of economical interest (SAVSNET)
- Financial interest (SIKAVA: farmers involved in the programs sell their pigs for a better price to abattoirs)
- Reducing the frequency of onsite visits of official veterinarians (data can be used by official veterinarians to plan their control thanks to a risk based analysis. Thus farmers that transmit correct information have less control)

3.2.3 Confidentiality

Involvement of data providers will be better if they have a guarantee on the confidentiality, especially when data shared have an economical interest.

Ex: in the GD system veterinary services have access to aggregated information but cannot go back to a particular herd

3.3 Data quality

3.3.1 Training

Training of data providers (farmers, veterinarians, hunters, etc.) on case definition is important to be sure that all of them us the same name for the same event. It is also important to train them on the software used for data registration, so that they all use it the same way.
3.3.2 Biases

It is important to evaluate the reliability of the proxy data collected and their representativeness regarding the population health. When notifications are not mandatory or not automated, it is important to evaluate factors that could lead farmer to notify or not an event.

*Ex: should mortality abnormally increases on a farm, the farmer could be willing to notify it in order to get a free diagnosis of the cause, but he could also prefer not notify it in order to avoid the consequences on its commercial activity (should a notifiable disease be found).*

3.3.3 Precision

Syndromic surveillance systems can often be based on data that are collected for other purpose than surveillance. Proxies are by definition not precise, what can for example make it difficult to interpret a signal.

*Ex: for swine carcasses on rendering plants, age of animals is not often available because all the carcasses are put into a container without any precision on individual age.*

3.3.4 Improving the data quality

Giving data providers feedbacks (summary, reports with graphical presentations) on data they transmitted can help improving their quality. The more the data are used, the more chance there is to improve their quality.

*Ex: in Denmark, quality of data on swine population increased when the drug consumption per pig which was estimated according to this data, gave a not favorable results: consumption per pigs was overestimate because pig population was underestimate.*

Another way to improve data quality would be to use data quality as a variable in the risk-based analysis used in the planning of official controls: if farmers or veterinarians have less control when they transmit better data, thus the general level of quality could be improved and the underreporting decreased.

4 Data analysis

The statistical analysis was one of the weak points identified in most of the veterinary syndromic systems presented. Stakeholders collect many data of interest for syndromic surveillance but few of them analyze them properly.

4.1 Tools

Many software are available, some being free (MySQL, R). They can be used for the management and analysis of data produced by syndromic surveillance systems.

There is an important need for statistical resources to implement syndromic surveillance system, and this need is often underestimated.

4.2 Scale of surveillance

It is difficult to choose the good temporal/spatial/population scale to conduct the analyses. The most adequate scale depends on data available and objectives of systems.

It can be interesting to define an alert when there are several consecutive values above the average. A change in the general trends can also be interesting information.
It seems important to split data in age classes and production type because there are a lot of confounding factors, which will have a big influence on the baseline.

Ex: works on cattle mortality in France, Spain and Italy

5 Standardization of records and results

5.1 Coding systems for clinical observations

Common coding systems are needed to record signs and symptoms, syndromes, diseases and causes of death. There are some coding systems already existing and used in different countries.

Scandinavian countries (Finland, Sweden and Norway) tried to share a common disease (and cause of death?) coding systems. There has been a working group since 2007. These countries use different coding systems which resemble each other very well. These coding systems are used for diagnosis and cause of deaths in cattle and pigs.

Austria has developed one system, close to the Scandinavian ones, which is also used in some parts of Germany.

In Denmark there is a codification in legislation for meat inspection where disease codes are common in pigs and cattle for diseases that exist in the two species. In France there is national codification in national legislation for cattle meat inspection.

In UK there is a list of codification for small animals which is quite largely used.

Syndromes can also be defined by international system of coding. But it is also possible to define them according to the data, by clustering clinical signs and symptoms. The method to define syndromes will depend on the purpose: i) a statistical definition confirmed by experts can be used for the surveillance of unexpected diseases; ii) expert definition can be used for surveillance of specific disease.

5.2 Other variables

Different population groups (defined by age or production) are monitored depending on the system. Perhaps it could be useful to do an inventory of the different grouping systems and the reasons why we use these classifications to help further harmonization of our outputs.

5.3 Comparison of results from different systems

Veterinary international coding systems for disease, clinical signs, causes of death, lesions, etc. could help harmonizing the data collected.

Perhaps it’s more important to have harmonized outputs that harmonized data to be able to share outputs.

For the moment, it is hardly conceivable to compare results of the different systems. Mortality data seem to be the most similar data in the MS.

6 Response to abnormal signals

Procedure to deal with abnormal signals should be well defined before implementing the system.
6.1 Interpretation of signals (alarms)

It is often difficult to interpret abnormal signals because usually the baselines can be influenced by a lot of different not sanitary phenomenon (regulation, market, calendar, IT dysfunction...).

*Ex: factors influencing the baseline of slaughterhouses data.*

A good knowledge of the baseline and its factors of variation can help to not investigate too much false alerts. Row alarm (statistical signal) should be interpreted by an expert or a group of experts having veterinary or biological knowledge, knowledge on the information technology used, on the context (factors of variations of the baseline) and possible biases, etc.

If the alarm is valid, onsite visit seems necessary.

*Examples of existing procedures*

*In the GD Veekijker, experts visit the farm together with the practitioner, take samples if necessary and inform authorities after that if necessary.*

*In Moss Emergences 2, when abnormal syndromes are notified, experts are automatically contacted according to their field of expertise. They can propose what they want afterwards. If the disease turns out to be mandatory, information is directly sent to public agency and not registered in Moss system.*

6.2 Notifications of alerts

Usually control measures, emergency plans are well defined for several exotic diseases which are known and expected, but this is not possible for unexpected events.

Legislation often state that public authorities should be informed of cases suspicious for notifiable disease, but it is not clear at which point they should be informed about an abnormal unspecific signal such as an increase of mortality.

7 Results dissemination

Syndromic surveillance systems can produce different outputs: row data, alerts reports, awareness bulletin (yearly, quarterly, monthly), scientific studies, etc.

These outputs can be difficult to interpret and thus the consequences of their dissemination must be carefully evaluated (social, economic impact, politic and confidentiality matters).

8 General organization

8.1 Funding

It is usually considered that syndromic surveillance is cheap, and that not much funding is needed to keep the system working. But actually syndromic surveillance needs funding, especially to pay human resources for managing the data collection, to carry out the data analysis, etc.

Even if the system is highly automated, human resources are still needed to interpret the alarms, display investigation, etc.

8.2 Sustainability

The question is to know how to justify the implementation and the maintenance of a system dedicated to the detection of emerging disease that will probably not occurred before 5 or 10 years?
To make the system sustainable, it the system must have another utility for the routine. There must be another interest than just the early detection.

9 Synergy between animal and human health

9.1 Know-how transfer

Human and animal epidemiologists face common statistical and epidemiological issues when dealing with syndromic surveillance:
- Use of data collected for other purpose than surveillance
- Standardization of clinical observations
- Case (syndrome) definition
- Anomaly detection
- Interpretation of unspecific signals
- Response to alerts

Both sides have thus interest in sharing their experiences and knowledge to improve their respective systems.

Ex: veterinary participants can notably learn from human representatives how to deal with confidentiality of data. Contrarily, ideas from veterinary systems to improve data providers involvement could be useful for manager of human systems (benchmarking).

9.2 Information exchanges

9.2.1 Why?

Before any exchange of data or outputs, it is important to define our respective objectives.

There are many cases where synergies between animal and human surveillance systems can enhance the performance of epidemiological surveillance, but it was difficult for working groups to identify interest of synergies in the particular case of syndromic surveillance.

It can be interesting to build synergies but the objectives must be well defined: what do we want to share data for? To improve sensitivity, timeliness, etc.

Sharing information can help to interpret a signal, to narrow an alert. Sharing information could also help improve the timeliness of the systems the signal appear earlier in one of the population.

9.2.2 What information?

What public health needs is analysis and interpretation from the vets, done properly and vice versa. Alert reports should be shared rather than raw data.

Representative of human syndromic systems thought that it would be more interesting for them to have information from specific animal surveillance systems than from syndromic ones. Indeed specific information could help them to confirm or not unspecific alerts they produced.

Sharing specific information can be useful to narrow unspecific alerts. It is harder to combine two unspecific signals.
9.2.3 How

It is important to create a common network so that contacts on both sides can be identified, know each other and organize regular exchange of information (notification of alerts, meetings, phone conferences...) during peace time.

Information should be shared automatically without waiting to know if it is relevant or not.

10 Perspectives

- Keep this new network alive, continue knowledge exchanges, and maybe organize in the future another meeting, when systems are better implemented
- Encourage initiatives for proposing and using a common coding system of clinical observations in veterinary sciences
- Encourage the knowledge exchanges regarding analysis tools and methods for syndromic data (anomaly detection tools)
- Write detailed fact sheets on each system identified
- Write guidelines for implementation of syndromic surveillance systems
- Evaluate the possibility to share data, beginning with mortality data
- Give more information on the cost and the cost effectiveness of the syndromic systems
- Continue the inventory and identify new systems or projects in Europe