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Applying participatory approaches in the evaluation of surveillance systems: A pilot study on African swine fever surveillance in Corsica

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ABSTRACT

The implementation of regular and relevant evaluations of surveillance systems is critical in improving their effectiveness and their relevance whilst limiting their cost. The complex nature of these systems and the variable contexts in which they are implemented call for the development of flexible evaluation tools. Within this scope, participatory tools have been developed and implemented for the African swine fever (ASF) surveillance system in Corsica (France). The objectives of this pilot study were, firstly, to assess the applicability of participatory approaches within a developed environment involving various stakeholders and, secondly, to define and test methods developed to assess evaluation attributes. Two evaluation attributes were targeted: the acceptability of the surveillance system and its the non-monetary benefits. Individual semi-structured interviews and focus groups were implemented with representatives from every level of the system. Diagramming and scoring tools were used to assess the different elements that compose the definition of acceptability. A contingent valuation method, associated with proportional piling, was used to assess the non-monetary benefits, i.e., the value of sanitary information. Sixteen stakeholders were involved in the process, through 3 focus groups and 8 individual semi-structured interviews. Stakeholders were selected according to their role in the system and to their availability. Results highlighted a moderate acceptability of the system for farmers and hunters and a high acceptability for other representatives (e.g., private veterinarians, local laboratories). Out of the 5 farmers involved in assessing the non-monetary benefits, 3 were interested in sanitary information on ASF. The data collected via participatory approaches enable relevant recommendations to be made, based on the Corsican context, to improve the current surveillance system.

1. Introduction

The regular and relevant evaluation of surveillance systems is essential to estimate the usefulness and the correct application of the data generated, and to ensure that limited resources are used effectively to provide the evidence required for protecting animal and human health (Hendrikx et al., 2011; Drewe et al., 2015). According to the Health Systems Strengthening Glossary developed by the World Health Organisation (WHO), evaluation refers to 'the systematic and objective assessment of the relevance, adequacy, progress, efficiency, effectiveness and impact of a course of actions, in relation to objectives and taking into account the resources and facilities that have been deployed' (WHO, undated). Applied to surveillance, this includes the assessment of a series of evaluation attributes such as sensitivity, acceptability and timeliness, using qualitative, semi-quantitative or quantitative methods and tools (Drewe et al., 2012). The complexity of surveillance systems, and

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the variable context in which they are implemented, entail the need for flexible evaluation tools designed to take into account the opinion of each stakeholder. This can be achieved by using flexible and adaptable methods based on participatory approaches within the evaluation process.

Participatory approaches refer to a range of methods and tools that enable stakeholders, to a variable extent, to play an active role in the definition and in the analysis of the problems they may encounter, and in their solution (Pretty, 1995; Pretty et al., 1995; Johnson et al., 2004; Mariner et al., 2011; Peyre et al., 2014). Indeed, the use of visualization tools through participatory approaches leads to open discussion between stakeholders and encourages a wide participation (Bradley et al., 2002). By taking stakeholders' perceptions, needs and expectations into consideration, these approaches could help us to achieve a better understanding of the system (Hoischen-Taubner et al., 2014). These methods make it possible to capture locking points in the system, such as communication and coordination between stakeholders, which can go unnoticed when using classical evaluation tools. The use of these tools should give rise to realistic and context-adapted recommendations. More importantly, these tools lead to enhanced acceptability of the evaluation, to an improved feeling of belonging to the system, and to even ownership of the evaluation outputs (Pahl-Wostl, 2002).

Factors used to assess the quality of system implementation (e.g., acceptability, communication), or the non-monetary costs and benefits of surveillance, are rarely considered despite their importance for decision makers and their impact on system performance (Calba et al., 2015; Peyre et al., 2014). Acceptability refers to the willingness of persons and organizations to participate in the surveillance system, and to the degree to which each of these users is involved in the surveillance (Hoinville et al., 2013); it has been listed by the Centers for Disease Control and Prevention (CDC) as one of the main qualities of surveillance (German et al., 2001). The decision to report a suspected event is a critical function of an emerging infectious disease surveillance system (Tsai et al., 2009). In order to limit the under-reporting of suspected cases and to identify the best ways to improve the current surveillance system, it is crucial to assess the stakeholders' willingness to participate in this system (Bronner et al., 2014). Non-monetary benefits refer to the positive direct and indirect consequences produced by the surveillance system and help to assess whether users are satisfied that their requirements have been met (definition developed by the RISKSUR[1] Consortium). The objective of this work was to develop methods and tools based on sociology, economics and participatory approaches to assess the acceptability of animal health surveillance systems and their non-monetary benefits through an estimation of the perceived economic value of sanitary information.

A pilot study was implemented in Corsica in order to test the applicability of these methods and tools in a developed context. The case of African swine fever (ASF) surveillance in Corsica was chosen for two main reasons. Firstly, current farming practices are mainly based on a traditional forest-pastoral system (outdoor free-range breeding) (Casabianca et al., 1989), and only a small number of rural private veterinarians work on the island (personal communication, Oscar Maestrini, INRA). Secondly, Corsican breeding systems are threatened by the endemic presence of ASF in Sardinia; this questions the current surveillance system faced with increased risk of introduction, spread and maintenance of ASF through Corsica (Desvaux et al., 2014; European Commission, 2011; Mur et al., 2014a). Indeed, ASF has been recognized to be among the most devastating of pig diseases with severe socio-economic consequences

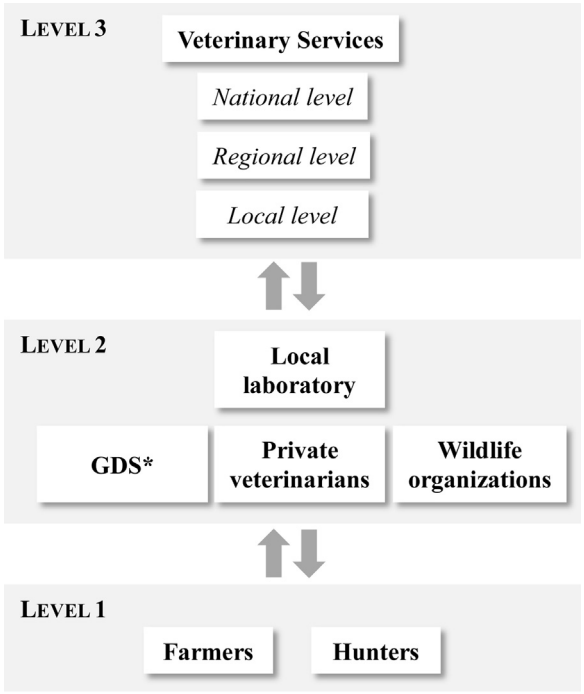

Fig. 1. Graphical representation of the African swine fever (ASF) surveillance system in Corsica (France).

(Moennig, 2000; Costard et al., 2013; Torre et al., 2013; Mur et al., 2014b).

Originally, the surveillance system targeted both ASF and Classical swine fever (CSF) but, due to the increasing threat, public authorities decided to redirect surveillance to target principally ASF. The objective of this system is to ensure the early detection of both diseases by using a passive surveillance approach based on clinical findings within the entire population of domestic pigs and wild boars. The system thus relies on the willingness of stakeholders to report suspicions, particularly given the fact that it is impossible to regularly assess the health of each animal (Sawford, 2011).

2. Material and methods

2.1. Description of the surveillance system and target population

Our first approach consisted of identifying stakeholders involved in the surveillance system. These were then divided into three levels (Fig. 1). Level 1 included farmers and hunters, who are on the front line of passive surveillance. In the event of a suspected case of ASF in farm animals, or among the wild animal population, they are supposed to contact the next level in the surveillance network (level 2) which can be composed of private veterinarians, of "Groupements de Défense Sanitaire" animal health groups (GDS, association of farmers addressing health issues, officially recognized by French law (Bronner et al., 2014)), of local laboratories, or of wildlife organizations (hunters' federations, for example). Any suspicions must be declared to the Veterinary Services, at local, regional, and national levels. These stakeholders represent the third level in the surveillance system (level 3). They are in direct contact with the authorities in charge of animal health surveillance coordination, the Directorate General for Food (DGAL), which is supervised by the French Ministry of Agriculture, Agribusiness and Forest (MAAF).

[1] Risk-based animal health surveillance systems, EU project (www.fp7-risksur.eu).

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Participants were thus selected according to their role in the surveillance system (i.e., according to the level to which they belonged), and also according to their availability and willingness to participate. Using a contact list provided by the National Institute for Agricultural Research (INRA), stakeholders were identified and individually contacted by phone.

Participants were interviewed using focus groups or individual semi-structured interviews. Focus groups are designed to expose a group of people to common stimuli (Pahl-Wostl, 2002). They are particularly important in assessing complex issues through the analysis of social processes and discussions (Pahl-Wostl, 2002). The data collection process relied on interviewing representatives at every level of the surveillance system. Indeed, it is common in qualitative approaches to rely on 'purposive sampling' to maximize the diversity of the data collected (i.e., perceptions and point of views) (Glaser and Strauss, 1967; Corbin and Strauss, 1990). The quality of the sample is therefore considered to be more important than the sample size in such approaches (Côte and Turgeon, 2002). Another objective was to reach theoretical saturation which has become the gold standard for health science research (Guest et al., 2006) and which refers to the point at which no new information is observed in the data (Guest et al., 2006).

The intention was to implement focus groups with (i) ten farmers (2 groups of 5 participants), and (ii) 5 hunters (one group) for level 1; (iii) 5 private veterinarians (one group), and (iv) 3 GDS technicians (one group) for level 2. For other stakeholders, the intention was to implement individual semi-structured interviews: with representatives from each local laboratory (two in Corsica), and one representative of a wildlife organization for level 2; two representatives of Veterinary Services at the local level, and one at the regional level for level 3.

Interviews were conducted between April and June 2014 by a team of 2–3 evaluators: one was in charge of leading the discussion, and the others were responsible for observing participant behavior and taking notes. All of the interviews were recorded with the participants consent and were subsequently transcribed into text format using Microsoft Word software (Microsoft Office 2010, Redmond, WA 98052-7329, USA).

3. Assessment of acceptability

Acceptability is relevant to different aspects of the surveillance system. It first refers to the actors' acceptance of the system's objectives and of the way it is operates. The acceptance of the way the system operates refers to (i) the role of each actor and the representation of their own utility, (ii) the consequences of the flow of information for each actor (i.e., changes in their activity and in their relations following a suspicion), (iii) the perception by each actor of the importance and recognition of their own role relative to that of other actors, and (iv) the relations between stakeholders. Trust is another essential element of acceptability; trust in the system and also trust in other stakeholders involved in the system. These elements were assessed using a combination of participatory diagraming and scoring tools, both of which were developed for, and adapted to, this specific context. Three main tools were implemented: (i) relational diagrams, (ii) flow diagrams (associated with proportional piling), and (iii) impact diagrams (associated with proportional piling). These tools were implemented with all participants, either through focus groups or through individual semi-structured interviews.

3.1. Relational diagrams

Relational diagrams were developed and used to identify professional networks and interactions among stakeholders. The participants' status or organization was placed in the middle of a flip chart. Facilitators then asked them to list the stakeholders and organizations with which they interacted and to describe these interactions (i.e., frequency and reciprocity).

3.1.1. Flow diagrams and proportional piling

Flow diagrams were developed and used to assess the participants' knowledge of the information flow in the case of suspected ASF and to identify how the information circulated. The diagrams were developed beginning with a representation of level 1 stakeholders (i.e., farmers or hunters) for whom participants were asked to show the customary flow of information within the system, i.e., to which stakeholder, or organization, the suspicion would be reported. Once the participants considered the diagram to be complete, proportional piling was performed to quantify the level of trust they had in the system (providing a percentage) and in the other stakeholders involved. This technique allowed participants to give relative scores to a number of different items or categories according to one criterion (Hendrickx et al., 2011). The method was based on visualization, but results were recorded numerically (Catley et al., 2012). Facilitators asked the participants to divide 100 counters into two parts, one representing their confidence in the system and their lack of confidence. The counters allocated to confidence were then used to specify the level of confidence in the actors and organizations represented in the diagram.

3.1.2. Impact diagrams and proportional piling

Impact diagrams, adapted to assess both positive and negative impacts of a specific event, are useful to document the consequences as experienced directly and indirectly by stakeholders (Kariuki and Njuki, 2013). In this pilot study, the specific event was a suspicion of ASF in Corsica. Facilitators asked the participants to list and explain the positive and negative impacts of a suspicion in their own work, organization and relations. Proportional piling was then implemented on the diagram by first dividing the 100 counters between positive and negative impacts according to their weights, and then by splitting the counters across the identified impacts to assess their probability of occurrence.

4. OASIS flash evaluation

OASIS is a standardized semi-quantitative assessment tool which was developed for the assessment of zoonotic and animal disease surveillance systems (Hendrikx et al., 2011). This tool is based on a detailed questionnaire used to collect information to describe the operation of the system under evaluation. The information collected is synthesized according a list of criteria (78 in total), for which participants provide scores (from 0 to 3) following a scoring guide.

There are two ways of implementing an OASIS evaluation. One way is to complete the questionnaire directly with stakeholders through interviews; another way ('OASIS flash') is to complete the questionnaire based on the available documentation. Due to time constraints, it was decided to implement an OASIS flash evaluation.

5. Assessment of non-monetary benefits

The economic value of sanitary information was assessed through a contingent valuation method (CVM) using proportional piling and was implemented through individual semi-structured interviews with farmers. This method has been used by economists to value changes in natural resources and environments, and it is somewhat similar to methods used in marketing to evaluate new concepts for goods and products (Louviere et al., 2003). It has recently been adapted to the evaluation of animal health surveil-

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lance in South East Asia (Delabouglise et al., 2015). This method consists of direct interviews during which facilitators ask individuals what they would be willing to pay for a change (Louviere et al., 2003); in the present study, they were asked what they would be willing to pay for sanitary information related to ASF.

As presented in Fig. 2, the first step of the process was for farmers to identify and to draw up a list of the main expenditure items for their farms. Facilitators asked them to give an average cost of these expenditures for one year. Proportional piling was then used for these expenditures in order to represent their costs with 100 counters. The second step was to highlight which information on ASF was of interest to the interviewee: which type of sanitary information and at which geographical level (e.g., village, commune, region). This information was then added to the list of expenditures; the facilitator asked participants to divide the counters used for the first step so as to represent their interest in this information and then to explain their choice.

6. Data analysis

6.1. Assessment of acceptability

Each element of acceptability was assessed by analyzing the pictures of the diagrams and also by using the transcribed discussions as stated in Table 1. The discussions were transcribed using Microsoft Word software. The acceptability of the objective of the surveillance system was assessed using the qualitative data collected during the elaboration of the impact diagrams (i.e., discussions). The acceptability of the way the system operated was assessed using all three diagrams (relation diagrams, flow diagrams, and impact diagrams) and using the qualitative data collected whilst they were being drawn (Table 1). The trust in the system as a whole and in other stakeholders was analyzed on the basis of the proportional piling implemented on flow diagrams, and by analyzing the qualitative data collected during the implementation.

Following this first analysis, and in order to be able to compare results obtained for each level, qualitative data were converted into semi-quantitative data. Thus, evaluation criteria were developed for each element. Each criterion was assigned a score as follows: low (−1), medium (0), or high (+1). This scale from −1 to +1 was selected in order to facilitate the representation of the results, using 0 as a central value.

The first step of the analysis was implemented at the interview level (i.e., focus group or individual semi-structured interview) and the scores obtained were used to calculate the arithmetic mean for each level using Microsoft Excel software (Microsoft Office 2010, Redmond, WA 98052-7329, USA). According to the mean value, the acceptability of each element was defined, at each level, as low (−1 to −0.33), medium (−0.32 to +0.33), or high (+0.34 to +1). These intervals were chosen with the objective of dividing the total distribution space into three equal parts.

6.2. Assessment of non-monetary benefits

Farmers were asked to provide a list of the main expenditures with their associated costs representing their production costs in the farm for the last year. Proportional piling was implemented on expenditures and the economic value of each counter was calculated. This value was then used to estimate the economic value of sanitary information and the willingness of participants to pay for it.

6.3. Comparison with the OASIS flash evaluation

Seven stakeholders were invited to join the scoring process: four representatives of the Veterinary Services (one from the local level, one from the national level and two from the regional level), one representative of the animal health association, one representative of the local laboratory and one private veterinarian.

The assessment of acceptability was based on 20 criteria according to the OASIS flash method, which can be grouped into 8 main categories: the organization of the surveillance system (e.g., existence of a charter), its animation (e.g., meetings frequencies), and organization (e.g., integration of laboratories in the system), the human and material resources, feedback to stakeholders, consequences of a suspicion, training provided, partnerships and stakeholder sensitization.

7. Results

7.1. Demographics of the interviews

A total of 16 actors were included, of which 3 were women and 13 were men. Eight stakeholders were involved through focus groups, and 8 through individual semi-structured interviews (Table 3). Three focus groups were held: one with 3 farmers, one with 3 representatives of the GDS (including one woman), and another one with two representatives of the Veterinary Services at the regional level (including one woman). Eight individual semi-structured interviews were implemented: 2 farmers/hunters, 3 hunters, one private veterinarian, one representative of the local laboratory, and one representative of the local Veterinary Services (woman). Focus groups lasted between 2 and 3 h while individual semi-structured interviews lasted 2 h on average. In addition, a total of 5 individual semi-structured interviews targeting the non-monetary benefits were implemented with farmers (men), each lasting 1 h.

7.2. Acceptability

7.2.1. Implementation of the tools

Relational diagrams were easily implemented with most stakeholders, and were mostly well-understood. This tool was a good way to introduce the process. It allowed participants to discuss their work and the relations they have with other stakeholders. The implementation of this tool was more complicated with 'isolated' participants (some hunters and farmers) due to their poor/inexistent professional network.

Flow diagrams allowed the collection of information relative to participants' knowledge about the system and the identification of the formal and informal pathways for transmission of suspicion information within the system. The implementation of flow diagrams was also more difficult with 'isolated' participants. The implementation of proportional piling was initially complex for participants to understand but all of them gained a clear understanding of the approach. Moreover, participants spontaneously explained their choices in the number of counters allocated to each stakeholder during the course of the activities. Nonetheless, this tool could not be implemented during the farmers' focus group. Indeed, they were reluctant to 'evaluate' the identified stakeholders through the proportional piling.

Impact diagrams were problematic, and not easily understood by participants. They had trouble identifying positive impacts following a suspicion, mostly due to the fact that they were focusing more on outbreaks rather than on suspected cases. Regarding the proportional piling implemented on these diagrams, the first step of the process (i.e., dividing the counters between the positive and

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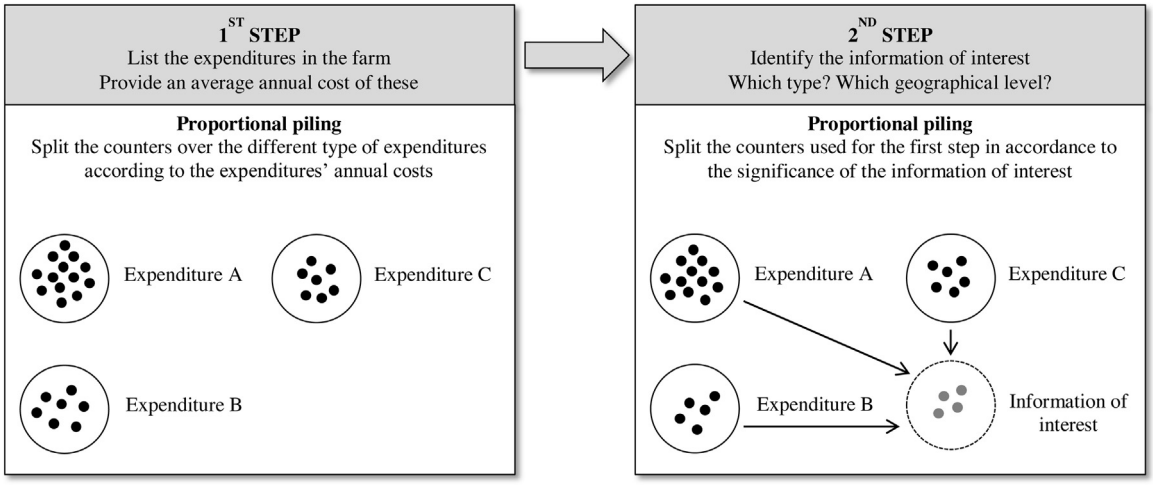

Fig. 2. Contingency valuation method associated with proportional piling to assess the economic value of the information of interest. 1st step—proportional piling was implemented on expenditures and the economic value of each counter was calculated. 2nd step—the participants were asked to represent their willingness to pay for sanitary information by tacking counters from the already listed expenditures items to a circle representing information.

Table 1
Participatory methods and tools used to assess the acceptability of animal health surveillance systems.

Acceptability elements	Associated questions	Associated participatory methods and tools
Objective	Is the objective(s) of the surveillance system in the line with the stakeholders' expected objective(s)?	Impact diagram
Operation	–	–
Role of each actor and representation of its own utility	Are stakeholders satisfied with their duty?	Flow diagram
Consequences of information flow	Are stakeholders satisfied with the consequences of information flow?	Impact diagram associated with proportional piling
Perception by each actor of its own role relative to other actors'	What is the perception of each actor of its own role relative to other actors'?	Flow diagram
Relations between stakeholders	Are stakeholders satisfied with the relations they have with other stakeholders?	Relational diagram
Trust		–
In the system	Do stakeholders trust the system to fulfil its surveillance objective(s)?	Flow diagram associated with proportional piling
In other stakeholders involved in the system	Do stakeholders trust the other stakeholders to fulfil their role in the system?	Flow diagram associated with proportional piling

negative impacts) was easily implemented; whereas the second step (i.e., dividing the counters between the different identified impacts) was more confusing for some participants and it took more time for them to understand the process.

7.2.2. Scoring criteria

Based on the analysis of the qualitative data gathered during the discussions, and the analysis of the diagrams and proportional piling, scoring criteria for each element of acceptability were developed (Table 2).

Information provided by relational diagrams was converted into quantitative data. To measure the frequency level, each arrow was associated to a numerical value: 0 for very rare, 2 for rare, 4 for regular and 6 for very common (Table 2). The same process was implemented for reciprocity: 0 when there was no relation, 2 when it was one-sided and 4 when the relation was mutual (Table 2).

Nonetheless, 'the perception by each actor of the importance and recognition of their own role relative to other actors' could not be assessed using the collected data due to the fact that this element did not appear spontaneously in a sufficient number of interviews. Therefore it has been left out from the present analysis.

Table 3
Demographics of the interviews implemented for the participatory approaches and for the OASIS flash evaluation tool in the scope of the assessment of the African swine fever (ASF) surveillance system acceptability in Corsica.

Evaluation process	Participants	Number	Interview type
OASIS	VS—National level	1	Expert opinion
	VS—Regional level	1	
	VS—Local level	1	
	GDS	1	
	Total	4	
Participatory approaches	Farmers	3	Focus groups discussion
	Farmers/hunters	2	Individual interview
	Hunters	3	Individual interview
	Private veterinarian	1	Individual interview
	GDS	3	Focus groups discussion
	Laboratory	1	Individual interview
	VS—Local level	1	Individual interview
	VS—Regional level	2	Focus groups discussion
	Total	16	

7.2.3. Participatory assessment

Elements of acceptability were scored according to the criteria developed. These results are summarized in Fig. 3.

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Table 2
Criteria developed to provide scores and levels to the elements of animal health surveillance systems acceptability.

Acceptability elements	Criteria	Associated scores	
Objective	Participants did not identify any objective, or they identified objectives that did not correspond to the objective of the surveillance system	Weak	−1
	The identified objective was partially corresponding to the one of the system	Medium	0
	The identified objective exactly corresponded to the objective of the system	Good	+1
Operation			
Role of each actor and representation of its own utility	Participants identified only negative points relative to their own role and utility	Weak	−1
	There was a balance between negative and positive points	Medium	0
	Mostly positive points came out	Good	+1
Consequences of information flow	The majority of the consequences identified were negative, or the weight of negative consequences was much higher than the one of the positive consequences	Weak	−1
	There was a balance between the positive and negative impacts, or there was a balance between the weight of positive and negatives impacts	Medium	0
	Mostly positive consequences were identified, or when their weight was much higher than the one of negative impacts	Good	+1
Perception by each actor of its own role relative to other actors'	No criteria	–	–
Relations between stakeholders	Frequency + reciprocity		
	[0 ; 3]	Weak	−1
	[4 ; 7]	Medium	0
	[8 ; 10]	Good	+1
Trust in the system	Number of counters allocated for the trust in the system		
	[0; 33]	Weak	−1
	[34; 66]	Medium	0
	[67; 100]	Good	+1

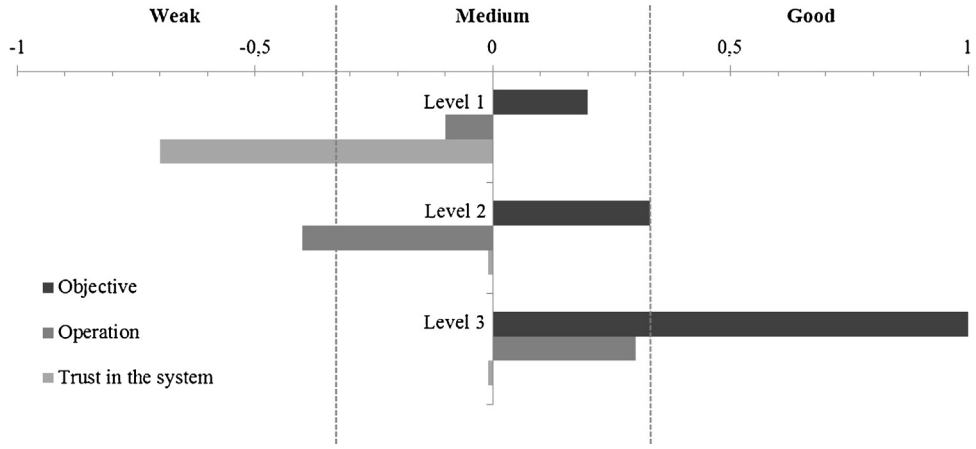

Fig. 3. Graphical representation of the acceptability of the African swine fever (ASF) surveillance system in Corsica. Level 1—farmers and hunters; level 2—private veterinarians, animal health groups and local laboratories; level 3—veterinary services (local level and regional level).

The acceptability of the objective of the surveillance system was considered as medium for level 1 (0.2) and for level 2 (0.33) (Fig. 3). It was high for level 3 (1) (Fig. 3). According to participants, passive surveillance seemed insufficient to reach the objective of early detection. They stated that once the disease is actually detected in pigs it is already too late to protect pig populations from infection. Consequently, the introduction of the disease must be avoided and harbor surveillance and awareness campaigns targeting tourists should be reinforced.

Most level 1 participants (6/8) understood their role in the system and accepted it, including the reporting of any ASF suspicion. Therefore the acceptability of their role and utility was high (0.4) (Fig. 3). The consequences of the information flow seemed to yield a low level of acceptability (−0.6) (Fig. 3), but differed between farmers and hunters. The three hunters did not identify any consequences following a suspicion due to the fact that they had never experienced an ASF epidemic. For all farmers, the consequences were not well-accepted because of regulatory restrictions to be implemented on the farm (i.e., animals have to be penned), leading to increased feed costs. In addition, and despite the fact that ASF is not a zoonotic disease, consumer confidence in the product could be affected, causing damage throughout the entire sector. However, respondents anticipated that if there was a suspicion of ASF in Corsica, farmers would face the problem together; this would probably give rise to collective efforts and contribute to improving the sector's organization. Satisfaction regarding the relations between stakeholders was medium (-0.2) (Fig. 3). All farmers felt isolated and 'completely abandoned' by animal health services

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(by private veterinarians, GDS and Veterinary Services). Farmers commented that 'contacts with the veterinarian correspond to minimum requirements',[2] stating more than once, and finding regrettable, that '90% of the information came from farmers'.[2] Most of the hunters (four out of the five interviewees, including two farmers/hunters) had a very poor network, their sole relations being with other hunters.

Level 2 participants were not completely satisfied with their role, the acceptability of this element was therefore medium (0) (Fig. 3). The private veterinarian highlighted the facts that in the case of an ASF suspicion 'it is impossible to comply with safety standards imposed by emergency plans'.[3] The local laboratory stated that 'the perception of each other's roles in the system is not clear'.[4] GDS technicians described the difficulties of being a moderator between Veterinary Services and farmers. The consequences of information flow were considered to be of low acceptability (−1) (Fig. 3). Level 2 participants highlighted that an ASF suspicion would cause an increase and disorganization of their workload, leading to a decrease in the surveillance of other diseases, even if it could spur an increase in contact and collaboration. The satisfaction of the relations between stakeholders was low (−0.3) (Fig. 3). Nonetheless, both the private veterinarian and the GDS technicians complained about the relations with the Veterinary Services at local level. They stated that the Veterinary Services did not always provide the required information. However, they highlighted that this was mostly due to human constraints. Although they were aware of the potentially important role of wildlife in the spread of the disease, they complained about the lack of collaboration between wildlife and animal health sectors.

All level 3 participants agreed on a high acceptability of their role and utility in the system (1) and expressed medium acceptability for the consequences of information flow (0) (Fig. 3). They stated that a suspicion 'could result in feedback which would allow the system to be tested and raise awareness among stakeholders'[5]; and could increase contact and collaboration between organizations. Nonetheless, they stated that a suspicion would also cause an increase and disorganization of their workload. The satisfaction of the relations between stakeholders was medium (0) (Fig. 3). Also, there was a certain lack of direct contact with level 1.

The trust of level 1 participants in the system was low (−0.7) (Fig. 3) and ranged from 15 to 56%. One hunter stated that 'people will listen if there is a problem, but I am not sure that any action will be taken'.[6] The two other hunters involved knew nothing about the way in which the system was organized and operated, thus they could not draw the flow diagram. The other participants showed some hesitation in drawing the surveillance system scheme. The time taken to do the exercise and hold the relative discussions showed that these actors were not very familiar with the system beyond their farm environment. Four farmers did not completely trust other farmers because 'some of them will hide it [suspicion], at least initially'[7]; and did not trust Veterinary Services at the local level because of budget constraints, and at the national level because 'for them Corsica is just a drop in the ocean compared to France as a whole'. Two farmers/hunters did not completely trust hunters either because of their lack of awareness, and did not trust wildlife organizations because relations between them were minimal.

For level 2, the trust allocated to the system as a whole was medium (0) (Fig. 3), about 37%. All participants agreed that there were problems with the local laboratories due to budgetary and human constraints, and to the difficulties in sending samples to mainland France. GDS representatives stated that they did not trust all private veterinarians because 'they are not interested in the pig sector'.[8] Even the private veterinarian highlighted that most of them had never experienced ASF in the field, and could miss a suspicion case as they might not suspect this disease. They agreed that 'the critical point is the farmers', because 'they will call at the last moment [in case of suspicion], they will even tend to hide it'.

For level 3, the trust allocated to the entire system was medium (0) (Fig. 3), about 40%. Again, local laboratories were identified as a critical point in the system, due to the same reasons stated by level 2 participants. Veterinary Services representatives had a lack of trust regarding farmers, especially due to the specificities of the dominant farming system (free-ranging). Indeed, as one respondent highlighted, farmers do not see their animals every day and can therefore take some time to notice that some animals are missing.

7.2.4. OASIS flash assessment

A total of four stakeholders joined the scoring process: three representatives from the Veterinary Services (one from each local, national and regional level), and one representative of the animal health association (Table 3). Results from this evaluation highlighted a moderate acceptability mostly due to the measures to be implemented in suspicious farms (i.e., farms with at least one suspected case of ASF).

7.3. Non-monetary benefits

Three out of the five farmers interviewed showed an interest in sanitary information (Table 4), and more specifically in ASF. They were interested in this information at the regional level. They highlighted that the information would not be that useful due to the fact that they do not know how to deal with an epidemic of this disease. Nonetheless, they were aware of its rapid spread, and of the high mortality rates and the current lack of a vaccine. These actors showed a willingness-to-pay between 187€ and 5283€ for information related to ASF in Corsica for a year (Table 4), representing from 1.76 to 4.13% of their farm production costs (Table 4).

The two other farmers were not interested in sanitary information related to ASF. Both of them said that diseases 'are part of nature' and that there is nothing to do but to wait for the end of a potential epidemic, especially for ASF. Thus, none of them were ready to invest in sanitary information (Table 4).

8. Discussion

This pilot study developed and tested a methodology for the implementation of participatory tools to measure acceptability and non-monetary benefits using qualitative and semi-quantitative data. Moreover, it highlighted the advantages and limitations of using such approaches. By directly assessing stakeholder perceptions and expectations, a relationship of trust was developed with the interviewees. The stakeholders' interest in ASF and in the existing surveillance system was also raised. Participatory methods and tools further facilitated the discussion about monetary aspects with farmers. The visualization tools helped the stakeholders to discuss their perception of the surveillance system. These tools enabled collection of further information regarding the context in which stakeholders operate and contribute to surveillance. Thanks to the

[2] Focus group with farmers, 28th May 2014.
[3] Individual semi-structured interview with a private veterinarian, 6th June 2014.
[4] Individual semi-structured interview with a local laboratory, 3th June 2014.
[5] Individual semi-structured interview with Veterinary Services at the local level, 12th June 2014.
[6] Individual semi-structured interview with a hunter, 4th June 2014.
[7] Focus group with farmers, 28th May 2014.
[8] Focus group with GDS representatives, 23th May 2014.

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Table 4
Results from the contingency valuation method implemented with farmers, used to assess the economic value of the sanitary information of interest in Corsica. NA—Not applicable.

Farmers	Number of animals	List of expenditures	Cost per year (€)	Economic value of the information (€) with standard error	Economic value of the information (%)
#1	40	NA	NA	0	0
#2	85	Infrastructures	10,000		4.13
		Deworming	1200	1700	
		Feed	30,000	(±150)	
		Total	41,200		
#3	100	Vaccination	200		1.76
		Deworming	400	187	
		Feed	10,000	(±62)	
		Total	10,600		
#4	200	NA	NA	0	0
#5	500	Vaccination	16,500		8.04
		Deworming	13,200	5200	
		Feed	35,000	(±660)	
		Total	64,700		

involvement of representatives from all levels, the limitations of the current system were highlighted. Nonetheless, the implementation of participatory approaches appeared to be time consuming. Time was required to make individual contact with stakeholders, to present the project to them and to define their willingness to participate in the study. It also took time to define a date and to find a place for the interview. Another constraint was related to the playful aspects of these approaches, which might have appeared to some stakeholders to be lacking in earnestness (mainly in focus groups). However, participants generally welcomed the evaluation process and the use of visual representation tools which allowed them to clearly represent their perception of the system.

Relational diagrams were a good way to introduce the process, allowing participants to talk about something they know well. Nonetheless, the elaboration of these diagrams was more complicated with 'isolated' participants. They did not understand how to build the relational diagram due to their lack of contact with others. These results raise more general questions regarding the way in which semi-structured interviews should be conducted when an overall approach of the topic seems tricky. Indeed, in the present case, it was necessary to ascertain the absence of relations with other stakeholders. One way to do so could be to provide participants with examples, asking them to confirm that they do not have contact with others. This, however, would entail the risk of directing the answers given by the interviewees or of making them feel uncomfortable and impeding the smooth progress of the discussion. Also, the information provided by these diagrams did not allow a clear assessment of the level of satisfaction regarding relations between stakeholders. Indeed, the tool allowed participants to talk about the frequency of contact with other stakeholders, but in fact it would have been incorrect to assimilate frequency of contact with the level of satisfaction. In some relationships, contact may be rare, but sufficient to satisfy stakeholders. In this case, there would be a need to implement an additional tool to assess the level of satisfaction, through the use of satisfaction tokens on the relational diagrams for example.

The flow diagrams were more difficult to implement with 'isolated' participants also, who had no knowledge either on the surveillance system or on the stakeholders involved in it. Once again, it would be necessary to find a way to conduct interviews that would ascertain this isolation without inducing forced and therefore unreliable answers. Moreover, participants often shifted during discussions from the referencing of a suspicion to that of a confirmed ASF outbreak. When this occurred, the facilitator corrected participants to keep them on the right track; nevertheless, participants often reiterated this confusion. Pushing participants in another direction could have raised some negative feelings, and could have led to a lack of interest in the interview. Therefore, some degree of confusion between suspicion and outbreak in answers could not be avoided. We may note that the participatory process allows the interviewer to identify such confusions and to take these into account in the conclusions, something that would be more difficult to achieve with approaches based on systematic questionnaire. The implementation of proportional piling was understood and implemented by most participants. Nonetheless, participants from the farmers' focus groups did not want to implement it. This may have been due to a poor understanding of the tool's objective, or to the fact that they perceived it as 'a childish game'. It may also have been due to the fact that one of the participants, who is deeply involved in Corsican politics, did not want to handle the counters and may have influenced the others in this direction.

It was difficult to implement the impact diagrams due to the fact that participants did not want to identify the positive impacts produced by an ASF suspicion. Indeed, some participants denied that any positive impacts could be identified due to the fact that 'nothing good can arise from a crisis'.

The analysis of diagrams, proportional piling and discussions during the interviews allowed us to develop scoring criteria for the previously identified acceptability criteria. Nonetheless, it was not possible to do this for one criterion (i.e., perception by each actor of the importance and recognition of his/her own role relative to other stakeholders). This element was therefore excluded from the analysis as we could not identify any qualitative data with which to assess it, making it impossible to develop evaluation criteria.

By combining CVM with proportional piling, we were able to assess the farmers' interest in sanitary information related to ASF. The method was easy to implement and participants readily provided an estimation of farm expenditures. The kind of information sought and the geographical area targeted were identified, thus allowing information to be collected on the farmers' perception of the disease. Nonetheless, the use of only 100 counters for proportional piling has led to a tendency to overestimate the economic value of the information. This overestimation was thus greater when the total expenditures were higher. One way of improving this method would be to increase the number of counters in order to gain a more accurate estimation of this economic value. It would also be valuable to identify some points of factual comparison in order to gage the relevance of the final estimated willingness-to-pay. Expenditures on insurance products could be used as a reference element. Indeed, the willingness-to-pay for animal or

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farm insurance may be interpreted as a means of risk aversion and would allow a better understanding of the farmers' willingness to pay for sanitary information (Shaik et al., 2006).

The semi-quantitative method developed to assess each acceptability criterion, although subjective, facilitated comparisons between the different levels. The OASIS flash method is also based on this type of semi-quantitative scoring, but involved only a small sample of stakeholders and did not include level 1 representatives. Few participants were involved in this pilot study, and thus some points of view may be missing. Nonetheless, results from this pilot study allowed us to collect relevant information regarding the current surveillance system in Corsica. In the future, it would be necessary to find a balance between the number of stakeholders to be included and the time available to undertake such a study. The recommendations from the research team would be to involve at least fifteen representatives from level one (i.e., farmers and hunters).

Qualitative approaches rely on 'purposive sampling' to maximize the diversity of the data collected (i.e., perceptions and point of views) (Bronner et al., 2014). Participants were selected in order to achieve this diversity, and to reach the theoretical saturation of the data (Côte and Turgeon, 2002). This standard for qualitative research was not achieved during this pilot study because of time constraints, and due to the lack of availability of certain stakeholders. Moreover, participants from all levels were selected according to their availability and also to their willingness to participate in the study. This means that most of the people involved in this study had an interest in animal health. As this was a pilot study, there may also have been biases in the way the questions were formulated and in the guidance provided to stakeholders. The lack of involvement of surveillance beneficiaries (i.e., level 1) in the OASIS flash evaluation process may also be a source of bias in the results.

This study confirmed the findings of other studies which showed that participatory methods and tools play an important role in helping researchers and decision makers to reconnect with farmers, and to gain a better understanding of diseases from a local perspective (Catley and Admassu, 2003). Nonetheless, due to the fact that participatory approaches are mostly used in developing countries, it is not currently possible to compare the results stemming from this study with those of other research projects. Results obtained from this field work might thus provide real insights into stakeholder perceptions. The communication of these results to decision makers should contribute improved surveillance and control strategies (Catley et al., 2012). Indeed, this pilot study can be considered as a developmental evaluation, with learning goals and not judgment ones (Dozois et al., 2010). This type of evaluation has been recognized as a way of supporting adaptive learning, leading to a deeper understanding of stakeholders' problems, resources, and the broader context (Dozois et al., 2010). The use of participatory methods and tools in the evaluation process led to the empowerment of stakeholders, thus improving both their acceptance of the evaluation and their feeling of ownership. This could improve the sustainability of health interventions (Calba et al., 2014). Several authors highlight that, besides its challenges, participatory evaluation can be seen as a very useful approach to the evaluation of health prevention programs as 'it strengthens capacities and alliances among participants, fosters commitment to health program principles and has also proved to be a useful decision making tool' (Rice and Franceschini, 2009; Nitsch et al., 2013).

Although acceptability represents an important concern in the evaluation process, limitations exist regarding how this attribute should be considered and evaluated (Auer et al., 2011). The participatory approaches developed in this study allowed the different elements behind the acceptability definition to be assessed. Since the information from all levels is critical for effective disease surveillance (Tsai et al., 2009), we may consider that the data collected with this approach gave rise to relevant recommendations for the Corsican context that can be implemented to improve the current surveillance system.

Moreover, economic evaluation should be an integral part of the evaluation of animal health surveillance systems, even if this is likely to be a difficult part to achieve (Drewe et al., 2012; Drewe et al., 2015). The benefits assessment, including non-monetary benefits, must be part of an economic evaluation process. This is a critical point for decision makers who need to make choices based on limited or diminishing resources (Drewe et al., 2012). Using a CVM method to assess non-monetary benefits could fill the existing gaps regarding the economic evaluation of surveillance systems. Nonetheless, the method implemented through this pilot study still requires some adjustment in order to better assess the stakeholders' interest in sanitary information, and thus to engage them in the surveillance system.

9. Conclusion

Socio-economic evaluation attributes are rarely considered in the evaluation of animal health surveillance; this may be due to the lack of methods and tools available for their assessment. The present work provides an initial step in the direction of filling these gaps. The methodology developed, based on participatory approaches, allowed us to assess the acceptability of the ASF surveillance system in Corsica, and to collect information relative to the non-monetary benefits of this surveillance for farmers.

In order to further assess its applicability, the proposed method should be applied in different contexts, targeting other surveillance systems with different objectives.

Conflict of interest

All authors declare that they have no conflicts of interest relevant to this paper.

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References

Auer, A.M., Dobmeier, T.M., Haglund, B.J., Tillgren, P., 2011. The relevance of WHO injury surveillance guidelines for evaluation: learning from the Aboriginal Community-Centered Injury Surveillance System (ACCISS) and two institution-based systems. BMC Public Health 11, 744.

Bradley, J.E., Mayfield, M.V., Mehta, M.P., Rukonge, A., 2002. Participatory evaluation of reproductive health care quality in developing countries. Soc. Sci. Med. 55, 269–282.

Bronner, A., Hénaux, V., Fortané, N., Hendrikx, P., Calavas, D., 2014. Why do farmers and veterinarians not report all bovine abortions, as requested by the clinical brucellosis surveillance system in France? BMC Vet. Res. 10, 93.

Calba, C., Goutard, F.L., Hoinville, L., Hendrikx, P., Lindberg, A., Saegerman, C., Peyre, M., 2015. Surveillance systems evaluation: a systematic review of the existing approaches. BMC Public Health 15, 448.

Calba, C., Ponsich, A., Nam, S., Collineau, L., Min, S., Thonnat, J., Goutard, F.L., 2014. Development of a participatory tool for the evaluation of village animal health workers in Cambodia. Acta Trop. 134, 17–28.

Casabianca, F., Picard, P., Sapin, J., Gauthier, J., Vallée, M., 1989. Contribution à l'épidémiologie des maladies virales en élevage porcin extensif. Application à la lutte contre le maladie d'Aujeszky en Région Corse. Journées Recherches Porcines France 21, 153–160.

Catley, A., Admassu, B., 2003. Using participatory epidemiology to assess the impact of livestock diseases. In: FAO-OIE-AU/IBAR-IAEA Consultative Group Meeting on Contagious Bovine Pleuropneumonia in Africa, 12–14 November 2003, FAO Headquarters, Rome, Italy.
Catley, A., Alders, R.G., Wood, J.L., 2012. Participatory epidemiology: approaches, methods, experiences. Vet. J. 191, 151–160.
Corbin, J.M., Strauss, A., 1990. Grounded theory research: procedures, canons, and evaluative criteria. Qual. Sociol. 13, 3–21.
Costard, S., Mur, L., Lubroth, J., Sanchez-Vizcaino, J., Pfeiffer, D., 2013. Epidemiology of African swine fever virus. Virus Res. 173, 191–197.
Côte, L., Turgeon, J., 2002. Comment lire de façon critique les articles de recherche qualitative en médecine. Pédag. Méd. 3, 81–90.
Delabouglise, A., Antoine-Moussiaux, N., Phan, T., Dao, D., Nguyen, T., Truong, B., Nguyen, X., Vu, T., Nguyen, K., Le, H., Salem, G., 2015. The perceived value of passive animal health surveillance: the case of highly pathogenic avian influenza in Vietnam. Zoonoses Public Health, http://dx.doi.org/10.1111/zph.12212.
Desvaux, S., Le Potier, M.F., Bourry, O., Hutet, E., Rose, N., Anjoubault, G., Havet, P., Clément, T., Marcé, C., 2014. Peste porcine africaine: étude sérologique dans les abattoirs en Corse durant l'hiver 2014. Bull. Epidémiol. 63, 19.
Dozois, E., Blanchet-Cohen, N., Langlois, M., 2010. DE 201: A Practitioner's Guide to Developmental Evaluation. The J.W. McConnell Family Foundation and the International Institute for Child Rights and Development http://www.mcconnellfoundation.ca/en/resources/publication/de-201-a-practitioner-s-guide-to-developmental-evaluation.
Drewe, J., Hoinville, L., Cook, A., Floyd, T., Gunn, G., Stärk, K., 2015. SERVAL: a new framework for the evaluation of animal health surveillance. Transbound. Emerg. Dis. 62, 33–45.
Drewe, J., Hoinville, L., Cook, A., Floyd, T., Stärk, K., 2012. Evaluation of animal and public health surveillance systems: a systematic review. Epidemiol. Infect. 140, 575–590.
European Commission, 2011. Commission Implementing Decision of 15 December 2011 amending Decision 2005/363/ EC concerning animal health protection measures against African swine fever in Sardinia, Italy. http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX.32007D0012&from=EN (accessed 29.04.15.).
German, R.R., Lee, L., Horan, J., Milstein, R., Pertowski, C., Waller, M., 2001. Updated guidelines for evaluating public health surveillance systems. MMWR recommendations and reports. Cent. Dis. Control Prev. 50, 1–35.
Glaser, B., Strauss, A., 1967. The Discovery of Grounded Theory. Strategies for Qualitative Research. Transaction Publishers, Hawthorne, New-York, pp. 271.
Guest, G., Bunce, A., Johnson, L., 2006. How many interviews are enough? An experiment with data saturation and variability. Field Methods 18, 59–582.
Hendrickx, S., El Masry, I., Atef, M., Aref, N., El Zahraa Kotb, F., El Shabacy, R., Jobre, Y., 2011. A Manual for Practitioners in Community-based Animal Health Outreach (caho) for Highly Pathogenic Avian Influenza. The International Livestock Research Institute and the Food and Agriculture Organization of the United Nations, pp. 77.
Hendrikx, P., Gay, E., Chazel, M., Moutou, F., Danan, C., Richomme, C., Boue, F., Souillard, R., Gauchard, F., Dufour, B., 2011. OASIS: an assessment tool of epidemiological surveillance systems in animal health and food safety. Epidemiol. Infect. 139, 1486–1496.
Hoinville, L., Alban, L., Drewe, J., Gibbens, J., Gustafson, L., Häsler, B., Saegerman, C., Salman, M., Stärk, K., 2013. Proposed terms and concepts for describing and evaluating animal-health surveillance systems. Prev. Vet. Med. 112, 1–12.
Hoischen-Taubner S., Bielecke A., Sundrum A., 2014. Different perspectives on animal health and implications for communication between stakeholders. In: Schobert Heike, Riecher Maja-Catrin, Fischer Holger, Aenis Thomas, Knierim Andrea (Eds.) Farming Systems Facing Global Challenges: Capacities and Strategies, 8–16.
Johnson, N., Lilja, N., Ashby, J.A., Garcia, J.A., 2004. The practice of participatory research and gender analysis in natural resource management. Nat. Res. Forum 28, 189–200.
Kariuki, J., Njuki, J., 2013. Using participatory impact diagrams to evaluate a community development project in Kenya. Dev. Pract. 23, 90–106.
Louviere, J.J., Hensher, D.A., Swait, J.D., 2003. Environmental valuation case studies. In: Stated Choice Methods: Analysis and Applications. Cambridge University Press, pp. 329–353.
Mariner, J., Hendrickx, S., Pfeiffer, D., Costard, S., Knopf, L., Okuthe, S., Chibeu, D., Parmley, J., Musenero, M., Pisang, C., 2011. Integration of participatory approaches into surveillance systems. Rev. Sci. Technol. 30, 653–659.
Moennig, V., 2000. Introduction to classical swine fever: virus, disease and control policy. Vet. Microbiol. 73, 93–102.
Mur, L., Atzeni, M., Martínez-López, B., Feliziani, F., Rolesu, S., Sanchez-Vizcaino, J., 2014a. Thirty-five-year presence of African swine fever in Sardinia: history, evolution and risk factors for disease maintenance. Transbound. Emerg. Dis., http://dx.doi.org/10.1111/tbed.12264.
Mur, L., Martínez-López, B., Costard, S., de la Torre, A., Jones, B.A., Martínez, M., Sánchez-Vizcaíno, F., Muñoz, M.J., Pfeiffer, D.U., Sánchez-Vizcaíno, J.M., 2014b. Modular framework to assess the risk of African swine fever virus entry into the European Union. BMC Vet. Res. 10, 145.
Nitsch, M., Waldherr, K., Denk, E., Griebler, U., Marent, B., Forster, R., 2013. Participation by different stakeholders in participatory evaluation of health promotion: a literature review. Eval. Progr. Plan. 40, 42–54.
Pahl-Wostl, C., 2002. Participative and stakeholder-based policy design, evaluation and modeling processes. Integr. Assess. 3, 3–14.
Peyre, M., Hoinville, L., Haesler, B., Lindberg, A., Bisdorff, B., Dorea, F., Wahlström, H., Frössling, J., Calba, C., Grosbois, V., Goutard, F., 2014. Network analysis of surveillance system evaluation attributes: a way towards improvement of the evaluation process. In: International Conference on Animal Health Surveillance (ICAHS), La Havane, Cuba.
Pretty, J.N., 1995. Participatory learning for sustainable agriculture. World Dev. 23, 1247–1263.
Pretty, J.N., Guijt, I., Thompson, J., Scoones, I., 1995. Participatory Learning and Action: A Trainer's Guide. International Institute for Environment and Development, pp. 267.
Rice, M., Franceschini, M.C., 2009. The participatory evaluation of healthy municipalities, cities and communities initiatives in the Americas. In: Health Promotion Evaluation Practices in the Americas. Springer, pp. 221–236.
Sawford, K.E., 2011. Animal Health Surveillance for Early Detection of Emerging Infectious Disease Risks. Phd Thesis. Department of Medical Science. University of Calgary, Calgary, Alberta, pp. 247.
Shaik, S., Barnett, B.J., Coble, K.H., Miller, J.C., Hanson, T., 2006. Insurability conditions and livestock disease insurance. In: Koontz, S.R., Hoag, D.L., Thilmany, D.D.G., Grannis, J.W.J.L. (Eds.), The Economics of Livestock Disease Insurance: Concepts, Issues and International Case Studies. CABI Publishing, pp. 53–67.
Torre, A.D.L., Bosch, J., Iglesias, I., Muñoz, M., Mur, L., Martínez-López, B., Martínez, M., Sánchez-Vizcaíno, J., 2013. Assessing the risk of African swine fever introduction into the European Union by wild boar. Transbound. Emerg. Dis. 62 (3), 272–279.
Tsai, P., Scott, K.A., Pappaioanou, M., Gonzalez, M.C., Keusch, G.T., 2009. Sustaining Global Surveillance and Response to Emerging Zoonotic Diseases. National Academies Press.

Please cite this article in press as: Calba, C., et al., Applying participatory approaches in the evaluation of surveillance systems: A pilot study on African swine fever surveillance in Corsica. PREVET (2015), http://dx.doi.org/10.1016/j.prevetmed.2015.10.001