Getting more from passive surveillance: an example applying the RISKSUR framework to avian influenza in the UK

Lucy Snow, Adam Brouwer

Animal & Plant Health Agency

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RISKSUR

Introduction

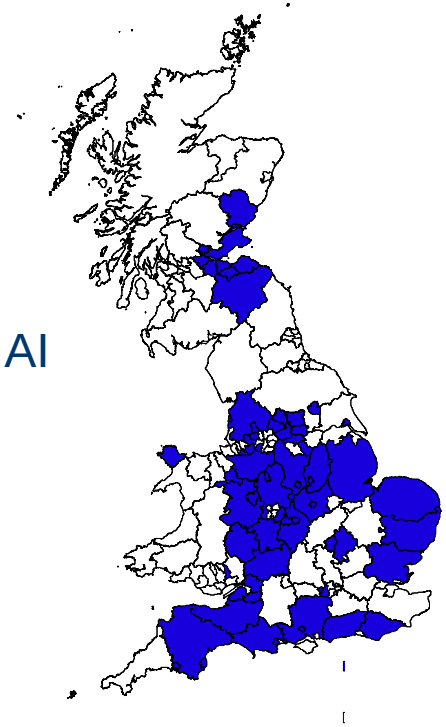
- **WP2: Early detection of exotic, new, or re-emerging disease:** To illustrate the use of the framework by designing and assessing the epidemiological performance of different surveillance systems for selected early detection risk scenario diseases.
- Apply the framework to document Avian Influenza surveillance in the UK:
  - Test the framework and identify problems, gaps, further development needs
  - Identify areas where more data or information is needed on AI surveillance before the start of the case study
  - Identify potential areas for assessing performance of different surveillance approaches
  - Identify areas where additional tools may be useful

UK/GB AI surveillance

1) Risk based serological survey in poultry
   - Detect LPAI H5 and H7 in chickens and turkeys
   - Detect LPAI subtypes H5 and H7 and highly pathogenic AI (HPAI) in domestic waterfowl;

2) AIWBS
   - RB warden patrols (targeted sites and species)
   - High mortality events (not RB)
   - Detect HP H5N1

3) Passive (NAD) surveillance in poultry
   - Detect notifiable H5 and H7 in poultry



RISKSUR

Documenting surveillance

FIT TO SCREEN

1 Surveillance System (or PORTFOLIO, which appilles when multiple hazards are targeted)

The RISKSUR tool has been developed to design and evaluate surveillance for specific systems . A system is defined by:

1) The hazard: the disease for which surveillance is being designed
2) The surveillance objective (see 1.2 in the next screen)
3) Geographical area covered

Having defined your system you can also enter information that will be useful to inform the design including:

4) The susceptible population (species)
5) The risk characteristics associated with the previous 3 points

The surveillance design framework was designed to be a general tool, a "guided tour" of the process of

Please name your surveillance system (to differentiate from other systems you may design using this tool)

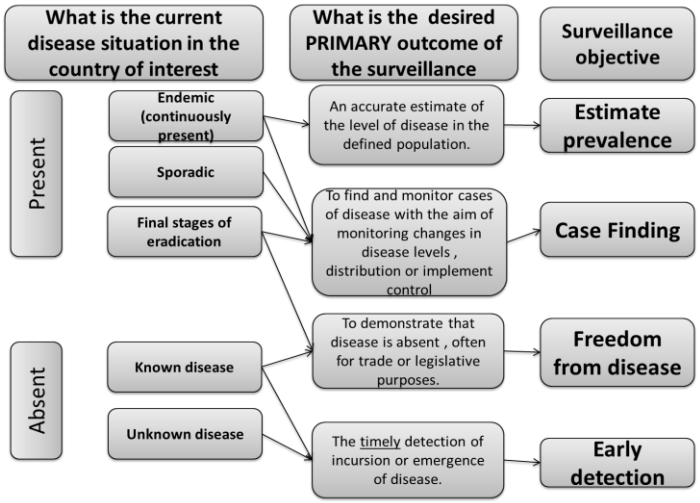
Avian Influenza in GB/UK_2014

1.1 Hazard

Please write the hazard name in the box below:

Avian Influenza – specifically notifiable H5 and H7 LP or HPAI in poultry and domestic birds (scanning and poultry survey); H5N1 HPAI in AIWBS

Visit the WIKI to get surveillance advice for particular hazards.



1 Surveillance System

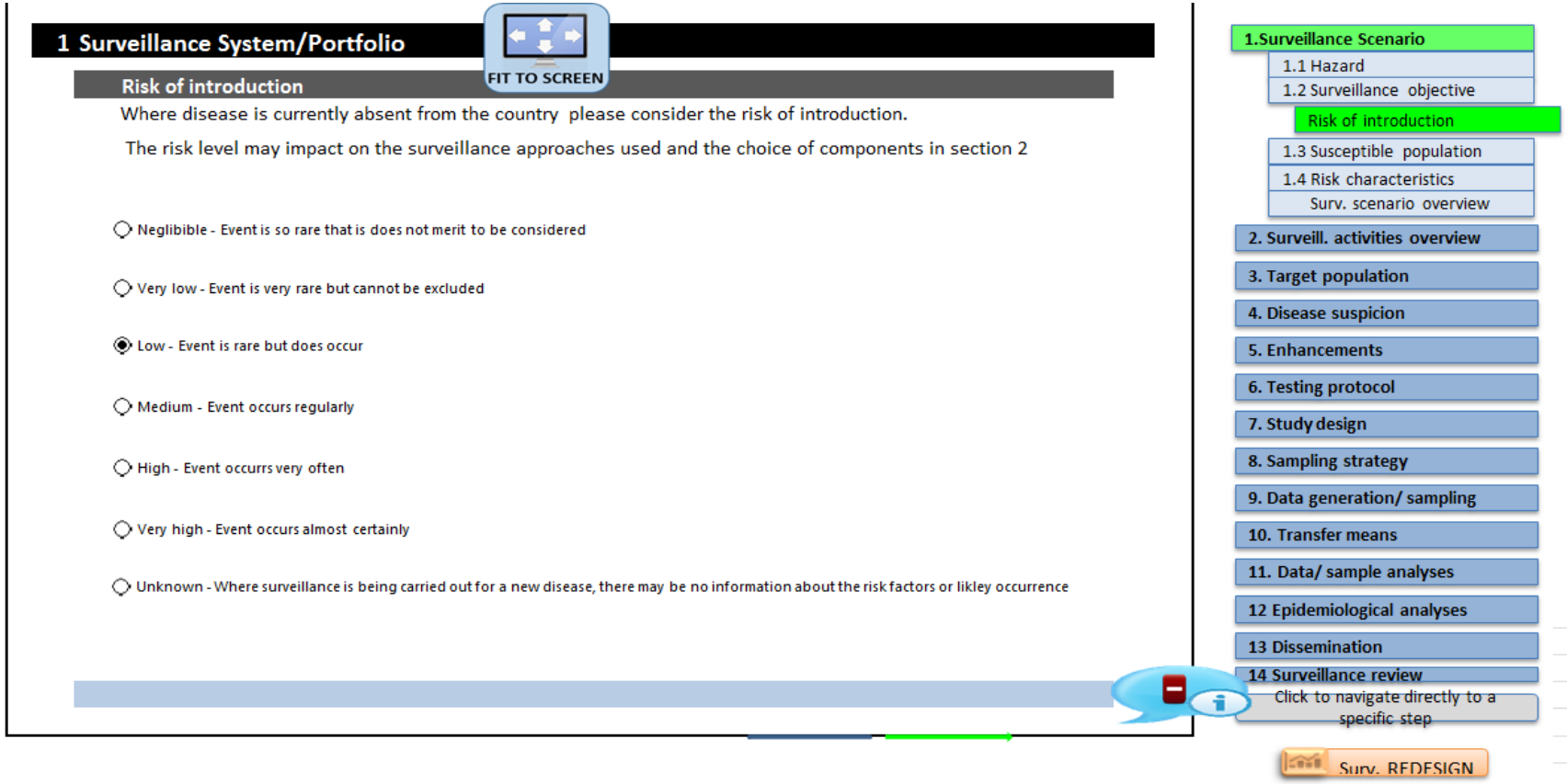
1.3 Geographical area covered

Please indicate the geographical area covered by this surveillance system:

NAD control strategy is GB; AIWBS and RBS is UK

Previous | Next | GLOSSARY

Risk of introduction



1 Surveillance System/Portfolio

1.5 Risk characteristics

The questions below are designed to encourage you to think about population (particularly geographical and temporal), herd and animal level risk characteristics associated with the hazard, susceptible population and surveillance goal you defined above. These risk characteristics may become relevant later in the framework when considering strategies to enhance the efficiency of your surveillance system:

WIKI GLOSSARY

Information on this section will be relevant later when considering the possibility of using risk-based surveillance approaches.

A. Population level risk factors

Are there any population level risk factors affecting the risk of introduction, infection, detection or consequences. If so, atate the risk factor (one per field), indicate which aspect of risk is affected (e.g. introduction, consequence) and describe details in the field beside it. Please note that risk factors can also be

RISK FACTORS	ASSOCIATED RISK OF	DESCRIBE DETAILS
A. POPULATION LEVEL RISK FACTORS		
Geographical factors:		
poultry density and wild bird density	Introduction	geographical areas where high density of poultry and wild birds coexist
proximity to water bodies	Introduction	Poultry holdings close to water bodies increase risk of transmission from wild birds to poultry
Temporal risks:		
seasonality	Introduction	Oct-Feb, main migration time for HRS wild birds
B. HERD LEVEL RISK FACTORS		
proximity to water bodies or areas with high wild bird densities	Introduction	Poultry holdings close to water bodies increase risk of transmission from wild birds to poultry
production type and Farms with high numbers of movements	Introduction	Outdoor production can increase frequency of contact with infected wild birds, whilst premises with high number of movements can increase probability of transmission between infected premises
poultry spp.	Detection	Different poultry species have differing clinical reactions to infection which can affect probability of detection
C. ANIMAL LEVEL RISK FACTORS		

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Component design

3 Target population Each surveillance component is targeted at a particular susceptible population, for which conclusions will be made. In this step, you will be guided through the process of definition this population.	names of the components are imported from Section 2				more / less	
	Component 1	Component 2	Component 3	Component 4	Component 5	Componen
	Poultry Passive Surveillance chickens	Poultry Passive Surveillance turkeys	Poultry Passive Surveillance ducks	Poultry Passive Surveillance geese	Poultry Passive Surveillance game birds	Poultry Passive Su other captive p
3.4 Geographical area covered What is the geographical area covered by this specific activity, in relation to the total area the surveillance system covers (defined in the Surveillance Scenario). You can state "entire region" or specify specific areas covered. List here the entire area covered by the activity. Any differences in sample allocation due to varied risk in different regions will be addressed later in the framework.	GB	GB	GB	GB	GB	GB
3.5 Target criteria Were there any selection criteria used to choose this particular target population? (If the target population for this component is not the entire susceptible population defined for the surveillance system). If so, please describe the selection criteria. Criteria for selection could be for instance **logistic/convenience** (this component focuses on a particular sector of the population because they are easier to sample or more accessible); ***higher probability of infection*** ; ***higher probability of showing clinical signs*** ; ***feasibility of detection*** (the diagnostic tests available can only be used in animals above a certain age, or non-vaccinated animals); or higher severity of ***consequences*** in case of infection, which is the case for instance when surveillance is focused on breeder animals.	All domestic poultry are covered by legislation	All domestic poultry are covered by legislation	All domestic poultry are covered by legislation	All domestic poultry are covered by legislation	All domestic poultry are covered by legislation	All domestic pou covered by legi
3.6 Percentage covered Are there any estimations of the percentage of the total susceptible population (defined in the surveillance scenario) covered by the target population defined for this specific component? (For example percentage of the cattle population that is dairy for a component focused on dairy cows). You may need to consult national registries or national experts.	95%(commercial)? Dependent on sector - very good in >50 (commercial holdings), low in backyard. 2009-2011 all specialist poultry vet practices made a submission, 88% poultry vet practices.	95%(commercial)? Dependent on sector - very good in >50 (commercial holdings), low in backyard. 2009-2011 all specialist poultry vet practices made a submission, 88% poultry vet practices.	95%(commercial)? Dependent on sector - very good in >50 (commercial holdings), low in backyard. 2009-2011 all specialist poultry vet practices made a submission, 88% poultry vet practices.	95%(commercial)? Dependent on sector - very good in >50 (commercial holdings), low in backyard. 2009-2011 all specialist poultry vet practices made a submission, 88% poultry vet practices.	low	low

RISKSUR

4 Suspicion of disease

In this section you will be asked to think about how a suspected case of the hazard of interest is defined and reported to the relevant authorities. This is relevant to ***passive surveillance*** components where the collection of surveillance data is observer -initiated.
If you are designing an active surveillance component please skip to section 5 below where you will be able to define testing protocol, study design and sampling strategy.

names of the components are imported from Section 2

	Component 1	Component 2	Component 3
	Poultry Passive Surveillance – chickens	Poultry Passive Su	
4.1 Definition For the hazard of interest please outline the definition or criteria used to identify a suspect case (for instance which clinical signs). It may be useful to consider: Likelihood of recovery; description of possible clinical states (Subclinical, Subacute, Acute, Chronic, Mortality)	Clinical disease including mortality, respiratory symptoms and production indicators. Unlikely to be subclinical disease but concurrent disease can complicate presentation	Clinical disease in respiratory sympto indicators. Unlikel disease but concu complicate p	
4.2 Obligations Are there currently any legal requirements in place in the region of interest requiring the reporting of a suspect case of this hazard? Please summarise or list the laws or regulations and describe any other obligations to report (may be associated with quality assurance schemes,	2005/94/EC (general requirement for surveillance). 2010/367/EU (implementation of surveillance – Annex 1).	2005/94/EC (gene survei 2010/367/EU (im surveillanc	
4.3 Notification procedures What procedures will be put in place for reporting a suspect case? Please outline the steps that will be involved and the methods employed, including how the notification is sent to the authorities eg. Phone, email,	Anyone in possession of any bird or bird carcase (excluding a wild bird or wild bird carcase) which they suspect may be infected with NAD must	Anyone in posses bird carcase (excl wild bird carcase) may be infecte	
4.4 Actions upon suspicions What will be the procedure following the reporting of a suspect case to the authorities? For example at what stage would/could restrictions be applied to premises or follow up investigations carried out?	Upon arrival at the premises, the visiting VO will examine the birds and other records as necessary (e.g. production records) and discuss the	Upon arrival at t visiting VO will exa other records as production record	
4.5 Actions upon confirmation of disease What will be the procedures following the confirmation of notifiable disease? At what stage would/could restrictions be applied to premises? Note that the procedures and tests used to confirm a case are outlined in section 6.4 below.	NAD is confirmed by the relevant CVO upon laboratory confirmation of the presence of NAD virus. It is important to note that, at this stage, further laboratory tests may still be ongoing (e.g. AI virus of the subtype H5 or H7	NAD is confirmed b upon laboratory c presence of NAD vi note that, at thi laboratory tests m (e.g. AI virus of the	

www.defra.gov.uk

Notifiable Avian Disease Control Strategy for Great Britain

January 2012
Revised July 2012

Llywodraeth Cymru
Welsh Government

The Scottish Government

defra
Department for Environment Food and Rural Affairs

RISKSUR

6 Testing protocol (if passive - for confirmation)

Consider how units will be tested to obtain information about the hazard. The particular details of a testing protocol only need to be defined later, but design of the surveillance will depend on identifying (in conjunction with those responsible for laboratory analysis, when that's the case) what methods will be chosen for testing the population.

names of the components are

	Component 1	Com
	Passive Surveillance -	Passive
6.1 Type of disease indicator/ test		
Informed in section 2 as pasted here. Use the field "other or details" to add more information if needed. Visite section 2 if you want to edit the type of disease indicator.	pathogen detection	pa de
	Other or details:	Other
6.2 Type of sample to be collected		
Informed in section 2 as pasted here. Use the field "other or details" to add more information if needed. Visite section 2 if you want to edit the type of sample to be collected.	Biological samples (swabs,	Bio sampl
	Other or details:	Other
6 Pooling		
Are samples going to be pooled for testing? Is pooling going to be performed in the field or in the laboratory? Describe any details in the free text field.	Generally no, but in some cases. 5 swabs/pool	Genera some sw
6.4 Screening/first test		
If only one test will be employed, use the box to define this test, as agreed with the laboratory. You can also add any details needed regarding for instance thresholds for considering an animal as positive. If multiple tests will be used, use this field to characterize the first or screening test.	RT-PCR	R
6.5 Confirmatory/ second test		
This is the confirmatory test in cases where screening is used, or the second test of a design using parallel tests. List the test to be used, as agreed with the laboratory, and any other important details you may want to save.	Virus Isolation	Virus
6.6 Any other testing protocol details		
Consider the testing protocol delineated above. If any further details are needed to make sure the entire process is documented, please provide in this free-text box.	Serology where mortality not 100%	Serol mortali

II

(Acts whose publication is not obligatory)

COMMISSION

COMMISSION DECISION

of 4 August 2006

approving a Diagnostic Manual for avian influenza as provided for in Council Directive 2005/94/EC

(notified under document number C(2006) 3477)

(Text with EEA relevance)

(2006/437/EC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to Council Directive 2005/94/EC of 20 December 2005 on Community measures for the control of avian influenza and repealing Directive 92/40/EEC (1), and in particular the second subparagraph of Article 50(1) thereof,

Whereas:

(1) Directive 2005/94/EC provides for certain preventive measures relating to the surveillance and early detection of avian influenza and also minimum control measures to be applied in the event of an outbreak of that disease in poultry and other captive birds.

(2) It is necessary to lay down at Community level diagnostic procedures, sampling methods and criteria for the evaluation of the results of laboratory tests for the confirmation of an outbreak of avian influenza.

(3) Annex VII to Directive 2005/94/EC lays down the functions and duties of the Community reference laboratory for avian influenza in order to coordinate, in consultation with the Commission, the methods employed in the Member States for diagnosing that disease. Those functions and duties include the organisation of periodic comparative tests and the supplying of standard reagents at Community level.

(4) Laboratory tests have recently been developed to ensure a quick diagnosis of avian influenza.

(5) The experience gained in the control of avian influenza in recent years has resulted in the identification of the most suitable sampling procedures and criteria for evaluation of the results of the laboratory tests for a proper diagnosis of this disease in different situations.

(6) The measures provided for in this Decision are in accordance with the opinion of the Standing Committee on the Food Chain and Animal Health,

HAS ADOPTED THIS DECISION:

Article 1

The diagnostic manual, as provided for in Directive 2005/94/EC and set out in the Annex to this Decision, is approved.

Article 2

Member States shall apply the diagnostic manual from the date they transpose Directive 2005/94/EC or from 1 July 2007, whichever date is the earlier.

(1) OJ L 10, 14.1.2006, p. 16.

RISKSUR

7 Study design

7.1-7.6 are likely NOT relevant for passive surveillance components. But please do refer to 7.7 and 7.8

names of the components are imported from Section 2

more

less

Component 1	Component 2	Component 3	Component 4	Component 5
Poultry Passive Surveillance	ssive Surveillance	assive Surveillance	assive Surveillance	ive Surveillance - ga

1.Surveillance Scenario
2. Surveill. activities overview
3. Target population
4. Disease suspicion
5. Enhancements
6. Testing protocol

Carefully consider how the
BDo you intend to perform
population) or is the popul
selective sampling strateg
may still want to consider
the number of units in the
data collection. Moreover, i
animals clustered in fari
performed (census of herds
sampling within

7.1 Point of sample col

Informed in section 2 as pa
add more information if ne
point

7.2 Selection of units

Sampling will be detailed i
units should consider caref
it is not possible to identi
where animal

7.3 Target unit

Select your target unit

8 Sampling strategy

If sampling is to be carried out, this section provides a list of information you will need to collect and decisions that you need to make in order to calculate the number of samples that should be collected.

names of the components are imported from Section 2

FIT TO SCREEN

more

less

Component 1	Component 2	Component 3	Component 4	Component 5
Poultry Passive Surveillance	ssive Surveillance	assive Surveillance	assive Surveillance	ive Surveillance - gar

design
Point of sample collection
Selection of units
Target unit
Sampling unit
Sampling design
Units in target populat

F) Specificity

This information is neede
some cases, the sample siz
based on a specific budget
this section empty and in s
use the linked tools to exp
and carry out

8.2 Sampling at the secondar

If one-stage sampling process i
unit to consider

A) Number of SSUs in the popu
B) Design prevalence
C) Desired confidence
D) Desired power
E) Sensitivity
F) Specificity

8.3 Selection criteria WITHIN

Within the target population, ar
selection of animal/units to targ
which is discussed further belo
refers to the selection of indiv
population, as opposed to criteri
populati

8 Sampling strategy

more

less

8.4 Risk-based allocation

When defining the risk scenario, you may have identified risk characteristics which lead to the characterization of different population strata, based on disease risk. If risk-based sampling can be applied to these strata, use this step to define the strata and collect information needed for sample size calculation and allocation.

The risk characteristics you have informed are pasted below:

Population level: Geograph. (1)	Introduction	Poultry Density and Wild Bird Density
Population level: Geograph. (2)	Introduction	Proximity to waterbodies
Population level: Geograph. (3)	fection, Detection, Consequen	No risk declared
Population level: Temporal (1)	Introduction	Seasonality
Population level: Temporal (2)	0	No risk declared
Population level: Temporal (3)	0	No risk declared
Herd level (1)	Introduction	Proximity to waterbodies or areas with high wild bird densities
Herd level (2)	Introduction	Production type and Farms with high numbers of movements
Herd level (3)	Detection	Poultry Species
Animal level (1)	0	No risk declared
Animal level (2)	0	No risk declared
Animal level (3)	0	No risk declared

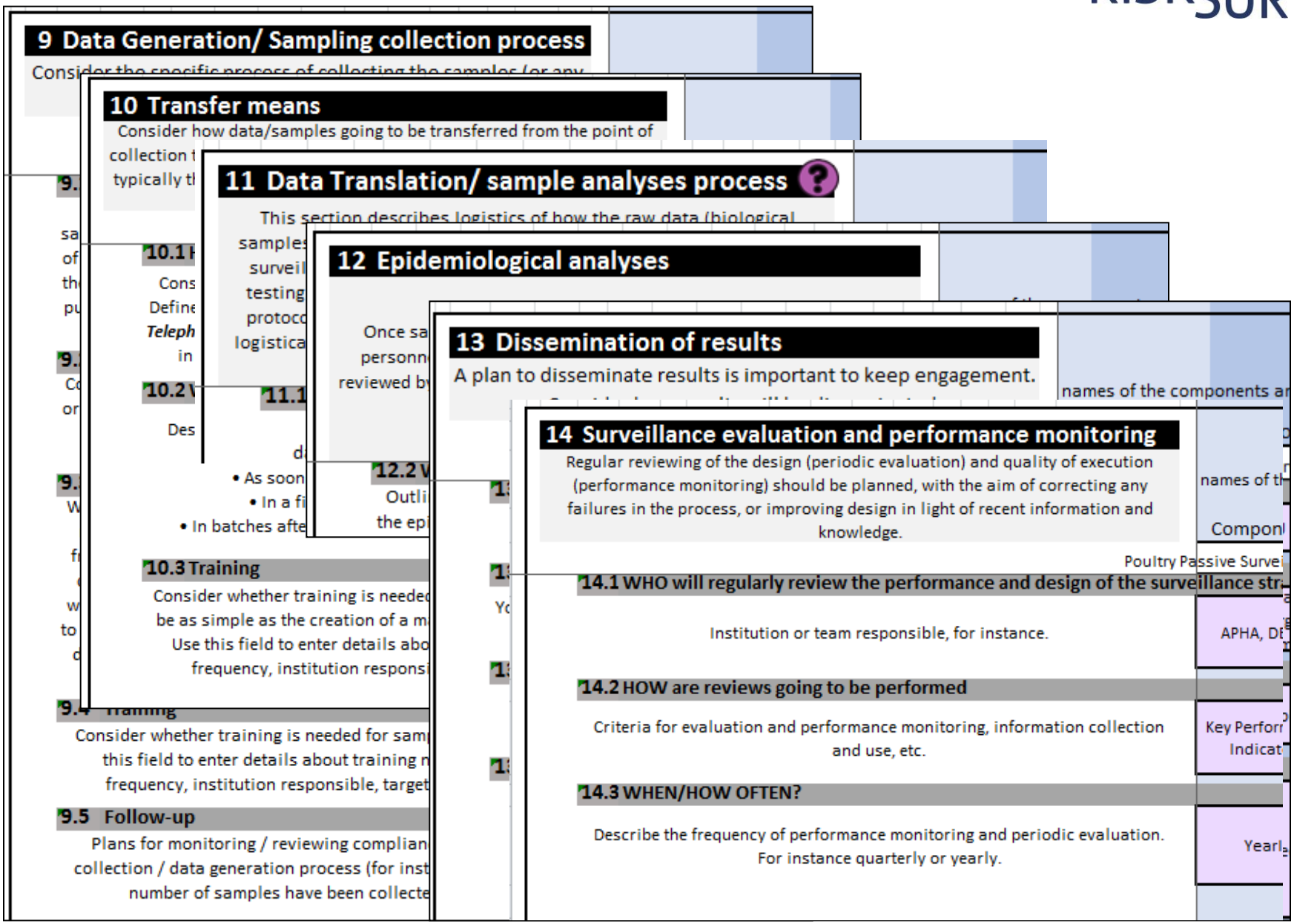
Visit the WIKI for more information on risk-based sample allocation

RISK ASSESSMENT TOOLS

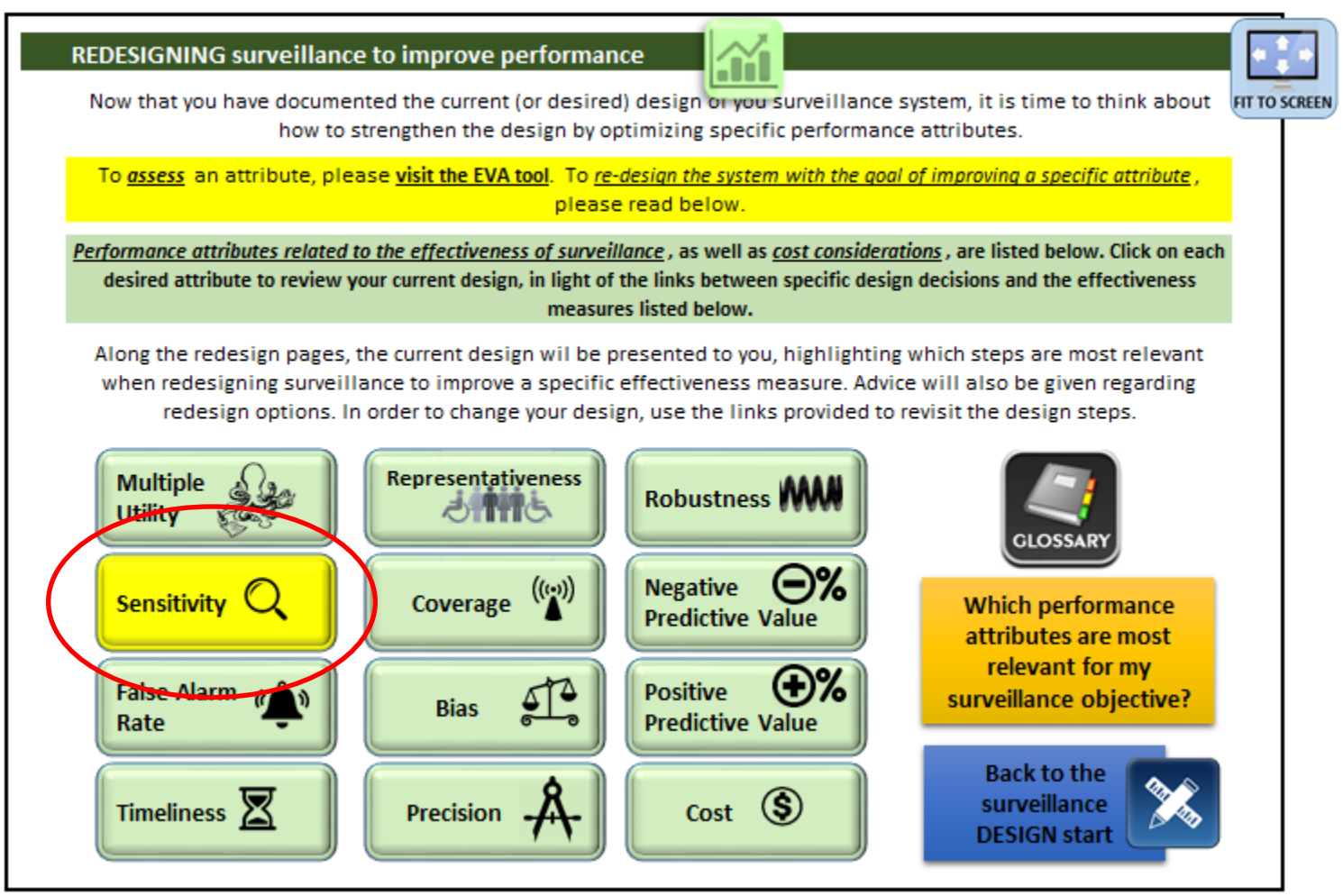
Component 1	Component 2	Component 3	Component 4	Component 5
Poultry Passive Surveillance	ssive Surveillance	assive Surveillance	assive Surveillance	ive Surveillance - gar

RISK STRATUM 1

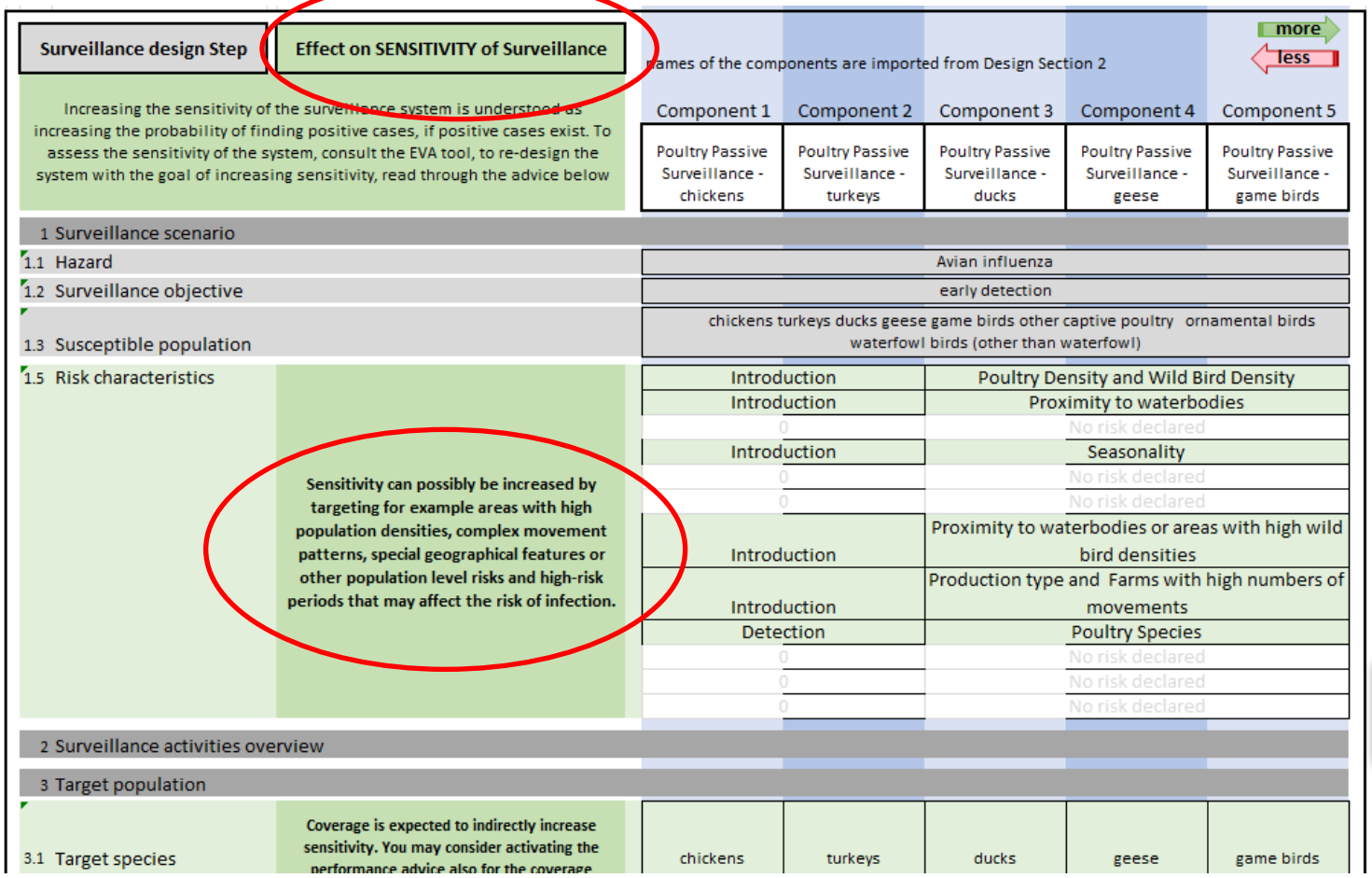
RISKSUR


9 Data Generation/ Sampling collection process
10 Transfer means
Consider how data/samples going to be transferred from the point of
11 Data Translation/ sample analyses process
This section describes logistics of how the raw data (biological
12 Epidemiological analyses
Once sa
13 Dissemination of results
A plan to disseminate results is important to keep engagement.
14 Surveillance evaluation and performance monitoring
Regular reviewing of the design (periodic evaluation) and quality of execution (performance monitoring) should be planned, with the aim of correcting any failures in the process, or improving design in light of recent information and knowledge.
14.1 WHO will regularly review the performance and design of the surveillance str
Institution or team responsible, for instance.
APHA, DE
14.2 HOW are reviews going to be performed
Criteria for evaluation and performance monitoring, information collection and use, etc.
Key Perfor
Indicat
14.3 WHEN/HOW OFTEN?
Describe the frequency of performance monitoring and periodic evaluation. For instance quarterly or yearly.
Yearl
names of the components ar
Poultry Passive Surve
10.3 Training
Consider whether training is needed
be as simple as the creation of a m
Use this field to enter details abo
frequency, institution responsi
9.4 Training
Consider whether training is needed for sam
this field to enter details about training n
frequency, institution responsible, target
9.5 Follow-up
Plans for monitoring / reviewing complian
collection / data generation process (for inst
number of samples have been collecte

Re-design


REDESIGNING surveillance to improve performance
FIT TO SCREEN
Now that you have documented the current (or desired) design of you surveillance system, it is time to think about how to strengthen the design by optimizing specific performance attributes.
To assess an attribute, please visit the EVA tool. To re-design the system with the goal of improving a specific attribute, please read below.
Performance attributes related to the effectiveness of surveillance, as well as cost considerations, are listed below. Click on each desired attribute to review your current design, in light of the links between specific design decisions and the effectiveness measures listed below.
Along the redesign pages, the current design wil be presented to you, highlighting which steps are most relevant when redesigning surveillance to improve a specific effectiveness measure. Advice will also be given regarding redesign options. In order to change your design, use the links provided to revisit the design steps.
Multiple Utility
Representativeness
Robustness
Sensitivity
Coverage
Negative Predictive Value
False Alarm Rate
Bias
Positive Predictive Value
Timeliness
Precision
Cost
GLOSSARY
Which performance attributes are most relevant for my surveillance objective?
Back to the surveillance DESIGN start

RISKSUR



Surveillance design Step	Effect on SENSITIVITY of Surveillance	names of the components are imported from Design Section 2 (more / less)				
	Increasing the sensitivity of the surveillance system is understood as increasing the probability of finding positive cases, if positive cases exist. To assess the sensitivity of the system, consult the EVA tool, to re-design the system with the goal of increasing sensitivity, read through the advice below	Component 1	Component 2	Component 3	Component 4	Component 5
		Poultry Passive Surveillance - chickens	Poultry Passive Surveillance - turkeys	Poultry Passive Surveillance - ducks	Poultry Passive Surveillance - geese	Poultry Passive Surveillance - game birds
1 Surveillance scenario						
1.1 Hazard		Avian influenza				
1.2 Surveillance objective		early detection				
1.3 Susceptible population		chickens turkeys ducks geese game birds other captive poultry ornamental birds waterfowl birds (other than waterfowl)				
1.5 Risk characteristics	Sensitivity can possibly be increased by targeting for example areas with high population densities, complex movement patterns, special geographical features or other population level risks and high-risk periods that may affect the risk of infection.	Introduction	Poultry Density and Wild Bird Density			
		Introduction	Proximity to waterbodies			
		0	No risk declared			
		Introduction	Seasonality			
		0	No risk declared			
		0	No risk declared			
		Introduction	Proximity to waterbodies or areas with high wild bird densities			
		Introduction	Production type and Farms with high numbers of movements			
		Detection	Poultry Species			
		0	No risk declared			
		0	No risk declared			
		0	No risk declared			
2 Surveillance activities overview						
3 Target population						
3.1 Target species	Coverage is expected to indirectly increase sensitivity. You may consider activating the performance advice also for the coverage	chickens	turkeys	ducks	geese	game birds

Use the menu below to navigate back to the Surveillance Design

BACK to the Surveillance REDESIGN menu

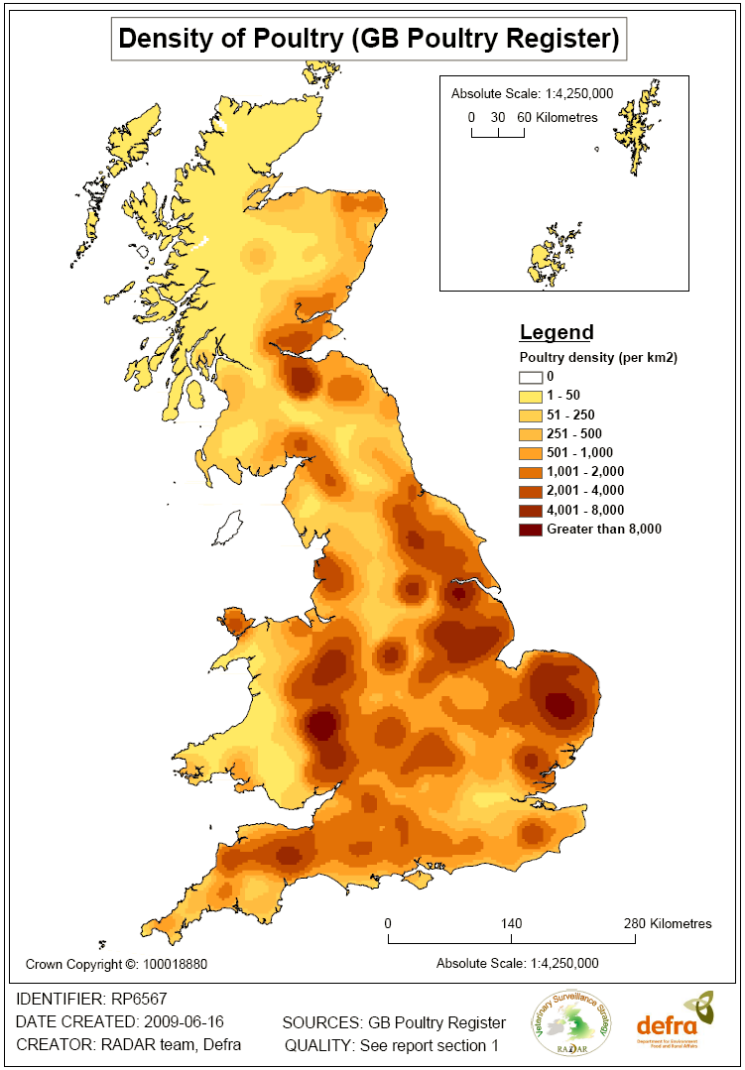
W GLOSSARY

Steps highlighted by PA advice

- Many areas where Se is affected by choices made
- Some not relevant to passive surveillance
- Not all re-design options were practical or realistic (for the purposes of the case study) e.g. Testing protocol
- Some steps highlighted for further investigation:
  - Risk targeting
  - Coverage of populations
  - Definition of a suspect
  - Actions upon suspicion
  - Enhancements

Coverage/engagement

- Some sectors well covered by passive surveillance
  - Commercial, company holdings
  - High proportion of poultry vets submit to APHA
- Others poorly engaged
  - Non-commercial sectors and game bird sectors
- Testable with the model
- Carry out further analysis of submissions



Disease suspicion

- Reporting is dependent on farmer recognising clinical or other signs and calling the vet
- HPAI in galliformes likely to be detected
- Situation of LP in galliformes and detection of HP in anseriformes (farmed ducks and geese) is less clear
- Can introducing monitoring of production factors (egg production, feed/water intake, weight gain) increase likelihood of detection?
- Testable using modelling approach

Next steps

- Further document the UK/GB AI surveillance system
- Document other surveillance systems for a variety of hazards
  - Passive, Active, Sentinel, Vector-borne, etc
- Apply full case study and associated tools including the simulation model to evaluate the epidemiological impact of redesigning the components

Thank you!

Contact

Lucy Snow

Animal and Plant Health Agency, UK

T +44 (0)1932 341111
lucy.snow@apha.gsi.gov.uk

www.fp7-RISKSUR.eu

Animal & Plant Health Agency

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