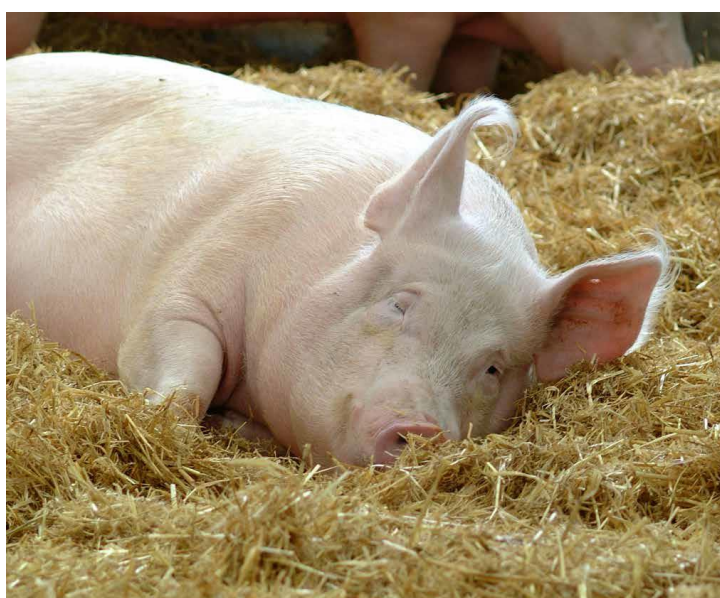# Report of Roundtable on Syndromic Surveillance in Pigs

15th September 2016, London

This Pig Health and Welfare Council Disease Surveillance Subgroup Roundtable on Syndromic Surveillance was jointly funded by the Animal and Plant Health Agency and AHDB Pork. The primary objective was to explore the concept of syndromic surveillance and how to obtain disease data from pig farms to assess disease trends and contribute to the prompt detection of possible new and emerging threats in a sustainable and cost-effective manner.

CONTENTS

REPORT OF SYNDROMIC SURVEILLANCE IN PIGS ROUNDTABLE

EXECUTIVE SUMMARY

- A PHWC Syndromic Surveillance (SS) Roundtable was held in September jointly organised by APHA and AHDB Pork. Forty two delegates attended the event incorporating pig practitioners, epidemiologists, academics, vets from diagnostic laboratories, a few producers and industry and Defra/APHA representatives.

- Presentations provided background on what SS means and its ideal elements, working examples of SS in pigs and companion animals, a previous SS pilot study sponsored by BPEX and how SS data might be reported.

- Discussion groups then considered questions on the best source(s) of SS data, how provision of data can be encouraged to ensure good coverage, identifying the needs of different stakeholders from SS data, what level of detail is needed in data from disease incidents, and how SS data should be managed and funded.

- A combination of sources was favoured for provision of SS data with veterinarians, followed by pig keepers, being the most favoured as one of the top three individual sources by delegates. The good coverage and timeliness of data from these two sources were identified, with the good quality of disease and syndrome recognition, and added value from veterinarians viewed positively. The absence of a unified or even predominant clinical recording system in veterinary practices in the pig sector was noted but could present an opportunity for the pig veterinary community to build their own through a whole industry approach, if funding were available.

- In exploring reasons and incentives for SS data sources to participate, for all sources, access to pig disease and surveillance data was highly rated. Professional aspects were also important to veterinarians, and included improving client service, professional interest, and collective learning. For producers, economic reasons and incentives featured significantly with business advantage, benchmarking, using information to improve productivity and thereby provide financial benefit all mentioned. Interestingly, providing evidence for responsible antimicrobial use was mentioned for both pig keepers and veterinarians. Responses for veterinary practices as sources of data were largely considered to overlap with those for veterinarians. Laboratories were considered to have a mix of professional and economic reasons to provide data in addition to pig disease and surveillance. A surveillance reason identified by several groups for laboratories specifically was the advantage of identifying issues/problems to, for example, target further investigations, justify test development and identify and facilitate relevant research.

- Early warnings or early alerts were identified as a priority need from SS for many stakeholders emphasising the importance given to timeliness in the collection and reporting of SS data. The group responses revealed multiple and diverse needs of different stakeholders. Ultimately any SS system will be most significantly influenced by those providing the data and those funding it. The needs of others are informative as they could yield potential alternative funding streams and further justification for establishing SS recording. The interests of different audiences also raised the issue of how accessible SS data should be to different stakeholders. The potential for inadvertent adverse consequences needs to be borne in mind in order to avoid undue concern in response to SS findings amongst, for example, trade partners or the public.

- Priority data to be collected from clinical disease incidents were discussed. A balance is needed between recording key information to provide useful timely SS data, and requesting too much thus adding to time and cost, and dissuading reporting leading to reduced coverage. The experiences of users of SS systems in the Netherlands and Canada can be drawn on to inform decisions here.

- Shortage of time limited full discussion on handling SS data. Possible SS data collection methods were listed and ranked. If the veterinarian or pig keeper is the provider of SS data, a mobile app-hand held device was favoured with data input by the veterinarian according to a standard format being preferred. Several suggestions were made as to who is best placed to collate and analyse data, with a variety of methods listed to report data back. In one group, a preference was expressed for quarterly digests with text alerts when action/awareness needed. The limitations identified to data reporting were confidentiality (personal and commercial), time and cost, and the need for a critical mass of data for SS data to be meaningful. These items all merit more substantial discussion.

- Voting exercises showed that at the end of the day:
  - all attendees understood what syndromic surveillance means
  - 89% considered that syndromic surveillance would be of value to UK pigs
  - 76% thought that data needed to be obtained from a combination of sources
  - 85% thought that the pig industry would the main beneficiary of systematic syndromic surveillance

- The summing up presentation thanked all attendees, facilitators, speakers and organisers for their input and proposed several next steps to progress SS development in pigs. These include developing a prioritised action plan, assessment of SS methodology already available, and development of proposal(s) for funded pilot trials likely to be based on SS data capture by veterinarians, and possible laboratory data collection, similar to SAVSNET. There was support for APHA to continue development of pig diagnosis dashboards with a view to launching in 2017.

BACKGROUND

1. One of the milestones of the Pig Health and Welfare Council surveillance subgroup for 2016 was to review options for, and if appropriate, develop a sustainable methodology for syndromic surveillance of GB pig disease. This Roundtable was one of the initiatives undertaken towards this milestone. The Pig Health and Welfare Council Syndromic Surveillance (SS) Roundtable was held in London on September 15th 2016 jointly organised by APHA and AHDB Pork. A small but engaged number of pig practitioners attended together with epidemiologists, academics, vets from diagnostic laboratories, a few producers and industry and Defra/APHA representatives. The essential idea of SS is to capture clinical disease information from more premises than the current VIDA data from diagnostic submissions to APHA (England and Wales) and SAC (Scotland), thus increasing sensitivity of surveillance as data is collected from more pig premises. It is generally accepted that while extending the capture of data to increase coverage, there is reduced accuracy (specificity) in identification of clinical syndrome and diagnosis.

2. Presentations in the morning provided background on what SS means, its ideal elements, working examples of SS and how SS data might be reported. The afternoon was for discussion in working groups. The discussion groups considered questions on the best source(s) of SS data, how provision of data can be encouraged to ensure good coverage, the needs of different stakeholders from SS data, what level of detail is needed in data from disease

incidents, how SS data should be collected, and how it should be collated, analysed, reported and funded. The opinions and ideas of delegates were captured and have been distilled in this report together with proposals for pilot work to progress capture of syndromic surveillance data from pigs. The meeting agenda is provided in appendix 1.

PRESENTATIONS
The link provided here gives access to pdf versions of the presentations given and the speaker biographies are given in appendix 2: http://pork.ahdb.org.uk/health-welfare/pig-health-welfare-council/phwc-disease-surveillance-sub-group/

Introduction *Jim Scudamore, Chair Pig health and Welfare Council*
This introduction defined the primary objectives of surveillance of which syndromic surveillance is one component. These were identified as monitoring the health of the pig herd to detect and characterise changes in health, determining causes of changes and then communicating information to those who need to take action including government, farmers and veterinarians. He reminded delegates that the meeting also addressed one of the challenges identified in the PHWC 20:20 vision which was to establish robust mechanisms for routine monitoring of the prevalence of key endemic diseases and baseline national health status, including engagement with smallholders and non-commercial pig keepers.

Syndromic Surveillance – what is it, what do we have in place, what more do we want and what are the main challenges? *Susanna Williamson, Veterinary Lead Pig Scanning Surveillance APHA*
This presentation defined syndromic surveillance as "the **real-time** (or near real-time) 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**" (Triple-S project). Syndromic surveillance is currently captured from diagnostic submission data to APHA and SAC from GB pigs and is entered into the GB diagnostic database (VIDA). However, this data represents the top of the surveillance "pyramid" (Figure 1) and there is no systematic collection of clinical data from disease events from which submissions are not made.

Figure 1: The surveillance pyramid
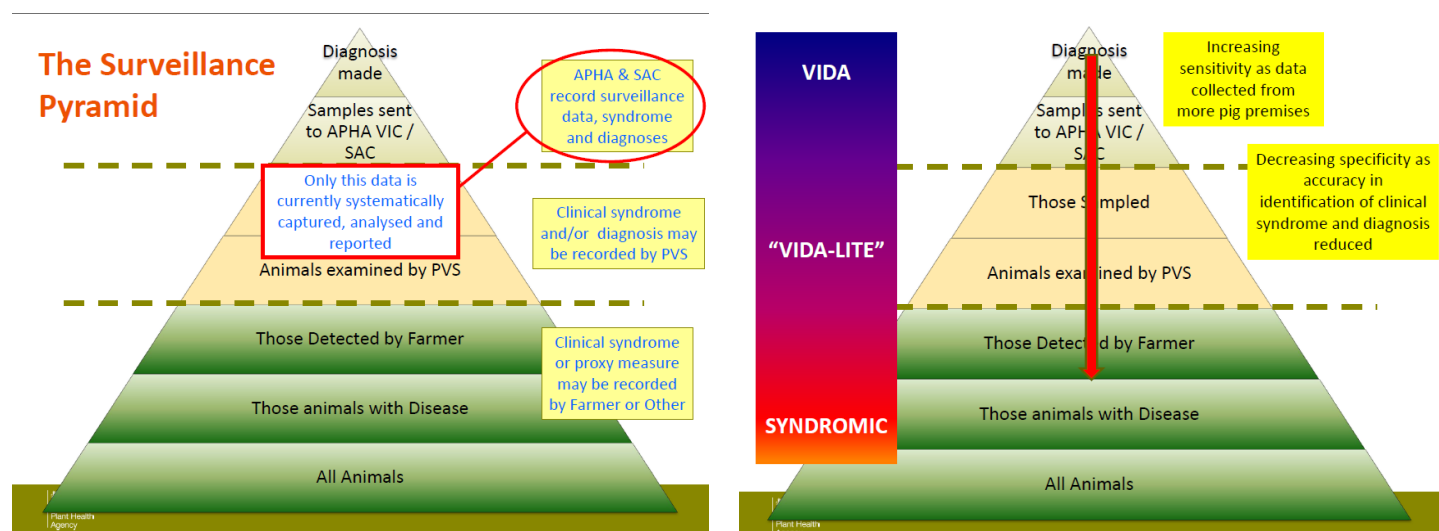
Syndromic surveillance data could be distilled from available data sources such as abattoir lesions, antimicrobial use, fallen stock, although each has its own biases and issues.

Alternatively, a more direct, and likely more accurate methodology could be established to capture clinical data from disease incidents. The ideal features, pros and cons, benefits of, and main challenges to, collection of syndromic surveillance data were described and identified as areas for later discussion. Motivated engaged data providers and motivated engaged funders (audiences/users) were both considered essential for successful clinical syndromic surveillance.

Syndromic surveillance – examples of methodologies
Each of the three speakers was asked to include the limitations or mitigating features of the system being described for the following challenges some of which are inter-related:confidentiality, standardisation, time required, coverage, cost, real-time reporting in/out.

Syndromic surveillance for pigs in the Netherlands *Theo Geudeuke, Deventer, Netherlands*
An on-line monitoring tool was described for use on the 6,000 pig farms in the country. This was developed to add to other forms of surveillance from the diagnostic laboratory, abattoir, rendering plant and telephone consultancy. Clinical syndromes are recorded via laptop or tablet during or immediately after the monthly farm visits required to pig farms. Data is anonymised but allows the region to be identified. Since January 2016, it has been compulsory for assured pig farms with Integrated Quality Control Systems and accredited veterinarians to enter syndromic surveillance data onto the on-line monitoring tool. The data recorded includes age group, clinical syndrome, clinical signs, most likely diagnosis if available and whether laboratory tests were used. After six months, 50% coverage of sow farms was achieved and slightly lower in finisher farms with 40% of farm visits resulting in a clinical incident being recorded. There is currently monthly feedback by region with trend analysis and real-time reporting planned for the future. The benefits, limitations and challenges were outlined. Importantly, the recording takes just a few minutes and the tool is considered to have great potential although the system needs to be refined based on feedback and maintaining motivation is vital and presents a major challenge.

Syndromic Surveillance by Private Veterinary Surgeons – feasibility trial *Carla Gomes, SRUC, Inverness*
A BPEX-funded pilot trial involving eight pig practitioners was described which required the participating vets to record details from all disease incidents they considered of note occurring over a six-week period on farms they attend. Standardised baseline data about each pig farm on which a disease incident was recorded was also requested. The trial primarily evaluated the feasibility (including practicality) of data gathering and submission. The average time to record data was around 20 minutes for disease incidents and 30 minutes for baseline data. This was seen as a significant limitation due to the time and cost implications if this was requested wider. A customised Excel database was used for unit baseline data and an on-line web server
for disease incident reports. Confidentiality, standardising data, engagement of vets, timeliness of reporting were highlighted as issues arising which have to be addressed in any future methodology.

Mining data from veterinary records *Phil Jones, SAVSNET, University of Liverpool*
This presentation described a national system known as SAVSNET operating to provide real-time veterinary surveillance in companion animals. Data is obtained from two main sources; real-time electronic health record data from veterinary practices and commercial laboratory diagnostic data. The data from practices takes vets just a few seconds to complete at the end of consultations and also harvests associated data already generated within the practice. 223 vet practices contribute >5,500 consultations each weekday. The laboratory data is accepted data in whatever format is most convenient for the laboratory and eight laboratories currently contribute. Laboratory data provided includes species, breed, postcode of veterinary practice,

sample type, assay type and method, result and interpretation. From both sources of data, summaries and benchmarking in context are available for providers and these reports are what sustains data contribution from veterinary practices and laboratories as there is no payment for data provided but the benchmarking and summary services are provided free of charge by SAVSNET. Other outputs include quarterly surveillance reports in the veterinary literature, "research-ready" data available to researchers through an application process and online access to data summaries for the general public. The majority of the initial funding to set this up was from large grants with additional funding from commercial/academic researchers. There is a dedicated core team of 3.5 FTE and input from academic staff. Whilst applying the same principles and adapting the approach to collection of farm data presents some unique challenges, they were not considered insurmountable and the talk also addressed how the issues of confidentiality, standardisation, time required, coverage, cost and real-time reporting in/out had been addressed for companion animal surveillance.

Provision of data: How is syndromic surveillance data best reported to users? *Sara Robertson – Principal Data Analyst, Surveillance Intelligence Unit, APHA*
Using data from diagnostic submissions, this presentation provided ideas on how syndromic surveillance data could be visualised, and how the data might be shared externally. Interactive dashboards were demonstrated using GB VIDA data providing a potential interface showing analyses which could be available for practitioners. This could be a model to which syndromic data could be added later. In the dashboard, it was shown how the user can select from picklists to see the most common diagnoses, trends in clinical signs, diagnoses by syndrome, regional variations and can interrogate by region, age and year. Other options such as correlation of syndrome and clinical sign, frequency and range of clinical signs with particular diagnoses could be examined, for example to investigate changing presentations over time; the data showed how porcine circovirus associated disease emerged as a disease manifesting mainly as wasting in postweaned pigs, but is now more variable in clinical presentation and age affected. The talk also gave a vision for how data in the APHA databases could be combined with veterinary/industry data to create a more complete picture for surveillance, potentially available in the cloud.

SUMMARY OF RESPONSES TO VOTING QUESTIONS

Forty two delegates attended the event from a variety of professional backgrounds and were asked to classify their backgrounds, those responding were classified as illustrated in Figure 2.

Figure 2: professional backgrounds of respondents amongst delegates
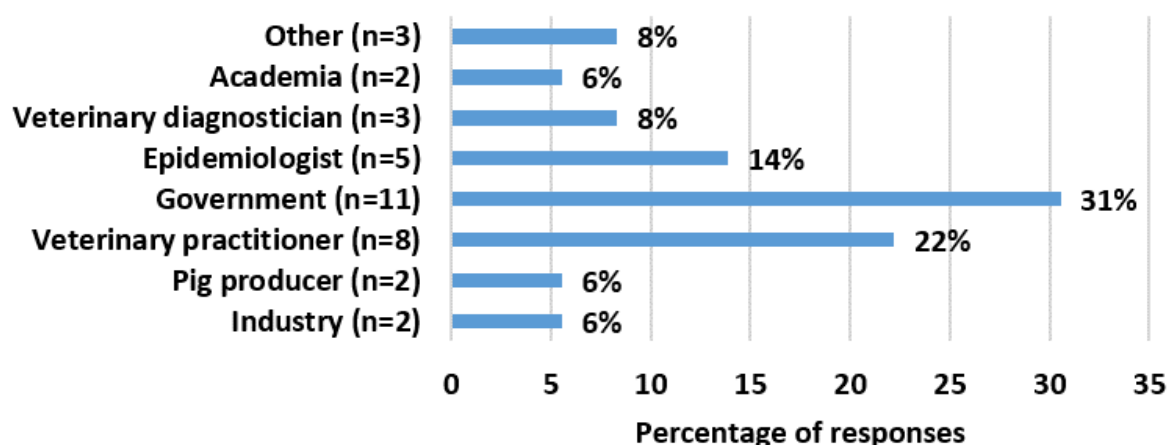
Those attending were asked to vote anonymously on a set of questions at the start of the morning session and on the same set of questions at the end of the discussion session in the afternoon. The questions were to gauge top level thoughts on Syndromic Surveillance and whether these changed at all over the course of the day. The responses are detailed in appendix 3 – those from the morning and afternoon together to show any shifts. A breakdown of responses by role of the attendees is given in a table after each response. In summary, the voting exercises showed that at the end of the day:

- All attendees understood what syndromic surveillance means
- 89% considered that syndromic surveillance would be of value to UK pigs
- 76% thought that data needed to be obtained from a combination of sources
- 85% thought that the pig industry would the main beneficiary of systematic syndromic surveillance
- 77% thought that a combination of funding sources would be needed

DISCUSSION GROUPS OUTPUTS

The questions considered by, and responses of, the six discussion group each guided by a facilitator are detailed in Appendices 4 and 5. Appendix 5 contains the comprehensive compiled responses of the groups to each of the six areas of discussion. Given the diverse and extensive responses, anyone needing more in depth understanding of the discussion group outputs is advised to read this compilation of responses. The summaries provided below give top level information only.

1. Advantages and disadvantages of different providers of syndromic surveillance data

1.1 The groups were asked for the pros and cons of the potential providers (sources) of syndromic surveillance data. Responses are summarised in Table 1 and have been categorised under the italicised criteria to provide some comparison. Groups then ranked which source of data they thought would be best as shown in Figure 2.

1.2 A combination of providers was most favoured. Of individual providers, the vet was ranked the next most popular, followed by the pig keeper in the top 3 providers by groups/delegates. The criteria favoured for these, and other providers, are given qualitative scores by provider to attempt to grade the responses for each in Table 2 below.

1.3 The good coverage and timeliness of data from veterinarians and pig keepers compared to laboratory data was identified. The quality of disease and syndrome recognition, and added value of veterinary expertise, at least for pig practitioners, was also viewed positively. However, the time/cost limitations involved of veterinary providers were highlighted by several groups. The absence of a unified or even predominant clinical recording system in veterinary practices in the pig sector was recorded as a weakness. A feedback comment received suggested that in fact this could be seen as an opportunity for the pig veterinary community to build their own through a whole industry approach, if funding were available.

Table 1: Pros and cons of potential providers of syndromic surveillance data

Data provider	Pros	Cons
Pig Keeper	*Timeliness* Instant, Direct from Source, Timely First observation of disease, Immediacy of data *Coverage (sensitivity)* All knowing, On farm all the time, Potentially	*Timeliness* Time in disease outbreak not directed to reporting *Coverage (sensitivity)*

Data provider	Pros	Cons
	most comprehensive, ↑ Volume of data Denominator data (V broad data), Pig keeper sees pigs daily, volume of information, Lots of animals and info, Quantity of info – breadth and denominator *Quality of data (specificity)* Good for simple things like deaths, coughing, diarrhoea; Recognise diseases – experienced, Variables in clinical signs, Knows own pigs, Exact location recorded, Quantitative, Large number of keepers & stock No & skill set & identifying disease, Ability of keeper to notice change *Data capture/availability* Some farms already recording, Data (some) already exists(production *Added value* Positive effect on AHW on farm	Seasonal limits to time to record, Keeping motivation *Quality of data(specificity)* Incomplete/inaccurate, Poor standardisation, Not so precise/ specific, Biased to perceptions, 'Lumpy', Limited interpretation(but good from syndrome perspective), No uniformity- is this feasible, Baseline setting – habituation (e.g ↑Coughing Normal), Risk of misinterpretation, Recording Quality, Syndrome recognition, Stockman observation (Variation, Training, Pig keeper may just see disease status quo, Producer tolerance of disease), Poor accuracy, Basic info, Limited to units, Background disease knowledge, Variable skill of stockmanship, May be small groups= lack of understanding, Influenced by media, Willing to accept a loss, Level of stockman expertise, Accuracy / impartiality of data, Tolerance of Disease, Setting baseline *Data capture/availability* May be difficult to collect, IT Competence/ Connectivity, Little data held electronically, Literacy (Language), IT Connectivity, Lack of electronic data
Vet	*Timeliness* Regular on farm at least 4x per annum Farmer likely to report disease problems in between Q. visits includes PMs *Coverage (sensitivity)* Active, Quantity, Likely to report disease problems between visits *Quality of data (specificity)* Great data if specialist pig vet, Accuracy and standardisation and supportive evidence, Good perspective, Quality, Specialist knowledge, Recognise the abnormal / normal, Big accumulation of knowledge, ↑ Accuracy of syndrome recognition, Filter/ objectivity (less broad), Knowledge to judge significant health changes, Additional knowledge from other sources eg abattoir, Professional skill, ↑accuracy of syndrome recognition *Data capture/availability* Already regular visits, Health plans – based on herd status	*Timeliness* Do they have time?, Will it be timely?, Need data when disease is active, Less real- time reporting, Time (Cost), Infrequency of contact, Vets usually only on farm quarterly *Coverage (sensitivity)* Miss a lot, May not hear, Depends on level of contact, May only hear about 'important' cases, Infrequency of contact, Lack of frequency of visits, Led by clients ?dates, Frequency of visits led by clients - Cost *Quality of data (specificity)* Not so sure if general practice, Non specialist vet poor source of data, Non specialist vets- poor data *Data capture/availability* Data capture system inconsistent (PMS), Duplication of data entry *Other issues* Disillusionment /repetitive effort (practice

Data provider	Pros	Cons
	Added value Local knowledge/ epi links, Bigger picture, Good knowledge of farm, Vets can compare between farms, Health plans built on health status of farm, Comparison between farms, additional knowledge, Broad picture	benefits though), Time poor, Expensive, Time and money issues, Cost, Cost- time
Vet Practice PMS = practice management system	*Timeliness* Daily *Coverage (sensitivity)* Covers practice rather than individual vet- removes practitioner bias in recording, Regional – wider area *Quality of data (specificity)* More standardised, May have diagnoses confirmed (own labs/??), Practice level- removes practitioner bias, May have confirmed diagnoses *Data capture/availability* Database of client information, Already data there, Electronic, Potential to be shared, Sharing of data regularly, Data is already there standardised, Admin staff could help *Added value* Shared knowledge, Engagement with PVS community *Other* Consolidated information, Admin staff can help	*Timeliness* *Coverage (sensitivity)* May exclude smallholdings, Small pig owners not captured, Some only have 1 main client, Small pig owners not captured *Quality of data (specificity)* *Data capture/availability* Different systems (IT), Client confidentiality, Few databases- word docs, Hard to extract, Risk confidentiality, Lack of commonality of PMS, Different PMSs, IT systems/ internet access Inaccessibility of data, Different systems,Client confidentiality *Other* Time (cost), Passive, Costly, Cost, Time
Laboratory	*Timeliness* *Coverage (sensitivity)* Type submission is important *Quality of data (specificity)* Could use vets to interpret lab data, High quality assurance/ speciality, Accurate data, Quality assured,High quality data and diagnostics, Objective, Detailed, Accuracy and non dx data, Quality controlled *Data capture/availability* Easier access to data, Historic data system in place for interrogation *Added value* Sample archives v. useful, Additional info	*Timeliness* Not so timely, May be slow (less real time), Not real time *Coverage (sensitivity)* Only disease that needs lab is included, Lower quantity, Not good for diseases already recognised on farm, Skewed samples, Don't capture private lab info., Passive, Biased (selected) population, Lack of submissions, Corporate user bias, Data selective and biased *Quality of data (specificity)* Lab doesn't see the case, Do they always record syndrome, Samples not always optimum, Too precise?, Relevant to PVS/ producer *Data capture/availability*

Data provider	Pros	Cons
	Other Syndromic data is about presentation	*Other* Cost, Costly
Combination	Quantity, Flexible, Embraces all sources Access all this data all pyramid levels covered Access to data all pyramid levels covered All sources embraced, High quality and flexible	Quality, Costs, IT systems, Cost, Need collator Uniformly collect – without bias, Cost, Need collection to be uniform without bias, Lower quality

Table 2: Qualitative score for different criteria for each provider

Criterion	Syndromic Surveillance Data Provider				
	Pig Keeper	**Veterinarian**	**Vet practice**	**Laboratory**	**Combination**
Timeliness	++++	+++	++	+	++++
Coverage (sensitivity)	++++	+++	+++	+	++++
Quality of data (specificity)	+	+++	+++	++++	++++
Data capture/availability	+	+	++	+++	+++
Added value	+	+++	++	+++	+++

++++ = provider considered favourably for this criterion
+ = provider not considered favourably/or less favourable for this criterion

Figure 2: Summary ranking of providers from the votes of members of six groups
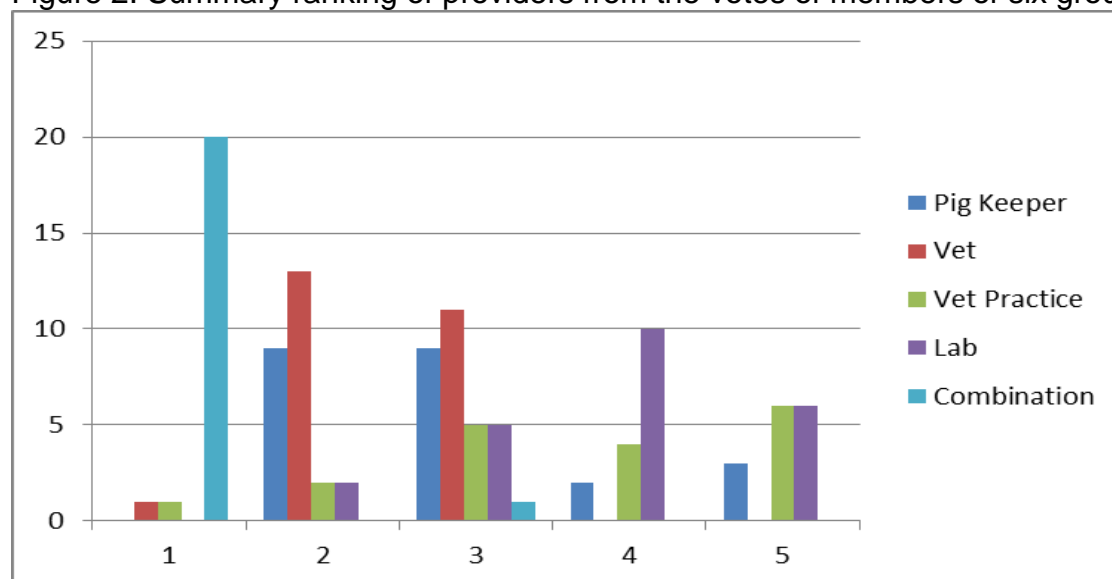
Ranked 1-5, 1= most favoured provider, 5 = least favoured provider
One group voted by consensus and their vote was only counted as one. The data on the responses of delegates with different professional backgrounds do not show any particular trend and are given in appendix 5.

2. How can provision of data be encouraged to ensure good coverage?

2.1 The reasons why different contributors might participate and provide data were explored for each of the SS sources (pig keeper/farmer, veterinary practitioner, veterinary practice (database) and laboratory). Then things that might act as incentives for different contributors to provide data were identified for the same sources. Some groups ranked these. Appendix 5 gives the detailed responses which merit examination. These are summarised according to selected criteria in Table 3 below which attempts to compare responses by provider. There was significant overlap between the reasons why providers of SS data might provide data and the incentives for them to do so – in retrospect, these questions could have been combined but the detailed responses provide useful insight and it is recommended that they are consulted.

2.2 For all sources, access to pig disease and surveillance data was highly rated. Professional aspects were important to veterinarians, and included improving client service, professional interest, and collective learning. For producers, economic reasons and incentives featured significantly with business advantage, benchmarking, using information to make decisions and improve pig health and productivity and thereby provide financial benefit, all mentioned. Interestingly, providing evidence for responsible antimicrobial use was mentioned for both pig keepers and veterinarians. Responses for veterinary practices as sources of data were largely considered to overlap with those for veterinarians. Laboratories were considered to have a mix of professional and economic reasons to provide data. Reasons identified by several groups for laboratories specifically included the advantage of identifying issues/problems to allow, for example, targeted in depth investigations, justification of test development and relevant research to be identified and facilitated. Several groups indicated that veterinary time would need funding or costs covered in some manner. It should be borne in mind that pig producers were not well represented to provide views.

Table 3: Reasons and incentives for SS data provision by different sources

Reasons for data provision by different surveillance sources – in black
Incentives for different surveillance sources to participate – in blue

| Criterion | Syndromic Surveillance Data Provider | | | |
	Pig Keeper	Veterinarian	Vet practice	Laboratory
Pig Health/Surveillance	++++ ++++	++++ +++	++++ +++	++++ +++
Professional	+ +	++++ +++	++++ +++	+++ +
Economic	++++ +++	++ +++	+++ ++++	+++ +++
Public relations	++ +	+ +	- +	+ +
Standards/assurance	+++ +++	++ ++	- ++	- -
Other	+	+	+	-
Logistic	++	++	+++	+

3. What are the needs of different stakeholders from syndromic surveillance data?
3.1 The groups considered the needs of different stakeholders or audiences for SS information and, for each audience, the different types of data and information they would want from syndromic surveillance was recorded. It should be borne in mind that pig producers were not well represented at the event. Some groups indicated which they considered to be the stakeholders' top three needs by group and, when given, this information is included in Table 4.

3.2 The table summarises all group responses. Several groups indicated that the same needs existed for industry, keepers, companies and vets and where appropriate those needs are replicated across the audiences. The main audiences were already identified and groups were asked to identify further audiences, those in blue in the table were their additional suggestions. One group questioned whether consumers should be included as a distinct audience for SS information.

3.3 Early warning or early alerts were identified for all of these stakeholders; Government, pig industry, pig keepers and veterinarians, and pig companies emphasising the importance given to timeliness in the collection and reporting of SS data. The responses revealed multiple and diverse needs of different stakeholders. Ultimately any SS system will be most significantly influenced by those providing the data and those funding it. The needs of others are informative as they could yield potential alternative funding streams and provide further justification for establishing SS recording. The interests of different audiences also raised the issue of how accessible SS data should be to different stakeholders. The potential for inadvertent adverse consequences needs to be borne in mind in order to avoid undue concern in response to SS findings amongst, for example, trade partners or the public.

Table 4: Audiences and their needs with ranking of need (if given, 1 = most needed)

Stakeholder/Audience	Surveillance needs
Government - policy	Over view simple
	Priority data, new/emerging risks to industry. Collated
	Risks, alerts and compliance (with EU)
	Trade, New and emerging, Notifiable
	Notifiable disease/ Public health disease info
	Zoonotic disease investigation, early warning, new/ emerging, change of trends, welfare, 1
	Freedom of disease-syndromic to feed info further investigation, 3 export approval 2
Government - surveillance	Reliable
	Quarterly trends
	Priority data, new/emerging risks to industry. Collated
	All data for trends
	NERT, Notifiable, Reputable (zoonosis), Food safety
	Zoonotic disease investigation, early warning, new/ emerging, change of trends, welfare, 1
	Freedom of disease-syndromic to feed info further investigation, 3 export approval 2
Pig industry (AHDB Pork)	Reliable
	Quarterly trends
	Endemic disease and epidemic threat
	Diagnoses and syndromes
	Benchmarking
	Health Management, trends, risks
	Threats, PR issues, Early alerts
	Red alert system for keepers/vets
	Everything 2

Stakeholder/Audience	Surveillance needs
Pig keepers	Reliable Quarterly trends Endemic disease and epidemic threat Diagnoses and syndromes Benchmarking Health Management, trends, risks Threats, PR issues, Early alerts and regional data For farmers- collated data is more practical s currently have a lot of data in separate sources Will get a digest from e.g AHDB, Local disease picture/notes1
Pig companies	Reliable Quarterly trends Endemic disease and epidemic threat Diagnoses and syndromes Benchmarking Seeing what others have- risks /benchmarking Threats, PR issues, Early alerts and regional data Everything, their info requirements may change depending on project 1
Veterinary practitioners	Reliable Quarterly trends Endemic disease and epidemic threat Diagnoses and syndromes Benchmarking Trends, all info. Threats, PR issues, Early alerts and regional data Red alert system Non specialist vets= unlikely to want a lot but opportunity to seek info 2 important specialist vet = everything1
Pig Veterinary Society	Endemic disease and epidemic threat Diagnoses and syndromes Benchmarking Everything 1
Pharmaceutical companies	Reliable Quarterly trends Incidence and prevalence, sectors, forecast Trends, where disease is Trends/usage, regional variation Cost of disease- vaccine breakdowns, disease trends, impact of interventions- pharmavigillance /ADRs Endemic Trends 1
Academia	Reliable Quarterly trends + on demand when demanded Access to raw data on syndromes/ trends/sector Trends too to target research All Research Direction, data source Data, robust data, pathogens / disease trends Everything 1

Stakeholder/Audience	Surveillance needs
Pork processors	Reliable
	Quarterly trends
	Guarantees food quality
	Want all
	Food safety, security(zoonosis, continuing supply, carcase quality)
	Disease trends, red alert
	Zoonosis 1 Antibiotic use AMR 3 Welfare 2
Retailers	Part of a QA System
	Guarantees food quality
	Want all - commercial advantage
	Food safety, security
	Disease trends, red alert
	Zoonosis 1 Antibiotic use AMR 3 Welfare 2
Feed companies	Regional data/ risks(distrib)
	Disease outbreak knowledge- hauliers, Mixing timetables, red alert system
	Biosecurity Risks 1
	Mycotoxins etc. Feed transmitted 3
	Potential adverse effects related to their products 2
Consumer	Part of a QA System
	Media driven risk info
	Need to know basis
Assurance schemes	Health/welfare
	Want to know it exists
	Welfare, Medication
	Disease trends
NGOs	As required
	All
	Disease trends
Commercial labs	As required
International consumer/trade	As required
	Disease trends
Equipment/housing suppliers	Impact on health
Hauliers	Regional data/ risks (distribution)
Fallen stock providers	Regional data/ risks (distribution)
Trading Standards	Disease trends, red alert
Public Health England	
Food Standards Agency	Zoonosis 1 Antibiotic use AMR 3 Welfare 2

4. Data needed from clinical disease incidents for Syndromic Surveillance

4.1 Two groups recorded the data they thought most important to capture from disease incidents to provide effective syndromic surveillance and prioritised them. This is shown in Appendix 5 Table App6. They selected from a wider data set which was provided to stimulate discussion, also provided in the Appendix 5.

4.2 Both groups identified some common data items (affected premises, clinical signs/syndrome, date) as well as individually identifying unit type, age of affected pigs, indoor/outdoor, number of pigs, and morbidity and mortality as priority data. There was comment that SS reporting should not be too complex; it is not a full case report. There is a balance needed between recording key information to provide useful timely SS data, and requesting too much thus adding to time and cost, and dissuading reporting leading to reduced

coverage. The experiences of users of current SS in the Netherlands and Canada (Farm Health Monitor, Be Safe, Be Seen http://www.farmhealthmonitor.com/) can be drawn on. There may be potential for customising existing options.

5. How could Syndromic Surveillance data be collected?

5.1 Two groups listed possible methods of SS data collection and ranked them as shown in Table 5, with one giving the pros and cons for each (Appendix Table App9). If the veterinarian or pig keeper is the provider of SS data, a mobile app-hand held device was favoured with data input by the veterinarian according to a standard format being preferred.

Table 5: Methods of data collection identified and ranked (1 = most favoured)
When ranking is included, the colours relate to professional background: Industry/producer – green, veterinary practitioner – red, Government – orange, academia – blue, other - black

First group	First group ranking	Second group	Second group ranking
Mobile App- hand held device	1	Compulsory data input to a standardised format by PVS	1111
Faxed paper copies	2	Data from practice databases (as for SAVSNET) Qualitative or Quantitative	2212
Online web page	3	Lab data- VIDA	2 3 3 3
Excel or similar		By Farmer- standardised format prod records	3 3
Vet Practice/ database extracts		Abattoir if accurate- improved meat inspection and recording	3
Lab LIMS extract			
Voice recording / voice recognition			
Other comments	Who holds the data? Data is there not integrated IT systems exist Costs		
Frequency of reporting from surveillance providers	Quarterly and other incidents Weekly Real time – Automatic Danger if not real time may forget to report		

5.2 Concerns were raised regarding data collection in relation to:
- Biosecurity – if devices taken farm to farm
- Mobile network coverage/ internet coverage problems in certain areas
- Some farmers may not engage with required technology
- Loss or damage to expensive equipment on farm
- Security/ hacking of system

- Financial investment required could be considerable
- Potential for information overload "not seeing the wood for the trees"

5.3 Practitioner feedback received subsequent to the meeting expressed enthusiasm expressed for use of a handheld recorder, selecting responses from menus, transmitting in real-time, recording position by GPS and ability to use as a phone.

6. Collation/analysis, reporting and funding of Syndromic Surveillance data

6.1 Two groups considered several questions although shortage of time did not allow full discussion of the various responses which are listed in Appendix 5.

6.2 Regarding who is best placed to collate and analyse data, one group identified just one option, namely the AHDB Pork Pig Hub with academic support, mainly because of industry trust and previous work. The other group identified several possibilities: SRUC/APHA, Universities, an independent not-for-profit organisation not subject to freedom of information e.g. SAVSNET (Liverpool), or AHDB collect data alongside other such as Real Welfare.

6.3 A variety of methods were suggested to report data back including the dashboard as described in the morning presentation. In one group, a preference was expressed for quarterly digests with text alerts when action/awareness needed. The limitations identified to data reporting were confidentiality (personal and commercial), time and cost, and the need for a critical mass of data for SS data to be meaningful.

6.4 Possible funding sources for a syndromic surveillance system were identified and an estimate of the likely % contribution made:

First group: 1 Industry – AHDB Pork 75-80%, 2 Government 1-10%, 3 Data use fees to any non-contributors eg academics, pharma, retailers etc. 15-19%
* also in kind contributions, for example, some veterinary time

Second group: 1 Industry Levy Body 60%, 2 Government 20%, 3 Pharma 20%

Laboratories, EU, research funding bodies, crowd funding and philanthropists were also listed but not rated as likely.

7. Showstoppers/other comments
7.1 Delegates were also asked to record:
- any absolute prerequisites for an effective syndromic surveillance system ie show stoppers without which they consider it would not be effective
- anything else considered important which was not been captured elsewhere during the discussions.

7.2 The comments resulting are given in Appendix 5. They have been grouped and edited:

a) Issues to avoid:
- trough of disillusionment
- 'own goals'
- overzealous data interpretation
- non-representative data

b) The need for a sustainable model:
- Business incentive is key
- Needs sustainable revenue model
- Has to have commitment at all levels
- Has to be user friendly at all levels
- Must be feedback loop
- Data must be simple to provide/capture

c) Needs funding commitment
- to maintain long term so that trends can be generated
- to enable the vital ICT which would be needed

DELEGATE FEEDBACK
Feedback forms were completed by delegates and several further comments were received by email after the meeting, these are given in full in Appendix 6. Eleven delegates considered that the Roundtable event moved the discussion on SS forward significantly, 12 a bit, and none thought it did not move in on at all. Nine delegates indicated that they were clear what the next steps in developing SS would be, four responded that they were not clear and comments about this captured in Appendix 6 indicate that several delegates are keen that SS, or pilot studies at least, should now be progressed and funding sought. Others were not sure that certain aspects were yet clear; in particular sustainability, long term funding and governance. Twenty three of 24 respondents asked how satisfied they were with the event indicated that they were very happy or happy, one was neither happy nor unhappy. Other comments of particular note from delegates on the feedback form or after the event alluded to the fact that pig producers were under-represented at the meeting and their opinions matter. Producers and industry may part-fund Syndromic Surveillance, either directly through veterinarians, or indirectly. Pig producers and the pig industry were identified as being beneficiaries of Syndromic Surveillance (see voting questions section) but they ultimately need to perceive economic benefits to support this initiative. It was also noted that practitioners attending in large part reflected those previously engaged and interested in surveillance, including NADIS – there are others who have not yet engaged and their views are not captured; good coverage depends on input across the pig veterinary community.

PROPOSALS FOR NEXT STEPS
Richard Irvine, veterinary lead of Scanning Surveillance at APHA summarised the day, thanked attendees, speakers, facilitators and organisers and proposed the next steps:
- Publish Syndromic Surveillance Roundtable report
- Develop prioritised Action Plan and allocate responsibilities
    - Industry – government – vets – academia – pig keepers as represented by membership of PHWC subgroup
- Assess SS methodology already available (e.g. Deventer, Farm Health Monitor)
- Develop proposal(s) for funded pilot trials
- Present to PHWC surveillance subgroup meeting, Pig Veterinary Society and other groups
- APHA SIU to continue pig diagnosis dashboard development with a view to 2017 launch

APPENDICES

APPENDIX 1 - AGENDA

9:30-10:00   Registration and refreshments

10:00-10:10 Introduction and plan for the day *Jim Scudamore – Pig Health and Welfare Council*

10:10-10:40 Syndromic Surveillance – what is it, what do we have in place, what more do we want and what are the main challenges? *Susanna Williamson – Veterinary Lead Pig Scanning Surveillance APHA*

10:40-12:10 Syndromic surveillance – examples of methodologies

Syndromic surveillance for pigs in the Netherlands *Theo Geudeuke, Deventer, Netherlands*

Pilot BPEX-funded syndromic surveillance study *Carla Gomes, SRUC*

Mining data from veterinary records *Phil Jones, SAVSNET, University of Liverpool*

Each of the above speakers have been asked to include the limitations or mitigating features of the system being described for the following challenges some of which are inter-related: Confidentiality, Standardisation, Lack of time, Good coverage, Cost, Real-time reporting in/out

12:10-12:30 Provision of data: How is syndromic surveillance data best reported to users? *Sara Robertson – Principal Data Analyst, Surveillance Intelligence Unit, APHA*

12:10-12:15 Prediscussion voting questions

12:30-13:15 LUNCH

13:15-13:20 Introducing how discussion groups will run Susanna Williamson

13:20-14:30 Questions 1, 2 and 3

ALL groups to discuss questions 1, 2 and 3.

14:30-14:55 Group-specific questions
Each group to consider two further questions:

Groups 1 and 2: questions 4
Groups 3 and 4: questions 5
Groups 5 and 6: questions 6

14:55-15:10 Tea and coffee break

15:10-15:25 Roundtable summary *Richard Irvine, Head of Scanning Surveillance, APHA*

15:25-15:30 Final remarks – *Jim Scudamore*

Susanna Williamson BVetMed PhD MRCVS
Susanna has been the Veterinary Lead for Scanning Surveillance for Pig Diseases in England and Wales at the Animal and Plant Health Agency (formerly AHVLA, formerly VLA) since April 2014. She works with colleagues in the Surveillance Intelligence Unit and GB Pig Expert Group to deliver surveillance for, and consultancy on, pig diseases and disease threats. Prior to that, Susanna was a Veterinary Investigation Officer at the Veterinary Investigation Centre at Bury St Edmunds since June 2000. Susanna has been involved in pig-orientated projects on salmonella, leptospire infections, porcine circovirus-2 associated disease, porcine respiratory and reproductive syndrome virus, swine influenza and porcine epidemic diarrhoea. Susanna leads the Defra-funded pig disease scanning surveillance project in APHA, and is currently President of the Pig Veterinary Society. She represents APHA on the Pig Health and Welfare Council and its surveillance and antimicrobial subgroups.

Theo Geudeuke DVM PhD Dipl. ECPHM
Theo is a specialist pig veterinarian at the Pig Health Department of the Animal Health Service, Deventer. He works in their advisory service providing specialised support on swine health topics (to veterinarians, farmers, AI-stations and pig breeding companies) and on-farm consultancy and systematic analysis of health status and production results. He is involved in organising, implementing and managing practical research projects, e.g. field trials and epidemiological surveys and writing educational articles for veterinarians, consultants and farmers. He provides input into practical and academic courses, with a focus on reproduction and AI and monitoring and organises/coordinates international post-academic courses for veterinarians.

Carla Gomes DVM PhD MRCVS
Carla qualified as a veterinarian from Porto University in 2002. She finished her PhD in January 2014 "Salmonella in swine in Portugal – risk characterization and development of a simulation model of disease transmission in swine herds". She has been employed in the Epidemiological Research Unit (ERU) of Scotland's Rural College (SRUC) as a veterinary epidemiologist since April 2012. She is currently involved in several projects related to the pig sector and other livestock species and is the ERU species-expert for pigs and contributes expertise to the existing EPIC COE. She leads the following projects: Great Britain pig health voluntary schemes (BPHS and WPS) data analysis, where ERU provides regional and temporal analysis of data collected at abattoirs; the KTIF Innovative use of emerging technologies to improve pig production efficiency, where ERU is working in collaboration with the Scottish pig industry to combine health and performance data to improve health and productivity.

Philip Jones BVSc MPVM PhD MRCVS
Philip graduated from the University of Bristol and spent two years in general mixed veterinary practice before returning to Bristol to undertake a PhD on the effects of weaning stressors on the susceptibility of piglets to post-weaning diarrhoea. He was awarded a Research Training Fellowship in Epidemiology from the Wellcome Trust in 1997 and studied for the Master of Preventive Veterinary Medicine at the University of California, Davis. He returned to the University of Liverpool to investigate the relationship between Johne's disease in cattle and Crohn's disease in dairy farmers. Philip then worked at the University of Bristol on post-doctoral projects investigating factors that influence the development of the mucosal immune system in the small intestines of neonatal piglets. In 2005, he took up his current position as Lecturer in Veterinary Epidemiology and Public Health at Liverpool and he has been part of the Small Animal Veterinary Surveillance Network (SAVSNET) since its early days in 2008.

Sara Robertson BSc (Hons) Ag Econ

Sara has been a data and business analyst at APHA's Weybridge site for more than 20 years, first in the IT Department, but more recently in the Surveillance Intelligence Unit. She helped design the APHA Laboratory Management and Surveillance Systems, and has been the main analyst responsible for surveillance data curation and creation of reports and queries. Current projects include assessment of new business intelligence tools to replace our old Business Objects environment – options such as Tableau and Qlik are under consideration.

APPENDIX 3 – DETAILS OF RESPONSES TO VOTING QUESTIONS

Question 1. Roles of respondents

Morning session
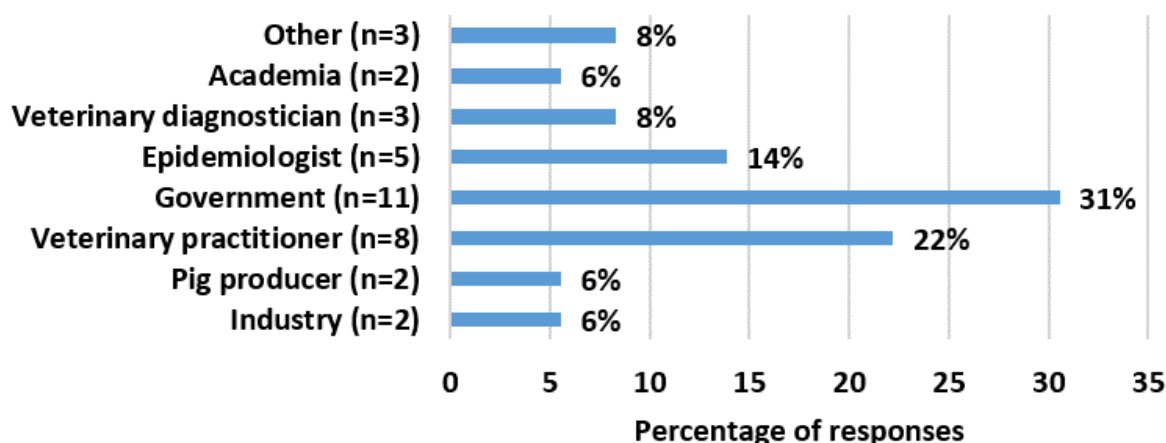
Afternoon session

Question 2. Do you understand what syndromic surveillance means?

Morning session

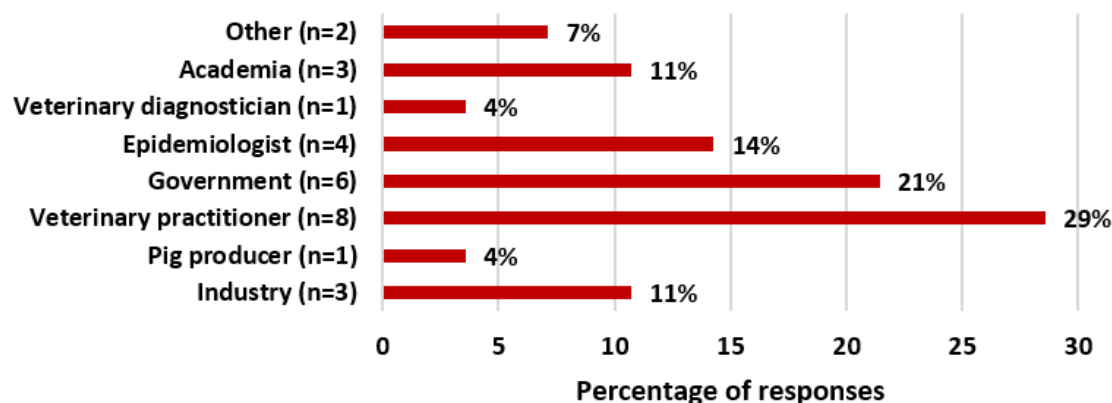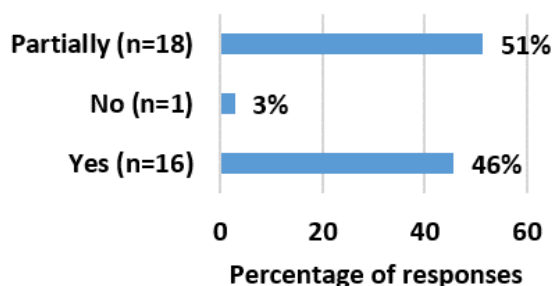| Role of responder	Yes	No	Partially
Industry	33.3% (1)	33.3% (1)	33.3% (1)
Producer	0% (0)	0% (0)	100% (1)
Veterinary practitioner	0% (0)	0% (0)	100% (8)
Government	63.6% (7)	0% (0)	36.4% (4)
Epidemiologist	75% (3)	0% (0)	25% (1)
Veterinary diagnostician	66.7% (2)	0% (0)	33.3% (1)
Academic	100% (2)	0% (0)	0% (0)
Other	33.3% (1)	0% (0)	66.7% (2)

Afternoon session
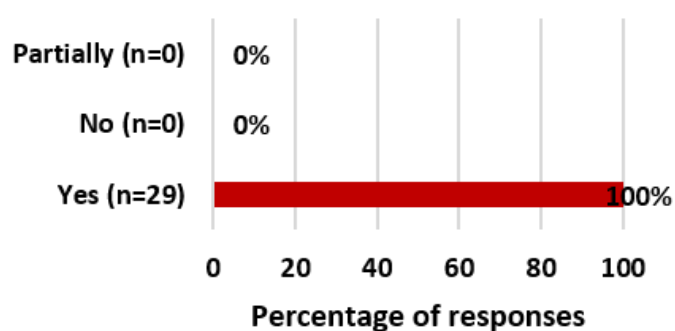
No breakdown table provided as all responders voted yes.

Question 3. Do you think a systematic surveillance system for pigs would have value in the UK?

Morning session
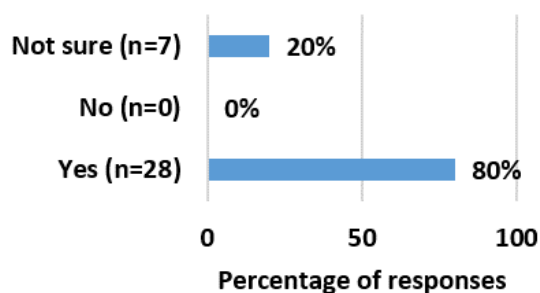
Role of responder	Yes	No	Not sure
Industry	100% (3)	0% (0)	0% (0)
Producer	100% (1)	0% (0)	0% (0)
Veterinary practitioner	62.5% (5)	0% (0)	37.5% (3)
Government	72.7% (8)	0% (0)	27.3% (3)
Epidemiologist	100% (4)	0% (0)	0% (0)
Veterinary diagnostician	100% (3)	0% (0)	0% (0)
Academic	100% (2)	0% (0)	0% (0)
Other	66.7% (2)	0% (0)	33.3% (1)

Afternoon session
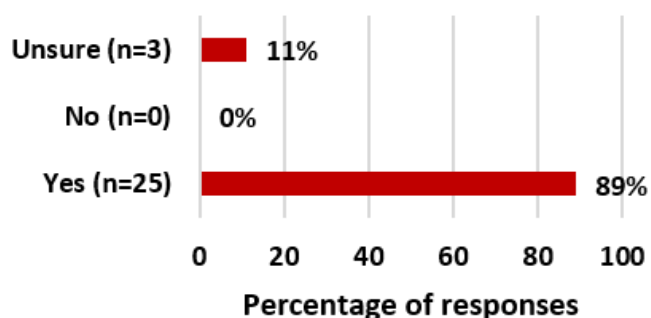
Role of responder	Yes	No	Not sure
Industry	100% (3)	0% (0)	0% (0)
Producer	100% (1)	0% (0)	0% (0)
Veterinary practitioner	67% (6)	0% (0)	22% (2)
Government	83% (5)	0% (0)	17% (1)
Epidemiologist	100% (4)	0% (0)	0% (0)
Veterinary diagnostician	100% (1)	0% (0)	0% (0)
Academic	100% (3)	0% (0)	0% (0)
Other	100% (2)	0% (0)	0% (0)

Question 4. From what source would the most useful syndromic surveillance data be collected?
Morning session
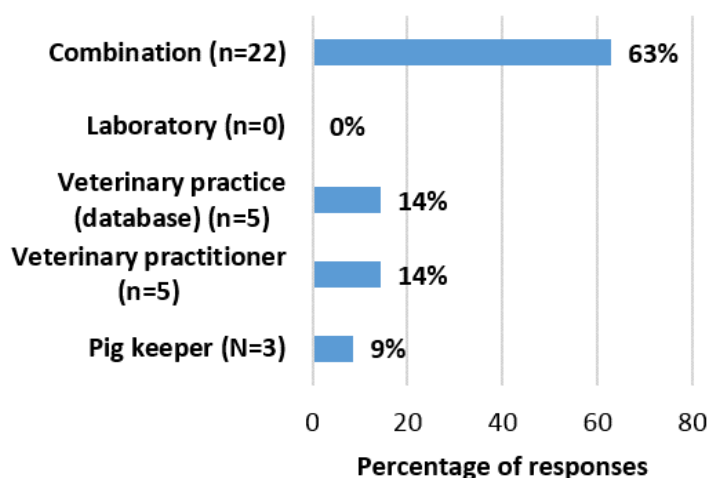
Role of responder	Pig keeper	Veterinary practitioner	Veterinary practice (database)	Laboratory	Combination
Industry	33.3% (1)	0% (0)	0% (0)	0% (0)	66.7% (2)
Producer	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)
Veterinary practitioner	12.5% (1)	12.5% (1)	12.5% (1)	0% (0)	62.5% (6)
Government	0% (0)	27.3% (3)	18.2% (2)	0% (0)	54.5% (2)
Epidemiologist	0% (0)	0% (0)	100% (2)	0% (0)	0% (0)
Veterinary diagnostician	0% (0)	33.3% (1)	0% (0)	66.7% (2)	0% (0)
Academic	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)
Other	33.3% (1)	0% (0)	0% (0)	0% (0)	66.7% (2)

Afternoon session
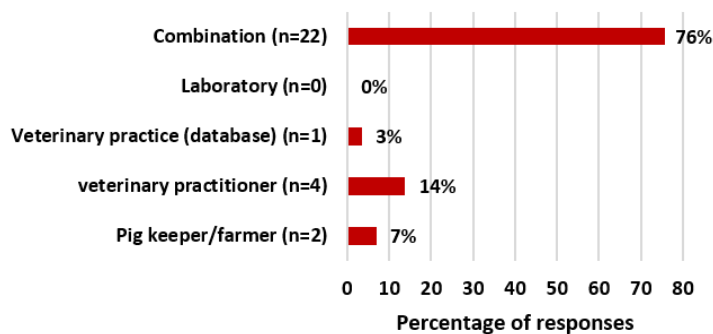
Role of responder	Pig keeper	Veterinary practitioner	Veterinary practice (database)	Laboratory	Combination
Industry	33% (1)	0% (0)	0% (0)	0% (0)	67% (2)
Producer	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)
Veterinary practitioner	0% (0)	14% (1)	0% (0)	0% (0)	86% (6)
Government	17% (1)	33% (2)	0% (0)	0% (0)	50% (3)
Epidemiologist	25% (1)	25% (1)	0% (0)	0% (0)	50% (2)
Veterinary diagnostician	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)
Academic	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)
Other	0% (0)	0% (0)	0% (0)	0% (0)	100% (2)

Question 5. Which group would the main beneficiary of systematic syndromic surveillance in UK pigs?

Morning session
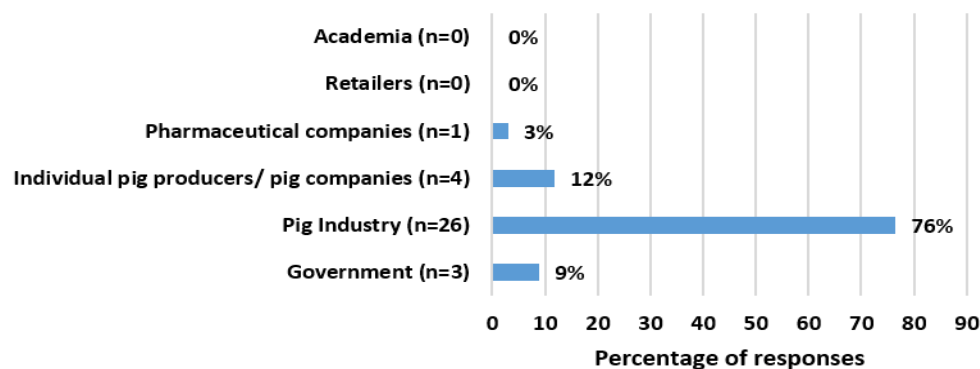
Role of responder	Government	Pig Industry	Individual pig producers/ pig companies	Pharmaceutical companies	Retailers	Academia
Industry	100% (0)	100% (3)	100% (0)	100% (0)	100% (0)	100% (0)
Producer	100% (0)	100% (1)	100% (0)	100% (0)	100% (0)	100% (0)
Veterinary practitioner	13% (1)	88% (7)	100% (0)	100% (0)	100% (0)	100% (0)
Government	9% (1)	73% (8)	18% (2)	100% (0)	100% (0)	100% (0)
Epidemiologist	100% (0)	75% (3)	25% (1)	100% (0)	100% (0)	100% (0)
Veterinary diagnostician	100% (0)	67% (2)	100% (0)	33% (1)	100% (0)	100% (0)
Academic	50% (1)	50% (1)	100% (0)	100% (0)	100% (0)	100% (0)
Other	100% (0)	67% (2)	33% (1)	100% (0)	100% (0)	100% (0)

Afternoon session
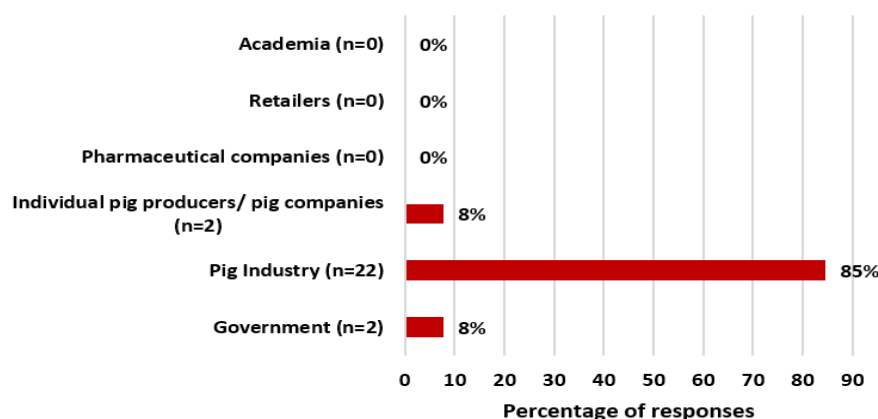
Role of responder	Government	Pig Industry	Individual pig producers/ pig companies	Pharmaceutical companies	Retailers	Academia
Industry	0% (0)	100% (3)	0% (0)	0% (0)	0% (0)	0% (0)
Producer	0% (0)	100% (1)	0% (0)	0% (0)	0% (0)	0% (0)
Veterinary practitioner	14% (1)	71% (5)	14% (1)	0% (0)	0% (0)	0% (0)
Government	0% (0)	80% (4)	20% (1)	0% (0)	0% (0)	0% (0)
Epidemiologist	0% (0)	100% (4)	0% (0)	0% (0)	0% (0)	0% (0)
Veterinary diagnostician	0% (0)	100% (1)	0% (0)	0% (0)	0% (0)	0% (0)
Academic	33% (1)	67% (2)	0% (0)	0% (0)	0% (0)	0% (0)
Other	0% (0)	100% (2)	0% (0)	0% (0)	0% (0)	0% (0)

Question 6. Which of the following should fund a syndromic surveillance system?
No morning session responses due to malfunction of voting.
Afternoon session
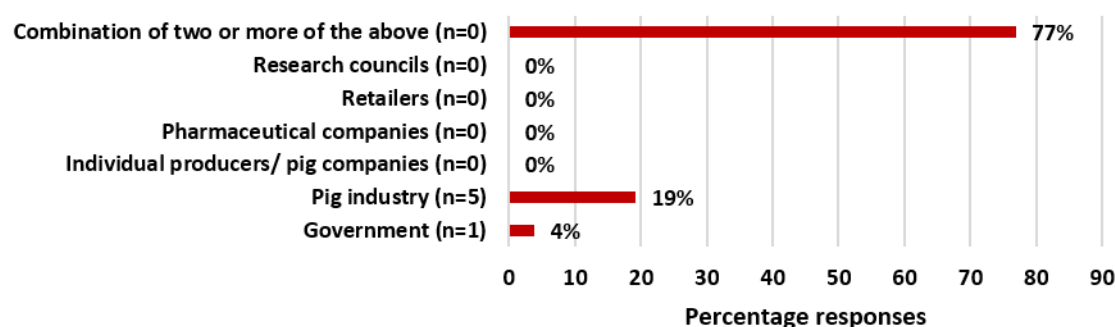
	Government	Pig industry	Individual producers/ pig companies	Pharmaceutical companies	Retailers	Research councils	Combination of two or more of the above
Industry	33% (1)	33% (1)	0% (0)	0% (0)	0% (0)	0% (0)	33% (1)
Producer	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)
Veterinary practitioner	0% (0)	14% (1)	0% (0)	0% (0)	0% (0)	0% (0)	86% (6)
Government	0% (0)	40% (2)	0% (0)	0% (0)	0% (0)	0% (0)	60% (3)
Epidemiologist	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (4)
Veterinary diagnostician	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (1)
Academic	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	100% (3)
Other	0% (0)	50% (1)	0% (0)	0% (0)	0% (0)	0% (0)	50% (1)

APPENDIX 4 - DISCUSSION QUESTIONS (in groups with facilitators)

Question 1. Source of data collection
a) List the pros and cons of each source of syndromic surveillance data:
- Pig keeper/Farmer
- Veterinary practitioner
- Veterinary practice (database)
- Laboratory
- Combination

b) Prioritise your list 1-5 with 1 being your favoured option as the source of data

c) Record any other comments

Question 2. How can provision of data be encouraged to ensure good coverage?

a) What are the reasons why different contributors might participate and provide data?:
- Pig keeper/Farmer
- Veterinary practitioner
- Veterinary practice (database)
- Laboratory

b) Rank the top 3 reasons for each contributor 1-3 (1 being most important reason)

c) What might act as incentives for different contributors to provide data?:
- Pig keeper/Farmer
- Veterinary practitioner
- Veterinary practice (database)
- Laboratory

d) Rank the top 3 incentives for each contributor 1-3 (1 being most important incentive)

Question 3. What are the needs of different stakeholders from syndromic surveillance data?
a) the different audiences for syndromic surveillance have been listed – add any further audiences not listed and if you disagree with any listed, record this

b) next to each audience, indicate the different types of data and information they would want from syndromic surveillance

c) for each audience, indicate their top 3 needs by marking 1-3 in order of priority (1 = most needed) by group consensus if possible – if not possible, can record individually

d) when data is reported back, how frequently should this be and record suggested minimum and maximum frequencies – this may vary with audience

e) Describe any limitations to reporting that the need for confidentiality raises

Question 4. Groups 3 and 4 ONLY: data needed from disease incidents
What level of detail is needed from disease incidents to provide effective syndromic surveillance:

a) What disease incident data should be captured?

b) prioritise the top 10 data items in each list which are most important to collect by indicating 1-10 (1 = most important)

c) record any in each list which you think are <u>not essential</u> by putting an N next to them

d) if you consider that some data in your two lists might identify a unit, mark with a C as confidential

e) Record any other comments

Question 5. Group 5 and 6 ONLY: How should data be collected:

a) List possible methods

b) What are the pros and cons for each method

c) Rank the top 3 methods 1-3 (1 = best method)

d) How often should reporting from different contributors be encouraged – daily/weekly/monthly/quarterly/other – give reasons for frequencies suggested
- Pig keeper/Farmer
- Veterinary practitioner
- Veterinary practice (database)
- Laboratory

e) Describe any limitations to data collection that the need for confidentiality raises

Question 6. Groups 1 and 2 ONLY: Collation/analysis, reporting and funding:
a) who is best placed to collate and analyse data

b) what methods could be used to report data back to audience e.g. web-based pages, dash boards, monthly digests etc and indicate your top 3 preferences 1-3 (1 = most preferred) by group consensus

c) Describe any limitations to data reporting that the need for confidentiality raises

d) List the possible funding source options for a syndromic surveillance system

e) rate the possible funding sources according to how likely funding is to be available (1 = most likely).

f) Also indicate how much funding you think each option you have suggested is likely to contribute (1 = most funding)
g) Record any extra comments the group may have

Any show stoppers or other comments
a) Try to remember to mention any absolute prerequisites for an effective syndromic surveillance system ie show stoppers without which you consider it would not be effective

b) Please record anything else you feel important which has not been captured elsewhere during the discussions on the flip chart which is dedicated for this purpose. This will be pointed out to you at the start of the afternoon discussion group session.

APPENDIX 5 - COMPILATION RESPONSES TO DISCUSSION QUESTIONS

All groups 1-4 considered questions 1-3.
Raw data for the six discussion group responses from which this compilation was obtained are available if required

1a: The pros and cons of each source/provider of syndromic surveillance data identified by discussion groups.
Table App1: Pros and cons of difference providers of surveillance data
Items in italics are headings to attempt to categorise responses

Data Source	Pros	Cons

Pig Keeper	*Timeliness*
	 Instant
	 Direct from Source
	 Timely
	 First observation of disease
	 Immediacy of data
	
	 Coverage (sensitivity)
	 All knowing
	 On farm all the time
	 Potentially most comprehensive
	 ↑ Volume of data
	 Denominator data (V broad data)
	 Pig keeper sees pigs daily
	 volume of information
	 Lots of animals and info
	 Quantity of info – breadth and denominator
	
	 Quality of data (specificity)
	 Good for simple things like deaths, coughing,, diarrhoea
	 Recognise diseases – experienced
	 Variables in clinical signs
	 Knows own pigs
	 Exact location recorded
	 Quantitative
	 Large number of keepers & stock No & skill set & identifying disease
	 Ability to notice change
	 Ability of keeper to notice change
	 Quantitative
	
	 Data capture/availability
	 Some farms already recording
	 Data (some) already exists(production
		Timeliness
		 Time in disease outbreak not directed to reporting
		
		 Coverage (sensitivity)
		 Seasonal limits to time to record
		 Keeping motivation
		
		 Quality of data(specificity)
		 Incomplete/inaccurate
		 Poor standardisation
		 Not so precise/ specific
		 Biased to perceptions
		 'Lumpy'
		 Limited interpretation(but good from syndrome perspective)
		 No uniformity- is this feasible
		 Baseline setting – habituation (e.g ↑Coughing Normal)
		 Risk of misinterpretation
		 Recording Quality
		 Syndrome recognition
		 Stockman observation
		   - Variation
		   - Training
		   - Pig keeper may just see disease status quo
		   - Producer tolerance of disease
		 Poor accuracy
		 Basic info Limited to units
		 Background disease knowledge
		 Variable skill of stockmanship
		 May be small groups= lack of understanding
		 Influenced by media
		 Willing to accept a loss
		 Level of stockman expertise
		 Accuracy / impartiality of data

Data Source	Pros	Cons
	Added value Positive effect on AHW on farm	Tolerance of Disease Setting baseline *Data capture/availability* May be difficult to collect IT Competence/ Connectivity Little data held electronically Literacy (Language) IT Connectivity Lack of electronic data
Vet	*Timeliness* Regular on farm at least 4x per annum Farmer likely to report disease problems in between Q. visits includes PMs *Coverage (sensitivity)* Active Quantity Likely to report disease problems between visits *Quality of data (specificity)* Great data if specialist pig vet Accuracy and standardisation and supportive evidence Good perspective Quality Specialist knowledge Recognise the abnormal / normal Big accumulation of knowledge ↑ Accuracy of syndrome recognition Filter/ objectivity (Less Broad) Knowledge to judge significant health changes Additional knowledge from other sources eg abattoir Professional skill ↑accuracy of syndrome recognition *Data capture/availability* Already regular visits Health plans – based on herd status *Added value* Local knowledge/ epi links Bigger picture Good knowledge of farm Vets can compare between farms Health plans built on health status of farm Comparison between farms, additional	*Timeliness* Do they have time? Will it be timely? Need data when disease is active. Less real- time reporting Time (Cost) Infrequency of contact Vets usually only on farm quarterly *Coverage (sensitivity)* Miss a lot. May not hear Depends on level of contact May only hear about 'important' cases Infrequency of contact Lack of frequency of visits Led by clients ?dates Freq of visits led by clients - Cost *Quality of data (specificity)* Not so sure if general practice Non specialist vet poor source of data Non specialist vets- poor data *Data capture/availability* Data capture system inconsistent (PMS) Duplication of data entry *Other issues* Disillusionment / repetitive effort (practice benefits though) Time poor Expensive Time and money issues Cost Cost- time

Data Source	Pros	Cons
	knowledge Broad picture	
Vet Practice PMS = practice management system	*Timeliness* Daily *Coverage (sensitivity)* Covers practice rather than individual vet- removes practitioner bias in recording Regional – wider area *Quality of data (specificity)* More standardised May have diagnoses confirmed (own labs/??) Practice level-removes practitioner bias May have confirmed diagnoses *Data capture/availability* Database of client information Already data there Electronic Potential to be shared Sharing of data regularly Data is already there standardised Admin staff could help *Added value* Shared knowledge Engagement with PVS Community *Other* Consolidated information Admin staff can help	*Timeliness* *Coverage (sensitivity)* May exclude smallholdings Small pig owners not captured Some only have 1 main client Small pig owners not captured *Quality of data (specificity)* *Data capture/availability* Different systems (IT) Client confidentiality Few databases- word docs Hard to extract Risk confidentiality Lack of commonality of PMS Different PMSs IT systems/ internet access Inaccessibility of data Different systems Client confidentiality *Other* Time (cost) Passive Costly Cost Time
Laboratory	*Timeliness* *Coverage (sensitivity)* Type submission is important *Quality of data (specificity)* ? could use vets to interpret lab data High quality assurance/ speciality Accurate data Quality assured High quality data and diagnostics Objective Detailed Accuracy and non dx data Quality controlled *Data capture/availability* Easier access to data Historic data system in place for interrogation	*Timeliness* Not so timely May be slow (less real time) Not real time *Coverage (sensitivity)* Only disease that <u>needs</u> lab is included Lower quantity Not good for diseases already recognised on farm Skewed samples Don't capture private lab info. Passive Biased (Selected) population Lack of submissions Corporate user bias Data selective and biased *Quality of data (specificity)* Lab doesn't <u>see</u> the case.

Data Source	Pros	Cons
	Added value	Do they always record syndrome
	Sample archives v. useful	Samples not always optimum
	Additional info	Too precise?
		Relevant to PVS/ producer
	Other	
	Syndromic data is about presentation	*Data capture/availability*
		Other
		Cost
		Costly
Combination	Quantity	Quality
	Flexible	Costs
	Embraces all sources	It systems
	Access all this data all pyramid levels covered	Cost
	Access to data all pyramid levels covered	Need collator
	All sources embraced	Uniformly collect – without bias
	High quality and flexible	Cost
		Need collection to be uniform without bias
		Lower quality

1b Providers ranked according to which is most favoured as data source

Ranked 1-5, 1= most favoured provider, 5 = least favoured provider. One group voted by consensus so only counted as one vote. The data on the responses of delegates with different professional backgrounds do not show any particular trend and are given in Table 1.

Table App1: Ranking data providers by professional background of delegate

Data source	Ranking
Pig Keeper	3 2 2 3 5 2 2 2 2 3 5 2 2 3 3 3 2 4 5 3 3 4
Vet	2 3 2 3 2 2 3 3 3 3 3 3 2 2 2 2 3 2 2 1 3 2 2 2
Vet Practice	3 3 3 4 3 4 5 2 5 3 5 2 1 5 4 5 4 5
Lab	4 4 4 4 3 5 5 5 5 4 4 4 5 4 3 3 4 3 2 2 4 5 3
Combination	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 1 1 1 1

Industry/producer – GREEN   Veterinary practitioner – RED
Government – ORANGE Academia – BLUE Other - BLACK

1c Other comments

- Abattoirs for smaller producers in practice can be useful source
- Inaccuracy of data recording in abattoirs by OVS
- Can fallen stock data be used?
- Credibility of crude FS data?
- PME providers through fallen stock centres useful for smaller producers
- Combination approach most favoured
- Labs alone least popular

Question 2. How can provision of data be encouraged to ensure good coverage?

2a Reasons for data provision by different surveillance sources
2b Rank the top 3 reasons for each contributor 1-3 (1 being most important reason)

Table App3: Reasons why different surveillance providers might participate and provide data
Italics are headings to attempt to categorise responses.
Where ranked, this is indicated 1-3, where 1 = most important reason

Data provider	Reason

Pig Keeper	*Pig Health/Surveillance*
	To protect industry-through early detection
	Benchmarking
	Improved productivity through better insight
	Control losses 1=
	Monitor impact of control measures 3
	Contribute to collective industry good eg disease charter
	Benchmarking 2
	Decision support 3
	Useful Feedback
	Benefit- Prevention of disease due to early recognition 2
	Responsibility to Increase health status of UK – raise focus on biosecurity. 3
	Benchmarking opportunities 4
	Benchmarking
	Optimising biosecurity
	Improved control strategy 1
	
	Professional
	Need for Knowledge
	Peer pressure
	
	Economic
	Retailer pressure
	Benchmarking
	Justify measures (eg antibiotic use)
	Business advantage 1
	Economics- improve productivity
	Benefit - Financial incentive 2
	Money
	Info to allow production decisions 2
	Focus on business 1
	
	Public relations
	Market access (quality assurance, market credibility)
	Retailer pressure
	Defending market
	Promoting sector 1=
	Demonstrate responsibility (AMR)
	
	Standards/assurance
	Enforcement 1
	    - Legislation
	    - *QA

Data provider	Reason
	- Market Added Value 2 -Individual -Industry Early Adopters 3 (must be easy) ← facilitates process Sales and exports/ assurance schemes 3 *Other* Trust the data Must work from day 1 Easy way to submit data (avoid duplication) should there be a legal obligation? Meat standards (EG assurance)

Vet	*Pig Health/Surveillance*
	Useful insight into rest of industry
	Improve advice 1
	Better dialogue farmer
	Evidence to support advice/ value for money
	Enhance communication
	Benchmarking
	Access to national evidence base (context) 3
	Improve contribution to national evidence
	Adds value to advice 1
	Benchmarking 2
	Added value 1
	    - Clients - region
	    - Industry
	    - Benchmarking
	Evidence based medicine
	Local disease knowledge
	Improving welfare
	Responsible antibiotic use
	Need for knowledge 2
	Benchmarking
	Biosecurity 3
	Monitoring change in disease landscape
	
	Professional
	Peer Pressure
	Improve client service
	Promote discussion within practice 2
	Push from client
	Pull from others (assurance scheme / APHA)
	Collective Learning
	Professional interest 1
	Job 2
	Better Service 1
	
	Economic
	£ please (which would improve quality)
	Economic

Data provider	Reason
	Money *Public relations* Public Good (Kudos!) 2 *Standards/assurance* Retailer imperative/assurance Enforcement 3 Legal requirement *Other* Public Health
Vet Practice	Same as vets *Pig Health/Surveillance* Monitoring change in disease landscape Benchmarking within practice *Professional* Kudos – being part of something good. Attract clients Practice brand (Vs individual vets) 2 Kudos / greater good R&D CPD Professional Development Improved service to client 1 *Economic* Payment Marketing opportunities 3 Financial Advertise to client as a benefit 3 Money- ability to charge for service 2 *Public relations* *Standards/assurance* *Other* Data ownership (practice vs individual vet) 1 (Centralisation) Easy (Automated) 3
LAB	*Pig Health/Surveillance* Feedback 1 2 3 3 Feedback with descriptive analysis of data 1 Early Warning (potential business) Know what's current 1 Trend analysis 2 Identify potential problems 3 New tests

Data provider	Reason

	Data source to facilitate further research 2
	Benchmarking between private sector labs 3
	Knowledge
	Info would allow justification for test development etc 2
	Adv further targeted testing= better service 1
	Allow targeted investigation for exotic/emerging – Government 1
	Seek more samples 1
	(Specifically VIC) Creation of a national picture from which to detect NRT for Defra / industry
	
	Professional
	Kudos from participation **4 3 4 4**
	Engagement with clients 2
	Public Good
	Professional Interest 1
	International recognition
	
	Economic
	Using the data helps attract funding- BBSRC etc **3 4 2 2**
	Benchmarking / commercial advantage **2 1 1 1**
	Economic- drive business 3
	If paid
	Private
	   - Profit 3
	   - Public good =2
	   - Marketing tool =2
	   - Added value 1
	Targeted resources
	↑Workload / testing 2
	R&D 3
	
	Public relations
	Public
	   - Public Good 2
	   - Statutory role 1
	
	Standards/assurance
	
	Other

2c Incentives for different contributors to provide data
2d Rank the top 3 incentives for each contributor

Table App4: Incentives for different surveillance sources to participate and provide surveillance data
Italics are headings to attempt to categorise responses.
Where ranked, this is indicated 1-3, where 1 = most important incentive

Data provider	Incentives
Pig Keeper	*Pig Health/Surveillance* Getting info/ benchmarking **1 3 2 1**

Data provider	Incentives
	Reducing risk **2** **2** **1** **2**
	Timely/relevant proactive feedback for management purposes 1
	To prevent the introduction of disease outbreaks –high clean up costs 1
	Avoid disease from ruining your farm 2
	Healthy pigs / welfare 3
	Maintain genetic lines
	Access for benchmarking
	Professional
	Peer Pressure
	Sharing / collaborating with others- pooling experience/ expertise/promoting 2
	Economic
	Improved productivity by acting on info.
	Focussed levy spend
	Subsidy for investigations 3
	Added value (for individual)- data analysis/ presentation access 2
	Money 3
	Improved health and production = profitability 1
	Public relations
	Public image/ pressure 4
	Standards/assurance
	Compliance **3** **1** **3** **3**
	Farm Assurance 1
	Compulsion
	Enforcement 1
	Sales and exports
	Assurance schemes 2
	Logistic
	Easy to do 2
	User friendly customisable data entry 3
	Succinct- visual 2
	Simple 2
Vet	*Pig Health/Surveillance*
	Raising awareness of condition- reaction-improving health
	Timely/relevant proactive feedback for management purposes 1
	Access to raw data as well as pre-designed reports 3
	Improved health 2
	Access to data 1
	Professional
	Peer Pressure **3** **3** **3** **3**
	Benchmarking/ Info- improving client service **1** **1** **1** **1**
	Part of bigger group- collaboration
	Increase rates at which younger vets gain experience , professional development 2
	Added value for clients 2
	CPD
	Interest 3
	Reputation – on the ball 2

Data provider	Incentives
	Economic Money **2** **2** **2** **2** Cover costs Must provide value 1 Money 3 Payment- time. ↑Workload ↑Paperwork 1 Someone will have to pay for time for data provision 3 *Public relations* Client relations 3 *Standards/assurance* Farm assurance (client need) 1 Compulsion Indirect compulsion Enforcement 1 *Logistic* Easy to do 2 User friendly customisable data entry 3 Succinct- visual 2 Simple 2 Simple ↓Work load – ease of recording
Vet Practice	*Pig Health/Surveillance* Raising awareness of condition- reaction-improving health Access to raw data as well as pre-designed reports 3 Improved health 2 Improved use of medication *Professional* Kudos – being part of something good. Part of bigger group- collaboration Increase rates at which younger vets gain experience , professional development 2 Interest 3 Reputation- proactive 2 Access to data= better service 1 *Economic* Payment Attract clients Cover costs Must provide value 1 Value proposition Must stack up Payment- time. ↑Workload ↑Paperwork 1 More work – solicit work based on risk patterns 3 *Public relations* Client relations 3 *Standards/assurance*

Data provider	Incentives
	Farm assurance (client need) 1
	Indirect compulsion
	Enforcement- QA 1
	Logistic
	Want passive data extraction
	Simple
	Practice management system 2
	Ease of data analysis 3
Lab	*Pig Health/Surveillance*
	Sharing Information (increasing knowledge base) 3
	Contribute to national health (one health) 1
	Providing pig industry support 3
	Added Value 1
	↑Surveillance 1
	Know what is going on 'on the ground' 1
	Professional
	Job Satisfaction 3
	Opportunity for publication/ research 3
	Economic
	Financial 2
	£- private labs 1
	Money 3
	Marketing tool (?) 2
	Added Value 1
	↑Business for private lab 2
	More work submissions 2
	Public relations
	PR
	Improved dialogue with industry 1
	Standards/assurance
	Logistic
	Simple extraction (no cost!) 1
	Needs to be easy 2

Significant overlap between reasons why data sources may provide data and incentives.

Question 3. The needs of different audiences (potential stakeholders) from syndromic surveillance data

Table App5: Audiences and their needs with frequency of data report or access

This table is summarised from all group responses. Many groups indicated that the same needs existed for industry, keepers, companies and vets and where appropriate those needs are replicated across the audiences

Audience	Surveillance needs	Frequency
Government - policy	Over view simple	Monthly and need to know

Audience	Surveillance needs	Frequency
	Priority data, new/emerging risks to industry. Collated	Monthly
	Risks, alerts and compliance (with EU)	Reactive reporting but continuing access
	Trade, New and emerging, Notifiable	
	Notifiable disease/ Public health disease info	Daily-weekly
	Zoonotic disease investigation, early warning, new/ emerging, change of trends, welfare, 1 freedom of disease-syndromic to feed info further investigation, 3 export approval 2	1-28 days
Government - surveillance	Reliable	Monthly and need to know
	Quarterly trends	Ongoing and immediate
	Priority data, new/emerging risks to industry. Collated	Daily for analysis
	All data for trends	Reactive reporting but continuing access
	NERT, Notifiable, Reputable (zoonosis), Food safety	Daily-Quarterly
	Zoonotic disease investigation, early warning, new/ emerging, change of trends, welfare, 1 freedom of disease-syndromic to feed info further investigation, 3 export approval 2	1-28 days
Pig industry (AHDB Pork)	Reliable	
	Quarterly trends	
	Endemic disease and epidemic threat	
	Diagnoses and syndromes	
	Benchmarking	
	Health Management, trends, risks	Reactive reporting but continuing access
	Threats, PR issues, Early alerts	Weekly-Quarterly
	Red alert system for keepers/vets	
	Everything 2	1-28 days
Pig keepers	Reliable	Monthly and need to know exception reports. Changes
	Quarterly trends	in patterns and trends (regional farm as applicable
	Endemic disease and epidemic threat	
	Diagnoses and syndromes	
	Benchmarking	Quarterly but immediate on threats
	Health Management, trends, risks	Reactive reporting but continuing access
	Threats, PR issues, Early alerts	Weekly-Quarterly
	and regional data	
	For farmers- collated data is more practical s currently have a lot of data in separate sources	
	Will get a digest from e.g AHDB, Local disease picture/notes1	7-28 days
Pig companies	Reliable	
	Quarterly trends	
	Endemic disease and epidemic threat	Quarterly but immediate on threats
	Diagnoses and syndromes	
	Benchmarking	
	Seeing what others have- risks /benchmarking	Reactive reporting but

Audience	Surveillance needs	Frequency
	Threats, PR issues, Early alerts and regional data	continuing access Realtime
	Everything, their info requirements may change depending on project 1	1-28 days
Veterinary practitioners	Reliable Quarterly trends Endemic disease and epidemic threat Diagnoses and syndromes Benchmarking Trends, all info. Threats, PR issues, Early alerts and regional data Red alert system Non specialist vets= unlikely to want a lot but opportunity to seek info 2 important specialist vet = everything1	Quarterly but immediate on threats Reactive reporting but continuing access Realtime 1-14 days
Pig Veterinary Society	Endemic disease and epidemic threat Diagnoses and syndromes Benchmarking Everything 1	Quarterly but immediate on threats 1-14 days
Pharmaceutical companies	Reliable Quarterly trends Incidence and prevalence, sectors, forecast Trends, where disease is Trends/usage, regional variation Cost of disease- vaccine breakdowns, disease trends, impact of interventions- pharmavigillance /ADRs Endemic Trends 1	Quarterly Reactive reporting but continuing access Monthly 28 days
Academia	Reliable Quarterly trends + on demand when demanded Access to raw data on syndromes/ trends/sector Trends too to target research All Research Direction, data source Data, robust data, pathogens / disease trends Everything 1	Annual/ on request Realtime Quarterly data Quarterly
Pork processors	Reliable Quarterly trends Guarantees food quality Want all Food safety, security(zoonosis, continuing supply, carcase quality) Disease trends, red alert Zoonosis 1 Antibiotic use AMR 3 Welfare 2	Realtime 6 monthly 7-28 days
Retailers	Part of a QA System Guarantees food quality	

Audience	Surveillance needs	Frequency
	Want all - commercial advantage Food safety, security Disease trends, red alert Zoonosis 1 Antibiotic use AMR 3 Welfare 2	 6 monthly 7-28 days
Feed companies	Regional data/ risks(distrib) Disease outbreak knowledge- hauliers, Mixing timetables, red alert system Biosecurity Risks 1 Mycotoxins etc. Feed transmitted 3 Potential adverse effects related to their products 2	Realtime 1-28 days
Consumer[1]	Part of a QA System Media driven risk info Need to know basis	 Annual
Assurance schemes	Health/welfare Want to know it exists Welfare, Medication Disease trends	 Realtime Annually
NGOs	As required All Disease trends	 Annually
Commercial labs	As required	
International consumer/trade	As required Disease trends	 Annually
Equipment/housing suppliers	Impact on health	Realtime
Hauliers	Regional data/ risks(distrib)	Realtime
Fallen stock providers	Regional data/ risks(distrib)	Realtime
Trading Standards	Disease trends, red alert	6 monthly
Public Health England		
Food Standards Agency	Zoonosis 1 Antibiotic use AMR 3 Welfare 2	

Main audiences were already identified for the discussion groups. Groups were asked to identify further audiences and those in blue were additional suggestions from the groups.
[1]One group questioned consumers being an audience for any of this information

Additional comments from groups:

a) Utilise "traffic light" system for reporting – everyone to hear about items which are red, selected for yellow, few for green

b) Different confidentiality agreements with different audiences

c) Data should not be censored based on audience but audience-appropriate data and interpretation should be available to all- freedom of information

d) In general data should be reported daily for any urgent outbreak. Max days for regular updates

4. Data needed from disease incidents (two groups)

Table App6 contains a list of possible clinical disease incident data provided to stimulate discussion.

Table App6: Prompt list of data for pig disease incidents

Pig clinical disease incident data
Confidential premises identifiers (not to be reported externally)
Attending vet (not to be reported externally)
County
Whether the unit signed up to the Significant Diseases Charter
Unit type (finisher, breeder-finisher etc)
Date disease incident began
Date vet consulted
How vet consulted (routine visit, telephone, emergency visit)
Age category of pigs affected – neonatal, preweaned, postweaned etc
If more than one age group affected, age category mainly affected
Stage of production affected if breeding pigs
Are affected pigs indoors or outdoors
How long have clinical signs been showing on the unit
How long do clinical signs show in individual pigs
What are the clinical signs
Ranking of clinical signs according to which is/are predominant
Is the disease incident a recrudescence of a pathogen/disease already present on this unit, or a possible new disease incident
Number of pigs in affected group
For most frequent clinical sign in breeding pigs, what % of pigs are affected
For most frequent clinical sign in growing pigs, what % of pigs are affected
Are affected pigs pyrexic
What approximate % of affected pigs die
Have post-mortems been undertaken to investigate
What clinical disease syndrome is predominant in breeding pigs
What clinical disease syndrome is predominant in growing pigs
What routine vaccinations are given to breeding pigs
What routine vaccinations are given to growing pigs
Have affected pigs been treated with antimicrobials
Response to treatment
Provisional (suspected) diagnosis

Table App7: Priority disease incident data identified for capture for SS by two groups
The data are prioritised (1 = most important). Confidential data is highlighted
Data in blue shaded areas considered less essential

Importance (1 – most impt)	First group	Second group
1	Place - **confidential**	Predominant clinical disease syndrome
2	Time	
3	Number animals	Combination of data – county, unit type, premises ID, vet, animal location. **Confidential**
4	Morbidity and mortality	Unit type
5	Clinical signs	Age category of pigs affected
6	Diagnosis	Linked farms
7	Rate of change	Is the disease incident a recrudescence of a pathogen/ disease already present on this unit or a possible new disease incident
8	Input sources	What approximate % of affected pigs die
9	End date, movement, treatment record, severity	Are affected pigs indoor or outdoor
10	Economic impact - **confidential**	Date disease incident began
Other comments	Free text description	Too complex? This is a full case incident report not the first level
Any data identified as non-essential		Unit signed up to Significant disease Charter Date vet consulted How vet consulted Ranking of clinical signs What routine vaccinations are given to breeding pigs What routine vaccinations are given to growing pigs Have affected pigs been treated with antibiotics

5. Group 5: How data should be collected (two groups)

5a) Methods: The groups were asked to list possible methods of data collection and rank them

Table App8: Methods of data collection and ranking (1 = favoured method)

First group	First group ranking	Second group	Second group ranking
Mobile App- hand held device like parcel delivery	1	Compulsory data input to a standardised format by PVS	1111
Faxed paper copies	2	Data from practice databases (as for SAVSNET) Qualitative or Quantitative	2212
Online web page	3	Lab data- VIDA	2 3 3 3
Excel or similar		By Farmer- standardised format prod records	3 3
Vet Practice/ database extracts		Abattoir if accurate- improved meat inspection and recording	3
Lab LIMS extract			
Voice recording / voice recognition			
Other comments	Who holds the data? Data is there not integrated IT systems exist Costs		
Frequency of reporting from surveillance providers	Quarterly and other incidents Weekly Real time – Automatic Danger if not real time may forget to report		

5b) Data collection pros and cons, from second group

Table App9: Pros and cons of data collection and collection frequency from second group

Data collection method	Pros	Cons	Frequency
Compulsory data input to a standardised format by PVS	Local accuracy. Standardised and comparable, expandable, real time	Frequency of visits, still need clarification of what is reasonable i.e. history of the problem. ? inclusive of telephone consultations	Real time

Data collection method	Pros	Cons	Frequency
Data from practice databases (as for SAVSNET) Qualitative or Quantitative	information is collected already –just needs to be standardised	is it adaptable to pig industry	Would like real time
Lab data- VIDA	highly accurate	CONS: Costly and throughput may miss geographical areas – top of pyramid	7-28 d
By Farmer- standardised format prod records	All areas of the sector should be represented, real time if we get engagement	Standardised approach may be difficult to achieve	Ideally daily, realistically weekly
Abattoir if accurate- improved meat inspection and recording	Good geographical representation	Accuracy, dead animals don't go to the abattoir	Real time
Farmer medicines on line record of use	Already compulsory just need to change format. V. Important to industry –antibiotic usage	Proxy- assumes appropriate medication is being used for a specified syndrome	Weekly

6. Data collation/analysis, reporting and funding (two groups):

6a) Who is best placed to collate and analyse data
First group identified several possibilities:
- SRUC / APHA/ -
- Universities
- An independent not-for-profit organisation not subject to FOI e.g. SAVSNET
- AHDB could collect data (as with RW) and APHA etc. analyse

Second group identified just one:
- Pig Hub with Academic support because of industry trust and previous work

b) What methods could be used to report data back to audience
- Dashboard where data can be looked at
- Alerts for important trends
- Forum for discussion
- Ability to dig down into data
- Interactive website, collated reports
- Preference quarterly digests with text alerts (preferred by second group)

c) Limitations to data reporting
- Confidentiality – no personal info
- Commercial confidentiality
- Time and money
- Critical mass of data needed
- How long is data kept?

d) Possible funding sources for a syndromic surveillance system rated according to how likely funding is to be available (1 = most likely) and estimating % contribution

First group:
1 Industry – AHDB Pork 75-80%%
2 Government 1-10%
3 Data use fees to any non contributors eg academics, pharma, retailers etc. 15-19%
* also in kind contributions, for example, some veterinary time

Second group:
1 Industry Levy Body 60%
2 Government 20%
3 Pharma 20%
Labs
EU
Research funding bodies
Crowd funding
Philanthropists

Showstoppers/other comments
Delegates were also asked to record:

- any absolute prerequisites for an effective syndromic surveillance system ie show stoppers without which they consider it would not be effective

- anything else considered important which was not been captured elsewhere during the discussions.

  - Avoid the trough of disillusionment
  - Avoid 'own goals'
  - Business incentive is key
  - Needs sustainable revenue model
  - Overzealous data interpretation
  - Has to be user friendly at all levels
  - Has to have commitment at all levels
  - The data must be representative
- Must be feedback loop
- Data must be simple to provide/capture
- Needs to be maintained so that longer term trends can be generated
- ICT vital

Additional Comments
a) For all questions, the smaller pig producer is not necessarily considered as a valuable audience or data source.

b) Private lab data: if there is no requirement for laboratories to provide data to the Government then is this data lost? Can we make use of it? Do we have to buy it?

APPENDIX 6 - DELEGATE FEEDBACK

Sessions identified by delegates as most valuable:

Syndromic Surveillance Session	Delegates indicating session was one of top three
Syndromic Surveillance – what is it etc	23
Syndromic surveillance for pigs in the Netherlands	25
Syndromic Surveillance by Private Veterinary Surgeons – feasibility trial	8
Mining data from veterinary records	14
Provision of data – reporting to users	20
Pre-discussion voting questions	3
Group-specific questions	19
Roundtable summary	5

Delegates opinion on whether event moved the discussion on Syndromic Surveillance forward:

Option	Number of delegates
Yes significantly	11
Yes a bit	12
No	0

Topics not covered which delegates suggested should have been:

- Some discussion on actually how data will be used and by whom
- Linking clinical surveillance with abattoir data given demise of BPHS
- Perhaps potential revenue models
- Interpretation with other elements (e.g. abattoir data)
- Developing pig vet focused Practice Management system
- Consumers/retailers Voice dissent
- Maybe, it would have been good to have some specific examples on how useful the syndromic surveillance has been in other countries where it has already been implemented

Were delegates clear what the next steps will be and comments:
Nine delegates responded "yes" they were clear, four responded that they were not clear and comments made were:
- Develop systems and IT
- Go for Innovate UK cross industry syndicate funding for gold standard system! Of Datavet Project in cattle sector
- Get on and do it!
- Depends on securing funding to develop a collection & collaboration system for syndrome data
- Piloting some elements nationally
- Not clear how it will be handled
- More attention to Business Sustainability
- How and where funding is divided into money input and resource input
- I think it is most important that AHDB are prepared to support this and sell it to the producers/ industry
- It is not clear for me who will have the governance of the pig syndromic system in GB, if it is implemented. It seems that APHA have already a system (dashboard) to gather, analyse and report back the information but the system requires more data from farmers, PVPs and private labs. How all is going to be integrated?

How satisfied were you with today's event overall?

How satisfied delegates were with the event overall	Number of delegates
Very Happy	7
Happy	16
In Between	1
Unhappy	0
Very Unhappy	0

Other edited comments from delegates on feedback form or after the event

- Needs full pig farm database-up to date nationally
- Be careful in drawing too many conclusions re pig producers- only two here and there were differing opinions between him and others in the group eg the benefits of data to the farmer - the only real benefit was ££
- Very well organised good venue
- Good day- great networking- good to hear the discussion many ideas committed people.
- Well done- great event and very well organised
- Will it be possible to get a summary report of the event
- Thanks for a most interesting day. Didn't get round to discussing show stoppers and some points raised by group 3 would be worth considering.
- Thanks
- Most important issues " feedback" & "ICT"
- Thank you
- I think "government" was not mentioned in some of the questions that we discussed and it seemed to be amalgamated with "lab". I think the drives are different for the lab and for the government.
- Producers were very under-represented and this may be an issue as likely that they, directly to their vets, or indirectly via the levy will have to fund Syndromic Surveillance.
- Of note that the practitioners attending in large part reflected those previously engaged and interested in surveillance, including NADIS – there are others who have not yet engaged and their views and not captured and, good coverage depends on input across the pig veterinary community.
- Enthusiasm expressed for use of a handheld recorder on which a stylus is used, selecting responses from menus, transmitting in real-time, recording position by GPS and ability to use it as a phone. This could be expensive.
- The fact that there is no unified or even predominant clinical recording system in veterinary practices in the pig sector could be seen as a weakness or an opportunity for pig vets to build their own via a whole industry approach to Innovate funding.
- There appeared to be support for farmer reporting but no real thoughts on how to get them to do this and this is not easily addressed.

APPENDIX 7 - DELEGATE LIST

	Shane McGettrick, Dept. of Agriculture, Food & the Marine, Ireland
Callum Blair, Boehringer Ingelheim	Tim Nelson, Livestock Research
Ian Campbell, National Fallen Stock Company	Mandy Nevel, Royal Veterinary College
David Chennells, Acorn House Vets	Ana Pascual, Department of Agriculture in Northern Ireland
Alex Cook, University of Surrey	Christina Pettit, BQP Veterinary Services
Lucy Coyne, AHDB Pork	Sara Robertson, Animal and Plant Health Agency
Georgina Crayford, National Pig Association	Ramon Romero, Food Standards Agency
Zoe Davies , National Pig Association	Michael Seals, National Fallen Stock Company
	Jim Scudamore, Pig Health and Welfare Council
Jane Downes, Pig Health and Welfare Council	Martin Smith, AHDB Pork
Milen Georgiev , Food Standards Agency	Richard Smith, Animal and Plant Health Agency
Theo Geudeke, Animal Health Service, Deventer	Bob Stevenson, British Pig Association
Carla Gomes, SRUC	Lesley Stringer, Animal and Plant Health Agency
George Gunn, SRUC	Paul Thompson, Garth Partnership
Gareth Hateley, Animal and Plant Health Agency	Jill Thomson, SAC Veterinary Services
Gordon Hickman, Animal and Plant Health Agency	Jake Waddilove, Eastgate Veterinary Group
Stewart Houston, Animal Health and Welfare Board for England	Meryl Ward, AHDB Pork Board
Richard Irvine, Animal and Plant Health Agency	David Welchman , Animal and Plant Health Agency
Joe Jacobs, Scotlean Pigs Limited	Mark White, Pig Veterinary Consultant
Phil Jones, University of Liverpool	Alan Wight , Animal and Plant Health Agency
John Mackinnon, Pig Health & Production Consultancy	Susanna Williamson , Animal and Plant Health Agency
Adrienne Mackintosh, Welsh Govt.	Nigel Woolfenden, Bishopton Veterinary Group