Animal &
Plant Health
Agency

Syndromic Surveillance in GB Pigs

What is it, what do we have in place, what more do we want and what are the main challenges?

PHWC Surveillance Subgroup Roundtable

September 15th 2016

What is syndromic surveillance?

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 (Syndromic Surveillance Systems in Europe) project

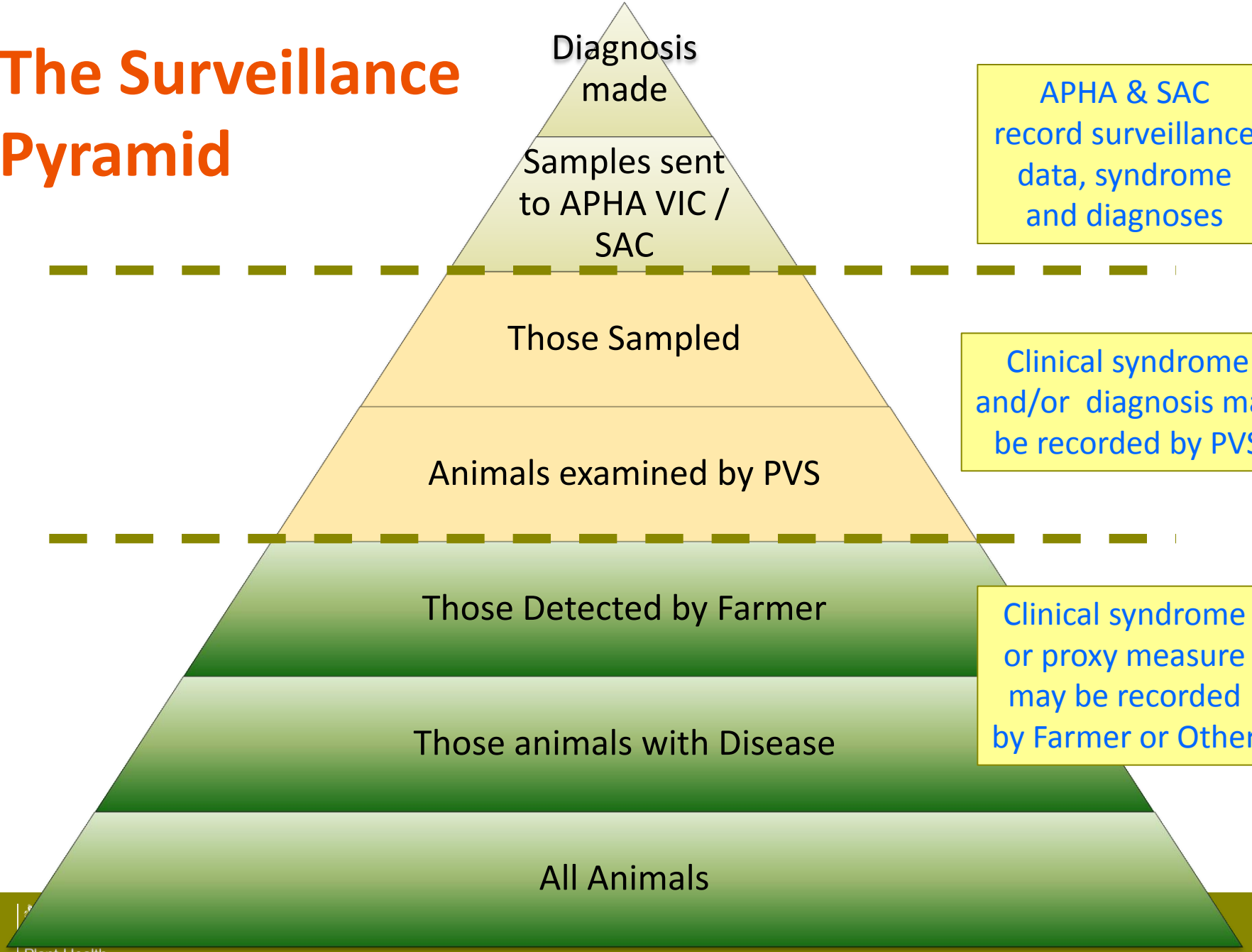
Syndromic surveillance strategy in development post Surveillance 2014

- Establish alternative and additional livestock disease surveillance data sources

- Extend capture of disease surveillance data to
  - increase sensitivity in scanning surveillance
  - increase confidence of promptly detecting potential new and emerging disease threats
  - accept that to do this, some of the data will be of lower specificity.

- Diverse livestock health-related data sources of variable availability and differing value exist. Those most relevant to SS are close proxy, or actual, measures of clinical disease syndromes and collectively these can provide syndromic surveillance.

The Surveillance Pyramid



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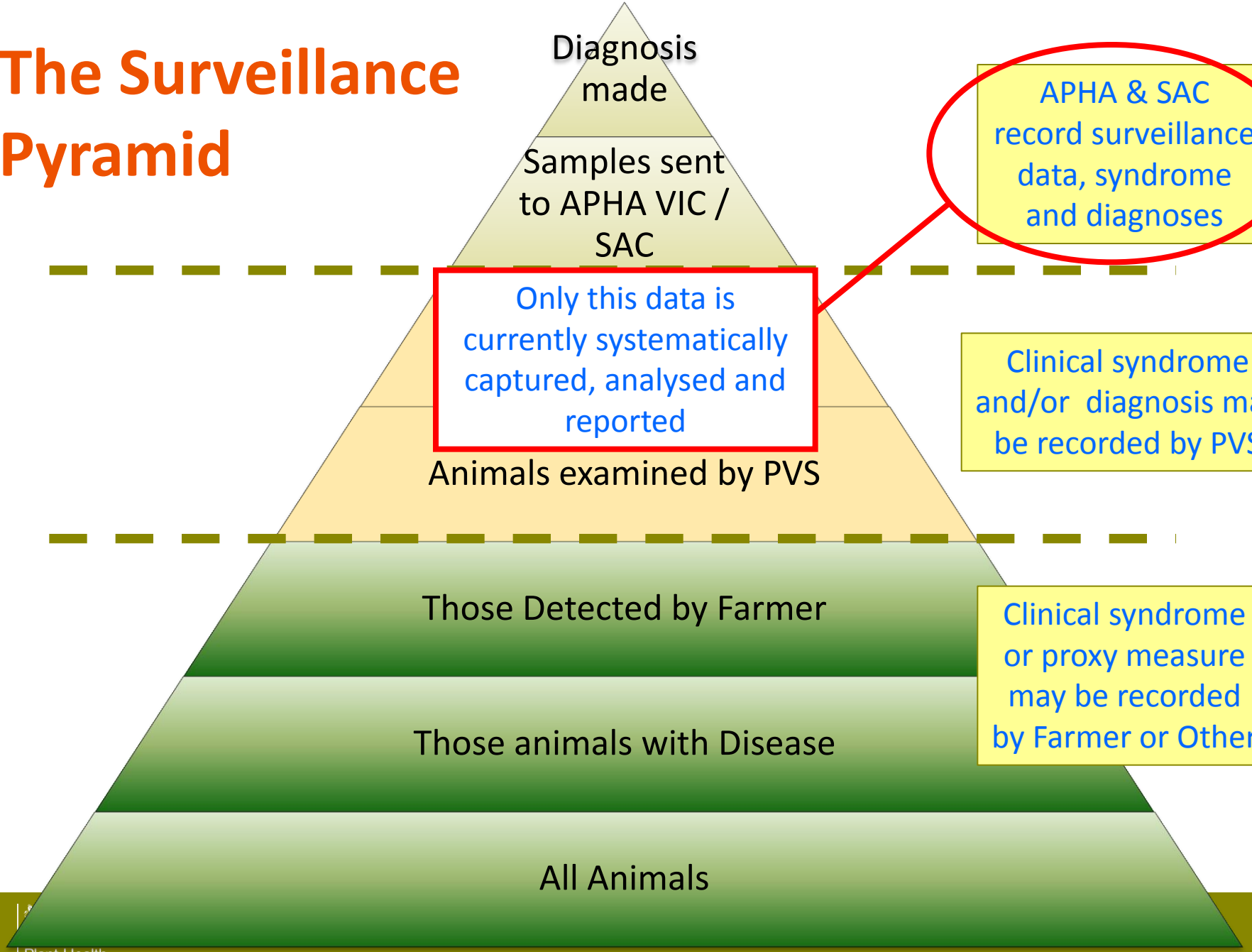
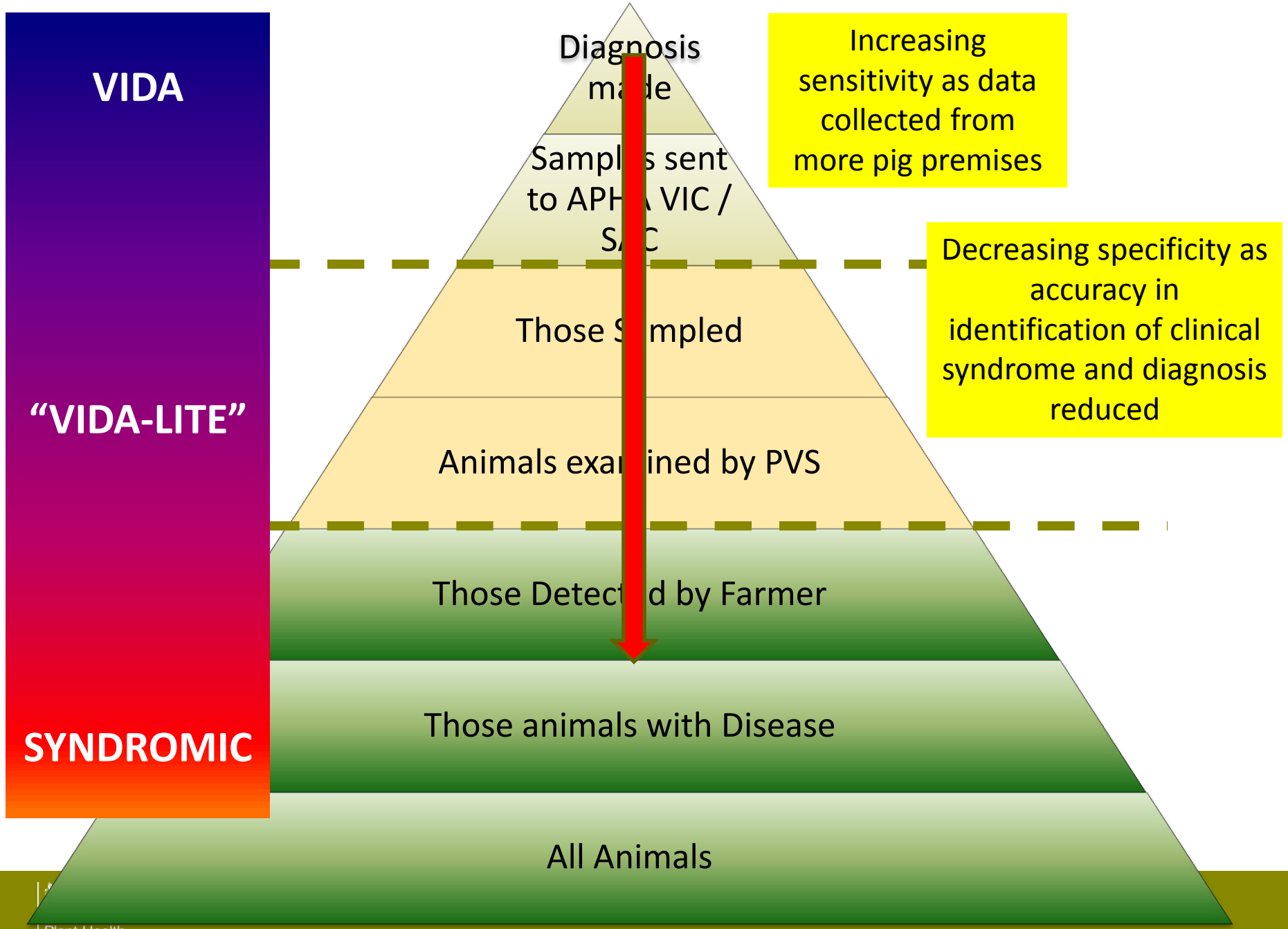


Livestock and wildlife disease surveillance - VIDA database

Veterinary Investigation Diagnosis Analysis

- National database
- Records all diagnoses
- All AHVLA and SAC laboratories enter data
- Strict diagnostic criteria


VIDA
"VIDA-LITE"
SYNDROMIC
Diagnosis made
Samples sent to APHA VIC / SAC
Those Sampled
Animals examined by PVS
Those Detected by Farmer
Those animals with Disease
All Animals
Increasing sensitivity as data collected from more pig premises
Decreasing specificity as accuracy in identification of clinical syndrome and diagnosis reduced

An aim of syndromic surveillance – contribute to threat detection

- Notifiable disease
- New disease or pathogen
- New pathogen variant/subtype
- New, rare or emerging antimicrobial resistance
- Public health-related – zoonosis, toxin
- Changes in endemic disease trends
- Unusual diagnoses or presentations
- Other (any not fitting the above)

Threats may present as common clinical syndromes or diagnoses occurring at higher rates

Two approaches to Syndromic Surveillance

- Proxy measures
  - distilled from available data sources

- Direct measures
  - clinical syndrome surveillance
  - specifically designed to capture clinical data

Syndromic Surveillance “by proxy”

Syndromic disease information from other data sources – examples for pigs

- AM use recording - reason for treatment
- Abattoir lesion recording
- Fallen stock

Antimicrobial use – electronic Medicines Book-Pig (eMB-Pig)

Pig Industry Medicines Hub

- An online record of total on-farm antibiotic use for the UK pig industry
- Password and username protected
- Single database providing an easy way to record all antibiotic usage
- Compliance with Red Tractor and QMS Farm Assurance Scheme
- Aggregated, anonymised national data to VMD and Brussels
- Built upon similar model to eAML2 (electronic pig movement system)
- Developed and designed by the pig industry in partnership with VMD

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Reason for treatment and AM use as a source of Syndromic Surveillance data

Pros and Cons

- Legislative requirement to record medicines use
- Farm level – good coverage
- Bench marking and trend analysis possible
- Real-time data likely to be patchy
- Recording reason for treatment is not a current priority
- Lack of IT use/mobile coverage in some areas/pig units

Has potential to be of increasing value in long term

AM use: eMB-Pig includes reason for treatment

Clinical Signs	Syndrome
Select one principal clinical sign for which treatment is being given	
Nasal discharge Sneezing Coughing Thumping Puffing Blowing Laboured breathing Suspect pneumonia Suspect APP	Respiratory
Scour Loose dung Blood/mucus in faeces Dehyration Rectal prolapse Vomiting	Enteric
Paddling Head tilt Tremors (continued)	Nervous

Abattoir lesion scoring – changes afoot

- FSA and livestock industries working to improve and rationalise CCIR lesion/condition scoring
- Industry-funded BPHS abattoir lesion scoring by vets - future uncertain

Abattoir lesion scoring as a source of Syndromic Surveillance data (and other)

- Specific diagnoses e.g. fluke, milk spot
- Specific pathologies e.g. pneumonia, pleurisy
- Syndromes can be inferred and assigned from the above
- (Welfare)

Abattoir lesion scoring as a source of Syndromic Surveillance data

Pros and Cons

- Individual, batch and farm level – good coverage
- Bench marking and trend analysis possible
- Quality of data (batch/pig id, training, time, IT, motivn)
  - BPHS and CCIR comparison
- Lesions/conditions recorded mainly historic/subclinical
  - BPHS and VIDA pig respiratory syndrome assessed BPEX project
- Farmer/vet confidence in CCIR results

Less useful for prompt detection of NET but has value for monitoring trends in health of individual and national herd

Abattoir lesion scoring as a source of Syndromic Surveillance data

Offal - APHA comments/suggestions and

Syndromic classification (for data to feed into)	Lesion/Condition to be recorded
Enteric	Milk Spot
Systemic	Peritonitis
Respiratory	Pleurisy mild Pleurisy severe
Respiratory	Abscess lung single Abscess lung multiple
Respiratory	Pneumonia mild Pneumonia severe
Systemic	Endocarditis
Systemic	Pericarditis

Fallen stock as source of Syndromic Surveillance data

- Has potential as early warning and recording livestock mortality is a legal requirement

BUT, in pigs, value currently limited as:

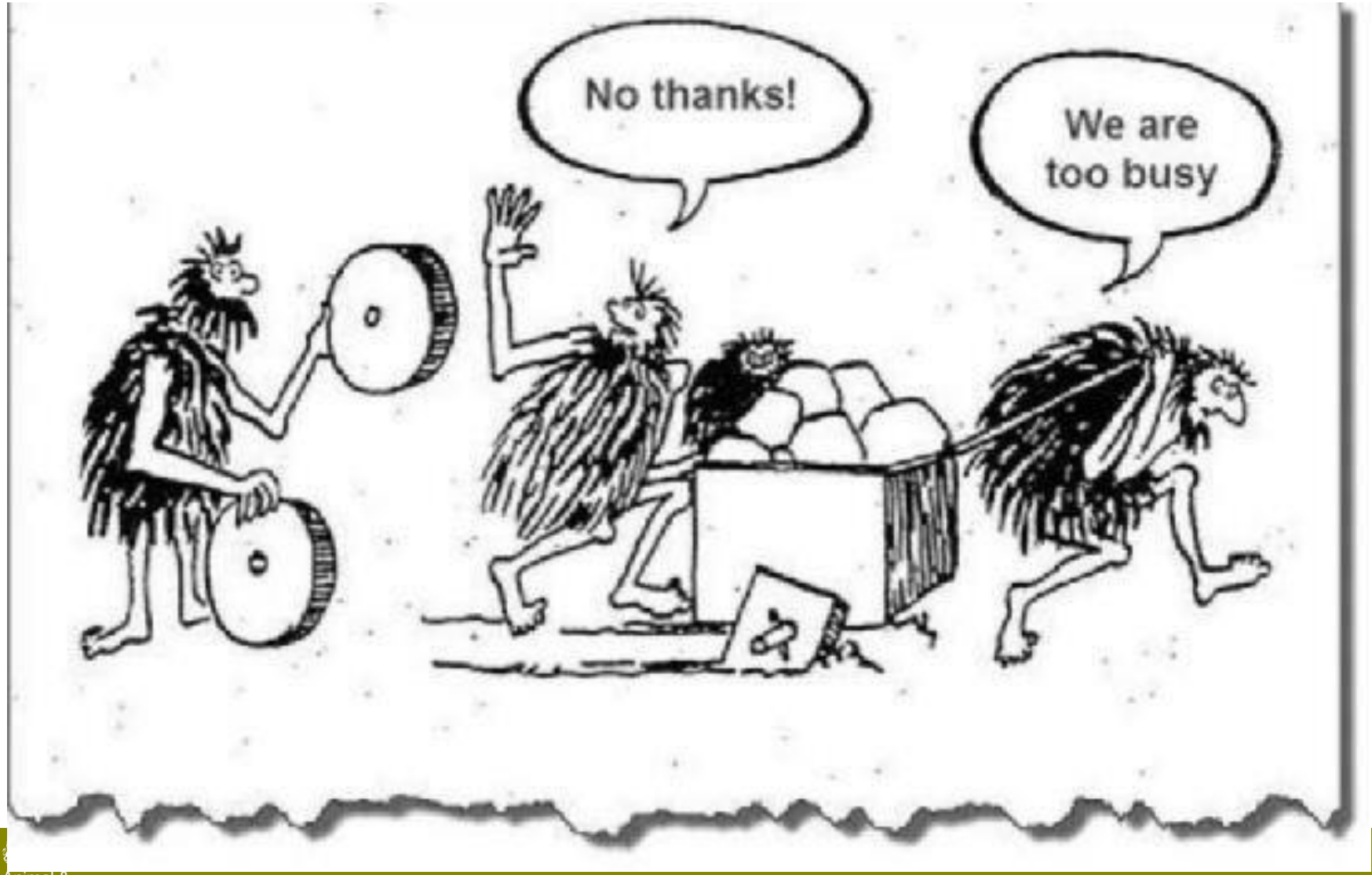
- Weight recorded not carcase numbers, weight estimates only
- Variable recording methods, some still paper-based
- Some significant contractors not part of NFSCo
- Non-specific – no syndromes, culls vs deaths
- On-farm incinerators

- Recent NFSCo meeting explored use of data
- Some NFSCo initiatives currently in progress

Direct: Clinical Syndromic Surveillance data
Disease incident information

- Farmer/keeper and/or vet and/or vet practice or labs…
- Real time or regular/intermittent
- Sector specific or sector common
- IT requirements
- Funding
- Who acts as data hub – industry/APHA/other?
- Some prerequisites
  - Farm premises unique identifiers
  - Unit baseline data – link with other databases

Direct: Clinical Syndromic Surveillance data
Disease incident information



Pig industry and clinical syndromic surveillance Pros and Cons

- Small number of pig practitioners/practices see large proportion of assured pigs, most slaughter pigs are assured
  2009 PVS survey: @ 28 vet practices attend @85% of quality assured pigs
  - All assured pig premises are routinely visited on quarterly basis
  - Most attended by a pig practitioner
- Pig practitioners regularly undertake PME so can provide both clinical and pathological data
- Commercial sensitivity of information and trade
- Potential confidentiality issues arise more readily
- Smallholder/pet pigs under-represented

Extracted from Ely and others, 2012 *Vet Rec;171:17 423*

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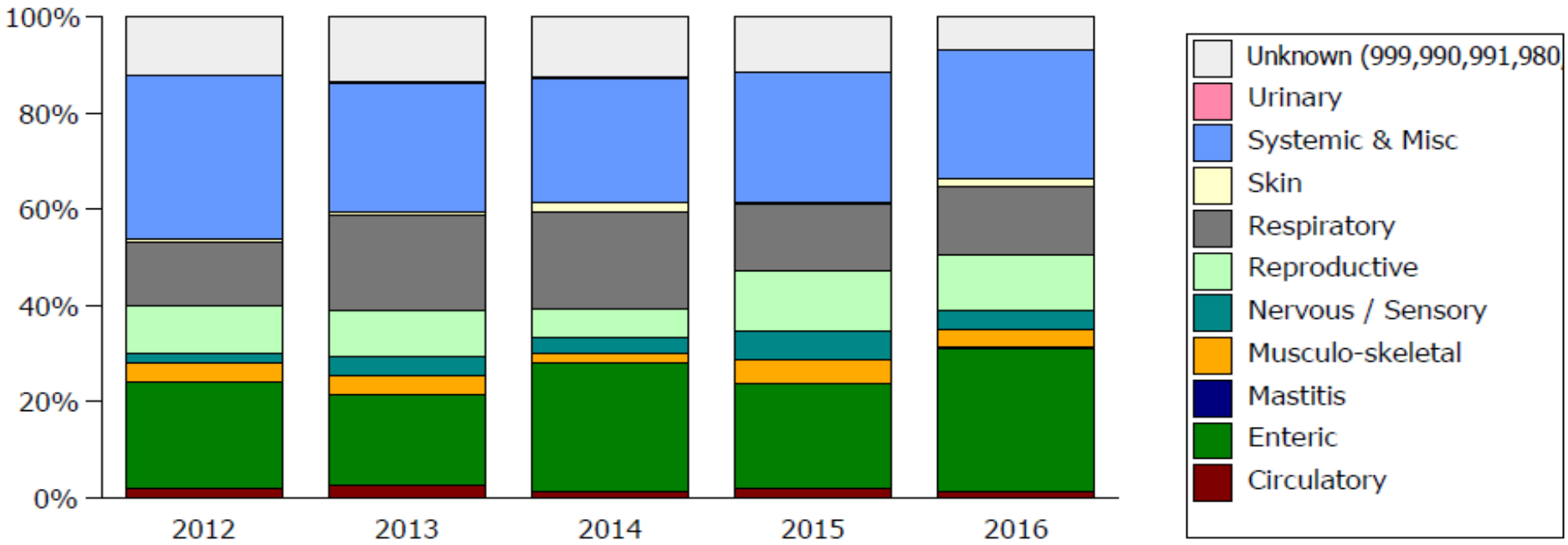
TABLE 3: The number of pigs and holdings of different size and type in each of the four counties and in England overall, according survey data and the agricultural census

	Cumbria	Devon	ERY	Norfolk
Survey data*				
Estimated number of pig holdings	156	371	336	354
Holdings registered with specialist practices (n (%))	33 (22.2)	79 (21.3)	321 (95.5)	256 (72.3)
Estimated number of pigs	40,580	68,243	421,698	450,290
Pigs on holdings registered with specialist practices (n (%))	32,583 (80.3)	52,691 (77.2)	419,420 (99.5)	418,744 (93.0)

*Includes estimates for non-responding practices and those with missing data
ERY, East Riding of Yorkshire

Extracted from Ely and others, 2012 *Vet Rec;171:17 423*

VIDA is a source of syndromic surveillance data



APHA pig submissions in each syndrome during April to June 2012 to 2016

Initially inferred from clinical (presenting) signs then qualified by VIO from other findings

VIDA as a source of syndromic surveillance data

Pros and Cons

- High quality – high specificity
- Syndromes well aligned with diagnoses
- Longstanding - trend analysis possible
- VIDA submissions reducing in some areas
- Lab level data
- Low and uneven coverage – low sensitivity
- Biases in submission types
- Submissions affected by many variables

VIDA as a source of syndromic surveillance data

Pros and Cons

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- Syndrom
- Longstan
- VIDA sul
- Lab leve
- Low and
- Biases in
- Submiss

		Total		
		Subs	2015 v Prior2	2015 v Prior 5
England	East Midlands	388	132 %	116 %
	East of England	1,673	114 %	108 %
	London	4		
	North East	103	113 %	72 %
	North West	281	58 %	47 %
	South East	588	61 %	50 %
	South West	1,016	93 %	71 %
	West Midlands	418	78 %	65 %
	Yorkshire and The	2,011	95 %	103 %
		6,482	96 %	89 %
Wales	Wales	162	93 %	66 %
Scotland	Scotland	1,184	93 %	53 %
Unknown		517	58 %	55 %
	Sum:	8,345	93 %	81 %

What would clinical syndromic surveillance (with potential to extend to VIDA-lite) allow?

- Allow others to contribute more to, and receive more representative information from, the surveillance system
- Capture diagnoses and syndromes for incidents tested outside APHA-SAC network
- Syndromic surveillance ideally part of a continuum with “VIDA-lite” and VIDA
- Capture of diagnoses not fulfilling full VIDA criteria

Benefit to national surveillance and threat detection as could enable:

- Simultaneous unusual clinical incidents to be noted promptly
- Monitor for changes in trends in disease syndrome patterns
- Targeting of enhanced surveillance and testing
- Soliciting of material/information for investigations
- Joins up diagnostic surveillance with field situation
- Targeting of advice – differentials, samples, tests
- Provision of evidence for absence of threats
- Identification of surveillance gaps
- Alerts for notifiable or exotic diseases

Clinical Syndromic Surveillance Examples

Pig disease incident data

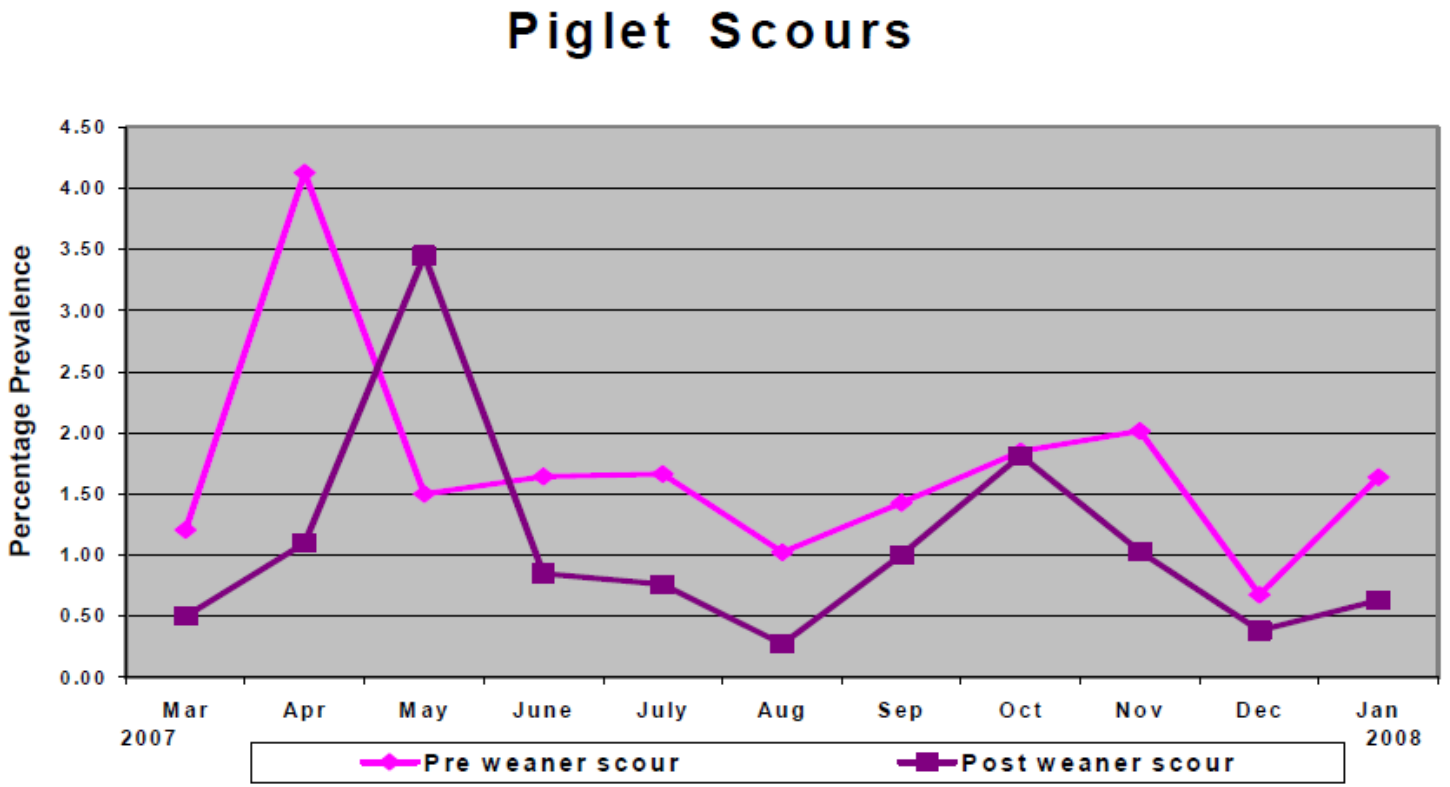
Netherlands initiative - Theo

Pilot trial in BPEX Pig H&W project – Carla

Mining veterinary practice records - Philip

National Animal Disease Information – NADIS via sentinel vets to 2011

- Clinical syndromic and diagnostic data from pig practitioners
- Challenges: standardisation, time, coverage, benefits…



Extracted from February 2008 NADIS report

Ideal features of clinical syndromic surveillance

- Wide and representative coverage (geographic, herd type etc)
  - sensitivity
- Accurate identification of clinical syndromes
  - specificity
- Real-time reporting with regional information
  - early warning and engagement
- Assurance of confidentiality
  - engagement
- Technology to allow rapid accurate reporting
  - engagement, cost, quality, early warning

Motivated engaged providers

AND

Motivated engaged funders (audiences/users)

Both essential for successful clinical syndromic surveillance

Surveillance "club with a hub" concept