GB surveillance
Pig diseases

Veterinary Laboratories Agency

Working for public and animal health

SAC

Quarterly Report: Vol 12 - Q4 2009

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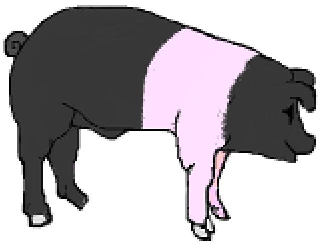


The VIDA diagnoses are recorded on the VLA FarmFile database and comply with agreed diagnostic criteria against which regular validations and audits are undertaken.

The investigational expertise and comprehensive diagnostic laboratory facilities of both VLA and SAC are widely acknowledged, and unusual disease problems tend to be referred to either. However recognised conditions where there is either no diagnostic test, or a clinical diagnosis offers sufficient specificity to negate the need for laboratory investigation, are unlikely to be represented. The report may therefore be biased in favour of unusual incidents or those diseases that require laboratory investigation for confirmation.

VLA Regional Laboratories and SAC Veterinary Surveillance Centres have UKAS Accreditation and comply with ISO 17025 standard.

Contents

Highlights

A serious case of selenium toxicity is reported which resulted in many paralysed pigs but where the food chain was protected.

A case of necrotising rhinitis, tonsillitis and necrotising hepatitis not inconsistent with Aujeszky's disease was investigated and once this Notifiable Disease was eliminated it was demonstrated that lesions seen were due to PCV2 associated disease.

The continued low incidence of PMWS and PCV2 associated disease is reported and thought to be directly related to the introduction of PCV2 vaccines.

PRRS remains the most important disease of pigs in GB with concerns that an American vaccine derived strain may be introduced into the UK via weaners.

The incidence of swine dysentery continues to rise and is of major concern, given that during 2008 and 2009 multiple resistant strains of Brachyspira hyodysenteriae were identified.

defra

SCOTTISH EXECUTIVE

1) INTRODUCTION

This is the seventh pig surveillance report that combines information from all areas of Great Britain into a single, integrated overview of pig health across the whole region. It has been made possible through a partnership between Defra, SEERAD, the Veterinary Laboratories Agency (VLA) and Scottish Agricultural Colleges Veterinary Services (SAC VS) Division.

A key objective for any pig disease scanning surveillance system is to increase the likelihood of early detection of important changes in pig health. Any major disease occurrence, such as the FMD outbreak of 2001, can have a major impact either by threatening public health and/or animal welfare, or through its economic impact on the agricultural industry and ancillary related industries like tourism across the whole of GB. The possibility of the incursion of exotic diseases, the emergence of a new disease, or changes in known diseases are all risks which scanning surveillance seeks to mitigate. Until now, the surveillance networks north and south of the Scottish border have reported their findings separately, which reduced the likelihood of early detection of important changes in health in this single epidemiological population. The newly unified GB-wide data resource, coupled with new collaborative analytical processes should make detection of all these scenarios both easier and quicker.

The network of 14 VLA Regional Laboratories (RLs) and two Surveillance Centres (at Veterinary Schools) in England and Wales and 8 SAC VS Disease Surveillance Centres in Scotland provides a diagnostic service to private veterinary practitioners across. Clinical scanning surveillance information derived from diagnostic samples and carcasses is collected and analysed to determine baseline disease levels in the pig population. The aim is to provide an assessment of the current disease status of the GB pig population and to warn of potential risks from changing disease trends or new diseases and of zoonotic diseases of human health significance.

Since 1975, diagnostic data from both the VLA and SAC has been merged in the veterinary investigation diagnosis analysis (VIDA) database. This database has been an invaluable source of epidemiological trends for over 30 years, but was limited in the range of data recorded and the analyses available. In 1998, the VLA started to produce a more detailed dataset within FarmFile - a powerful database, linked to the VIDA database, containing a greater amount of descriptive epidemiological data on all submissions and incorporating analysis tools used for disease surveillance purposes. These tools provide automated statistical analysis and built-in "alerters" which highlight statistically significant and therefore potentially clinically significant changes in disease diagnosis and trends enabling more extensive analysis of data for England and Wales from 1999 onwards.

The harmonisation project was initiated in 2006 to allow the extension of FarmFile analysis to cover Scotland as well. This involved the development of a single, standardised data collection system; consistent diagnostic criteria and harmonised recording, which enables the collation of the disease surveillance data from all three countries. This has been achieved by collaboration between staff and disease consultants at the VLA and SAC VS, funded by Defra and SEERAD.

Detailed surveillance data from laboratory submissions for all three countries can now be collated, providing a far greater amount of data for analysis and interpretation by disease consultants at a GB level, resulting in improved disease understanding and efficient use of relevant expertise. This should enable action to be taken and resources to be appropriately targeted at an earlier stage than was previously possible, as the dataset is now much more extensive and drawn from the whole pig population of GB. Further analyses will be developed and refined to improve disease surveillance and the health and welfare of the pig population of GB.

2) OVERVIEW

UK SELF SUFFICIENCY

The UK now produces 73% of the food that we consume and is a significant exporter of lamb, wheat, dairy products and breakfast cereals.

PORK AND PIGMEAT SALES

Total pork exports were down 18% in Jan-Aug 2009 and imports were also down 13% compared with the same period in 2008.
In the 12 weeks to 1st November retail purchases of fresh and frozen pork were 3% higher than the same period of 2008.
For the four-week period ending October 4th 2009 consumer purchases of bacon and sausages soared, bacon was up 7.9%, pork up 5.3% and sausages were up 2% compared with the previous four weeks. Two supermarkets chains are mainly using cheap imports instead of providing British, particularly with respect to bacon and sausages. However, other supermarket chains are selling British pork products with the Quality Standard Mark.
In the first six months of the year imports were down 12% with more pork from Netherlands and Belgium but less from Denmark and Germany. Danish bacon was up by 25% compared with the first 6 months of last year.
Stewart Houston from BPEX spoke to MPs and applauded the efforts of the Co-op, Morrisons, Waitrose and M&S, all of whom had pledged 100% commitment to British pork and were in fact all seeing recent huge increases in sales.

PIG PRICES

The pig price in the week ending Nov 28th was 139.41p/kg, which was 6% higher than the price a year ago. The average weight was 79.7kg with an average probe (fat thickness) of 11.4mm. The 30kg spot weaner price was £48, 11% higher than one year ago.

FARM INCOME

Pig farmers showed a large increase in farm income over the 12 months to February 2009.
Pig production costs rose by 12% in 2008 against a European average increase of 24% mainly due to the exchange rate but there was a slight improvement in physical performance. Post-weaning mortality dropped from 7% to 6%. The average number of finished pigs per sow rose for the 5th year in succession to reach 20.9.
In addition, the growth rate increased to 757g/day for feeding herds. In 2009 the further fall in sterling has been offset by the increase in feed prices.
Pig producers are now in profit but are clearing the huge mountain of debt they have accumulated. As pig production becomes more profitable sow numbers are likely to increase.
The top third of the producers now rear 25.16 pigs per sow per year indoors and 24.15 outdoors in the 12 months up to June 2009.

CEREAL CROPS

The forecast plantings for wheat for harvest in 2010 are slightly less than for 2009 (down 1.5 million hectares from the 222 million planted in 2009). The barley plantings for the 2010 harvest are also down by about 800,000 hectares from a total of 13.1 m hectares for 2009.

Overall it looks as if the stocks of maize, wheat and soya could be at the highest since 2001-2002. This may mean that the value of such crops may slide over the rest of 2010 unless there is a late failure of Southern hemisphere crops and a dreadful spring in the Northern hemisphere.

The availability and prices of cereals affect the profitability of pig farming.

POLLUTION

Nitrate vulnerable zones affect a large part of the country and will have a significant effect on outdoor pig keeping unless the right decisions are made before the implementation of the new rules in January 2012. There has to be a farm plan for manure disposal. It will affect producers on concrete with slurry systems particularly. There will be a limit of only 3 months to spread and there must be 6 months storage facilities. It will be more complicated to provide new storage facilities if farms are near residential accommodation (smell considerations) or in low-lying land. In addition the levels proposed may mean that the average outdoor producer may have to halve the stocking density of outdoor sows.

MRSA

The superbug MRSA is present in pigs in 17 out of 24 countries in the EU but was not detected in the EU survey of British pigs which was undertaken on behalf of the EFSA. No legislation is currently in place to prevent the importation of MRSA carrying pigs from affected countries into GB.

SALMONELLA

Ten per cent of the salmonella control programmes were reviewed by Prof. Geoff Mead of the Farm Assurance Technical Advisory Committee. He considered that they did not include enough effective action and the plans were requested to be re-submitted.
Cleaning and disinfection plans, rodent control, general farm maintenance, biosecurity and importation of salmonella infected pigs on to the farm were considered to be problems. In an attempt to reduce levels at abattoirs, anal bunging, scalding and singeing are being looked at.

HUSBANDRY

A recent leaflet from BPEX has highlighted the advantage of removing iron from borehole water. It reduces sedimentation in the pipes, reduces bacterial growth, increases water output and is compact and easy to install.
A second leaflet has highlighted the responsibility of farmers to use medicines correctly and in particular fill in their medicines books properly.
A third leaflet highlights the waste of food that occurs when pigs are not deprived of food before loading to the abattoir. The loss occurs through direct feed wastage, through waste charges at the abattoir and reduction in carcase payment.

See Appendix 2 for an update on pig related publications.

2.1 Demographics, submissions and carcases

2.1.1Diagnostic submissions and carcases

Table 1: Pig Diagnostic Submissions and Carcases, 2005 – 2009 (Q4 only)
Table 2: Pig Diagnostic Submissions 2005 – 2009 for England, Scotland and Wales

Table 1

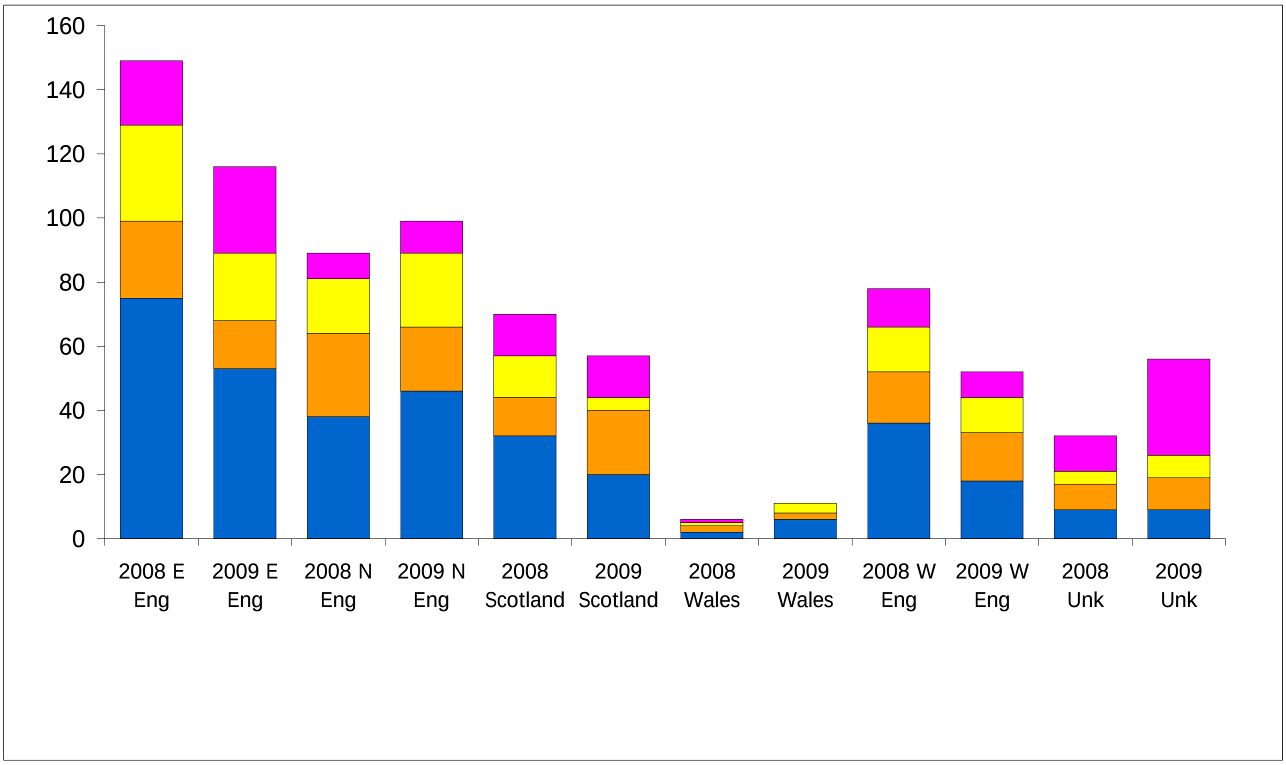
Quarter Oct - Dec	Submissions			Carcases		
	E&W	Scotland	Total	E&W	Scotland	Total
2009	251	140	391	245	47	292
2008	301	118	419	363	90	453
2007	230	61	291	215	38	253
2006	319	114	433	282	57	339
2005	290	120	410	262	95	357

Table 2

All Years 2005-2009	Breeding	Finishing	Rearing	Unknown/Other	Sum:
Eastern England	239	115	156	119	**629**
Northern England	176	126	78	53	**433**
Scotland	72	36	27	168	**303**
Wales	16	10	9	5	**40**
Western England	142	94	58	42	**336**
Unknown	43	31	21	113	**208**
Sum:	**688**	**412**	**349**	**500**	**1,949**

Higher carcase numbers in Q4 2008 were because of pleurisy project involving post mortem examination of pigs from numerous farms.

<u>Figure 1 : GB Diagnostic Submissions, October – December left column 2008 right column 2009</u>



2.2 The Meteorological Office report

In October and November, mean temperatures in GB were about 1^{o}C above the 1971-2009 average. October was slightly drier than average throughout GB but November was very much wetter – 150% of average rainfall fell in Scotland and over 200% in England and Wales.

December was a cold month throughout GB, with mean temperatures about 1.7 ^{o}C below average in England and Wales and about 2.7 ^{o}C below average in Scotland. Rainfall in December was close to average in England and Wales but almost 50% below average in Scotland.

Figure 2 Rainfall in England, Scotland and Wales in 2009

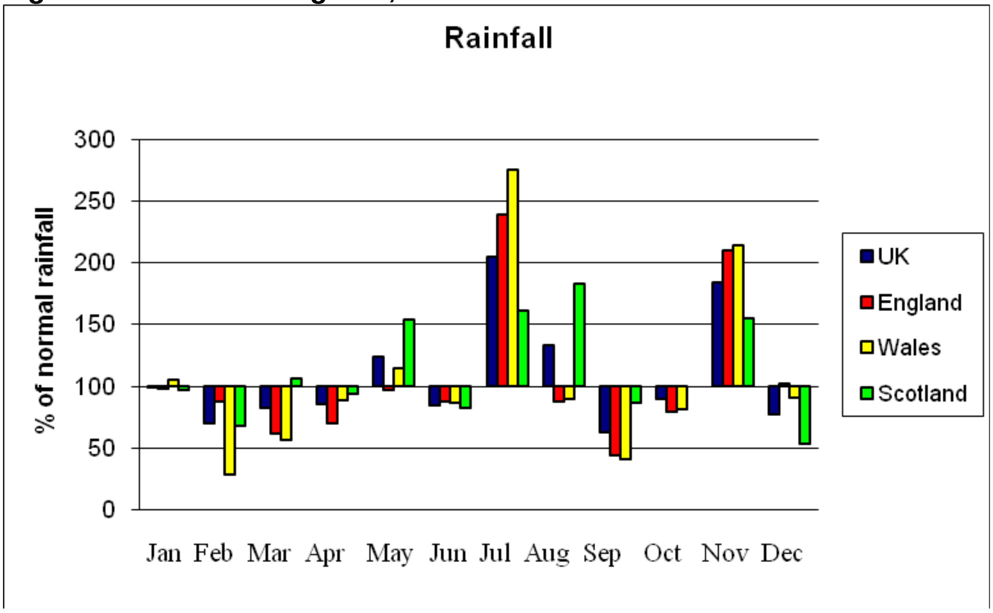
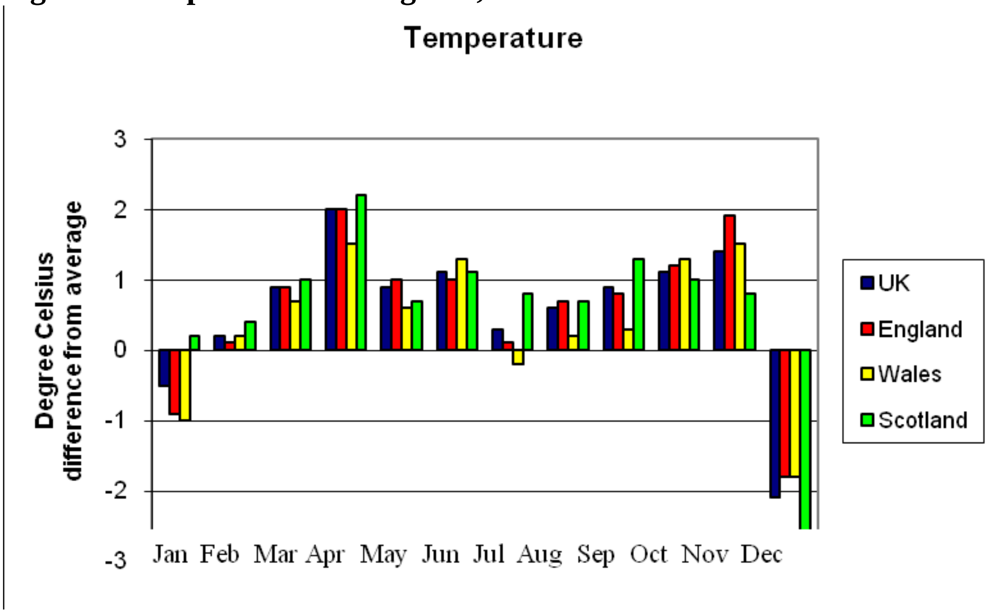


Figure 3 Temperatures in England, Scotland and Wales in 2009



November was wet and conditions were not good for pigs although temperatures were above average. During December the below average temperatures will have affected outdoor pigs where energy is expended in body temperature regulation and indoor fattening units where ventilation can be reduced to conserve heat in buildings. However, this was offset by average rainfall and dryer underfoot conditions for outdoor pigs and lower humidity for indoor pigs where high humidity can adversely affect the incidence of respiratory disease. The weather was consistent for much of the quarter and livestock respond well to consistent rather than changeable weather.

2.3 Potential Notifiable Diseases Investigated

An investigation following an increase in mortality in a continuous flow bacon house on a 300 sow farrow-to-finish indoor unit was undertaken. Clinical signs in affected pigs included severe acute onset malaise, dyspnoea, mild pyrexia (39-40^{0}C) and cutaneous erythema, followed by rapid weight loss and death. Total mortality exceeded 20% and case mortality was around 50%. Four typical, acute, unmedicated 13-week-old pigs were submitted for post mortem examination. Gross findings comprised mucopurulent to necrotic rhinitis, necrotic tonsillitis, generalised lymphadenopathy, miliary hepatic beige foci of necrosis up to 3mm in diameter ('sawdust necrosis'), severe multifocal splenic haemorrhage, splenic infarcts, and variable pulmonary purple discolouration and interlobular oedema. Enzootic pneumonia-like lesions were present in antero-dependant lobes, comprising 10-20% of lung volume. Despite the absence of reported reproductive signs on the unit, on the basis of these post mortem findings, particularly the hepatic sawdust necrosis and necrotic rhinitis and tonsillitis, and considering the high mortality among affected pigs in this outbreak, a diagnosis of Aujeszky's disease (pseudorabies) could not be excluded, and Animal Health was notified.
Tissues harvested from these pigs were sent for virus isolation and PCR for Aujeszky's disease virus (ADV) with negative results being obtained. In addition, blood samples taken by Animal Health during a farm visit triggered by the report, were sent for serological testing but were negative for ADV antibodies. Further investigation demonstrated that the disease was PCV2 associated.

See Appendix 1 for a world map detailing outbreaks of Notifiable Disease and swine influenza in domestic pigs and wild boar – Influenza is a Notifiable disease in some countries but not in GB.

2.4 Farm Investigational and Advisory Visits

Currently, farm investigatory visits by VLA Veterinary Investigatory Officers are recorded for England and Wales. For Scotland, SAC record investigations, which may or may not include a visit to a farm. Harmonisation of this information is being considered for future reports.
The information below is for England and Wales only.

Table 3:
Farm Investigation and Advisory Visits

Oct to Dec Q4	Breeder	Breeder Fattener	Breeder Rearer	Fattener	Rearer	Rearer Fattener	Other	Breeder/ Rearer/ Fattener	Total Visits
2009	5	0	0	4	1	2	3	3	18
2008	1	2	2	2	2	1	0	10	20
2007	1	0	2	7	1	2	1	8	22
2006	2	0	1	14	3	12	3	7	42
2005	0	1	1	1	2	1	0	4	10
Total	9	3	6	28	9	18	7	32	112

15 out of the 18 visits were salmonella investigations.

2.5 Food Safety Incidents

SAC Aberdeen investigated an incident of selenium toxicity in pigs, arising from the inclusion of a feed supplement called Devi-jex, included in an attempt to reduce the incidence of tail biting. 50 out of a group of 280 growers after having access to a home mixed feed that contained the supplement became paralysed. It transpired that the concentration of selenium within the compound was far higher than it should have been and as a consequence the finished feed contained approx 200 times the recommended level of selenium.
The pigs that received the supplemented feed developed ataxia, progressing to hind and forelimb paresis within about five days of being introduced to the ration. They were bright, a febrile and keen to feed and drink when. Several were euthanased for diagnostic purposes and had spectacular spinal cord lesions amounting to necrosis of tissue within ventral horns of the spinal cord resulting in cavitation and reactive changes. In total 416 pigs were euthanased and of these 100 were on welfare grounds and the remainder because of restrictions that would have been applied at slaughter, which made their sale for human consumption uneconomic.

3) ENDEMIC DISEASE SURVEILLANCE

A note about the disease trends charts.
This section of the report gives information on the data collected and analysed for diseases that were especially prevalent during the quarter due to seasonal influences or are especially topical or noteworthy for the period covered. For this report, data for England and Wales and Scotland have been combined onto a single histogram. Our charts show the number of diagnoses (numerator) as a proportion of the number of submissions in which that diagnosis was possible (denominator). These proportions are represented as blocks and the GB, combined, proportion as a line. The blocks are accompanied by bars indicating 95% confidence limits – generally, the greater the number of samples examined, the smaller is this range and the greater the confidence that reported figure is true. Note that the y-axis scale of the charts varies and therefore care must be taken when comparing individual charts.

3.1) Salmonella and Salmonellosis

The rate of diagnosis of salmonellosis from GB diagnosable submissions fell markedly in Q4, 2009, to 4.9 % (10/205), down from 11.6% in the previous quarter, and from 10% in the same quarter in 2008.

However, in the case of SAC submissions alone, the rate of diagnosis increased from 10% in Q4, 2008 to 12.5% this quarter, albeit on a lower number of submissions tested. This apparent reduction may be related to the further control of PCVD by vaccination and greater awareness by farmers and practitioners of the signs of salmonellosis, who then do not need confirmatory post mortem examinations.

Of the 10 confirmed cases, 5 isolates were *Salmonella Typhimurium,* with phage type U288 in 3 cases and one each of PT 320 and untyable.

S. Derby was isolated from an outdoor farrow to finish unit practising biodynamic in addition to organic methods. Clinical salmonellosis had occurred with a single group of growing pigs and the organism was present in environmental and faecal samples collected from the growing pig pens, but was not isolated from environmental samples collected from the farrowing fields during a ZO4 advisory visit.

SAC reported the isolation of a Group C *Salmonella* organism from seven-week-old pigs as a coinfection with *Brachyspira hyodysenteriae.*

In one of the *Salmonella Typhimurium* incidents, *Brachyspira pilosicoli* together with a heavy *Trichuris spp* worm burden were present, resulting in severe large intestinal pathology.

In a separate incident, a multidrug resistant *S. Typhimurium* U288 was isolated in addition to *Streptococcus suis* type 5 from pigs with nervous signs in which meningitis was confirmed by histopathology.

Under the ZNCP support project (FZ 2015), four visits were made this quarter, with *S. Typhimurium* phage types U288 and 193 again predominating.

No Intervention/Demonstration Farm faecal samples were tested under the same project in this quarter.

3.2) Brucellosis

The number of cultures for Brucella suis undertaken at Regional Laboratories since Q2 2007 is shown in Table 4. Brucella suis was not isolated from any of the specimens cultured. New guidelines on sampling were issued, after agreement with Defra, together with a reminder, which has resulted in an increased number of samples being cultured, compared to the previous quarter.

Table 4: The number of primary cultures for *B.suis* undertaken by Regional Laboratories under project SB4070

	Q1	Q2	Q3	Q4	Total
2007	**Data not available**	**26**	**24**	**7**	**57 plus Q1**
2008	**33**	**13**	**26**	**7**	**79**
2009	**10**	**11**	**14**	**47**	**82**

3.3) Streptococcal Infections

Table 5: *Streptococcus suis* figures for October to December 2005-2009

type	1	2	3	4	7	8	9	11	12	14	15	16	21	22	23	26	29	31	1/2	N/T	totals
year																					
2005		15	4	4											1			1			25
2006	3	11	1	1		1			1		1								1	1	21
2007	1	8	5		2	1	2				1									1	21
2008	1	12	2	1	2	1						1		1					1	3	25
2009	1	15	2	3		1		1		1		1	1			1	1			3	31

Table 5 shows similar results to previous years; the predominant strain is type 2 (approximately 50% of isolates). There are small numbers of some of the less common types in this quarter.

SAC will be sending some of their untypable strains of *Streptococcus suis* to Bury St Edmunds as SAC had commented that they were encountering more untypable strains of *S.suis*

No other bacteria (isolated from pigs) of note were referred to Bury St Edmunds (Bury St Edmunds is the determinative bacteriology Regional Laboratory for England and Wales)

3.4) PMWS

The decline in quarterly percentage of relevant diagnostic submissions with a diagnosis of PMWS continued for Q4 for GB (see histogram figure 4) as was seen for the previous quarter. GB recorded the lowest Q4 rate of diagnosis (1.38%) since 2003 Q4. The GB annual rate of diagnoses for PMWS for 2009 was the lowest at 2.9% since a peak in 2003 at 24.6% (see figure 6 below). The annual diagnostic rate for PMWS in England and Wales has fallen steadily since 2002 however the annual diagnostic rate for Scotland in 2009 (5.6%) was an increase on 2008 (4.2%) although not statistically significant (see figure 5). The continued use of PCV2 vaccine is the main reason why the incidence of PMWS has declined.

Figure 4: Diagnostic rates for PMWS for fourth quarters of each year 2002 – 2009

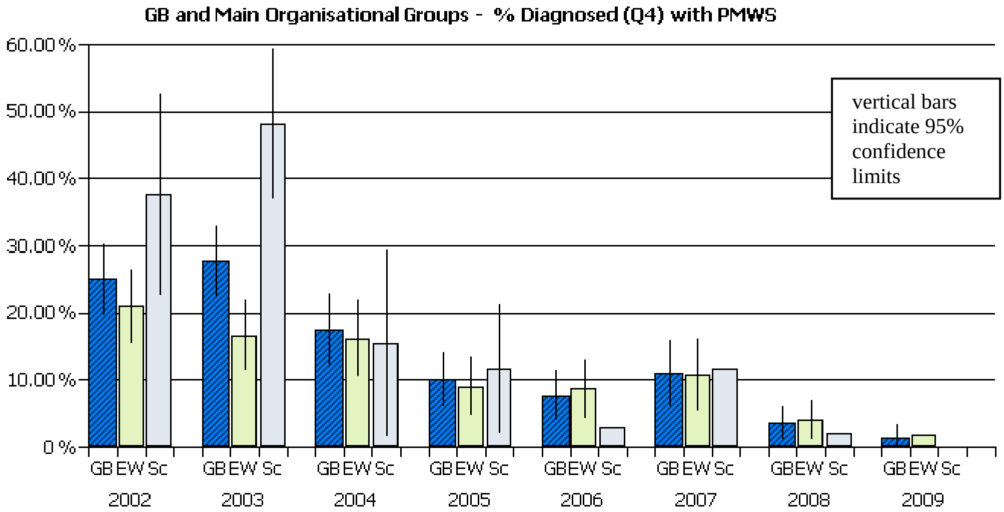
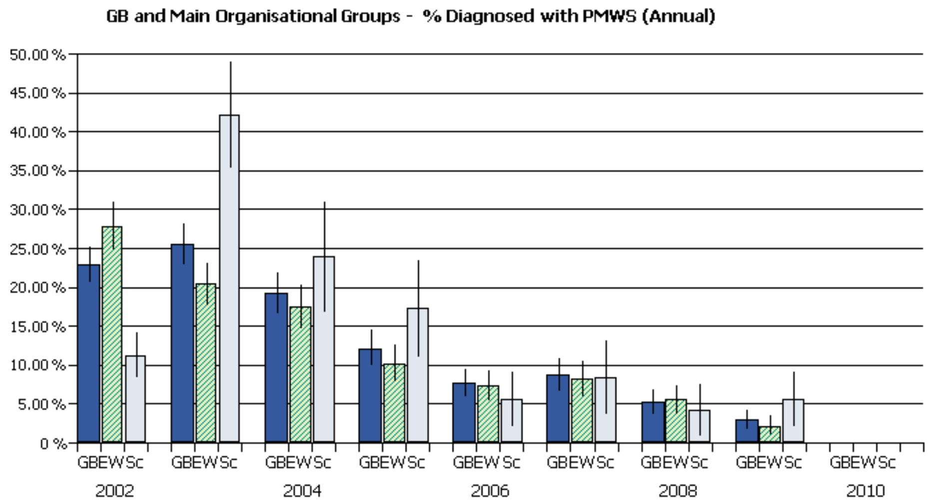


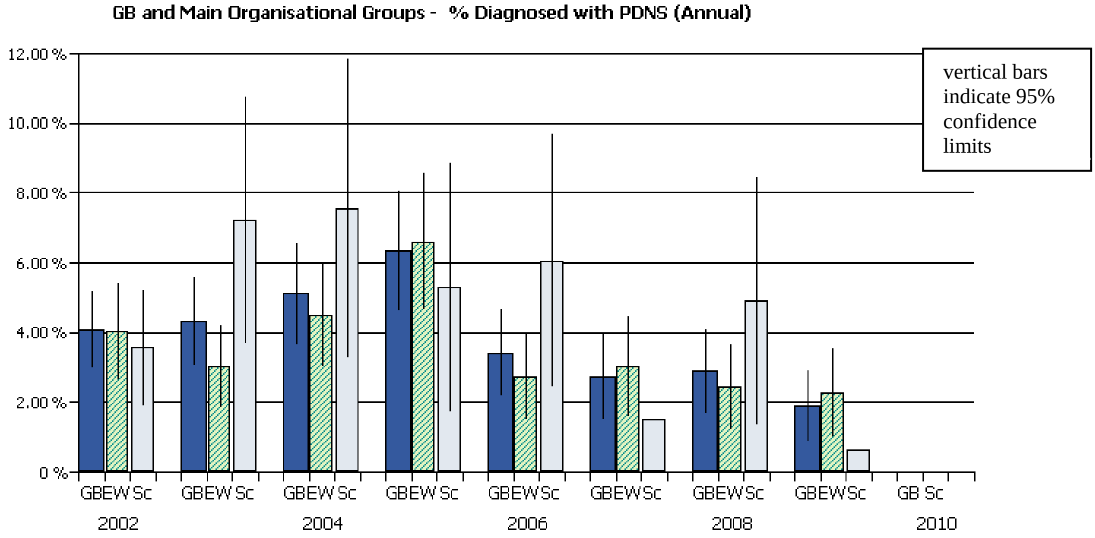
Figure 5: Annual diagnostic rates for PMWS 2002-2009



3.5) Porcine Dermatitis Nephropathy Syndrome (PDNS)

Cases of PDNS remained low this quarter and the annual figures show a continued downward trend with the 2009 GB rate of diagnosis being the lowest since 2002 (see histogram figure 6).

Figure 6: annual diagnostic rates for PDNS 2002-2009



3.6) Porcine Circovirus Associated Disease

In common with the findings for other PCV2 associated diseases there were only four cases of PCV2 associated pneumonia recorded in 2009.

A review of cases of PCV2 associated disease (2009) and the use of PCV2 vaccines in these cases has shown the following:

Cases in pigs from vaccinated sows

- 1 case of PCV2-associated pneumonia with PMWS and 3 cases of PDNS.
- In the case with PMWS and PCV2-associated pneumonia concurrent infection with PRRSV was diagnosed.
- PDNS has occurred in pigs from vaccinated dams, although the vaccines make no specific claims to protect against PDNS the aetiology of which has not yet been established

Cases in vaccinated piglets

1 case of PCV2-associated pneumonia and the same case also had PMWS. In this case the farmer reported that the mortality had reduced from 30-40% in weaned pigs to nearer 5% since the commencement of vaccine use

Annual summary for submissions between 01-01-09 and 01-01-10

- 26 submissions identified with a diagnosis of PMWS, PCV2 associated pneumonia or PDNS.

- **Cases known to have occurred in pigs from vaccinated sows**

  1 case PCV2 pneumonia with PMWS, 3 cases PDNS,

  Cases known to have occurred in vaccinated piglets

  1 case PCV2 pneumonia same case also had PMWS

3.6) Porcine Reproductive and Respiratory Syndrome (PRRS)

The quarterly percentage of relevant diagnostic submission with a diagnosis of PRRS showed a decrease, which was not statistically significant, on the same quarter last year (see histogram, figure 7). This data includes diagnoses of pneumonia associated with PRRS, systemic PRRS and foetopathy. The diagnostic rate for this quarter (3.3%) is the lowest for all quarters of 2009 and has returned from the peak in Q2 (9.3%)(see figure 8). The annual diagnostic rate is lower for 2009 (5.3%) than the peak of 2008 (6.8%).

Figure 7: Percentage of diagnosable submissions with PRRS in the fourth quarters of each year 2002 – 2009

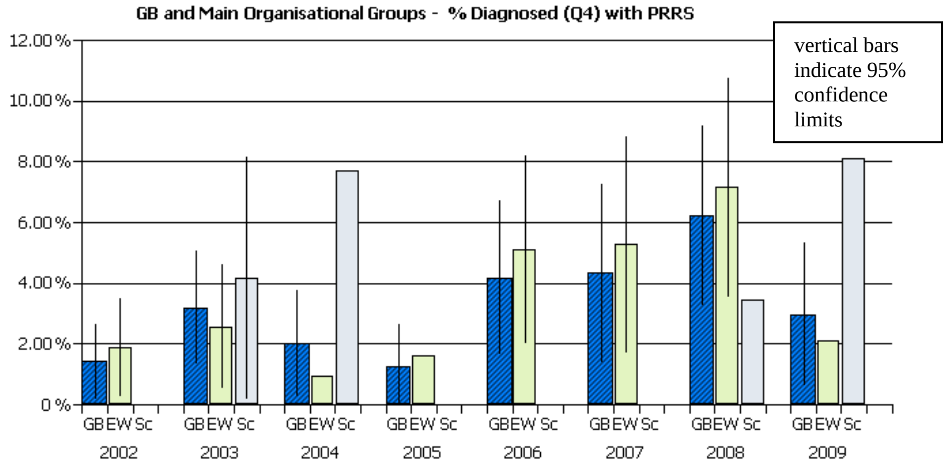
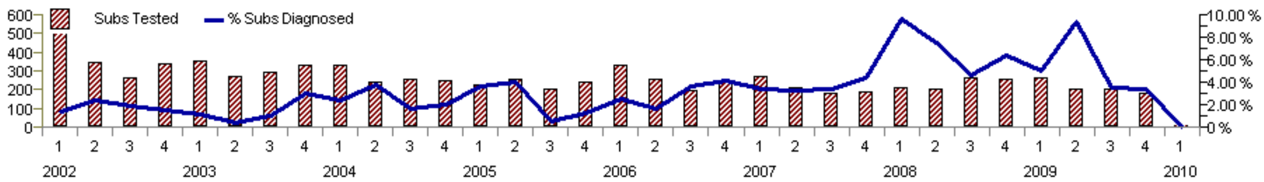


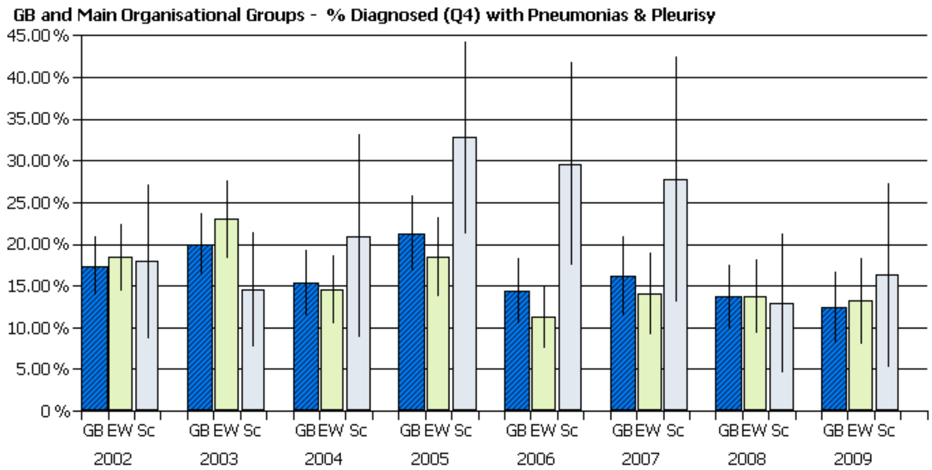
Figure 8: Numbers of submissions tested and percentages diagnosed with PRRS for all quarters since 2002



3.7) Respiratory Disease

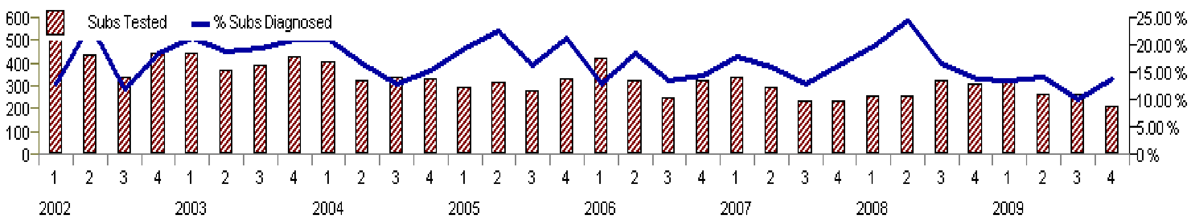
For this quarter there were concerns that the potential for diagnosing pandemic H1N1 influenza and the perceived repercussions of this might reduce the number of pigs submitted for investigation of respiratory disease. Surveillance for respiratory disease was not however compromised and submissions with a presenting sign of respiratory disease for this quarter show a 9% increase to the same quarter in 2008. Carcases and specimens are commonly submitted with a history of the pig having a presenting sign of respiratory disease but where there is no necropsy evidence of respiratory disease. The diagnostic rate for pneumonia and/or pleurisy has remained approximately static for the 4th quarter since 2002 (see figure 9).

Figure 9: Percentage of diagnosable submissions with pneumonia and/or pleurisy in the fourth quarters of each year 2002 – 2009



The annual percentage of relevant diagnostic submissions with a diagnosis of pneumonia and/or pleurisy for 2009 was the lowest since 2002 although not statistically significant (see histogram, figure 10).

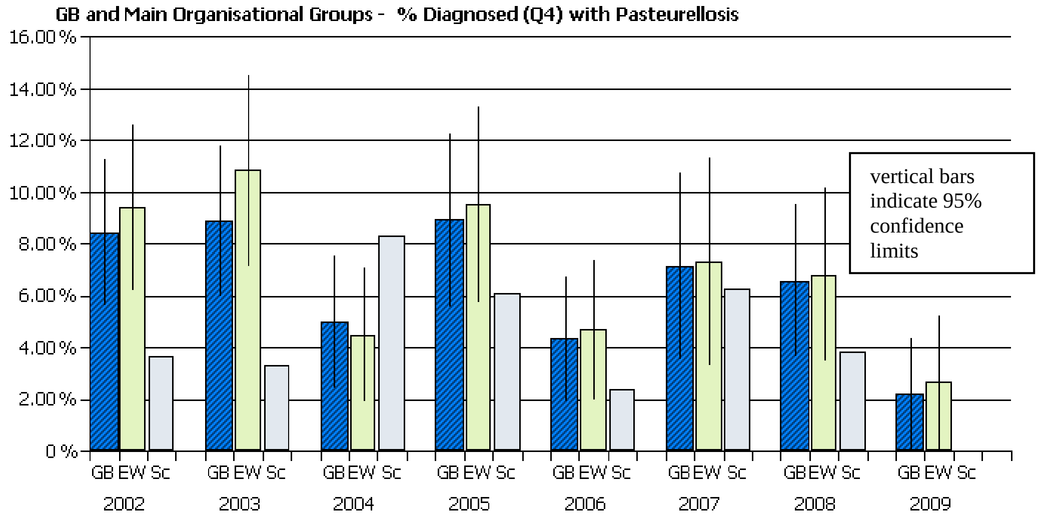
Figure 10: Numbers of submissions tested and percentages diagnosed with pneumonia and/or pleurisy for all quarters since 2002



3.7.1 Pasteurellosis

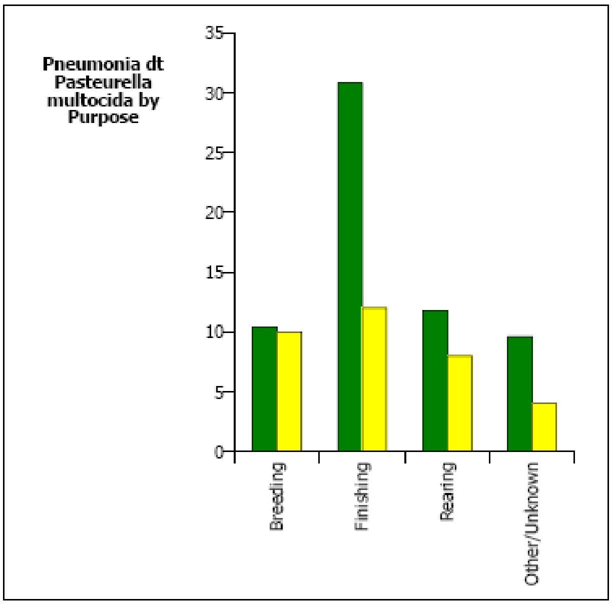
The fall in pneumonias and pleurisy is reflected in figures for pasteurellosis as shown in figure 11.

Figure 11: Fourth quarter diagnostic rates for pasteurellosis 2002 – 2009



By applying a z-test to annual data there is a statistically significant decrease in diagnoses of pasteurellosis in 2009 (yellow bars) compared to the previous 60 months (green bars) with the predominant fall in diagnoses being in finishing pigs see figure 12

Figure 12: z-test to show significant decrease in pasteurellosis



	Prior years			Last 12 months		
	n	Mean	%	n	%	z
Breeding	52	10.4	17 %	10	29 %	
Finishing	154	30.8	49 %	12	35 %	
Rearing	59	11.8	19 %	8	24 %	
Other/Unknown	48	9.6	15 %	4	12 %	
Sum:	313	62.6		34		-2.19

Prior Years	(green)	Previous 60 months (18/Jan/2004 to 17/Jan/2009) Mean
	(yellow)	Last 12 months (18/Jan/2009 to 19/Jan/2010) (n=xx)

Comparison of data for 2008 and 2009 diagnoses of *P multocida* suggest that a reduction in both PRRSV and PCVAD in 2009 may in part be responsible for this decrease. In 2008 26%

and 25% of pasteurellosis cases had concurrent PRRSV infection and PCVAD respectively. In 2009 16% of diagnoses for pasteurellosis had concurrent PRRSV infection and 16% concurrent PCVAD. Interestingly the data for diagnoses of pasteurellosis with no other bacterial or viral concurrent infections remains stable at 14% of all *P. multocida* diagnoses for 2008 and 16% for 2009.

3.7.2 Actinobacillosis

In contrast the rate for diagnoses of *Actinobacillus pleuropneumonia* (APP) pneumonia in Figure 13 shows an increase, not statistically significant, compared with fourth quarters since 2005. The annual rate of diagnosis for *Actinobacillus pleuropneumonia* (APP) pneumonia has also increased (not statistically significant) compared to all years since 2002 (see figure 14).

Figure13 Fourth quarter diagnostic rates for actinobacillosis 2002 – 2009

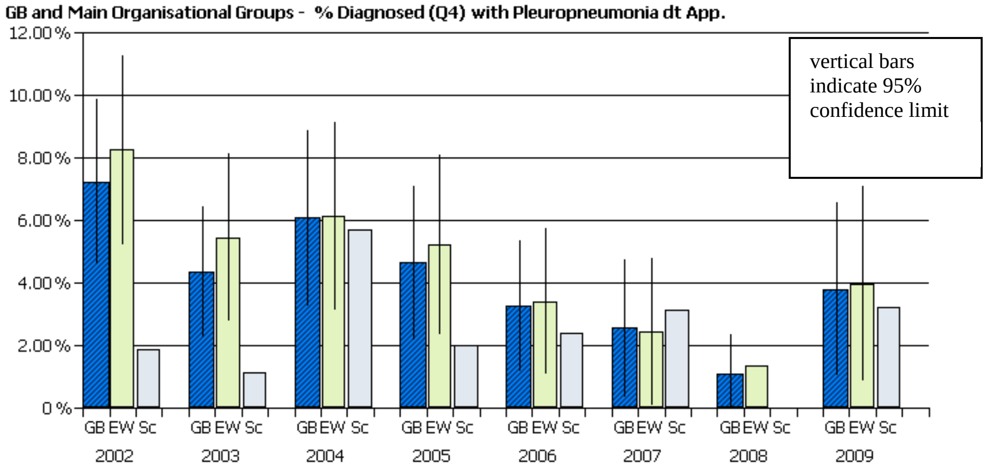
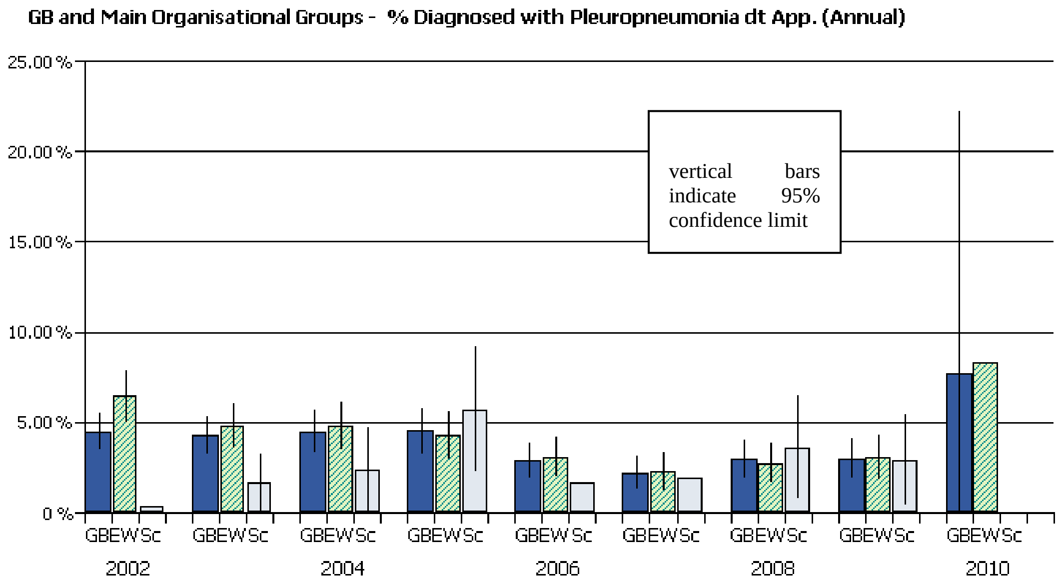


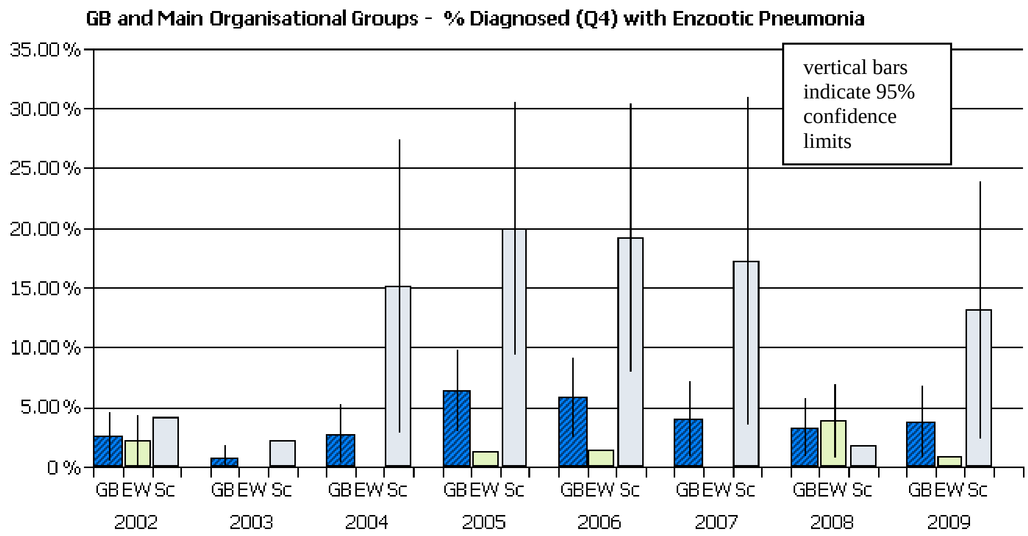
Figure 14 Annual diagnostic rates for actinobacillosis 2002-2009



3.7.3 Enzootic pneumonia

GB Q4 diagnostic rates for enzootic pneumonia remain stable (see figure 15) as does the annual rate of diagnoses. The diagnostic rate for enzootic pneumonia remains high in Scotland and is the most commonly diagnosed cause of respiratory disease. This may be linked to vaccine usage.

Figure 15: Fourth quarter diagnostic rates for enzootic pneumonia 2002 – 2009



Experimental infection of piglets with *M. hyorhinis* has produced cranioventral pneumonic lesions resembling those usually associated with enzootic pneumonia (EP) due to *Mycoplasma hyopneumoniae* infection and some strains of *M hyorhinis* can cause EP-like disease. In view of this a VIDA code was introduced this year to gather data on pneumonia associated with *M hyorhinis.* In 2009 in England and Wales *M hyorhinis* accounted for 61% of pneumonia in pigs due to *M hyorhinis* and *Mycoplasma hyopneumoniae.*

3.7.4) Swine Influenza

Northern Ireland

Pandemic (H1N1) 2009 virus was first detected in pigs in the UK in Northern Ireland in September 2009 when there was a series of five herd outbreaks (Welsh and others, in press).

Great Britain

Submissions from eight pig herds, out of a total of 45 tested, were influenza A virus positive during the period October to December 2009 in Great Britain (GB) compared with one positive herd over the same period in 2008 and two positive herds during the same quarter in 2007.

During this quarter, pandemic (H1N1) 2009 virus was detected in four pig herds. Two of these were detected in November and further two in December. The remaining influenza A serotypes identified were H1N2 influenza virus (2 herds), avian-like H1N1 (2 herds)

During 2009, the total number of samples from the 169 herds tested was very similar to that of 2008 (see table 6).

Table 6: Number of samples tested for influenza and the number positive by quarter and year from 2007 – 2009. The samples originated from a total of 432 herds

Year	Q1 no tested	Q1 no (%) positive	Q2 no tested	Q2 no (%) positive	Q3 no tested	Q3 no (%) positive	Q4 no tested	Q4 no (%) positive	Total
2007	88	4	33	1	27	0	53	3	201/8
		(4.5%)		(3.0%)		(0%)		(5.7%)	(4.0%)
2008	84	4	64	4	72	2	152	3	372/13
		(4.8%)		(6.3%)		(2.8%)		(2.0%)	(3.5%)
2009	76	3	103	2	91	6	105	13	375/24
		(3.9%)		(1.9%)		(6.6%)		(12.4%)	(6.4%)

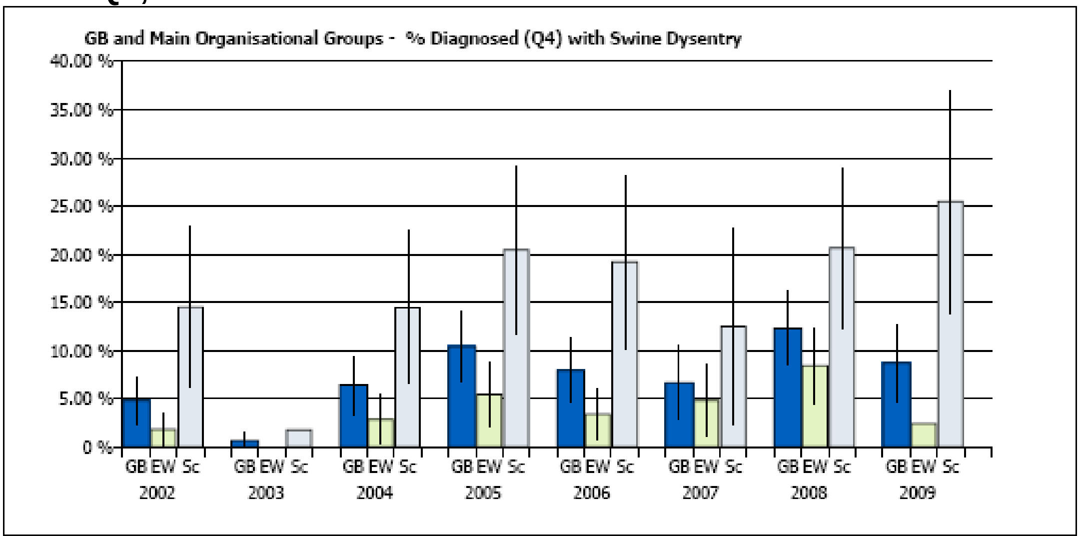
3.8) Alimentary Disease

3.8.1) Swine Dysentery (*B. hyodysenteriae*)

3.8.1.1) Swine Dysentery Trends Q4 2009

In the last quarter of 2009, 17 diagnoses of swine dysentery were made in GB comprising 3 cases form England (two from Thirsk and one from Bury St. Edmunds), and 14 diagnoses from Scotland. The GB diagnostic rate in Q4 has increased every year since 2007(see figure 17).

Figure 16: Percentage of all diagnosable submissions diagnosed with swine dysentery in GB in Q4, since 2002

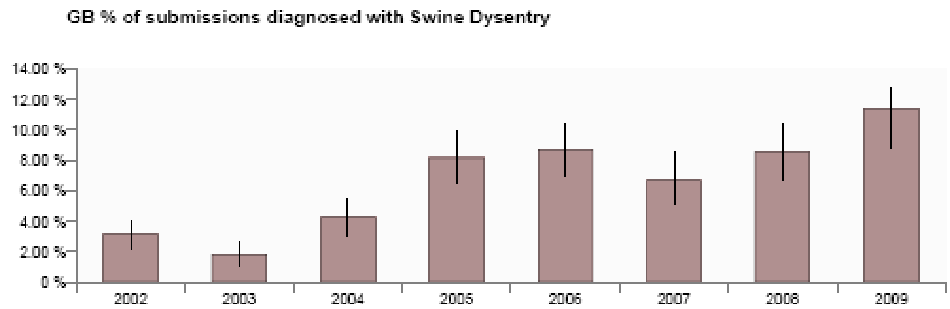


In one of the cases investigated by Thirsk, swine dysentery was diagnosed on a 600 sow farrow to finish unit with slatted floors throughout. MICs for tiamulin were obtained for the isolates and as they proved low (0.062 and 0.031 mg/l) a medicated eradication programme was initiated. This was working well until it was reported that some finisher pigs appeared to be showing clinical signs of swine dysentery. Laboratory testing confirmed the diagnosis, and MICs for tiamulin on the second isolates were considerably higher, at 8 mg/l. An investigation revealed a degree of likely underdosing because of an in-feed inclusion rate less than that advised and because of some freezing of water pipes (some medication was administered in water). When these two factors were rectified, the eradication proved successful and the clinical signs abated. It is important that eradication programmes are carried out with a high degree of diligence and attention to detail, as resistant strains of *Brachyspira hyodysenteriae* are a threat to all concerned.

3.8.1.2 Annual Trends in Swine Dysentery

The annual diagnosis rate of swine dysentery for GB in 2009 was the highest for any year between 2002 and 2009 (see figure 17). This confirms anecdotal reports and highlights the relevance of industry-led efforts to control this disease. See details of the SD producers' charter below.

Figure 17: Annual diagnosis rates for swine dysentery since 2002, as a percentage of diagnosable submissions



3.8.1.3 The Swine Dysentery Producer's Charter

This continues to operate and has seen increasing interest in the North of England, following its successful adoption in East Anglia.

Further details are available on the BPEX website, at:

http://www.bpex.org/SwineDysentery/Default.aspx

3.8.2 Porcine Proliferative Enteritis (*Lawsonia intracellularis)*

Six diagnoses of *L. intracellularis* were made in GB in Quarter 4 of 2009, half in Scotland and half in England. All the English diagnoses were made by Thirsk and concerned outbreaks of disease on farrow to finish units 18-24 months after partial or full depopulation programmes to improve health and performance. In both cases, the units had been positive for the disease prior to the intervention, and it had taken that long for the disease to become clinical again. Both were well run units with all-in all-out systems and high levels of stockmanship. This finding is consistent with the latency of infection as it is likely that the replacement animals were subclinically infected.

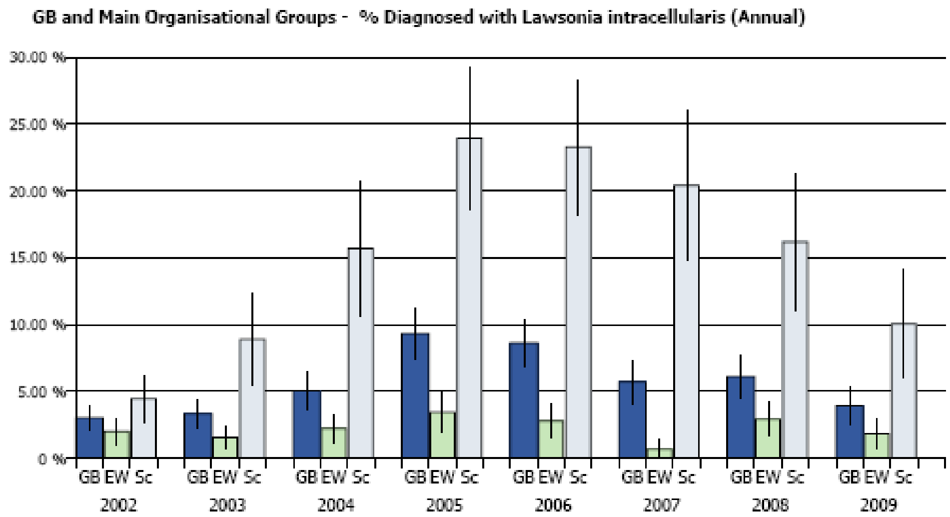
Table 7: Diagnoses of *L. intracellularis* in Q4 since 2002.

	Subs & Subs Tested						
Year	Num Subs Rec'd	Num Subs Tested	Num Subs Diag'd	% Subs Rec'd Tested	% Subs Tested Diag'd	Confidence Interval	
2002	513	264	5	51.46 %	1.89 %	0.25 %	3.52 %
2003	495	300	10	60.61 %	3.33 %	1.30 %	5.36 %
2004	447	215	18	48.10 %	8.37 %	4.67 %	12.07 %
2005	408	223	19	54.66 %	8.52 %	5.19 %	12.66 %
2006	426	228	23	53.52 %	10.09 %	6.18 %	14.00 %
2007	285	165	10	57.89 %	6.06 %	2.42 %	9.70 %
2008	416	244	17	58.65 %	6.97 %	3.76 %	10.12 %
2009	281	152	6	54.09 %	3.95 %	0.82 %	6.78 %

3.8.2.1 Annual trends in diagnosis rate for *Lawsonia intracellularis*

As shown in figure 19, the annual diagnostic rates for *Lawsonia intracellularis* infection have been declining since 2005, a trend which is continued by 2009 figures. It may be that this pattern is linked to the trends in porcine circovirus associated disease (PCVAD), as some of the pigs suspected of having PCVAD (in the form of PMWS) may have been diagnosed as porcine proliferative enteropathy (caused by *L. intracellularis*) in 2005-7. It may also be that widespread vaccination has controlled PCVAD and this has resulted in a real drop in porcine proliferative enteropathy.

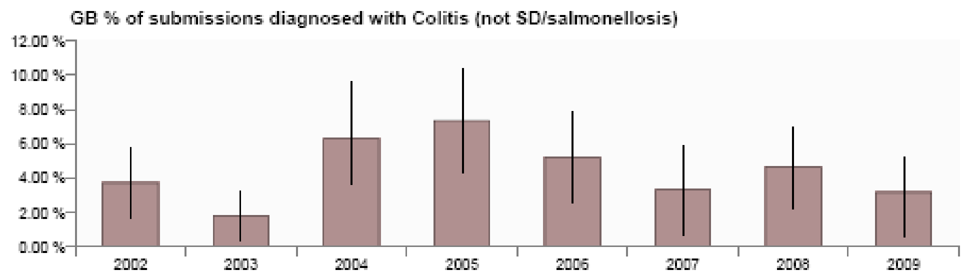
Figure 19: Annual trends in diagnostic rate for *L. intracellularis,* EW and Scotland, since 2002.



3.8.3 Colitis not due to swine dysentery or salmonellosis.

Porcine Intestinal Spirochaetosis due to *Brachyspira pilosicoli* accounted for all remaining diagnoses of colitis in Q4 of 2009, which is usually the case. In three of the four cases diagnosed in England, it was the only diagnosis made. In all cases, scour and disappointing growth performance were the presenting clinical signs. In another case, *B. pilosicoli* was present alongside helminthiasis and salmonellosis.

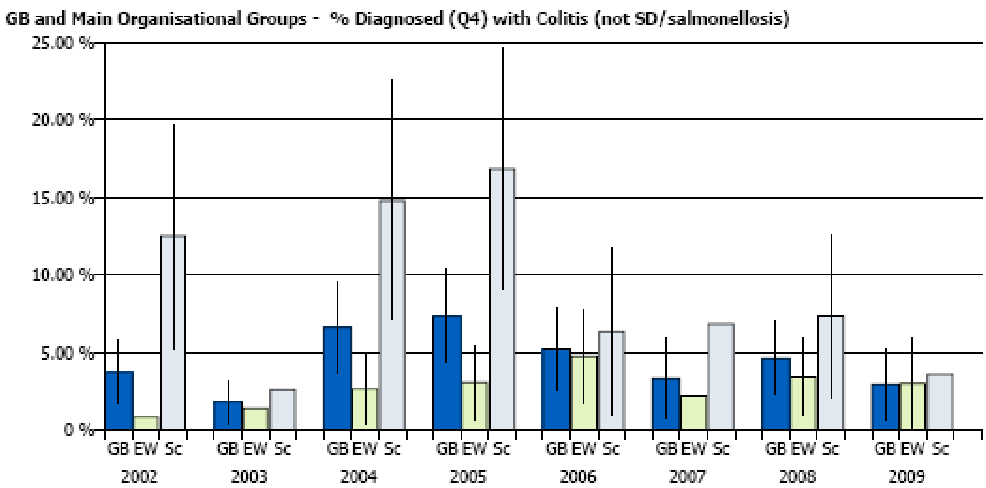
Figure 20: Q4 GB diagnosis rates for colitis not due to Salmonella or swine dysentery.



Annual Trends.

Colitis not due to salmonellosis or swine dysentery has accounted for around 5% of GB diagnoses since 2006. 2009 saw a further drop in the incidence (see figure 21).

Figure 21: Annual trends in GB diagnosis rate for non-SD/ *Salmonella* colitis



3.8.4 Enteric colibacillosis

Annual figures for general E. coli disease in pigs are slightly lower than in 2008 with no statistical significance. The total number of diagnoses recorded in England and Wales for the year is at a ten year low.

The ages affected by enteric colibacillosis ranged this quarter from two weeks to four months with the younger end of the spectrum often suffering from other alimentary pathogens. One case involving mixed ages of pigs reported a morbidity of 40/150 animals and 20 deaths. Enteric colibacillosis and colisepticeamia were diagnosed.

Three separate submissions from the same unit over the course of this quarter confirmed K88 positive enteric colibacillosis in pigs two to three weeks of age, presenting with either sudden death or wasting. Clostridial necrotic enteritis was diagnosed in one of the submissions from this outdoor unit.

3.8.5 Neonatal enteric disease

Five cases of rota virus were diagnosed in England and Wales this last quarter.
One case of Clostridial necrotic enteritis as mentioned in the previous section was recorded.
Coccidiosis likewise was only diagnosed once this quarter from a 14-day-old pig.

3.8.6 Gastric ulceration

Gastric ulceration was diagnosed on four units in England this quarter in pigs ranging from five to twenty weeks of age. The problem was reported to affect only small numbers in each case.

3.8.7 Helminthiasis

Co-infection with *Trichuris* and *Ascaris suum* was seen in a 10-week old free-range pig in poor body condition. *Brachyspira pilosicoli* and *Salmonella Typhimurium* were also cultured from the large intestinal contents. Several management issues were identified including the need to treat outdoor pigs with appropriate anthelmintics.
In another case, Ascaris suum was identified as the cause of ill thrift in an outdoor pig, on the basis of a submitted faeces sample.

3.8.8 Intestinal Torsion.

There were seven cases of intestinal torsion in Q4 of 2009, which is unusually high. No consistent features were noted between the incidents, and in two cases other disease was present: Aero chocolate liver due to *Clostridium novyi* in one case, and pneumonia associated with *P. multocida* in the other. Intestinal torsions are associated with gorging after a period of feed deprivation.

3.9) Mycoplasmas

3.9.1 Mycoplasma Surveillance
48 samples from 33 cases were submitted to the Mycoplasma Group. *M. hyopneumoniae* was identified twice, once from a lung and once from joint fluid. In addition *M. hyopneumoniae* was also identified mixed with *M. hyorhinis* twice, once from a lung sample and once from joint fluid. *M. hyorhinis* was detected in 7 lung samples and once from viscera. *M. hyosynoviae* was detected twice from lung samples. *M. arginini* was detected on 5 occasions, from lungs 3 times and from joint samples twice. *M. flocculare* was also detected in a stifle joint sample submitted by the SAC.

3.9.2 Review of Mycoplasma Surveillance 2009.
Mycoplasma species were identified in 133 samples: *M. hyorhinis* (61.4%); *M. hyopneumoniae* (26.9%); *M. arginini* (7.6%); *M. hyosynoviae* (3.4%); and *M. bovirhinis* (<1.0%).

The percentage of *M. hyorhinis* identifications increased in 2009 to 61.4% compared with 46.4% in 2008, whereas the identifications of *M. hyosynoviae* decreased from 20.2% in 2008 to 3.4% in 2009. *M. hyopneumoniae* remained at approx 27%. It should be noted that *M. hyorhinis* is recognised as causing enzootic pneumonia like clinical signs.

3.9.3 Mycoplasma News from Publications

Four sampling methods for detecting *Mycoplasma hyopneumoniae* in pigs were compared. The most sensitive sampling methods in live naturally infected pigs were tracheo-bronchial swabbing and tracheo-bronchial washing as compared to oral-pharyngeal brushing and nasal swabbing (Fablet *et al*., 2009).

Mycoplasma suis was detected in 10% of 359 wild boars tested in southern Europe. Its role as pathogen in wild boars is not known but the animals may be a reservoir for these bacteria (Hoelzle *et al*., 2010). The energy source of *M. suis* might depend mainly on glycometabolism according to a proteomic study by Congli *et al*. (2009).

References

Congli *et al*. (2009). Proteomic study of *Mycoplasma suis* using the gel-based shotgun strategy. *Vet Microbiol.* Oct 31 E pub ahead of print.

Fablet *et al*. (2009). Estimation of the sensitivity of four sampling methods for *Mycoplasma hyopneumoniae* detection in live pigs using a Bayesian approach. *Vet Microbiol.* Dec 5 E pub ahead of print.

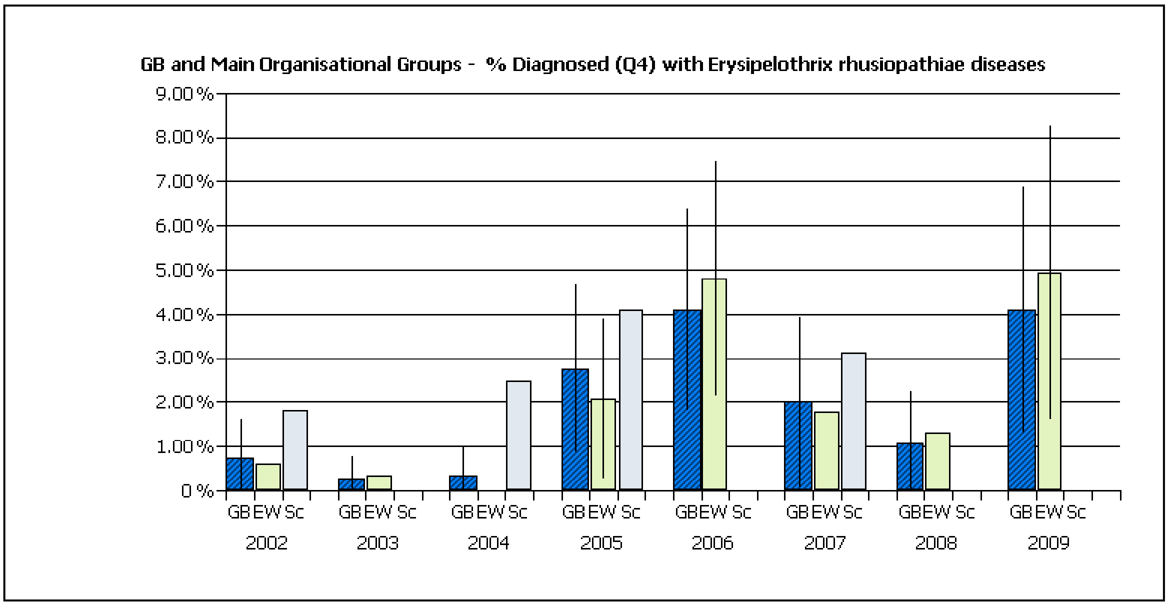
Hoelzle *et al*. (2010). Occurrence of *Mycoplasma suis in wild boars* (*Sus scrofa L.*). *Vet Microbiol. E pub ahead of print*

3.9 Systemic disease

Erysipelelothrix rhusiopathiae

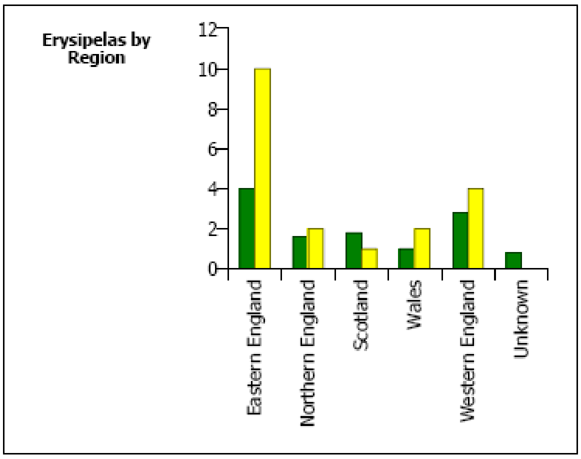
The Q4 diagnostic rate for E.rhusiopathiae for England and Wales showed a statistically significant increase from Q4 of 2008 and was the highest rate since 2002 (see figure 22).

Figure 22: Fourth quarter diagnostic rates for Erysipelelothrix rhusiopathiae 2002-2009



By applying a z-test there has been a statistically significant increase in diagnosis of erysipelas in 2009 (yellow bars) compared with the prior 60 months (green bars). This is largely due to an increase in diagnoses in Eastern England in Q4, which is considered due to a failure by one company to follow their usual vaccination protocol in some herds.

Figure 23: z-test to show significant increase in diagnoses of erysipelas



	Prior years			Last 12 months		
	n	Mean	%	n	%	z
Eastern England	20	4.0	33 %	10	53 %	
Northern England	8	1.6	13 %	2	11 %	
Scotland	9	1.8	15 %	1	5 %	
Wales	5	1.0	8 %	2	11 %	
Western England	14	2.8	23 %	4	21 %	
Unknown	4	0.8	7 %			
Sum:	60	12		19		2.72

Prior Years		Previous 60 months (18/Jan/2004 to 17/Jan/2009) Mean
		Last 12 months (18/Jan/2009 to 19/Jan/2010) (n=xx)

3.10) Reproductive Diseases

The number of submissions for investigation of reproductive diseases was similar to previous quarters (see table 8). The cause of abortion was ascribed to *Streptococcus dysgalactiae* once and erysipelas once, but all other submissions resulted in no diagnosis. A low diagnostic rate is not unusual.

Table 8: Number of pig submissions for diagnosis of reproductive diseases

Year	Abortion					Other reproductive				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
2006	27	17	21	11	76	17	14	19	34	84
2007	16	11	24	14	65	9	11	22	18	60
2008	13	20	32	16	81	15	16	17	18	66
2009	20	17	18*	21	76	11	10*	12*	9	42

* data revised on farmfile since previous quarterly report.

3.11) Nervous Diseases

There were no diseases of note other than the previously reported isolates from cases of streptococcal meningitis.

4) UNUSUAL AND NEW DISEASES

There were no unusual diseases recorded.

5) SCANNING SURVEILLANCE FOR NEW AND EMERGING DISEASES IN PIGS

Monitoring the trends in diagnoses of known diseases cannot, by definition, detect either new diseases, or changes in endemic diseases that would prevent a diagnosis from being reached (for example a change in the pathogen that compromised the usual diagnostic test). Such new or emerging diseases would likely first be detected by observation of increased numbers of clinical and/or pathological syndromes for which a diagnosis could not be reached in the normal way. Such submissions are regularly analysed to look for changes that could indicate the presence of a new or emerging disease, which may be reflected by an increase in undiagnosed disease. Undiagnosed disease submissions are summarised broadly by the clinical presentation of disease and, once this has been determined by further investigation, the body system affected. Both groups are investigated and trends in the levels are compared over time.

This approach has been developed and refined over recent years and such analyses are now possible for data from GB.

The following is a summary of pig data analysed by VLA and SAC from diagnostic samples submitted to Regional Laboratories. The aim of this report is to review data where a diagnosis was not reached despite the sample receiving "reasonable" testing. This allows monitoring of this class with the aim of providing information on new or emerging syndromes. For a full account of the methodology, please consult: http://vla51/ScanningSurveillance/Home.aspx

It should be noted that VLA reports prior to 2005 on undiagnosed submissions included submissions which received both adequate and limited testing. Comparisons between the figures within this report should bear this is mind. 'Prior years' refers to pooled data for years 2004-2008 for VLA only data, and to data for 2008 for GB VIDA data. For DNR a rolling 12 month period is examined so that Q4 includes the DNRs for the 12 months upto the end of December 2009.

Overall DNR rates

The overall percentage of pig diagnostic submissions for GB VIDA for the 12 months of 2009 (to Q4 2009) where a diagnosis was not reached (DNR) was 19.8% (202/1018). This was significantly increased from data to Q4 for prior years in which DNR was 16.2% (180/1109). A significant proportion of this was enteric disease.

When VIDA data for VLA and SAC was separated, there was a significant increase in DNR for overall VLA data (22%) but not for overall SAC data (14.5%).

Although overall VIDA DNR was significantly increased, there was no significant increase in DNR rate for any individual presenting sign to Q4, 2009 compared to 2008 for VIDA (GB), VLA or SAC data.

There was no significant increase in DNR for any individual syndrome in 2009 compared to 2008 for VIDA (GB) or SAC data. There was a significant increase in DNR for VLA data for 2009 for the enteric syndrome; DNR was 26.7% (56/210) in 2009 compared to 18.3% (46/251) in 2008.

Looking at VLA only data for 2009 compared to five prior years, there was no significant increase in DNR overall or for any individual presenting sign. There was a significant increase in DNR for reproductive syndrome (81.3%, 52/64) in 2009 compared to prior years (64.9%, 185/285) but not for enteric syndrome for which DNR in 2009 was 26.7% compared to 23.3% in prior years.

Tables 12 and 13 give GB, VLA and SAC DNR rates by syndrome and presenting sign for the 12 months of 2009 compared to 2008.

Increased overall DNR

The significant increase in overall DNR for GB for the 12 months of 2009 may reflect the combined effect of significant increases in DNR for individual presenting signs highlighted within different quarters of 2009 as indicated in table 9. These are reviewed.

Table 9: Presenting signs showing significant increases in DNR within individual quarters of 2009

Presenting sign	Jan-Mar	Apr-June	July-Sept	Oct-Dec	All of 2009
Wasting	Yes	-	-	-	-
Diarrhoea	-	Yes	-	-	-
Respiratory	-	Yes	-	-	-
Found dead	-	-	Yes	-	-
Overall DNR	-	Yes	-	-	Yes

Details of undiagnosed submissions with wasting as a presenting sign were reviewed in each of the three previous quarterly reports in 2009 and provided no evidence of a common presentation, history or pathology to suggest that the increased DNR for pigs presented with wasting was due to the emergence of a new disease or syndrome.

Undiagnosed submissions for enteric disease are examined in more detail below.

In Q2 there was a significant increase in DNR for submissions with respiratory disease as a presenting sign (17.7% compared to 2.9% in Q2, 2008), this was not present in Q3 and all such submissions were diagnosed in Q4. DNR for 2009 for respiratory syndrome remains low at 5.7% and for respiratory disease as a presenting sign at 9.9%. Both these DNR rates are higher than in 2008 but not significantly. As a precaution, the undiagnosed VLA submissions for respiratory disease were reviewed. Most of these were limited testing on non-carcase submissions, some may have been affected by antimicrobial treatment prior to submission and others were not submissions with respiratory pathology. There was no consistent feature in undiagnosed submissions to suggest the emergence of a new disease or syndrome.

Undiagnosed VLA submissions from pigs found dead in July to September 2009 were reviewed, most of these were individual pigs and they provided no evidence to suggest the emergence of a new disease or syndrome.

Increased DNR for enteric syndrome

Further analysis for the undiagnosed enteric submissions in 2009 indicates:

- DNR increased in Eastern and Western England regions (not Wales, Scotland, Northern) but was only significantly increased in Eastern England where DNR in 2009 was 25.3% compared to 12.8% in 2008.
- The DNR was significantly increased for enteric submissions with a history of diarrhoea as a presenting sign, consistent with disease being due to an enteric problem.
- Neonatal pigs were the age category with a significant increase in DNR for enteric submissions as shown in table 10. There was no significant change in DNR for enteric submissions in other age categories, including preweaned pigs.

Table 10: Age categories of undiagnosed enteric submissions to Q4 2009, GB data

	Overall			Prior Years (to Q4)			2009 (to Q4)					
Age Category	DNR	Subs	% DNR	DNR	Subs	% DNR	DNR	Subs	% DNR	diff	SE Year to Year	z
ADULT	8	62	12.90 %	7	35	20.00 %	1	27	3.70 %	-16.30 %	8.59 %	-1.90
MIXED	4	22	18.18 %	3	12	25.00 %	1	10	10.00 %	-15.00 %		
NEONATAL	15	52	28.85 %	3	25	12.00 %	12	27	44.44 %	32.44 %	12.57 %	2.58
NonSpecific	23	211	10.90 %	12	105	11.43 %	11	106	10.38 %	-1.05 %	4.29 %	-0.24
POSTWEAN	64	304	21.05 %	27	161	16.77 %	37	143	25.87 %	9.10 %	4.68 %	1.94
PREWEAN	25	87	28.74 %	13	48	27.08 %	12	39	30.77 %	3.69 %	9.76 %	0.38
Overall	139	738	18.83 %	65	386	16.84 %	74	352	21.02 %	4.18 %	2.88 %	1.45

In view of the reports from some northern European countries (France and Denmark) of an increase in unexplained neonatal enteric disease which is proving difficult to control, a review of the undiagnosed VLA neonatal submissions for enteric syndrome and with diarrhoea as a presenting sign was given for the first 9 months of 2009 in the last quarterly report. In the last 3 months of 2009, there has been only one further undiagnosed submission to add to this review (table 11); testing on this submission was limited.

Table 11: Undiagnosed VLA neonatal pig enteric submissions to Q3, 2009

Submission number	Age of pig	Sample type	History	Comments
17-P0235-02-09	0 days	Faeces x 1	Diarrhoea. Housing not known.	Limited testing
27-P0091-02-09	3 days	Live pigs x 2	25% pigs affected with diarrhoea in 4000 pig herd. Mortality very low but growth retarded. Housed.	Same farm as 27- P0273-03-09 Histopath pointed to bacterial enteritis, possibly E coli. Feedback from PVS: see below
27-P0273-03-09	3 days	Live pigs x 3	Same farm as 27-P0091-02-09	Same farm as 27-P0091-02-09 Histopath again suggestive of bacterial enteritis. Feedback from PVS: ongoing fluctuating problem over last 12 years. Responds well to antibiotic treatment. Has resolved at present. Farm visit and further PME planned with local RL for future when problem recurs.
15-P0218-03-09	7 days	Bacterial cultures x 2	2-7 day old pigs scouring with 5% morbidity, 3% mortality. Housing unknown.	Limited testing, cultures from private lab
14-P0403-03-09	5 days	Dead pigs x 2	5/8 pigs died from a pharmaceutical company challenge trial. Housed.	Necrotic enteritis, suggestive of clostridial disease, not confirmed by toxin testing.

15-P248-05-09	7 days	Live pig x 1	18 month history of sporadic sudden deaths in one week old pigs on 120 sow indoor unit. Housed.	Unusual severe mucosal necrosis involving whole intestine, ? Fusobacter. VIO not suspicious of new syndrome in Europe. Feedback from PVS: problem self limiting and has resolved completely after cleaning and disinfection of building.
27-P0033-06-09	4 days	Live pig x 1 Dead pigs x 2	Scour in a group of 80 piglets. Housed.	Histopath pointed to a likely viral cause with villus stunting
23-P0192-06-09	0 days	Live pigs x 3	Scour up to 1 week old on 800 sow unit. Housed.	Alpha clostridial toxin id in 1 pig - possible clostridial disease in this pig, not detected in other two.
14-P453-06-09	10 days	Dead pigs x 3	Scour and lethargy in 7-10 day old pigs – Berkshire breed. Housed.	Preweaned pigs coded as neonatal. Possible coccidiosis, autolysis prevented useful histopath
16-P0152-07-09	4 days	Dead pigs x 3	Piglets fading and dying at 4-5 days old over last 5-6 months with some scour. Mortality 15%. Majority recover. Housed.	Histopathology pointed to a bacterial enteritis, possible enterotoxigenic *E. coli* Feedback from VIO: case history and pathology not considered typical of description of new syndrome in Europe.
14-P0047-08-09	1 day	Live pigs x 2	Scour affecting whole litter, sometimes all litters in a batch affected, sometimes just a few litters. Housed.	Clostridial enteritis suspected from gross lesions, no toxins detected, colostral intake satisfactory. Histopath: acute multifocal neutrophilic enteritis. PVS feedback: problem still ongoing though not apparent at last vet visit. Agreed further PME free of charge, awaiting submission.
23-P0120-10-09	1 day	Swab x 1	Diarrhoea in outdoor pigs. 70% preweaning mortality	Swab submitted for identification – *E.coli* id, untypeable.

There is a significant increase in the proportion of undiagnosed neonatal enteric submissions and, as the European neonatal enteric disease syndrome described appears difficult to characterise with no clear case definition, this will be kept under review and further investigation of future undiagnosed neonatal enteric cases will be undertaken.

Increased DNR for reproductive syndrome VLA only data

The undiagnosed submissions do not relate to any particular region, housed pigs provide the greater proportion of submissions (40 of 64) and DNR is significantly increased in housed pigs.

Reasons why diagnoses may not be made and for the higher DNR for reproductive syndrome compared to others have been outlined by Bidewell and others (Pig Journal, volume 56, 88-106). The poor diagnostic rate for submissions of fetuses/stillborn piglets in part reflects the fact that laboratory investigations are geared to diagnosing infectious disease. In pigs, non-infectious disease and management problems are prominent amongst the causes of reproductive disease and can only be adequately assessed by on-farm investigations supplemented with laboratory submissions to rule out infectious disease. In addition, even where reproductive disease has an infectious cause, diagnosis of some of these remains problematic. Autolysis is common in aborted fetuses and affects test sensitivity. Other pathogens e.g. PRRSV may no longer be detectable by the time the fetopathy manifests as abortion, stillbirth or weak neonatal piglets. For this reason, multiple submissions are encouraged from herds to increase the chances of achieving a diagnosis.

Table 12: VIDA Overall Changes in DNR rates for Pigs by Presenting Sign to Q4 for 2009 and prior years (2008)

GB

	Overall			Prior years (from 2008)			2009					
Presenting Sign	DNR	Subs	% DNR	DNR	Subs	% DNR	DNR	Subs	% DNR	diff	SE Yr-Yr	z
ABORTION	73	100	73.00 %	36	51	70.59 %	37	49	75.51 %	4.92 %	8.88 %	0.55
DIARRHOEA	103	448	22.99 %	45	226	19.91 %	58	222	26.13 %	6.21 %	3.98 %	1.56
EYE	0	2	0.00 %	0	2	0.00 %	0	0		0.00 %		
FNDDEAD	42	377	11.14 %	22	203	10.84 %	20	174	11.49 %	0.66 %	3.25 %	0.20
GIT_XDIARR	3	16	18.75 %	3	12	25.00 %	0	4	0.00 %	-25.00 %		
HEALTHY	1	4	25.00 %	1	2	50.00 %	0	2	0.00 %	-50.00 %		
ILL_THRIFT	0	1	0.00 %	0	1	0.00 %	0	0		0.00 %		
LAME	12	81	14.81 %	5	43	11.63 %	7	38	18.42 %	6.79 %	7.91 %	0.86
MALAISE	21	97	21.65 %	11	47	23.40 %	10	50	20.00 %	-3.40 %	8.37 %	-0.41
MASTCLIN	0	4	0.00 %	0	4	0.00 %	0	0		0.00 %		
MUSC_SKEL	1	9	11.11 %	0	3	0.00 %	1	6	16.67 %	16.67 %		
NERVOUS	10	78	12.82 %	4	40	10.00 %	6	38	15.79 %	5.79 %	7.57 %	0.76
OTHER	26	246	10.57 %	17	127	13.39 %	9	119	7.56 %	-5.82 %	3.92 %	-1.48
RECUMBT	3	24	12.50 %	2	14	14.29 %	1	10	10.00 %	-4.29 %		
REPRO	22	41	53.66 %	9	20	45.00 %	13	21	61.90 %	16.90 %	15.58 %	1.09
RESPIR	16	212	7.55 %	6	111	5.41 %	10	101	9.90 %	4.50 %	3.63 %	1.24
SKIN	3	36	8.33 %	3	25	12.00 %	0	11	0.00 %	-12.00 %		
UNKNOWN	23	155	14.84 %	8	76	10.53 %	15	79	18.99 %	8.46 %	5.71 %	1.48
URINARY	0	1	0.00 %	0	0		0	1	0.00 %	0.00 %		
WASTING	23	195	11.79 %	8	102	7.84 %	15	93	16.13 %	8.29 %	4.62 %	1.79
	382	2,127	17.96 %	180	1,109	16.23 %	202	1,018	19.8 %	3.61 %	1.67 %	2.17

The red highlighting indicates a significant increase in DNR compared to prior years.

SAC	Overall			Prior years			2009					
Pres	DNR	Subs	% DNR	DNR	Subs	% DNR	DNR	Subs	% DNR	diff	SE Yr-Yr	z
ABORTION	7	10	70.0 %	4	4	100.00 %	3	6	50.0 %	-50.0 %		
DIARRHOEA	19	105	18.1 %	6	41	14.63 %	13	64	20.3 %	5.7 %	7.7 %	0.74
EYE	0	1	0.0 %	0	1	0.00 %	0	0		0.0 %		
FNDDEAD	17	119	14.3 %	10	63	15.87 %	7	56	12.5 %	-3.4 %	6.4 %	-0.52
GIT_XDIARR	0	1	0.0 %	0	1	0.00 %	0	0		0.0 %		
ILL_THRIFT	0	1	0.0 %	0	1	0.00 %	0	0		0.0 %		
LAME	3	12	25.0 %	1	7	14.29 %	2	5	40.0 %	25.7 %		
MALAISE	4	6	66.7 %	1	2	50.00 %	3	4	75.0 %	25.0 %		
NERVOUS	1	22	4.5 %	1	12	8.33 %	0	10	0.0 %	-8.3 %		
OTHER	13	205	6.3 %	10	109	9.17 %	3	96	3.1 %	-6.0 %	3.4 %	-1.77
RECUMBT	0	2	0.0 %	0	0		0	2	0.0 %	0.0 %		
REPRO	6	11	54.5 %	3	4	75.00 %	3	7	42.9 %	-32.1 %		
RESPIR	4	32	12.5 %	2	21	9.52 %	2	11	18.2 %	8.7 %		
SKIN	1	11	9.1 %	1	9	11.11 %	0	2	0.0 %	-11.1 %		
UNKNOWN	4	25	16.0 %	1	9	11.11 %	3	16	18.8 %	7.6 %		
WASTING	8	32	25.0 %	3	12	25.00 %	5	20	25.0 %	0.0 %		
	87	595	14.62 %	43	296	14.53 %	44	299	14.72 %	0.19 %	2.90 %	0.07

VLA	Overall			Prior years			2009					
Pres	DNR	Subs	% DNR	DNR	Subs	% DNR	DNR	Subs	% DNR	diff	SE Yr-Yr	z
ABORTION	66	90	73.3 %	32	47	68.09 %	34	43	79.1 %	11.0 %	9.3 %	1.18
DIARRHOEA	84	343	24.5 %	39	185	21.08 %	45	158	28.5 %	7.4 %	4.7 %	1.59
EYE	0	1	0.0 %	0	1	0.00 %	0	0		0.0 %		
FNDDEAD	25	258	9.7 %	12	140	8.57 %	13	118	11.0 %	2.4 %	3.7 %	0.66
GIT_XDIARR	3	15	20.0 %	3	11	27.27 %	0	4	0.0 %	-27.3 %		
HEALTHY	1	4	25.0 %	1	2	50.00 %	0	2	0.0 %	-50.0 %		
LAME	9	69	13.0 %	4	36	11.11 %	5	33	15.2 %	4.0 %	8.1 %	0.50
MALAISE	17	91	18.7 %	10	45	22.22 %	7	46	15.2 %	-7.0 %	8.2 %	-0.86
MASTCLIN	0	4	0.0 %	0	4	0.00 %	0	0		0.0 %		
MUSC_SKEL	1	9	11.1 %	0	3	0.00 %	1	6	16.7 %	16.7 %		
NERVOUS	9	56	16.1 %	3	28	10.71 %	6	28	21.4 %	10.7 %	9.8 %	1.09
OTHER	13	41	31.7 %	7	18	38.89 %	6	23	26.1 %	-12.8 %	14.6 %	-0.87
RECUMBT	3	22	13.6 %	2	14	14.29 %	1	8	12.5 %	-1.8 %		
REPRO	16	30	53.3 %	6	16	37.50 %	10	14	71.4 %	33.9 %		
RESPIR	12	180	6.7 %	4	90	4.44 %	8	90	8.9 %	4.4 %	3.7 %	1.20
SKIN	2	25	8.0 %	2	16	12.50 %	0	9	0.0 %	-12.5 %		
UNKNOWN	19	130	14.6 %	7	67	10.45 %	12	63	19.0 %	8.6 %	6.2 %	1.39
URINARY	0	1	0.0 %	0	0		0	1	0.0 %	0.0 %		
WASTING	15	163	9.2 %	5	90	5.56 %	10	73	13.7 %	8.1 %	4.6 %	1.79
	295	1,532	19.26 %	137	813	16.85 %	158	719	21.97 %	5.12 %	2.02 %	2.54

Table 13: VIDA Overall Changes in DNR rates for Pigs by Syndrome to Q4 for 2009 and prior years

GB

	Overall			Prior years (2008 onwards)			2009					
Syndrome	DNR	Subs	% DNR	DNR	Subs	% DNR	DNR	Subs	% DNR	diff	SE Yr - Yr	z
Circulatory	3	46	6.52 %	1	22	4.55 %	2	24	8.33 %	3.79 %	7.29 %	0.52
Enteric	139	738	18.83 %	65	386	16.84 %	74	352	21.02 %	4.18 %	2.88 %	1.45
Mastitis	0	4	0.00 %	0	4	0.00 %	0	0		0.00 %		
Musculo-skeletal	12	107	11.21 %	4	54	7.41 %	8	53	15.09 %	7.69 %	6.10 %	1.26
Nervous / Sensory	15	129	11.63 %	9	62	14.52 %	6	67	8.96 %	-5.56 %	5.65 %	-0.98
Reproductive	109	146	74.66 %	49	70	70.00 %	60	76	78.95 %	8.95 %	7.21 %	1.24
Respiratory	16	373	4.29 %	7	216	3.24 %	9	157	5.73 %	2.49 %	2.13 %	1.17
Skin	3	50	6.00 %	1	33	3.03 %	2	17	11.76 %	8.73 %	7.09 %	1.23
Systemic & Misc	52	758	6.86 %	30	402	7.46 %	22	356	6.18 %	-1.28 %	1.84 %	-0.70
Unknown (999,990,991,980,970	31	38	81.58 %	13	16	81.25 %	18	22	81.82 %	0.57 %		
Urinary	3	19	15.79 %	1	10	10.00 %	2	9	22.22 %	12.22 %		

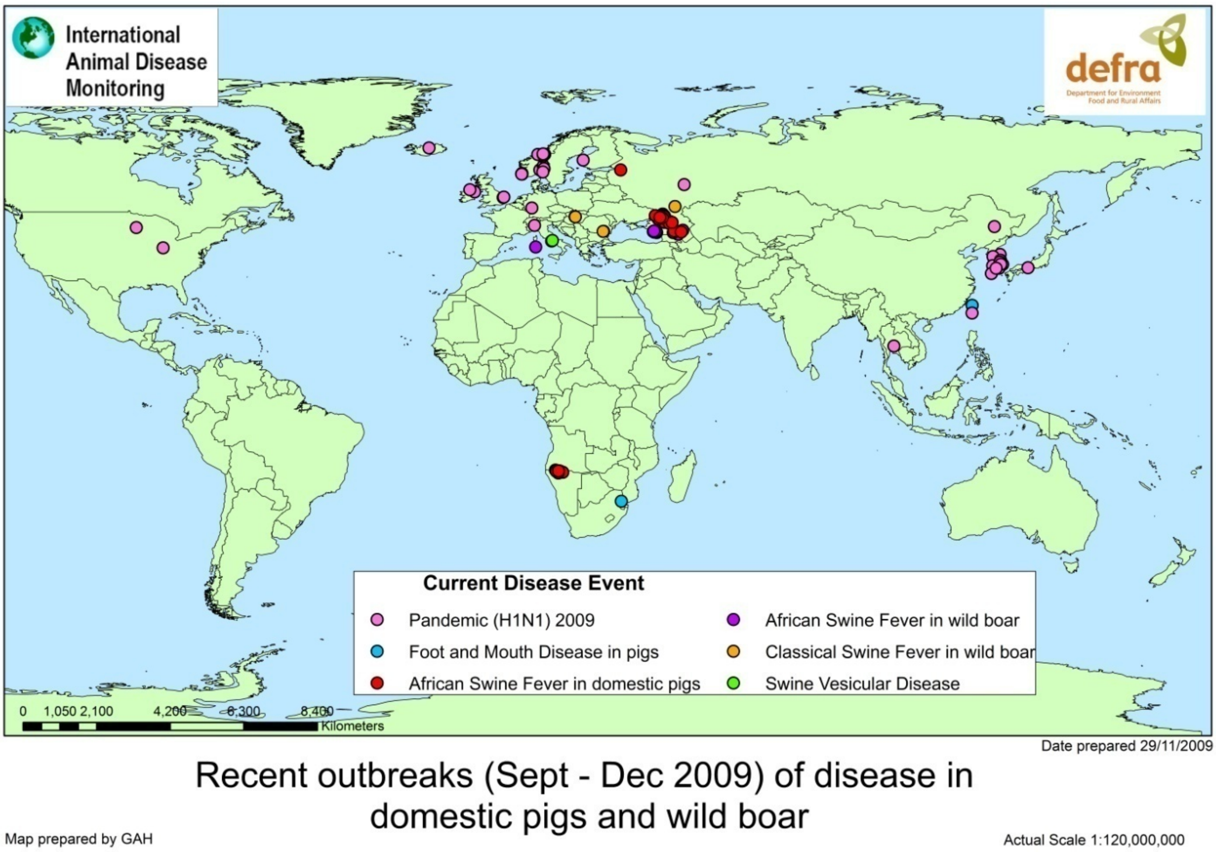
SAC

	Overall			Prior years (2008 onwards)			2009					
Syndrome	DNR	Subs	% DNR	DNR	Subs	% DNR	DNR	Subs	% DNR	diff	SE Yr - Yr	z
Circulatory	2	16	12.50 %	1	5	20.00 %	1	11	9.09 %	-10.91 %		
Enteric	37	277	13.36 %	19	135	14.07 %	18	142	12.68 %	-1.40 %	4.09 %	-0.34
Musculo-skeletal	3	17	17.65 %	1	9	11.11 %	2	8	25.00 %	13.89 %		
Nervous / Sensory	1	34	2.94 %	0	14	0.00 %	1	20	5.00 %	5.00 %		
Reproductive	15	21	71.43 %	7	9	77.78 %	8	12	66.67 %	-11.11 %		
Respiratory	4	90	4.44 %	2	56	3.57 %	2	34	5.88 %	2.31 %	4.48 %	0.52
Skin	0	20	0.00 %	0	15	0.00 %	0	5	0.00 %	0.00 %		
Systemic & Misc	7	156	4.49 %	5	79	6.33 %	2	77	2.60 %	-3.73 %	3.32 %	-1.13
Unknown (999,990,991,980,970	18	23	78.26 %	8	11	72.73 %	10	12	83.33 %	10.61 %		
Urinary	1	3	33.33 %	0	1	0.00 %	1	2	50.00 %	50.00 %		

VLA

	Overall			Prior years (2008 onwards)			2009					
Syndrome	DNR	Subs	% DNR	DNR	Subs	% DNR	DNR	Subs	% DNR	diff	SE Yr - Yr	z
Circulatory	1	30	3.33 %	0	17	0.00 %	1	13	7.69 %	7.69 %		
Enteric	102	461	22.13 %	46	251	18.33 %	56	210	26.67 %	8.34 %	3.88 %	2.15
Mastitis	0	4	0.00 %	0	4	0.00 %	0	0		0.00 %		
Musculo-skeletal	9	90	10.00 %	3	45	6.67 %	6	45	13.33 %	6.67 %	6.32 %	1.05
Nervous / Sensory	14	95	14.74 %	9	48	18.75 %	5	47	10.64 %	-8.11 %	7.27 %	-1.12
Reproductive	94	125	75.20 %	42	61	68.85 %	52	64	81.25 %	12.40 %	7.73 %	1.60
Respiratory	12	283	4.24 %	5	160	3.13 %	7	123	5.69 %	2.57 %	2.42 %	1.06
Skin	3	30	10.00 %	1	18	5.56 %	2	12	16.67 %	11.11 %		
Systemic & Misc	45	602	7.48 %	25	323	7.74 %	20	279	7.17 %	-0.57 %	2.15 %	-0.27
Unknown (999,990,991,980,970	13	15	86.67 %	5	5	100.00 %	8	10	80.00 %	-20.00 %		
Urinary	2	16	12.50 %	1	9	11.11 %	1	7	14.29 %	3.17 %		

Appendix 1



This report summarises official information on outbreaks of specified diseases of pigs of interest. Defra's Food and Farming Group, Global Animal Health (FFG-GAH) monitors outbreaks of animal disease in countries that trade with the UK and EU Member States. It also notes new epidemiological developments, which may give an early warning of emerging threats to the UK. Where a new disease outbreak could pose a threat, the FFG-GAH carries out assessments of the risks to UK livestock. We publish these on Defra's website (note: this address has changed recently) (http://www.defra.gov.uk/foodfarm/farmanimal/diseases/monitoring/index.htm). The EU and the UK take appropriate safeguard measures to mitigate the potential risks of disease being introduced through legal trade. Defra notes that it is also important to recognise the continuing threat to the UK through illegal imports from countries with endemic disease, and other routes. Maps in this report were prepared from official reports received during the period. They are primarily for visual purposes, do not necessarily reflect the true situation in every country and should not be regarded as definitive. The maps were produced using ESRI Data and Maps CD

(2002). Unless otherwise stated, disease control measures have been put in place by the affected country or region.

OFFICIAL INFORMATION SOURCES

Office International des Epizooties - World Organisation for Animal Health (OIE), Paris, France

(http://www.oie.int/eng/info/hebdo/a_INFO.HTM)

European Commission, Brussels, Belgium

- Animal Disease Notification System. Weekly Reports

- CVO Emergency notifications/SANCO documents

- EUR-LEX – (http://europa.eu.int/eur-lex/en/index.html)

A list of declarations issued by DEFRA in relation to international animal disease and customer information notes can be obtained online at

http://www.defra.gov.uk/animalh/int-trde/animl-im/cins/ai_cins.htm or by contacting the Food and Farming Group, Global Animal Health, DEFRA, 17 Smith Square, London SW1P 3JR. Details of all European Commission legislation are available online at the EUR-Lex website at http://europa.eu.int/eur-lex/en/index.html.

APPENDIX 2 – Scientific update on pigs

NEW DISEASE

A new condition called porcine ulcerative dermatitis syndrome (only previously reported by Coignoul et al (1985) and Scmoll et al, 2004) which may be a form of vesicular cutaneous lupus erythematosus (VCLE) has been described by A.Lopez et al (2009, Vet Rec., 165, 501-506). The skin condition appears as severe crusting dermal ulcerations of the abdomen and flanks with moderate lesions on the base of the tail and on the perineum. It is unlikely that either environmental factors or infectious diseases (no response to antibiotics) were associated with the condition. The disease was considered to be of an immunological nature as IgG and a preponderance of CD3+ and CD1+ cells were found in the lesions. The lesions were similar to lesions of VCLE found in Shetland sheepdogs and rough collie.

Porcine sapovirusis is an enteric calicivirus similar to the virus which occurs in man. The incidence, genetic diversity and molecular epidemiology in six European countries has been reported by G.Reuter et al (2010, J.Clin.Micro., 363-368). They were found in all 6 countries at a low level (7.6%). No “human-like” sapoviruses were detected in the pigs.

A new manifestation of PCV2AD has been described by Dr Steve Henry on the Kansas State University web site. It involves a serious outbreak of respiratory disease in 7-14 week old pigs with acute mortality in pigs of good bodily condition with the pigs showing severe pulmonary oedema. All pigs were vaccinated at 4 and 7 weeks of age. The PCV2 virus isolated is similar to others from the area. The amount of circovirus detected was very high. PRRS virus was found in many of the pigs but not all.
Maternal antibody levels were at such a level that they would not interfere with effective vaccination. Vaccines have been investigated and appear to be ok (7 batches involved). Vaccination does not eliminate the virus from the environment.
Diagnostic efforts continue. Questions include 1) is there a circovirus that is not neutralised by circulating neutralising antibody? 2) are there other agents involved? 3) is this just an expression of acute circoviral disease or a new variant of pathogenesis?.

WELFARE

A prototype welfare monitoring system for sows and piglets (Welfare Quality Project) has been described by K. Scott et al, (2009), Animal Welfare, 18, 441-449 is being developed for European wide use. Preliminary analysis of data from 82 farms in the Netherlands and UK) suggests that incidences of clinical welfare problems were low, with less than 1.2% showing lesions of skin disease, bursitis, vulval lesions or poor body condition. Vulval lesions were more common were there were electric sow feeders. Withdrawal behaviour from humans was rare. Some form of stereotypic behaviour was seen in 75% of farms and the most common was sham chewing.
A paper by E. von Borell et al (Animal (2009), 3, 1488-1496) has suggested that sperm sexing and raising entire males after genetic control of boar taint may be better alternatives to surgical castration.

PIG HEALTH MONITORING

A review of the strengths, weaknesses, opportunities and threats of the pig health monitoring systems used in the UK has been produced by K. D. C. Staerk & A. Nevel (Vet. Rec., 2009, 165, 461-465). It suggests that although there is a high level of awareness and involvement through quantitative analysis of the data it could be enhanced. The paper recommended a further assessment of each of the systems impact and the bias associated with each.

VIRAL INFECTIONS

A brilliant review of RT-PCR technologies used in veterinary virology and disease control for the five diseases notifiable to the WHO for Animal Health has been published by B. Hoffmann et al (2009, Vet. Micro., 139, 1-23). It includes significant contributions from VLA and IAH staff.

CLASSICAL SWINE FEVER

The virulence of Classical Swine Fever isolates from Europe and other areas from 1996 to 2007 has been reviewed by G. Floegel-Niesmann et al (2009, Vet. Micro., 139, 165-169). Several times the diagnosis was made too late because of the non-specific signs which did not trigger the thought of CSF. Only lymphadenosis and high temperature were seen without characteristic haemorrhagic lesions. Experiments were carried out with 6 reference strains at the CSF reference laboratory in Hannover. There is a correlation between virulence and pathological signs (many are non-specific) which is shown in the newly assessed method of clinical scoring (mCSF). High virulence is associated with a high score. A sub-clinical course of a CSF outbreak in weaner pigs is unlikely. In older pigs it is suggested that the signs may be masked by other infections particularly respiratory infections.
G-J lin et al(2009, Vet. Micro., 139, 369-374) have developed a yeast-expressed CSF glycoprotein E2 vaccine that induces a protective immune response. It can therefore be used to differentiate between vaccinated animals and natural infections.
A gel- based multiplex RT-PCR has been developed to differentiate between CSF, BDV type 1, BDV type 2 and Border disease all of which are pestiviruses. (H.D. de Arce et al, 2009, Vet.Micro., 139, 245-252). It can detect pigs infected with low and moderately virulent strains at an early stage. It has two systems one to detect pestiviruses in general and the other to detect specific CSF viruses. It is sensitive, rapid and cost-effective.
A modified live marker vaccine candidate CP7_E2alf provides early onset of protection against lethal challenge with CSF after both intramuscular (I week later) and oral immunisation (2 weeks later). It could be a useful marker vaccine and an emergency vaccination (I.Leiffer et al, 2009, Vaccine, 27, 6522-6529).

ZOONOSIS and WILD BOAR
HEPATITIS E VIRUS (HEV)

The HEV isolates from sporadic human cases in the countries which have had the disease have similar genomes to animal isolates especially those from pigs. For the years 2001-2007 there were 311 cases of human HEV in Germany. A case control study showed that the main risk factor was consumption of offal and meat from wild boars. During the hunting season for 2007 samples were collected from wild boar. A sero-prevalence of around 29% was detected by ELISA but the qPCR on bile samples showed a level of 68.2% with regional differences. Adult wild sows and boars were highly HEV positive. All were within genotype 3 but the sub-groups varied from hunting spot to spot. Within one population HEV isolates are closely related but social groups of animals in close proximity may have a different sub-type. It can be assumed that hunters may be susceptible to infection from the high number of virus copies found in the younger animals particularly when they remove organs from the carcases with bare hands. Wild boars may represent one of the major reservoirs of HEV infection for infection in humans. There is as yet no study of HEV in domestic pigs in Germany.

TUBERCULOSIS

First experimental data on the immunisation of Eurasian wild boar with BCG and subsequent challenge with a *M.bovis* field strain (C.Ballesteros et al, 2009, Vaccine, 27, 6662-6668) has shown that the oral BCG vaccine may be able to up-regulate immunoregulatory genes associated with a protective response to *M. bovis* in wild boar. More studies need to be made to see if vaccine efficacy, delivery, and safety mean that oral BCG could be used to in bTB control programs.
The epidemiology of the *M.bovis* infections in wild boar in Portugal has just been described by N. Santos et al (2009, J. Wild. Dis., 45, 1048-1061). The infection rate varies very greatly between the areas in Portugal which were tested e.g. 6, 22, and 46%. The differences may be real or as a result of different approaches not using pathology. In this study sows were more likely to be affected than males probably because they live in groups. Infection rates were higher in young animals. This may be due to early death in the older infected animals. This may be due to them picking up infection whilst together in the family group from infected milk or direct transmission. *M.avium* was found in 19% of pigs and other bacteria were found in 36% of cases. The infection of the head lymph nodes suggests that both respiratory and alimentary routes of natural infection are important. Most lesions were encapsulated with few organisms but not all. Wild ungulates may be the hosts for the pig. It seems likely that the wild boar is a reservoir of *M. bovis* in Iberia. The authors think that since wild boar are largely sedentary the disease is spreading outwards slowly at around 1km/year.

BRUCELLA SUIS BIOVAR

Antibodies to *B.suis* were first detected in wild boar in NW Italy in 2001 possible through the importation of wild hares from countries where the disease was endemic. A new survey of *B.suis* in wild boar in the North-west of Italy (S. Bergagna et al, 2009, J. Wildlife Research, 45, 1178-1181) has shown that around 20% of pigs by serology and 11% by culture were positive. There is no data on the numbers of the wild boar in this area.

ENCEPHALOMYOCARDITIS VIRUS

This is a widespread virus which is found in 30 species and can infect humans. Pigs are the most susceptible domestic animal. Belgium, Italy, Greece and Cyprus appear to be the most common countries affected. Outbreaks are often clustered in endemic areas. Two strains are known-type A causing reproductive disorders (causes transplacental infection resulting malformations, abortions, and mummification or stillborn or weak piglets) and type B causes myocarditis. Neonatal piglets die with no signs or with nervous signs. Some strains can cause both. Infected rodent faeces are the source of infection. The tonsils are the entry point and macrophages spread the infection in the body. In piglets and weaners myocarditis is usually noted. Older piglets are not usually affected. It is often limited to individual farms or pig houses. Diagnosis is by IHC, virus isolation, or serology. No treatment is available. There is a commercial vaccine in the USA. Effective rodent control through a proper policy is essential. This review was conducted by I.Markowska-Daniel et al, (2009, Med. Wet., 65, 747-751).

PORCINE PARVOVIRUS

Porcine parvovirus is the most common infectious cause of reproductive failure. It produces the clinical syndrome of SMEDI. The development of the disease depends on the virus strain and the time of infection. Foetuses infected before day 70 of gestation usually die whereas those infected later develop antibodies and usually survive. It was originally thought to be 1 virus but was shown by Zimmermann (2006) to be more diverse with two genotypes existing with 100-1000 fold titre differences between them. The original type 1 is not very virulent when compared with prototype genotype 2 infections in pregnant gilts. The important point is that the vaccines in use today were developed some 30 years ago using the original type 1 strain. Two of the old style vaccine strains and a new vaccine based on the new strain were given to sows and then were challenged after insemination with the new challenge virus. After challenge (the AB titres were then 128 or 256) all pigs replicated and shed the virus for up to 7 days. Vaccination of sows with a type 1 virus does not prevent infection and shedding of the type 2 virus. More surprising was that both vaccinated and non-vaccinated sows showed the same serological response and virus shedding after challenge. At the herd level vaccination with these vaccines may not be the perfect tool to manage PPV infection (A. Jozwik et al, 2009, Archives of General Virology, 90, 2437-2441). The authors conclude that it is essential to vaccinate sows in the field at 4-6 month intervals to maintain protection in the absence of more efficient vaccines.

TRANSMISSIBLE GASTRO-ENTERITIS (TGE)

A real-time Taqman RT-PCR assay has been developed for TGE (R. Vermulapalli et al, 2009, J.Virol. Methods, 162, 231-235). It is a highly sensitive diagnostic test for the rapid detection of TGEv in faeces.

PCV2

K.Dupont et al (Vet. Micro., 2009, 139, 219-226) have described the transmission of different variants PCV2 and viral dynamics in a research facility with pigs mingled from PMWS-affected herds and non-affected herds. Eight variants of PCV2b were found in the research facility. PCV2 primarily spreads through close contact particularly nose to nose contact. Pigs entering the unit with PCV2 had PMWS associated with the same virus and this virus was at a much higher level. Pigs from non-affected herds developed infections from PCV2 affected pigs. Pigs able to control the serum level of PCV2 recovered clinically or stayed healthy. Pigs with a titre below 5x10x8 copies /ml serum during the study period had a chance to recover whereas those above did not. It seems obvious from this study that very strong biosecurity barriers are required between sections to avoid the spread of the virus and disease.

A genetically engineered chimeric PCV2 vaccine against PCV2 has been shown to improve clinical, pathological, and virological outcomes in PMWS affected farms (J. Segales et al, 2009, Vaccine, 27, 7313-7321.). It reduces the PCV2 viral load in lymphoid organs. This is the first vaccine to show a specific reduction in PMWS associated mortality.
The evolutionary history of PCV2 has been investigated by C. Firth et al (2009, J. Virol., 83, 12813-12821) who suggested that PCV2 recently emerged by jumping from birds to pigs possibly through intermediate contact with wild boar.

In addition the worldwide trade in asymptomatic pigs has probably helped to spread the virus. There are two genotypes 2a and 2b.There may be increasing diversity in PCV2b that is not so present in PCV2a. There is evidence that the virus is not new to pigs but has only just started to

cause disease. Circoviruses are likely to be of fairly recent origin probably within the last 100 years. It is likely that the first cases of PMWS were seen at the time of the arrival of PCV2b. PCV2b did not arise from PCV2a but evolved separately from a common ancestor about 100 years ago. In addition, the estimated rate of nucleotide substitution is higher than that measured for any ssDNA virus to date. This places PCV2 in the evolutionary rates normally associated with ssRNA viruses. It is particularly striking for a virus that uses the host polymerase.
Intra-uterine infection with PCV2 spiked semen was shown to be responsible for reproductive failure in an experimental study by D. Madson et al (2009, Vet. Pathol., 46, 707-716). It caused viraemia in the sows and fetal infection but not abortion. If increased numbers of stillborn or mummified foetuses are born PCV2 should always be considered through infected semen. In this study there was *in utero* transmission between foetuses. Death of the foetuses occurred between 42 and 105 days of gestation. Abundant antigen was always detected in the myocardial tissue and rarely in lymphoid tissues which suggests that myocardium is the best foetal tissue for accurate diagnosis in foetal tissues. Many of the foetuses were AB positive ie indicating infection after day 70 of foetal life.

PRRS

An interesting paper by C. C Chang et al (2009, J. Swine. Hlth. Prod., 17, 318-324) has shown that persistent PRRS infection does not require significant genetic changes in ORF5 as has been proposed in the past. ORF 5 encodes for the major envelope protein and could therefore be involved in antigenic shift, virus-host interactions, and protective immunity. Six potential antigenic sites have been identified in the envelope. The variable regions are located near the N terminus and the C terminus. On-going PRRSv mutation may be selective but independent of host responses. It seems that viral genetic change is not necessary to evade the host's immune responses.

The frequency of PRRS live vaccine virus both European and North American (NA) in vaccinated and non-vaccinated pigs submitted for respiratory tract diagnostics in North-Western Germany was reported by E. Beilage et al (Prev. Vet. Med., 2009, 92, 31-37.). Overall, 18.5% of the samples had European type wild virus. The European vaccine type was found in 1.3% and the North American in 8.9% of the samples.

Spontaneous transmission of the NA vaccine probably does occur whereas spontaneous transmission of the E vaccine is probably limited. The European isolate was only isolated from 1.3%,(12 pigs) and the isolate was 99.1-100% nucleotide similar to the vaccine virus and it is therefore likely that these strains evolved from the vaccine virus. In the case of the NA viral isolates (55 of 64 isolates) they were 98-100% similar to the corresponding vaccine virus. In the case of 9, the virus was 96.0-97.8% similar suggesting a continuous mutation of the viral genome. It is likely that the divergence of both series of virus isolates will continue.
The influence of PRRS on subsequent PRCV infection was described by K. Jung et al (J. Gen. Virol., 2009, 90, 2713-2720) who showed that PRRS had an immunomodulatory effect on subsequent infection by altering early innate IFN alpha function and later T-helper1(IFN gamma) and T-helper 2 (IL-4) function. This then affects alveolar macrophages NK and T cells. The subsequent PRCV infection was exacerbated which in turn led to enhanced PRRSv replication in the lung and a trend towards increased TH1 (IFN-alpha) cytokines which exacerbated the severity of PRCV infection.

The use of saliva for haptoglobin and C-reactive protein quantification in PRRS affected pigs in field conditions was described by A. M. Gutierrez et al (Vet. Immunol. and Immunopath., 2009, 132, 218-223). Acute phase proteins had higher values in the affected pigs than SPF pigs.
Gilts were inoculated at 90 days of gestation with a low dose of mildly virulent PRRS virus (J.P.Cano et al Canad. J. Vet. Res, 2009, 73, 303-307.). Most of the gilts became clinically ill

and transmitted the virus *in utero.* 28% of the piglets were born serologically negative but 100% were positive by 4 days of age and most of the piglets were still viraemic at 17 days of age.
A field study of PCV2 and PRRS infections in 7 PMWS affected farms (L. Fraile et al, 2009, Canad. J. Vet. Res., 73, 308-312.) in Spain showed that piglets from primiparous sows , PCV2 infected sows, and farms in an area of high piglet density have a higher risk of co-infection than piglets from sows of greater parity , non-infected sows and farms in low-density areas. The risk is also much higher in large herds in large density areas than in small farms in low density areas. PCV2 infection dynamics in piglets are dependent on their dam characteristics. The % of piglets dying was much higher in the viraemic sows and was higher in sows which have low or non-detectable AB levels than from non-viraemic or high AB level sows. It seems that greater amounts of maternally derived PCV2 antibody seem to protect against piglet death as well as modifying the effects of PCV2 dynamics. A positive relationship was observed between PCV2 infections and PRRS infections. This suggests that effective PRRS control is one of the best ways to control the effects of PMWS.

SWINE INFLUENZA

An H1N1 virus was isolated from pigs at an Ohio country fair in 2007 (H.M. Yassine et al, 2009, Vet. Miocro., 139, 132-139.). It was shown to be 100% identical to the humanH1N12009 virus. Twenty-six people developed influenza from being in- contact with the pigs. Three isolates were studied from 2004, 2006 and the 2007. All three, although isolated over a short period of time showed distinct genotypic and phenotypic features. The 2006 and 2007 were more similar to each other but all three were more than 85% similar. All three were triple re-assortants. Interestingly the internal genes of these Ohio viruses and others isolated have similar internal genes in both turkeys and pigs and this suggests that this internal configuration may confer stability. In any case these viruses appear to transmit easily from turkeys to pigs and vice versa. The shared amino acid at the binding sites of these porcine viruses and the human viruses may facilitate their spread from pigs to humans. The viruses have the PB1 gene from humans, The HA, NA, NP, M and NS from pigs and the PB" and PA genes from avian lineage viruses.

Although there is no vaccination of pigs for swine influenza in the UK there is considerable world wide interest in vaccination. At the present time vaccines are based on inactivated whole virus of the H1N1 and h3N2 sub-types. Recently, workers in Canada have developed an elastase-dependent live attenuated H1N1 vaccine (LAIV) that seems to give complete protection to homologous viruses and partial protection to H3N2 viruses. These LAIV are able to induce protective systemic and mucosal immune responses (A. Maksic et al, 2009, J.Virol., 83, 10198-10210)
A study reported by P. Kitikoon et al (2009, Vet. Micro., 139, 235-244) studied the impact of virulent PRRS infection on attenuated SIV vaccination. Evaluation used clinical signs, gross and microscopic lesions virus isolation and immunological parameters. High health status pigs were used. Pigs vaccinated for SIV had mild clinical disease but no reduced weight gains. Infection with PRRSv between the two SIV doses (at 4 and 7 weeks) resulted in a slight increase in the pyrexia time, increased coughing, clinical signs similar to non-vaccinated pigs

but in addition a reduced weight gain. Infection with PRRSv increased the gross and microscopic lesions when compared with the SIV vaccinated pigs. Effective SIV vaccination is important in reducing disease induced by co-infections of PRRSV and SIV. It is possible that the macrophage response to the SIV means that there are more cells available to be colonised by the PRRSv which increases the length of time of the pneumonia. The decreased efficacy may be due to an immunosuppressive effect caused by an increased IL-10 level. PRRSv infection may also induce a polyclonal expansion of B-cells which may result in an increased production of antibodies with a lower affinity to the virus and thus reduced vaccine efficacy and an increased disease in the presence of antibodies. The role of PRRSv should always be considered when vaccinating for other endemic diseases. The authors point out that the impact could be quite important during gilt acclimatisation.

Prior infection with an H1N1 swine influenza virus partially protects pigs against a low pathogenic H5N1 avian influenza virus (AIV)(K. Van Reeth et al, 2009, Vaccine, 27, 6330-6339). The data suggest that seasonal H1N1 may provide some protection against H5N1 or other H5 AIVs in the absence of neutralising H5 antibodies. It is likely that H5N1 infected humans may have some immunity to the N1 component from other exposures or they may have cross-reactive T-cell responses. Previous infection with natural H1N1 is likely to be the prime inducer of cross-reactivity. They also found sub-type cross-reactive CMI responses in H1N1 infection-immune pigs. Much of this cytotoxic response is to the conserved epitopes on the NP, M1 and NS1 proteins. It is likely that most of the cells involved are T helper 1 cells. These stimulate virus specific cytotoxic T- lymphocytes. The effectiveness of this cross protection is highly dependent on the challenge dose and therefore the replication levels of the virus. Cross protection probably can prevent high morbidity and mortality but effective vaccination requires vaccination with the same sub type.

Experimental infection of turkeys with Pandemic (H1N1) 2009 influenza virus (A/H1N1.09v) has been described by C. Russell et al (2009, J. Virol., 83,13046-13047). Reverse zoonosis has been reported to have occurred naturally. The virus failed in experimental transmission to produce clinical signs and to fully replicate the virus although RNA was transiently recovered in two turkeys. As the H1N1 pandemic progresses variants with better ability to infect species may be generated.

An investigation into human pandemic influenza virus infection (H1N1) 2009 on an Alberta swine farm was described by K.J.Howden et al, (Canadian Vet. J., 2009, 50, 1153-1161). The farmer notified his veterinarian of an acute cough in his pre-grower and grower animals. A contract worker had recently returned from Mexico and showed signs of influenza. None of the involved authorities advised complete slaughter of the herd but no movements off the farm were allowed so crowding became a welfare issue. A batch of 475 pigs were slaughtered and sent to rendering and the remains placed in landfill. The pigs made an uneventful recovery but no slaughterhouse would accept them so the owner slaughtered and rendered them. Clinical signs included oculo-nasal discharge, sneezing, mild conjunctivitis, and a deep, dry non-productive cough. Clinically affected pigs were pyrexic, moderately depressed, anorectic and mildly dehydrated. Mortality had returned to levels less than 1%. Grossly, pigs had poorly collapsed lungs, rubbery texture, and mild interlobular oedema. There was a cranio-ventral pneumonia. Secondary bacterial infections were noted. Histopathology, showed mild tracheitis, broncho-interstitial pneumonia, necrotising and suppurative alveolitis. Nineteen of 24 swabs were shown to be positive for the M gene and H1 gene (RT-PCRs) and 21 had influenza virus isolated. The pigs were all exposed to the virus over a short period of time.

BACTERIAL INFECTIONS

SALMONELLA

A study by M.H. Rostagno et al (Foodborne Pathogens and Disease, 2009, 6, 865- 869) has shown that there was an increase in salmonella isolations by 9.2% from the first extraction of a group of pigs from the barn to the last and there was a 31.3% increase in the sero-prevalence over the same time scale. There are two possible explanations: firstly, a reactivation of latent infections following social disruption and secondly, mechanical transmission. The authors conclude that the last group out of a shed may constitute a higher risk for salmonella than the first.

Salmonella Cubana has been one of the most commonly detected serovars in environmental samples from feed mills in Sweden. *Salmonella* Derby is consistently associated with pigs and is the most common type associated with pork and pork products in the EU. In this experiment the authors (J. Osterburg et al, Vet.Rec., 2009, 165, 404-408.) described the patterns of shedding, the distribution in the pigs bodies and the serological responses. In general the dose had a greater impact than the serovar. In the low dose group none of the pigs excreted any salmonella of either type. In the moderate dose group only 1 pig excreted Cubana but in the high dose group. All the pigs given moderate or high doses of Derby shed salmonella for whole or part of the 8 weeks of the trial. All pigs seroconverted. No serological response was found in the Cubana exposed pigs. At post-mortem both serovars were re-isolated from the caecal contents and colonic tissue.

A.D.Wales et al (Vet.Rec., 2009, 165, 648-657) studied the occurrence of *Salmonella* in pigs and the environment of nucleus breeder and multiplier pig herds in England. Some serovars were repeatedly isolated, others rarely and Kedougou, Newport, and Typhimurium were isolated consistently on others. Pens holding pigs for production herds were frequently positive. Herds under common ownership showed similar serovar combinations.

Cleaning and disinfection was frequently inadequate. On one farm a low level of *Salmonella* was attributed to a small herd size, good cleaning, and good rodent control. The prevalence of *Salmonella* was greater in the young stock.

Different feed withdrawal times before slaughter were examined by S. Martin-Pelaez et al (Vet. Journal, 2009, 182, 469-473) in respect of faecal *Salmonella* shedding. As the time increased so the short chain fatty acids increased and the pH increased. This increased the *Enterobacteriacae* in the caecum and increased the shedding of *Salmonella* in faeces. The explanation may lie in the increased stress due to hunger resulting in aggression

A study of the interaction of host cells and septicaemic *Salmonella enterica* serovar Typhimurium has shown (J. Clin. Microbiol., 2009,47, 3413-3419) that the ability of these septicaemic isolates to cause diseases probably is associated with their increased capacity to invade epithelial cells

and to their lower rate of phagocytosis by monocytes. A study of the effect of the mycotoxin DON on *Salmonella* showed that at low concentrations it did not have much effect but it did predispose to the uptake of *Salmonella* into macrophages suggesting that it does modulate the innate immune system (V. Vandenbroucke et al, 2009, Vet. Res., 40:64.).

M. E. Arnold & A.J .C. Cook (2009, Epidemiol. Infect., 137, 1734-1741) suggested that pooled samples should always be used to detect salmonellosis in pigs. Pooling was highly efficient compared with individual sampling (e.g. 18 pooled samples required to detect 10% prevalence with 95% certainty compared with 35 individual samples).

ALIMENTARY

LAWSONIANA

A paper by Wattanaphansak et al (2010, J. Swine Hlth. Prod., 18, 11-17) has shown that *Lawsoniana* is susceptible *in vitro* under field conditions to quarternary ammonium compounds (QACs), QACs with aldehydes and oxidising agents.

ADDITIVES

Phenyl-lactic acid (PLA) is an organic acid that is produced as a result of phenylalanine metabolism and has recently been found in the culture of a strain of *Lactobacillus plantarum.* PLA has also been shown to have a broad spectrum of antibacterial and antifungal activities. It can also be used as a source for phenylalanine in pigs. This study was carried out to review the effects of inclusion of PLA in the diet of growing pigs on the performance, nutrient digestibility faecal microbial shedding and blood profile of pigs (J. P. Wang et al, J. Anim. Sci., 2009,87, 3235-3243.). It seemed that PLA decreased the number of *E.coli* and also stimulated the immune system of both weanling and growing pigs and may therefore be a suitable alternative to antibiotics in pigs.

ANTIBIOTICS

A study of the pharmacology of tetracycline water medication in swine (S. E. Mason et al, 2009, J. Anim. Sci., 87, 3179-3186) has shown that tetracycline should not be used enterically to treat salmonellosis and respiratory disease. There may still be a positive gastro-intestinal effect from using oral tetracycline for prevention of scours and other enteric diseases, but this does need to be assessed further.

PARASITOLOGY

TRICHINELLA

A comparison of the anti-*Trichinella* IgG by ELISA on pig sera from 21 different laboratories showed a 97.5% sensitivity and 98.29% specificity. There was no cross-reactivity with sera from pigs infected with other parasites including nematodes. The number of false positives and false negatives varied greatly between the laboratories. (M. Gomez-Morales et al, 2009, Vet. Paras., 166, 241-248.)

CRYPTOSPORIDIA

Cryptosporidium infection in East Anglia was studied by C. A. Featherstone et al (2010, Vet. Rec., 166, 51-52. There was a farm prevalence of 69.5%. The highest proportion of positive samples came from growers with a suggestion that infection increased until 10 weeks of age and then decreased. There was no correlation between FAT status and faecal consistency and clinical diagnosis. There was also no difference between indoor and outdoor-housed pigs. *Cryptosporidium* genotype II was detected in 64.1% of the 39 isolates that were sequenced. *C.parvum* was found in 8 (20.5%) and *C.suis* in 6 (15.4%). There was no association between genotype age, and housing. The infections appear to be entirely sub-clinical and incidental. The zoonotic importance of the agent in pigs is believed to be low as *C.parvum* the recognised parasite of man was rarely found in the pig and the number of oocysts present is also very low.

TOXOPLASMOSIS

J.P Dubey the world authority on toxoplasmosis has just reviewed the progress made in the study of porcine toxoplasmosis in the 20 years since his last review of the subject (Veterinary Parasitology, 164, 89-103.). His most important comment is that the increase in organic farming is likely to increase the prevalence of infection. Further research is needed to standardise conditions for killing *T.gondii* in pork and to improve antigens for use in diagnostic testing. Current testing methods are not sensitive enough to detect the parasite in pork because the density of the parasite in meat is too low.