

GB surveillance

Small ruminant diseases

Annual Report 2008: Volume 12 No. 4

Date: February 2009



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 RLs have UKAS Accreditation and comply with ISO 17025 standard. SAC Veterinary Services have UKAS accreditation at their central diagnostic laboratory and at the Aberdeen, Edinburgh, Inverness, St Boswells and Thurso Disease Surveillance Centres which comply with ISO 17025 standard.

Contents

	page
Overview	2
Diagnostic submissions	4
Notifiable diseases reported	6
Farm visit investigations	6
Food safety incidents	7
Endemic disease surveillance - sheep	8
Endemic disease surveillance - goats	21
Scanning surveillance for new and emerging diseases	22

Annual Highlights

- **Significant increase in disease due to acute and chronic fasciolosis in England, Wales and Scotland.**
- **Suspected triclabendazole resistance in England, Wales, and Scotland.**
- **Parasitic gastro-enteritis continues to cause disease problems.**
- **Macrocytic lactone anthelmintic resistance confirmed in three flocks. (VLA and SAC laboratories continue to identify anthelmintic resistance to benzimidazoles, levamisole and less commonly macrocytic lactones).**
- **Reduction in the overall number of incidents of salmonellosis, although the number of incidents of *Salmonella* Montevideo increased in England and Wales.**
- **Five incidents of disease associated with maedi-visna virus infection identified in 2008.**
- **No significant change in the incidence of sheep scab, although louse infestation more commonly diagnosed.**
- **Bovine Tb in Golden Guernsey goats.**

OVERVIEW

Weather and climate

Annual

Figure 1: Annual Rainfall - GB

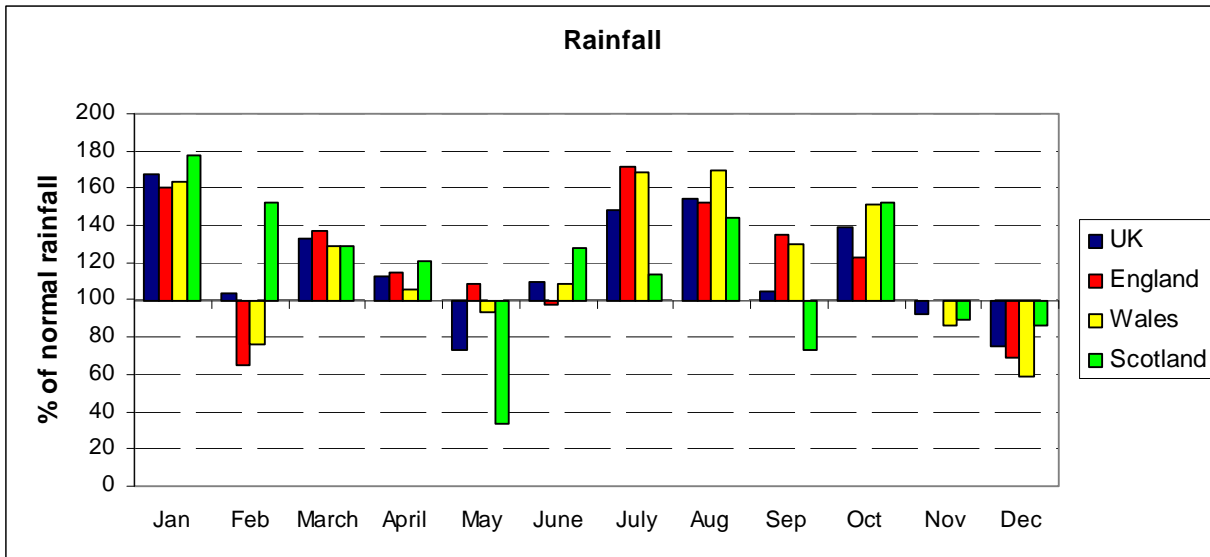
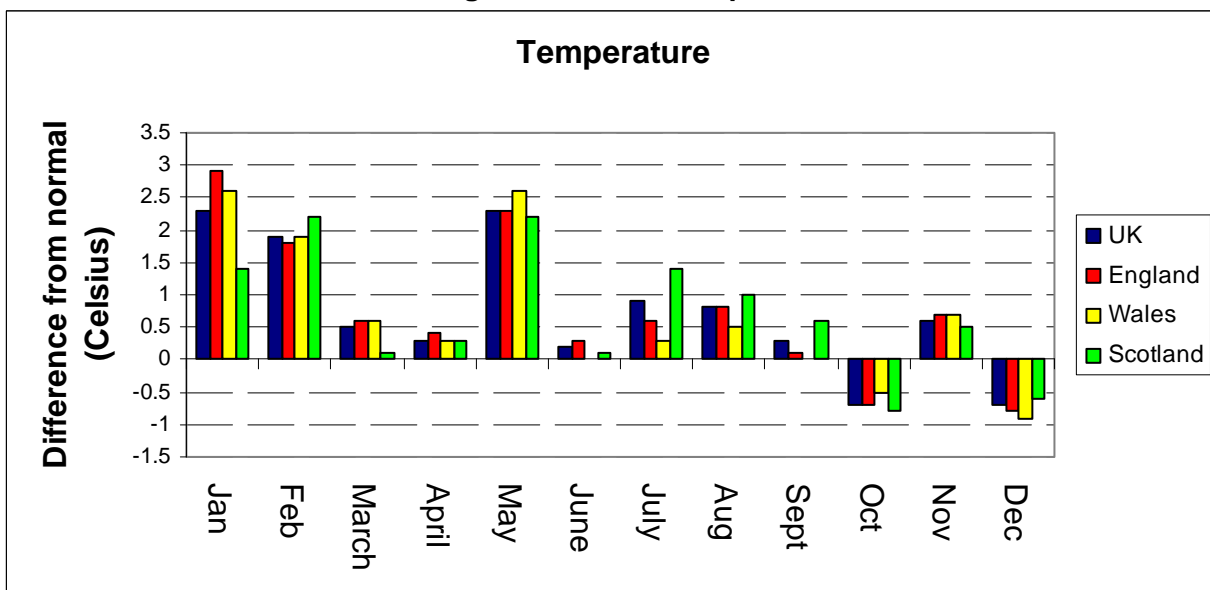


Figure 2: Annual temperature - GB



October – December 2008

In October, temperatures were all below average across GB. Most areas, provisionally, had their coldest October since 2003. Rainfall was well above average across N Wales and NW England, with some areas having over double their average rainfall. Provisionally for Scotland, it was the fourth wettest October since 1954. In November, temperatures were generally close to or slightly (up to 1°C) above average. Rainfall in GB was close to average. December was a very cold month across all of GB, particularly in the South and West. Maximum temperatures were generally below average and around 1°C below average across parts of southern England. Rainfall was below or well-below normal in most areas, with only around 50% of normal over parts of England and Wales, but locally 150% in eastern Scotland.

Economics of the small ruminant industries

National breeding flock 2008 (June agricultural and horticultural census)

Overall in the UK, the size of the ewe breeding flock reduced in 2008 to around 15.6 million, with a 7% reduction in ewe numbers in Wales, a 5% reduction in Scotland, and an increase of 1% in England.

Domestic lamb market

In the last quarter of 2008, lamb prices at slaughter were higher than the corresponding period of 2007. In October, even though prices were falling, they were over 30% higher than in 2007, due to the FMD outbreak in late summer in 2007 leading to disruption of the market pattern. In December 2008, prices remained above 2007 levels, gradually rising through the month (Table 1). Prices throughout 2008 remained higher than in 2007, partly supported by strong export demand and latterly a favourable Sterling: Euro exchange rate (Figures 3 and 4).

Figure 3: Average weekly market lamb price (pence/kg estimated deadweight – Standard Quality Quotation) 2002 - 2008

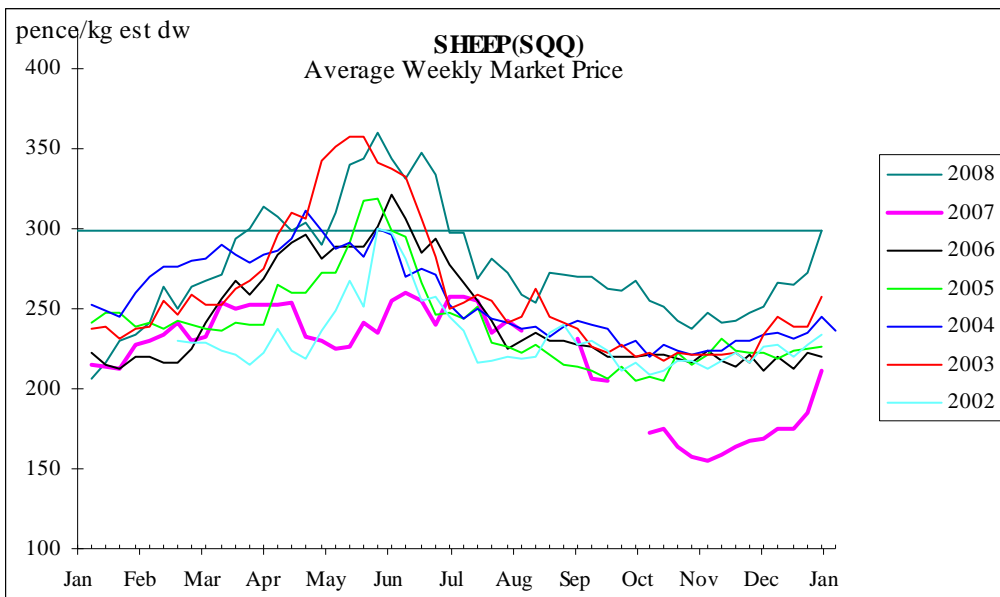


Figure 4: Average weekly market lamb price (pence/kg estimated deadweight) 2002 - 2008

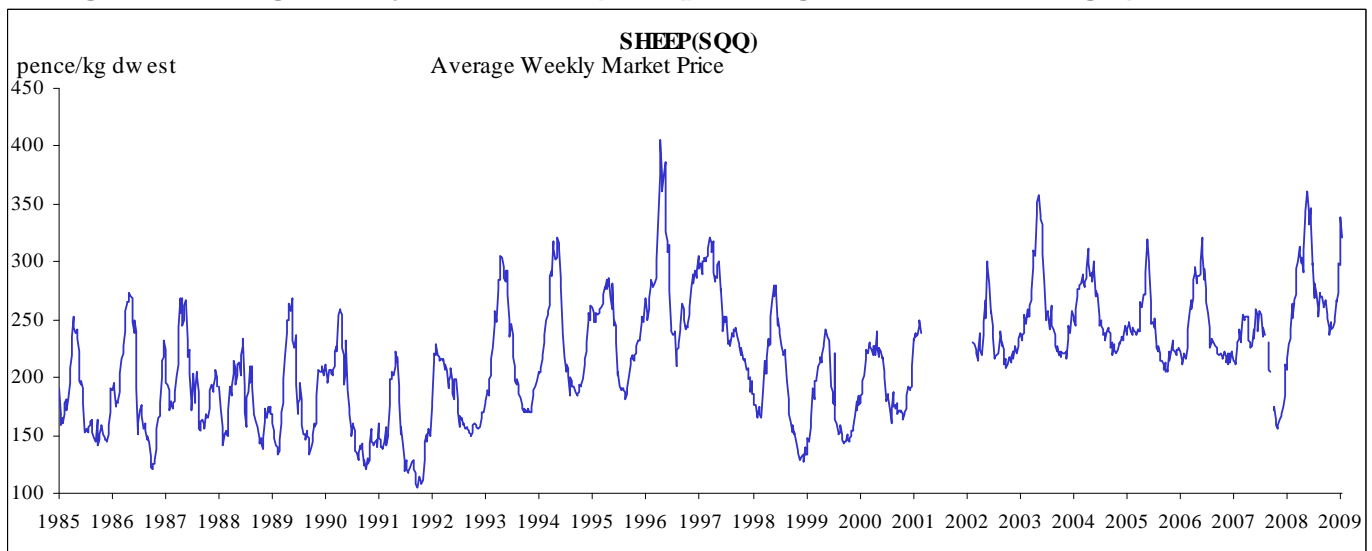


Table 1: UK Weekly sheep prices (p/kg est dw) Oct – Dec 2008

Year	week ending	week number	Sheep (SQQ) (p/kg estimated deadweight)	
			price	Annual % change
2008	04 Oct	40	255.0	+ 48.2
2008	11 Oct	41	251.7	+ 43.6
2008	18 Oct	42	242.5	+ 47.9
2008	25 Oct	43	237.0	+ 49.9
2008	01 Nov	44	248.0	+ 59.7
2008	08 Nov	45	241.0	+ 51.1
2008	15 Nov	46	243.0	+ 48.8
2008	22 Nov	47	247.2	+ 47.5
2008	29 Nov	48	251.8	+ 49.5
2008	06 Dec	49	266.6	+ 52.4
2008	13 Dec	50	265.4	+ 51.7
2008	20 Dec	51	272.7	<i>Not given</i>
2008	27 Dec	52	298.8	<i>Not given</i>
2009	03 Jan	01	297.8	+ 44.1

Exports

In the first ten months of 2008, UK sheep meat exports were 30% higher than the same period in 2007. Three-quarters of the exports were to France, helped by the weak pound, and tightening lamb supplies in France. The export market accounts for approximately 30% of UK sheep meat production.

EBLEX Business Pointers

The 2007/08 edition of EBLEX Business Pointers suggests that sheep enterprises are becoming more efficient, despite rising costs. However, nearly all sheep enterprises returned a negative net margin figure for the year ended 31st March 2008, with average losses of almost £35 per ewe. For most farms, that figure was an improvement on previous years, by as much as £17 per ewe. Store lamb enterprises were one of the few examples of producers reporting a positive net margin – an average of £1.80 per lamb (or £10.77 for the top third). This was due to faster finishing times and more timely marketing. Since the document was compiled, input costs have risen dramatically over the summer, and it remains to be seen whether the impact of this will be offset by returns from the market place.

Sources: <http://www.eblex.org.uk/>, Hybu cig Cymru – Meat Promotion Wales, and Defra: <https://statistics.defra.gov.uk/esg/datasets/wplivest.xls>

Submissions for scanning surveillance

Sheep

GB diagnostic sheep submissions were slightly lower in the final quarter of 2008 compared with 2007, due to a reduction in submissions in Scotland (table 2). GB carcass submissions during the quarter were slightly higher than in 2007, although submissions in England and Wales increased by 19% with a fall of approximately 28% in Scotland (table 2). Fasciolosis, which was commonly diagnosed in the final quarter is likely to have contributed to the increase in GB carcass submissions. Overall in 2008, diagnostic submissions were slightly higher in England and Wales, although submissions in Scotland fell by 20%. However, diagnostic carcass submissions were similar to 2007 in Scotland and increased by 11% in England and Wales (table 3, figure 5).

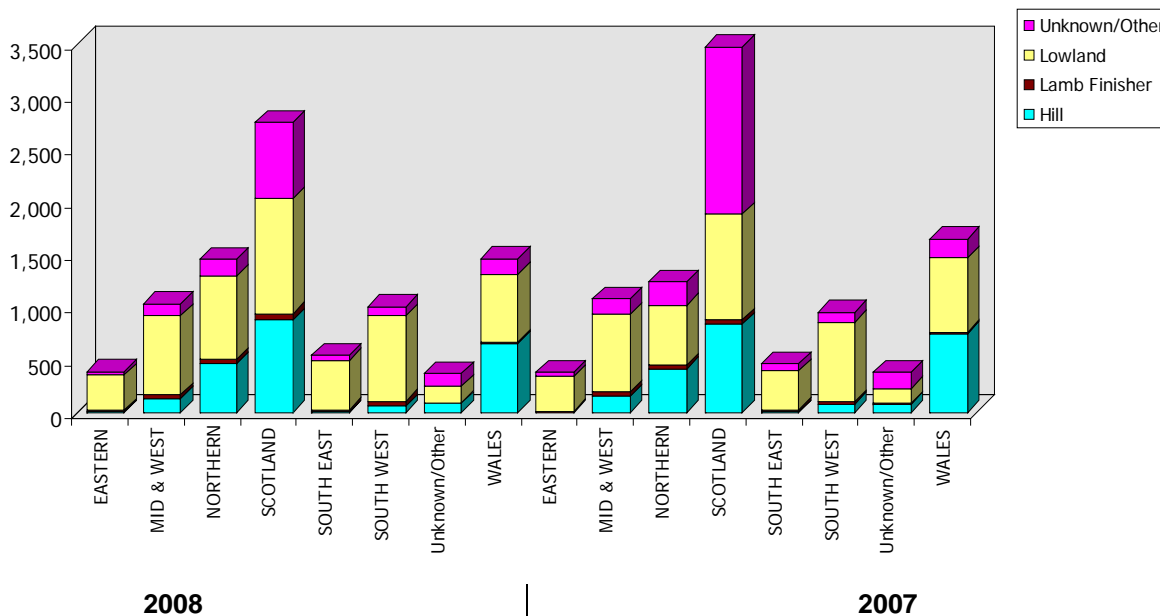
Table 2: Sheep Diagnostic Submissions and Carcasses, Oct – Dec 2008

Oct-Dec	Submissions			Carcasses		
	E&W	Scotland	Total	E&W	Scotland	Total
2004	982	583	1,565	429	323	752
2005	1,439	790	2,229	671	374	1,045
2006	1,294	905	2,199	605	377	982
2007	917	476	1,393	430	263	693
2008	945	420	1,365	512	190	702

Table 3: Annual Sheep Diagnostic Submissions in GB

Year	Submissions			Carcasses		
	E&W	Scotland	Total	E&W	Scotland	Total
2004	7,553	3,697	11,250	2,761	1,708	4,469
2005	6,837	4,044	10,881	2,701	1,571	4,272
2006	6,904	4,381	11,285	2,881	1,659	4,540
2007	5,827	3,801	9,628	2,175	1,238	3,413
2008	5,878	3,129	9,007	2,419	1,235	3,654

Figure 5: Annual GB Sheep Diagnostic Submissions, 2008 (Left) 2007 (Right)



Goats

Annual GB goat diagnostic submissions increased by 11% and diagnostic carcass submissions by 17% compared with 2007. This was due principally to an increase in submissions in England and Wales seen in the first three quarters of the year; diagnostic carcass submissions decreased in the last quarter compared with the equivalent quarter of 2007 (tables 4, 5 and 6).

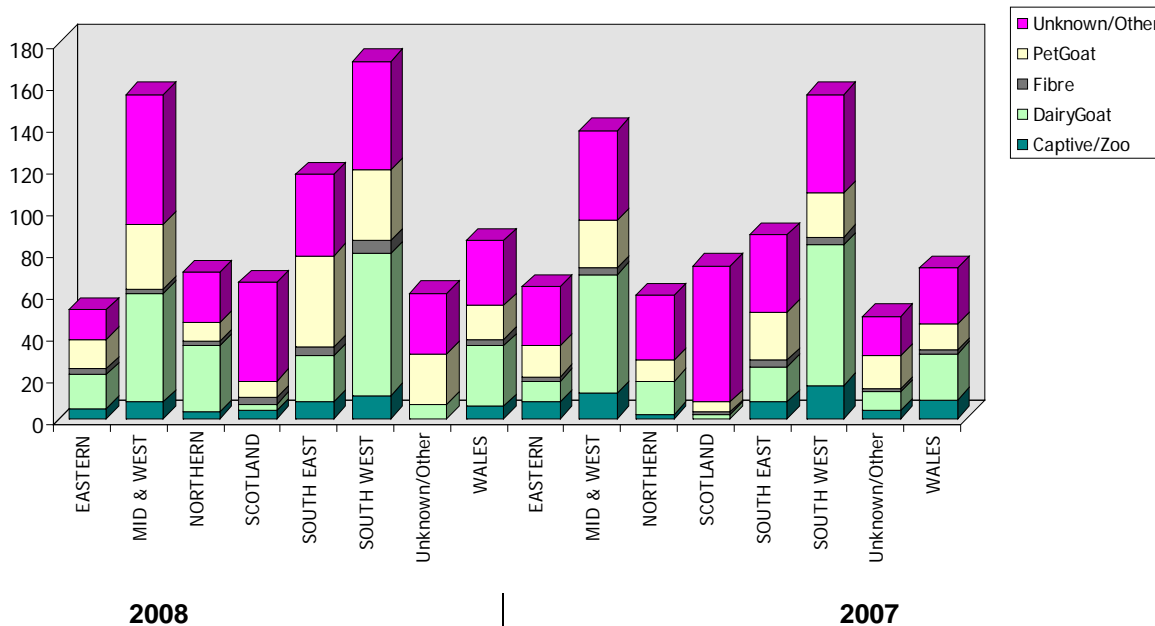
Table 4: Goat Diagnostic Submissions and Carcasses, Oct - Dec 2008

Oct-Dec	Submissions			Carcasses		
	E&W	Scotland	Total	E&W	Scotland	Total
2004	103	16	119	20	5	25
2005	121	15	136	35	4	39
2006	129	17	146	35	4	39
2007	109	11	120	43	3	46
2008	117	10	127	28	1	29

Table 5: Annual Goat Diagnostic Submissions in GB

Year	Submissions			Carcasses		
	E&W	Scotland	Total	E&W	Scotland	Total
2004	566	71	637	105	18	123
2005	543	99	642	144	15	159
2006	582	111	693	130	19	149
2007	620	77	697	174	7	181
2008	702	73	775	202	10	212

Figure 6: GB Goat Diagnostic Submissions, 2008 (Left) 2007 (Right)



Notifiable Disease Reported

During the final quarter, lesions suspicious of bluetongue seen in a lamb resulted in notification of the local Animal Health Divisional Office (AHDO). Bluetongue was ruled out following consultation with a Veterinary Officer. In another incident, calcified lesions seen in mediastinal and mesenteric lymph nodes of an aged ewe resulted in notification of the AHDO as tuberculosis could not be ruled out. *Mycobacterium* sp. were not isolated from the lesions following subsequent culture. Parasite migration leading to calcification was a likely cause of the lesions.

Brucella melitensis

1398 sheep and goat abortion submissions were examined during 2008 by VLA and SAC including 54 in the final quarter and *Brucella melitensis* was not isolated from any sample

Investigatory and Advisory Farm Visits

VLA and SAC veterinarians visit farms at the request of private veterinary surgeons, to assist with the investigation of unusual, severe or difficult disease incidents. VLA veterinarians also visit for statutory purposes (for example, under the Zoonoses Order to investigate outbreaks of salmonellosis). From the second quarter of 2007, the VLA and SAC VS harmonised the way in which these more detailed investigations involving visits to farms were recorded. This is why comparable data is not available for previous years.

Table 6: Farm Investigation and Advisory Visits – Annual 2004 - 2008

Oct-Dec	E&W	S	Total Visits
2004	60	NA	NA
2005	55	NA	NA
2006	47	NA	NA
2007	49	NA	NA
2008	51	20	71

Table 7: Farm Investigation and Advisory Visits Oct – Dec 2008

Oct-Dec	E&W	S	Total Visits
2004	14	NA	NA
2005	12	NA	NA
2006	17	NA	NA
2007	9	NA	NA
2008	9	0	9

Potential Food Safety Incidents**Table 8: Potential Food Safety Incidents - Annual 2008**

Jan-Dec	Total Incidents	Botulism	Lead	Copper	Other
2008	12	1	6	5	0
2007	14	3	5	2	4
2006	11	4	0	4	3
2005	11	3	2	6	0
2004	12	1	7	3	1

Twelve potential food safety incidents were investigated in 2008 (Table 5) including a single incident of suspected botulism in the last quarter. Ten out of 300 adult ewes were affected with typical clinical signs and had access to poultry litter.

ENDEMIC DISEASE SURVEILLANCE

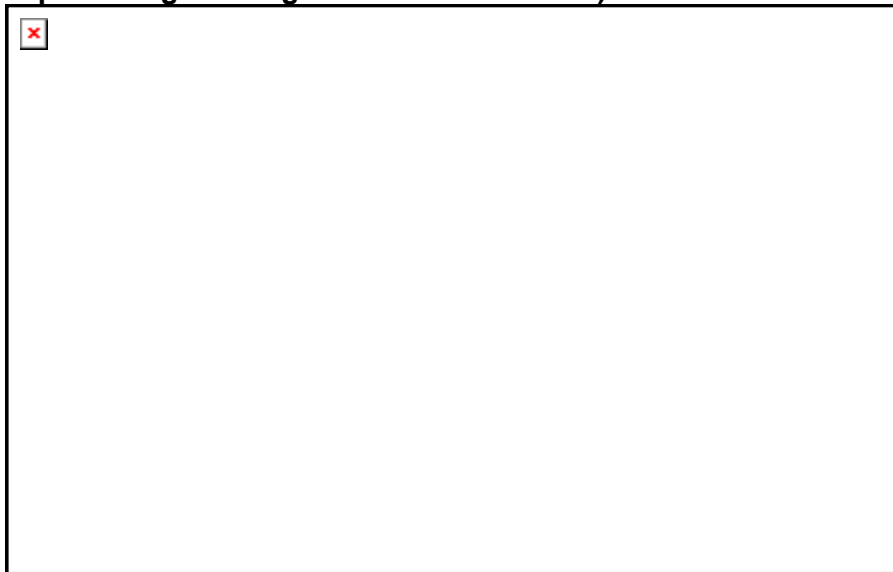
A note about the disease trends charts.

This section of the report gives information on occurrence of selected diseases. The data originate from submissions and are summarised and presented according to the diagnosis reached and assigned as a VIDA code. Our charts show the number of diagnoses (numerator) as a proportion of the number of submissions in which that diagnosis was possible (denominator), for all of GB, England & Wales and for Scotland. The bars indicate the 95% confidence limits. Note that the y-axis scale of the charts varies and therefore care must be taken when comparing individual charts.

SYSTEMIC AND MISCELLANEOUS DISEASES

***Bibersteinia trehalosi* septicaemia:** Diagnoses of septicaemia due to *Bibersteinia* (formerly *Pasteurella*) *trehalosi* have fallen in both Scotland and England and Wales in the fourth quarter of 2008 compared to previous years. This mirrors the trend for the full year as most diagnoses of *B. trehalosi* septicaemia are made in the months October to December in growing or store lambs (figure 7). The annual number of diagnoses in GB in 2008 was 75 compared to 118 in 2007 and 226 in 2006. It is difficult to assess the significance of this decline as a separate VIDA code for "Pasteurella septicaemia" was only introduced in 2004. Disease is likely to be associated with stress such as transport/movement or changing weather and vaccination will help to control.

Figure 7: Annual VIDA Incidents of *Bibersteinia trehalosi* septicaemia in sheep in GB (as a percentage of diagnosable submissions) from 2004 to 2008.



Maedi-visna: Five incidents of disease were recorded this year compared with no diagnoses in 2007 or 2006 (table 9). Four of these have been in England and one in Scotland. In the fourth quarter of 2008 MV was diagnosed in a flock of 250 Friesland dairy sheep. The flock had experienced problems with coughing and chronic respiratory disease for over 2 years. In addition ewes were in poor body condition with reduced milk yields. Serological testing demonstrated antibodies by agar gel immunodiffusion test in these 3 ewes and in 7 of 12 other ewes that were blood sampled. The intensive management of milking sheep (extended housing periods, feeding pooled colostrum to lambs) facilitates the spread of the MV virus and high seroprevalence levels are often found in such infected flocks when testing is undertaken. The source of infection is likely to have been bought in rams. From the history it seems likely that this flock has had MV for at least 3 years. Submission of a carcass for examination from a suspect clinical case is a useful means of confirming disease due to MV. Subsequent serological testing may then help to determine the extent of infection in a flock. To eliminate the disease in this flock would necessitate culling and restocking, however this is not practical. An aggressive culling policy will be followed and concurrent disease problems will be addressed to reduce the clinical cases of disease.

In another outbreak reported in a commercial flock in southwest Scotland, an adult mule ewe collapsed during a flock gather, at which time it was found to be poor condition. Although able to walk, it took short

steps with the front legs and became inco-ordinated when encouraged to walk faster. At necropsy there was found to be consolidation of the anterior third of both diaphragmatic lobes, with similar smaller areas of pneumonic change in other areas of the lungs. Serology for MV was positive using the AGID test and histopathology of the lungs identified changes suggestive of a lentivirus-type pneumonia. Subsequent neuropathology identified lesions in the white matter of the spinal cord consistent with visna. When a further 61 blood samples were submitted from the flock to SAC for testing by ELISA and 69% were positive.

Table 9: GB Incidents of maedi-visna in Sheep

Year	Number of submissions diagnosed per year	Number of submissions diagnosed in Quarter 4
2002	6	0
2003	13	7
2004	3	0
2005	3	0
2006	0	0
2007	0	0
2008	5	1

Membership of the SAC maedi-visna / caprine arthritis encephalitis accreditation scheme has decreased from 3000 flocks 2 years ago to 2700 flocks in 2008. The scheme requires flocks wishing to gain accreditation to undertake 2 qualifying blood tests at least 6 months apart and a routine periodic blood test 12 months after qualifying. There has been a recent change to the scheme rules, such that flocks where all sheep on the holding are MV accredited and have been for the past 3 years, must receive a routine periodic blood test every three years instead of every two years. However any MV accredited animals that are bought-in must be blood sampled within twelve months of purchase.

In the past year 6 sheep flocks and one goat herd in the scheme have had evidence of antibodies to the virus detected. Four of these have been identified at periodic blood tests, one at the stage of the second qualifying blood test, one from testing of purchased stock and one from tracings of animals from an infected holding.

Salmonellosis

October to December: Provisional data for diagnostic submissions indicate that a diagnosis of salmonellosis was recorded in 4 VLA ovine submissions (0.3% of diagnostic submissions) in the fourth quarter of 2008, with no incidents recorded by SAC. In the equivalent period in 2007, salmonellosis was recorded in 12 submissions (0.8%), 9 to VLA and 3 to SAC.

Annual: Provisional data indicate that in 2008 a diagnosis of salmonellosis was recorded in 87 ovine submissions (0.9% of diagnostic submissions), 70 to VLA (1.1%) and 17 to SAC (0.6%) In 2007, salmonellosis was recorded in 110 submissions (1.1%), 83 to VLA (1.3%) and 27 to SAC (0.8%). Serotypes, where determined, in ovine salmonellosis incidents are shown in table 10.

- Both number and percentage of *S. Dublin* incidents was lower than in 2007. Most cases were diagnosed in the first quarter and the predominant clinical sign was abortion.
- Both number and percentage of *S. Typhimurium* incidents was lower than in 2007. Clinical signs were diarrhoea and sudden death. Significant mortality was reported.
- Number of incidents due to other serotypes was slightly lower than in 2007, although percentage was very similar due to reduction in the number of submissions tested.

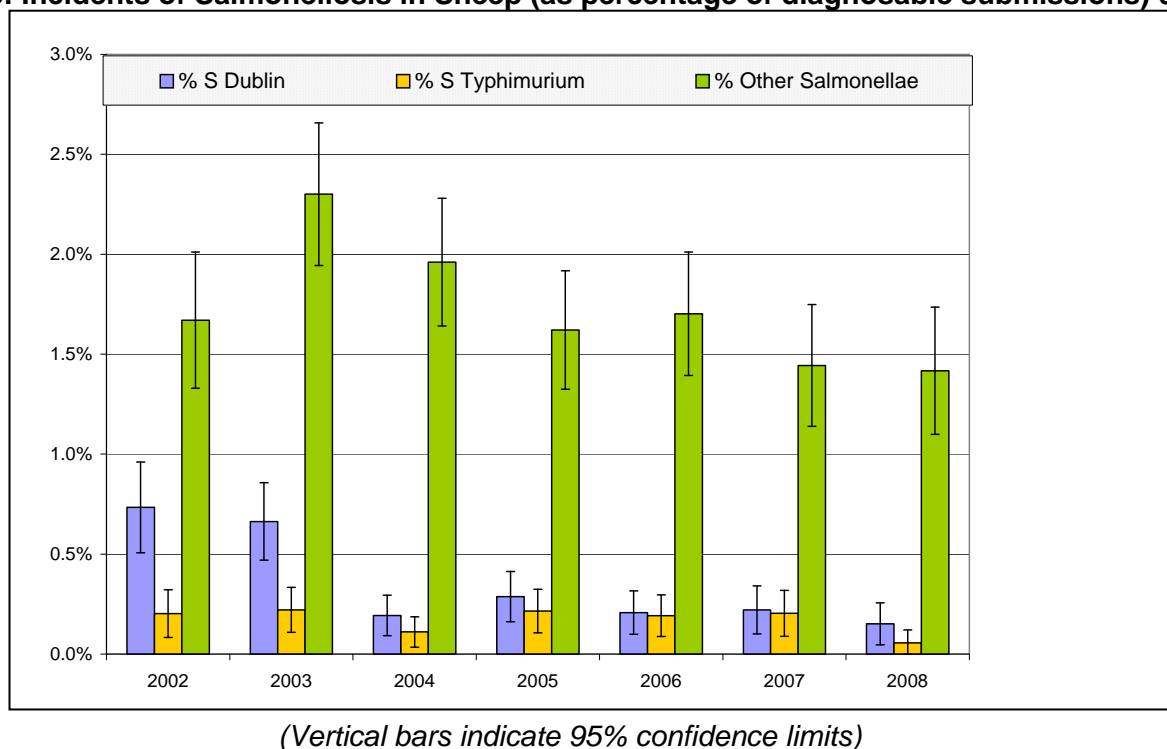
The percentage of appropriately tested submissions in which disease due to *Salmonella* was diagnosed is shown in Figure 8.

Table 10: Serotypes in ovine salmonellosis incidents 2004 to 2008*

Serotype or Group	Phage Type	Year Received				
		2004	2005	2006	2007	2008
Agama		3	2	9	6	
Agona					1	
Anatum		1	1	1		
B				1	1	1
C		3		2		
Derby		8	2	1	2	1
diarizonae		87	79	83	55	49
Dublin		14	19	14	12	7
Duesseldorf			1			
Durham			1		2	
Enteritidis				1	1	
Havana				3		
Indiana		2	3			
Kottbus			1			
Montevideo		38	24	17	15	28
Newport		1	3		1	1
not determined				1		
Oslo		1	1			
Schwartzengrund					1	
Stourbridge			1	1	2	
Thompson			1			
Typhimurium	104	2	11	7	6	2
	8					1
	others & untyp	6	5	6	6	
Total		166	155	147	111	90

* More than one serotype was isolated from some submissions

Figure 8: Incidents of Salmonellosis in Sheep (as percentage of diagnosable submissions) 02-08



- There was a slight decrease in incidents attributed to *S. diarizonae* serotype 61:k:1,5,7 and variants, although this remained the most frequently recorded serotype. Concurrent disease was diagnosed in 29% of abortion and 45% of non-abortion incidents. Zoonotic risks from this serotype are low for persons with an intact immune system.
- More incidents due to *S. Montevideo* were diagnosed in 2008 than in any year since incidents previously peaked in 2004. This is mainly accounted for by an increase in VLA diagnoses, predominantly for Powys, Hereford and Worcester. Abortion remained the most commonly recorded clinical sign, with a few reports of other signs such as diarrhoea. Non-abortion incidents were more often reported by SAC than VLA. High morbidity was reported in several abortion incidents. Ewes were usually reported to be otherwise well, although there were occasional cases of malaise. Purulent placentitis was described in some cases, raising the possibility of mis-diagnosis as EAE on gross appearance. The literature records outbreaks of ovine abortion in association with excretion of *S. Montevideo* by wild birds. RL reports in 2008 mentioned outbreaks associated with isolation from wild bird faeces, presence of large numbers of starlings on affected premises and attraction of birds to concentrates fed at grass.
- In 2008, incidents peaked in Q1, which is the usual seasonal pattern and is likely to be associated with lambing of housed flocks and consequent increased susceptibility due to physiological stress and exposure to higher levels of environmental contamination.

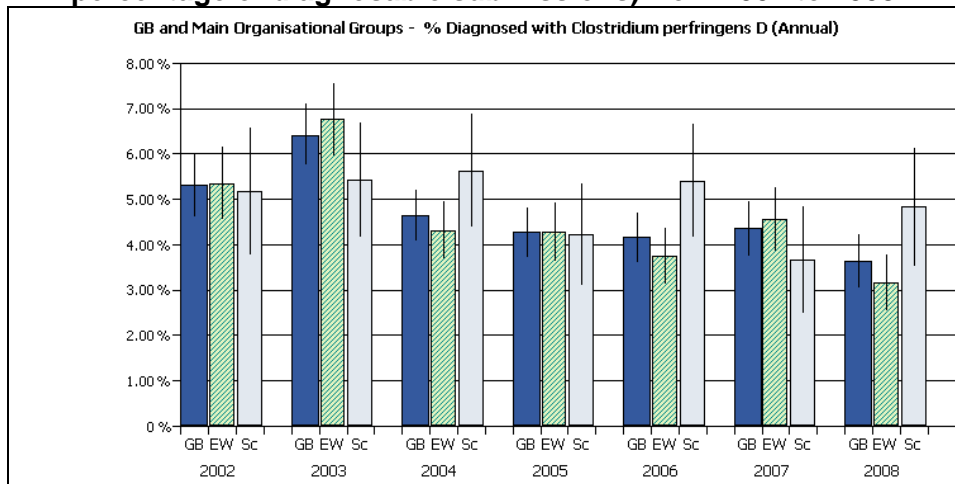
Early Detection Model (EDS): EDS uses historic data in an algorithm to derive expected and threshold values. An exceedance score indicates the degree to which the current count exceeds the threshold; a value of >1 indicates a significant increase in reported incidents, which may indicate a potential outbreak. There was no indication of significant increases in reporting of salmonellosis in 2008 using either the 5 or 12 year baseline.

Goats: Salmonellosis was not diagnosed in goats in 2008. The last caprine report was for the isolation of *Salmonella diarizonae* from an abortion submission in 2006.

ALIMENTARY TRACT DISEASES

***Clostridium perfringens* type D infection:** Although there are no statistically significant changes when compared to the previous equivalent quarter, the number of submissions diagnosed with this condition for quarter 4 in GB has declined steadily from a high of 56 in 2003 to 12 for 2008. The annual figures have declined significantly from 327 in 2003 to 145 in 2008 with a notable decline (as a percentage of diagnosable submissions) in England and Wales (figure 9).

Figure 9: Annual VIDA Incidents of *Clostridium perfringens* type D infection in sheep in GB (as a percentage of diagnosable submissions) from 2002 to 2008.



Listeriosis- enteric: Listerial abomasitis and typhlocolitis is occasionally diagnosed by VLA / SAC. A single incident was recorded in the final quarter following submission of three ewe lambs for post mortem examination. These were three of nine that died in a group of 135 ewe lambs. They were being fed big bale silage for three weeks before showing signs of morbidity, sternal recumbency, salivation and slight diarrhoea before death. At necropsy, all three ewes had thickening of the abomasal mucosa and one had a severe haemorrhagic and purulent exudate on this mucosa. One of the three also had a haemorrhagic typhlocolitis.

Acidosis: The number of annual submissions diagnosed with this condition in GB increased significantly from 27 in 2007 to 61 in 2008. A similar significant increase was seen in the fourth quarter, with 33 incidents diagnosed in 2008 compared with 11 in 2007. It is unlikely that these figures give any true reflection of the real situation, as most cases are diagnosed by private veterinary surgeons on the basis of a history of exposure to grains/concentrates and clinical signs, with no need to submit carcasses for post mortem examination.

Parasitic gastro-enteritis (PGE) in sheep: There were more incidents of PGE recorded in 2008 in GB, as a percentage of diagnosable submissions than any year since the start of the current recording system in 2002 (figure 10). In England and Wales, the largest number of incidents since the start of the current recording system was recorded (table 11). The wet summer and the increasing incidence of anthelmintic resistance are likely to be reasons for this increase.

The peak of diagnoses was in the 3rd quarter of 2008 (figure 11). Diagnoses were reduced in the last quarter which was likely to be due to the combination of the onset of an immune response in lambs exposed to the gastro-intestinal parasites earlier and the weather (colder and drier than average) in the last months of 2008.

Figure 10: VIDA Incidents of PGE, as a percentage of diagnosable submissions, 2002-2008

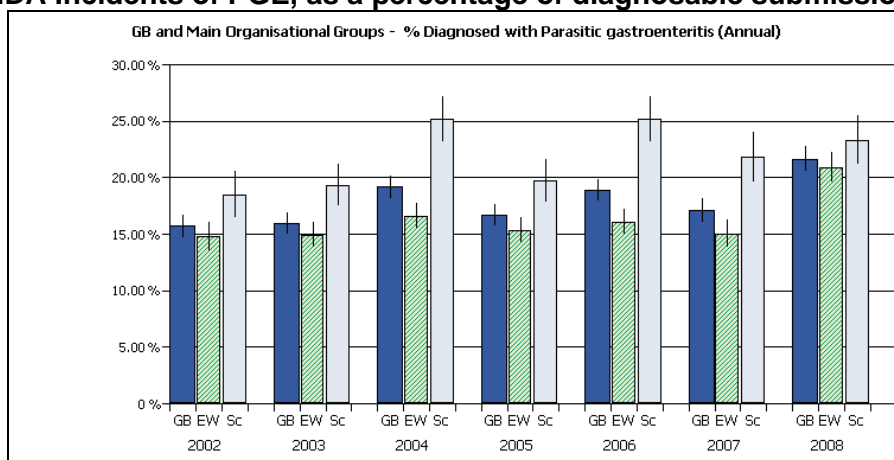
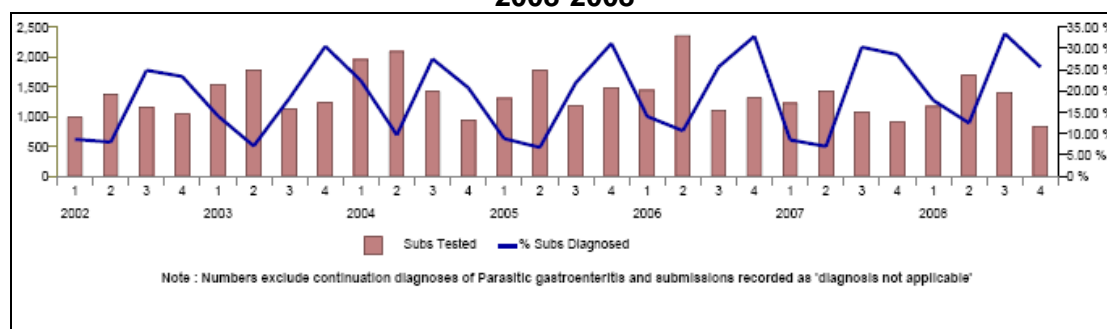


Table 11 Number of diagnosed in GB,

Year	Incidents (E & W)	Incidents (Scotland)	Total (GB)
2002	468	257	725
2003	583	341	924
2004	748	476	1224
2005	621	334	955
2006	704	464	1168
2007	505	286	791
2008	769	333	1102

incidents of PGE 2002-2008

Figure 11: VIDA Incidents of PGE, as a percentage of diagnosable submissions, for each quarter 2008-2008

Age of animals diagnosed with PGE: PGE is predominantly a disease of lambs (juveniles, less than 1 year). Analysis of the age of animals diagnosed with PGE in GB, where given, shows this to be the case in 2008 and every year since the start of the current recording system in 2002 (table 12).

Immunity to gastro-intestinal parasites is slowly acquired and dependent on exposure. It may take exposure over two grazing seasons for significant resistance to infection to occur with e.g. *Teladorsagia circumcincta*. This is reflected in the numbers of incidents seen in young adults. Immunity should be well established in older adult ewes, except around parturition. In all ages, concomitant disease or poor nutrition, may allow larger numbers of parasites to establish in the host. In 2008, 17 incidents of PGE in older adults also had other diagnoses recorded that may have affected immunity (e.g. Johne's disease, chronic fasciolosis etc.)

Table 12: Number of incidents of PGE and age of host 2002-2008

Year	Number of incidents: juveniles (<1 year)	Number of incidents young adults: (1- 3 years)	Number of incidents: in older adults (>3 years)
2002	420	45	49
2003	504	97	75
2004	634	170	104
2005	534	82	55
2006	652	106	82
2007	389	51	58
2008	609	112	61

Monitoring worm egg counts in England and Wales: Monitoring worm egg counts (WECs) have been promoted as an aid to controlling gastro-intestinal parasites on sheep farms. VLA introduced a monitoring WEC package in 2004 where 10 faeces samples are submitted individually and a mean WEC is reported. Alternatively single WECs are requested. Farmers, private veterinary surgeons, commercial laboratories and SAC may also carry out tests for farms in England and Wales. The number of tests carried out by VLA are shown in Table 13.

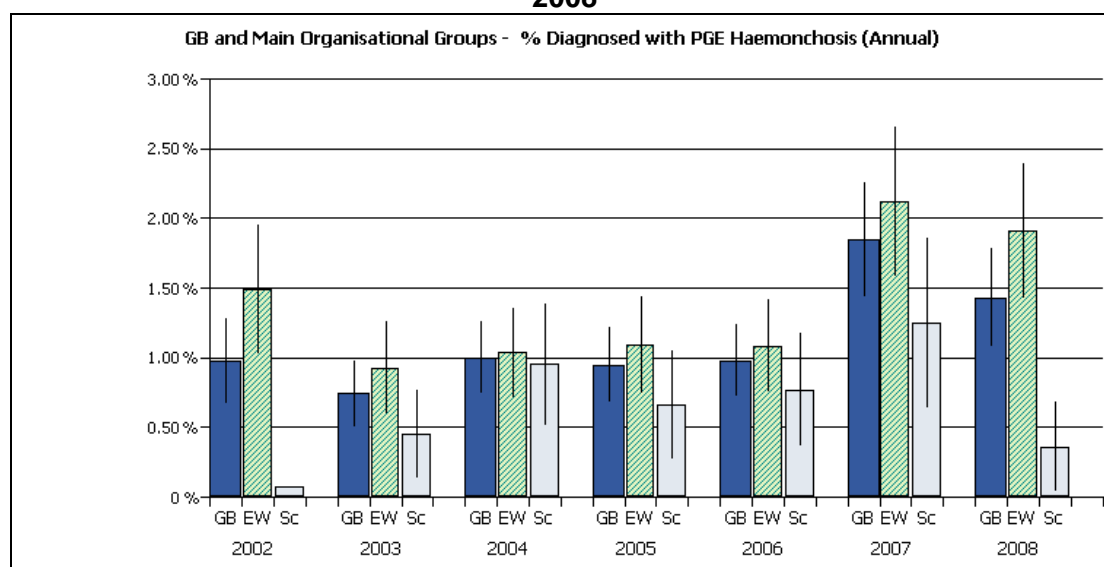
Table 13: Number of worm egg counts for monitoring purposes in sheep

Year	2002	2003	2004	2005	2006	2007	2008
WECs	197	228	356	338	395	358	497
Monitoring WECs			92	89	66	102	137

PGE-Haemonchosis: Disease caused by the abomasal parasite *Haemonchus contortus* was diagnosed in 64 incidents in GB during 2008 (1.4% of diagnosable submissions). The same number of incidents was diagnosed in England and Wales in 2008 as in 2007, but in Scotland only 5 incidents were recorded in 2008 compared to 16 in 2007 (table 14).

Table 14 Number of incidents of haemonchosis diagnosed 2002-2008

Year	Incidents: E & W	Incidents: Scotland
2002	39	1
2003	30	8
2004	40	18
2005	37	11
2006	41	14
2007	59	16
2008	59	5

Figure 12: VIDA Incidents of haemonchosis, as a percentage of diagnosable submissions, 2002-2008

Age of animals diagnosed with haemonchosis

In contrast to PGE, there is no acquired immunity to *H. contortus* and disease can be seen in adults as well as lambs. Analysis of the age of animals (where given) in which haemonchosis was diagnosed is shown in table 15. As this parasite sucks blood in the abomasum of the host, clinical signs are of anaemia without diarrhoea, where other gastro-intestinal nematodes are not present. It is possible that adult sheep with these signs are more commonly presented for diagnosis, than lambs where diarrhoea due to other gastro-intestinal parasites may lead to anthelmintic treatment and /or no diagnosis being sought.

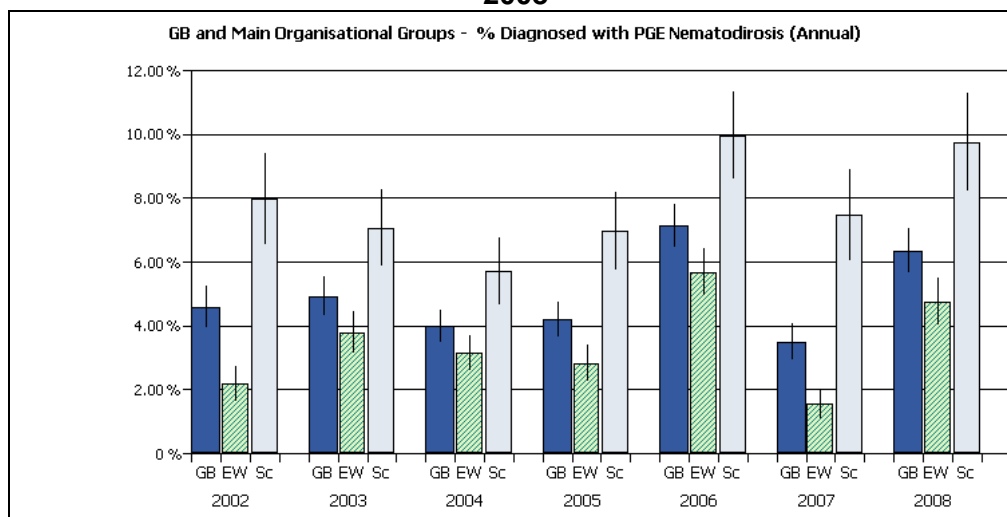
Table 15: Number of incidents of haemonchosis and age of host, 2002-2008

Year	Incidents: juveniles (<1 year)	Incidents: young adults (1- 3 years)	Incidents: older adults (>3 years)
2002	26	5	2
2003	25	5	2
2004	38	5	7
2005	33	1	8
2006	22	6	14
2007	39	2	12
2008	37	7	10

PGE-Nematodirosis: There were more incidents of nematodirosis due to *Nematodirus* sp, predominantly *N. battus* in 2008 than 2007, but the situation was not as severe as in 2006. However, the weather conditions in early 2008 allowed a mass hatch of parasites to occur in England, Wales and Scotland, which infected and caused clinical disease in a large number of lambs (table 16, figure 13).

Table 16: Number of incidents of nematodirosis diagnosed 2002-2008

Year	Incidents E & W	Incidents: Scotland
2002	57	110
2003	123	125
2004	122	108
2005	96	118
2006	215	183
2007	44	98
2008	148	139

Figure 13: VIDA Incidents of nematodirosis, as a percentage of diagnosable submissions, 2002-2008

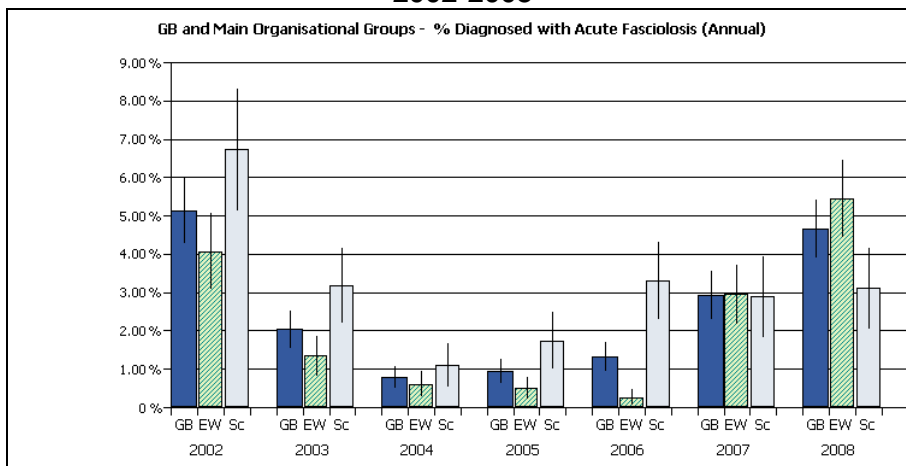
Anthelmintic resistance: Sixteen cases of benzimidazole resistance, 3 of levamisole and 3 of macrocyclic lactone resistance were diagnosed by the VLA in 2008. This is likely to represent an underestimate of the numbers of cases occurring in the field. However, these are the first cases of macrocyclic lactone resistance detected by VLA and reflect the increasing occurrence of anthelmintic resistance in England and Wales. Resistance to the ML anthelmintics has been detected relatively quickly after the introduction of this class. It is thought by some workers that use of other anthelmintic classes have promoted 'non-specific' mechanisms e.g. membranes pumps in parasites that aid their survival in the face of other anthelmintic treatments.

Fasciolosis

Acute Fasciolosis

- The wet summer of 2008 following the wet summer of 2007 contributed to an increased population of the intermediate snail host, and a build-up of infective metacercariae on pasture. This presented a significant parasite challenge over a short period of time, resulting in the high incidence of acute fasciolosis encountered in England and Wales in November and December of 2008.
- Cases of acute fasciolosis were regularly reported by Regional Laboratories. Previously, acute fasciolosis was seen more commonly in September and October. In 2008, cases were reported in January (i.e. last winter), and again in December (this winter).
- Cases of acute fasciolosis have been encountered despite very cold periods of weather at the end of October and November. It has been shown that 50% of metacercariae are able to survive over the winter at temperatures between 2 and 10°C, but lose their infectivity at -20°C.

Figure 14: VIDA Incidents of acute fasciolosis, as a percentage of diagnosable submissions, 2002-2008



Chronic fasciolosis

- The incidence of chronic fasciolosis was far higher in 2008 (412 cases) compared to 2007 (184 cases), and 2006 (188 cases). As with acute fasciolosis, this is likely to be due to the cumulative affect of two wet summers increasing the population of the intermediate snail host and a build up of the parasite metacercariae on grazing land. The rise in incidence was notable in England, Wales and Scotland (table 17, figure 14).
- Following a forecast of increased risk of fasciolosis, issued by the VLA, SAC and others in the autumn, cases of chronic fasciolosis were encountered by most of the VLA Regional Laboratories and SAC Surveillance Centres in December. Mortality rates of between 3% and 10% were common.
- There was a suspicion of lack of efficacy of flukicide (triclabendazole) treatment in some outbreaks of fasciolosis investigated by the VLA and SAC and this was reported to private veterinary surgeons. This highlighted the need for their farming clients to vary products used for flukicide treatment, particularly in high risk areas.

Figure 14: VIDA Incidents of chronic fasciolosis, as a percentage of diagnosable submissions, 2002-2008

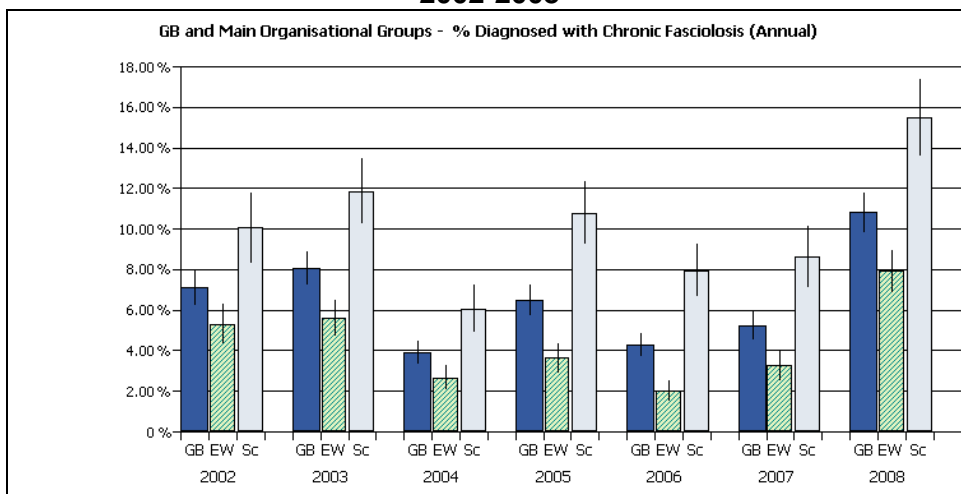


Table 17: Number of incidents of acute and chronic fasciolosis diagnosed 2002-2008

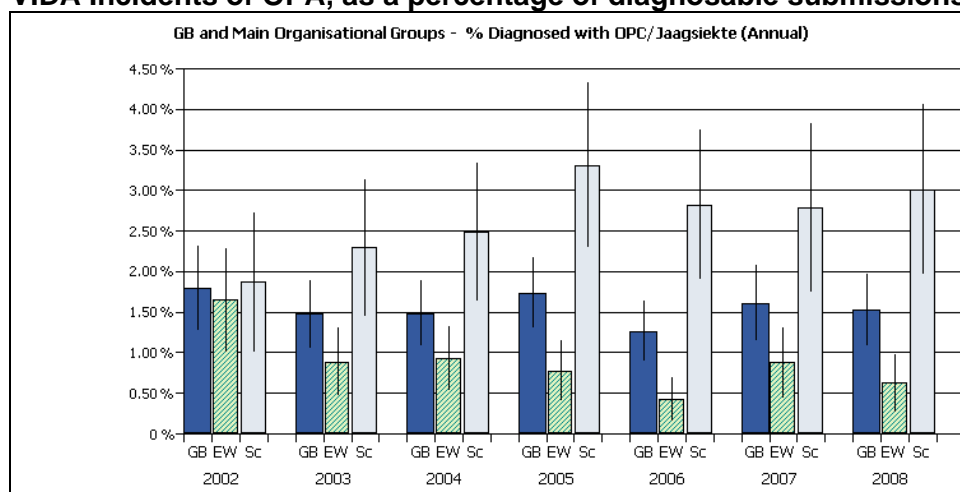
Year	Incidents of Acute Fasciolosis			Incidents of Chronic Fasciolosis		
	E&W	Scotland	Total	E&W	Scotland	Total
2002	62	65	127	102	115	217
2003	26	39	65	140	186	326
2004	14	14	28	77	98	175
2005	11	21	32	96	168	264
2006	6	41	47	57	131	188
2007	54	28	82	73	111	184
2008	104	32	136	195	217	412

RESPIRATORY DISEASES

Ovine pulmonary adenocarcinoma (OPA): There has been no difference in the number of diagnoses in 2008 for Great Britain, with 43 cases diagnosed in each of the past three years. The trend for greater number of diagnoses in Scotland compared to England and Wales has also continued, with 31 of the diagnoses in 2008 being made in Scotland, compared with 12 in England and Wales. This may reflect increased awareness of the disease in Scottish flocks due to the research carried out at Moredun Research Institute and a recent prevalence study in Scottish flocks using a PCR test on blood samples carried out in collaboration with SAC.

Maedi-visna – see systemic disease section

Figure 15: VIDA Incidents of OPA, as a percentage of diagnosable submissions, 2002-2008



URINARY DISEASES

Nephrosis: The number of incidents of nephrosis diagnosed in GB increased from 29 in 2007 to 70 in 2008. However, there is variation in the number of annual incidents recorded and the figure in 2008 was similar to the number recorded between 2002 and 2006.

Melamine toxicity: No incidents of urolithiasis associated with melamine contamination of animal feed were identified. Regional Laboratories were alerted to the possible risk of disease following identification of imported animal feed containing melamine.

SKIN DISEASES

Ectoparasites

Pediculosis (louse infestation): The number of diagnoses of lice infection in GB increased once again on the previous year, although this was due largely to a marked rise in the number of diagnoses in Scotland (figure 16, table 18). With many farmers moving to the use of injectable products to control

sheep scab, which are ineffective against lice, and away from plunge dipping which is most effective against lice, the frequency of lice diagnoses is likely to remain elevated for the foreseeable future.

Figure 16: VIDA Incidents of pediculosis, as a percentage of diagnosable submissions, 2002-2008

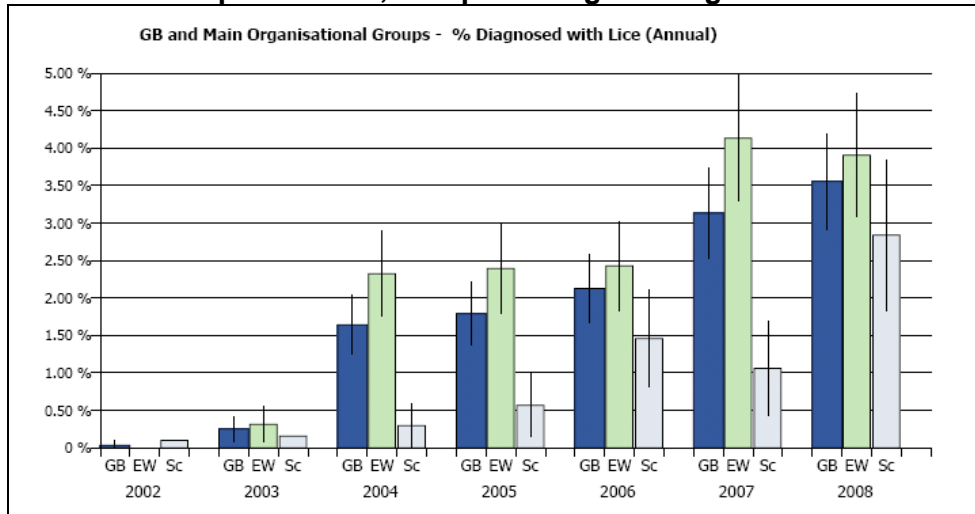
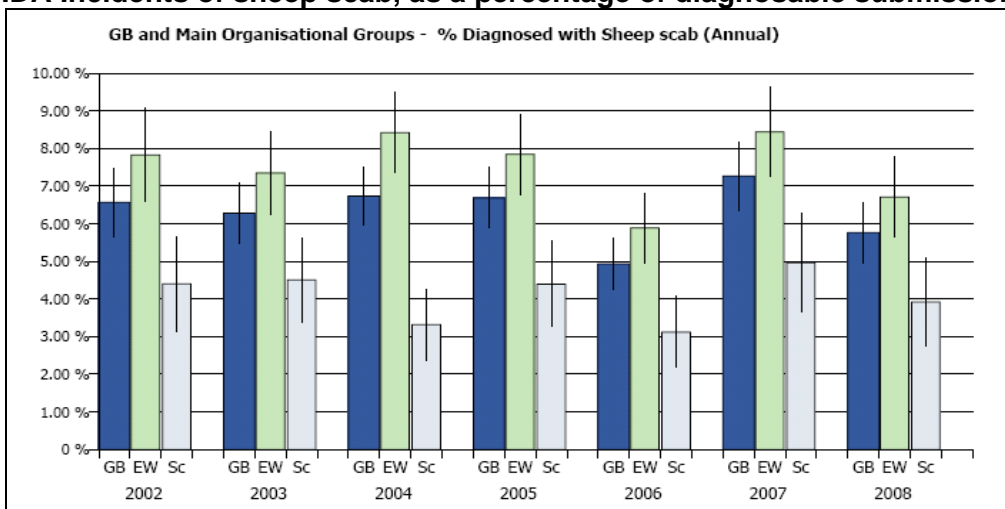


Table 18: Number of incidents of pediculosis (louse infestation) and sheep scab in GB 2002 - 2008

Year	Incidents of pediculosis	Incidents of sheep scab
2002	1	184
2003	9	219
2004	66	265
2005	67	248
2006	81	188
2007	100	228
2008	114	183

Sheep scab remained the most commonly diagnosed ectoparasite infection, the number of diagnoses was below 2007, but the table 18 and figure 17 show some natural variation from year to year over the last seven years. The reduction may or may not be due to recent industry initiatives to control sheep scab, but this will become apparent over future years.

Figure 17: VIDA Incidents of sheep scab, as a percentage of diagnosable submissions, 2002-2008

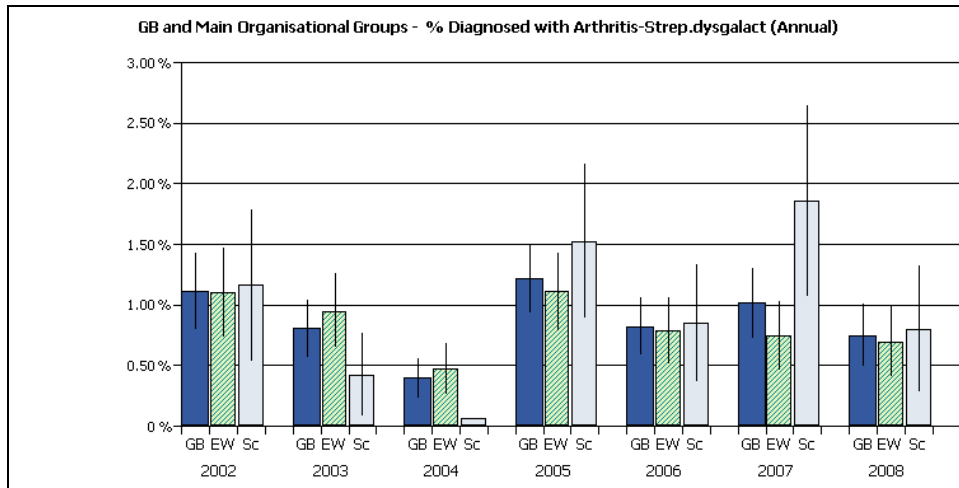


MUSCULO-SKELETAL DISEASES

Arthritis due to *Streptococcus dysgalactiae* subsp *dysgalactiae*

There was a decrease in the number of diagnoses of arthritis due to *Streptococcus dysgalactiae* subsp *dysgalactiae* in 2008 compared to 2007 as a percentage of diagnosable submissions (Figure 18). The number of cases recorded by the VLA remained relatively stable with 27 and 21 cases diagnosed in 2007 and 2008 respectively. However, SAC recorded significantly fewer cases in 2008 (9 cases) compared to 2007 (21 cases).

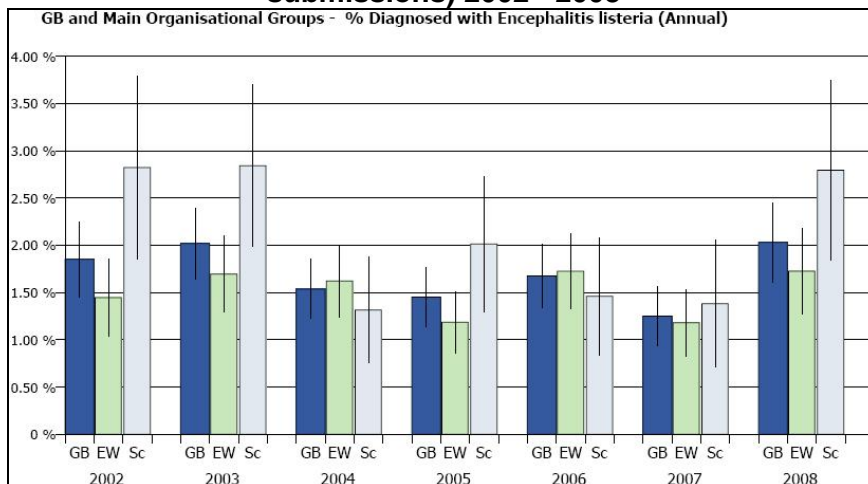
Figure 18: VIDA incidents of Arthritis due to *Strep.dysgalactiae* (as a percentage of diagnosable submissions) 2002-2008



NERVOUS DISEASES

Listerial encephalitis: A significant increase in the number of incidents (as a percentage of diagnosable submissions) of encephalitis associated with *Listeria monocytogenes* was noted in 2008 compared to 2007 (Figure 19). This increase was seen most notably in Scotland with nearly twice the number of listeria encephalitis cases in quarter one of 2008 compared with the same quarter of 2007. This trend continued into quarter two of 2008 with almost a tripling of the cases diagnosed by SAC VS (11 incidents in 2008 compared to four from the same period in 2007). As stated in previous reports this was most likely to be associated with the production of poorer quality silage during the wet summer of 2007. Summer harvest conditions were also poor in 2008, which may mean this trend continues into the early part of 2009.

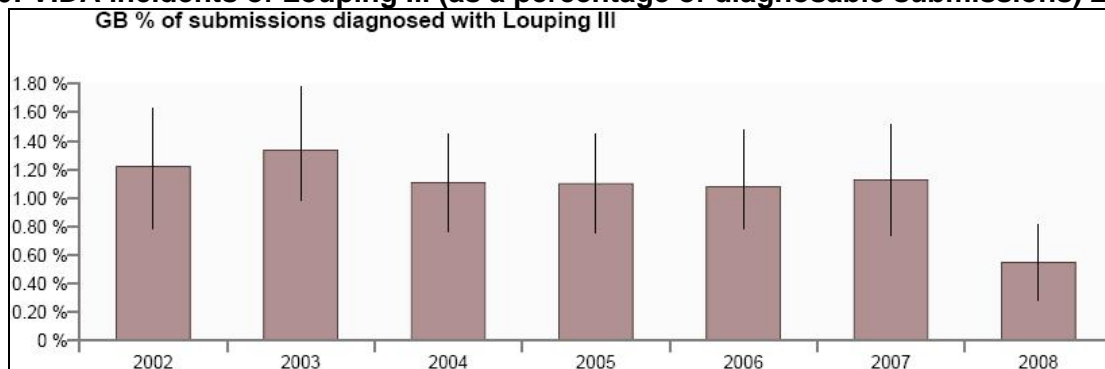
Figure 19: VIDA incidents of Listerial encephalitis in sheep (as a percentage of diagnosable submissions) 2002 - 2008



Cerebro-cortical necrosis (CCN): There was a slight increase in diagnoses of CCN in 2008 when compared to 2007 as a percentage of diagnosable submissions, 1.56% in 2008 versus 1.06% in 2007. Most incidents were seen in the second and third quarters, the majority recorded by the VLA (26 incidents) when compared to SAC (10 incidents).

Louping ill: There was a reduction in the number of incidents of louping ill as a percentage of diagnosable submissions compared to 2007 (Figure 20). Both England/Wales and Scotland saw a reduction in diagnosed cases, particularly in quarter two (6 incidents in 2008 compared to 18 reports in 2007). The specific cause for this decrease is unknown but is most likely to be associated with the cyclical life-cycle of the tick and variations in flock immunity. The movement restrictions associated with the Bluetongue vaccination strategy may have also prevented movement of susceptible animals into endemic areas.

Figure 20: VIDA incidents of Louping Ill (as a percentage of diagnosable submissions) 2002-2008



Compressive cervical myelopathy in a young Texel sheep: Compressive cervical myelopathy was diagnosed in 2½-year-old Texel ram. Progressive hindlimb ataxia and weakness had been noted and this had resulted in the inability to serve ewes in 2008. Clinical examination revealed marked proprioceptive deficits, knuckling on all four limbs with scuffing of the toes and weakness progressing to recumbency. Post mortem examination identified two discrete nodular projections of adipose tissue which impinged on the underlying cervical spinal cord resulting in a significant depression of the spinal cord tissue in that area. Histopathology of the spinal cord identified a severe sub-acute to chronic myelopathy consistent with a diagnosis of compressive myelopathy. This condition has only recently been recognised with all clinical cases reported in Scotland (Penny *et al* (2007) Compressive Cervical Myelopathy in Young Texel and Beltex Sheep, *Journal of Veterinary Internal Medicine*, **21**, 322-327). Possible aetiologies of the condition include a hereditary component, short neck conformation or the rapid growth rate of these animals in the first 12-18 months of age.

REPRODUCTIVE DISEASES

Ovine abortion: A syndromic analysis of ovine abortion diagnoses was provided in Vol12 No 2. Enzootic abortion (*Chlamydophila abortus*) remains the most commonly diagnosed cause of abortion in Great Britain, with *Toxoplasma gondii* infections the second most common diagnosis. The association between feeding of poor quality conserved forage, due to wet weather conditions during the grass growing season, and increased abortion due to *Listeria* sp. and *Bacillus licheniformis* seen in Scotland in 2008 may continue in 2009 as the weather this summer was also wetter than average.

Q Fever: A highlight of 2008 was two incidents of abortion due to *Coxiella burnetii* (Q fever). These were diagnosed in January 2008 in early lambing flocks in England and Wales. There have been no cases of abortion due to *C. burnetii* recorded in Scotland in the past seven years for which records exist. Q fever more commonly causes clinical disease in humans. The organism is shed in lambing fluids by infected ewes usually without signs of disease. It is a rare and sporadic cause of abortion in sheep. Zoonotic transmission may occur via fomites and there are many reports of human infections from indirect contact with lambing ewes. Dissemination on wind has also been reported. The infective dose is low and outbreaks in people have a seasonal peak coinciding with lambing time.

GOAT DISEASES

The 2008 Defra agricultural census returns confirm a fairly static goat population in England, Wales and Scotland at around 94,000. There are currently 124 registered commercial goat milking units in the UK, an increase of three over the past 12 months. Submissions to the VLA rose again in 2008 to 705 from 621 (2007) and 584 (2006). Enteric disease accounts for the major proportion of diagnoses made, and in particular Johne's disease and parasitic gastro-enteritis, both of which remain relatively constant year on year. Unfortunately the resultant low level of VIDA diagnoses for many of the other VIDA diagnoses makes significant trend analysis difficult.

Two significant conditions that have caused concerns throughout the industry during the year are Tuberculosis and Scrapie.

Tuberculosis - during the year a serious outbreak of tuberculosis was identified and investigated with Animal Health colleagues. The outbreak was confined to the Golden Guernsey breed, and resulted from the apparent dispersal of a single herd in which infection was inapparent. Goats were traced to a total of 19 premises in England and Wales, with skin test +ve animals identified on nine units. As a result, VLA RLs undertook a total of 36 post mortem examinations of reactor goats ranging in age from three months to five years. All had lesions in the broncho-mediastinal lymph nodes and pulmonary abscesses up to 5 cm diameter were identified, and the comparative intra-dermal skin test was reported to be highly predictive. Infection was associated with Spoligotype 9 infection, described as the "local spoligotype" to the index case. Although rarely reported in goats under UK conditions, this is now the third incident in the past two years. It is evident that infection can be picked up and progress to the severe lesions identified in as little as 12 months. Preliminary results were published in a letter to the Veterinary Record [Crawshaw and others, Vet Rec, (2008), **163**, 4, 127].

TSEs – concerns over the potential implications on the viability of commercial goat milk production in the UK continue, particularly following the paper by Konold and others, [BMC Veterinary Research, (2008), **4**, 14]. New restrictions expected early in 2009, follow deliberations on the implications of these findings by EFSA (European Food Standards Authority) and Standing Committee on the Food Chain and Animal Health (SCoFCAH). These concerns focus on the potential impact of Scrapie diagnosis in a commercial herd and its implications on future viability, but also on the continuing extrapolation of sheep based data to goats. Two goat herds in which an unusually high prevalence of Scrapie had been identified were culled during the year, many were examined at the VLA.

PGE – was widely reported by all RLs in goats of all ages on a wide range of management systems involving grazing – larger commercial herds are housed all year round, and PGE is not a problem as a result. In line with observations in other species, the level of PGE in 2008 was particularly high.

Johne's disease – continues to be a sporadic diagnosis at RLs. As previous reports have stated infection has been identified but controlled on units within the commercial sector by a combination of management and targeted vaccination. During the last quarter of 2008 however, RLs reported confirmed infection in a small Angora herd and in a group of pet Pygmy goats.

Urolithiasis – was confirmed by two RLs during the last quarter, in a six-month-old castrated Angora and a three-year-old Pygmy goat. The second case co-occurred with concerns over possible melamine feed contamination in the UK, but this seemed unlikely as the problem appeared to have been fairly chronic and longstanding, and was an isolated case.

Cryptosporidiosis - was confirmed in a group of 200 young kids, almost all of which were reportedly showing marked diarrhoea, from seven days of age. Approximately 5% mortality was recorded within a ten day period. This unit has around 2000 milking does, and problems such as cryptosporidiosis can develop and spread rapidly through a group particularly when batch kidding. The potential zoonotic risk to farm staff in such incidents is also of importance.

SCANNING SURVEILLANCE FOR NEW AND EMERGING DISEASES IN SMALL RUMINANTS

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 probably first be detected by observation of increased numbers of submissions for clinical and/or pathological syndromes for which a diagnosis could not be reached in the normal way. Submissions for which no diagnosis is reached (DNR) despite testing deemed to allow reasonable potential for a diagnosis to be reached are regularly analysed to look for increases in undiagnosed disease which could indicate the presence of a new or emerging 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. For

Data recording by VLA and SAC was harmonised from 2007. In this report GB data from 2008 is compared with the data from 2007, because only limited data from SAC is available at present. VLA data for this quarter has also been compared with pooled data for the five previous years.

Supplementary analysis of VLA DNR data is also undertaken using an early detection system (EDS). This uses a statistical algorithm to estimate an expected number of DNR reports and a threshold value. If the current number of DNR reports exceeds the threshold (i.e. exceedance score > 1), this indicates that the number of reports is statistically higher than expected.

Summary

Data analysis revealed no changes thought to constitute evidence of emergence of new, undiagnosed disease in sheep or goats during 2008.

- A statistically significant increase was seen in %DNR for sheep submissions to SAC in 2008 compared to 2007.
- For GB, there was a statistically significant increase in %DNR for the reproductive syndrome in sheep, and an associated increase in %DNR for submissions with presenting sign "abortion".
- SAC showed a statistically significant increase in %DNR for the musculoskeletal syndrome
- SAC showed a statistically significant increase in %DNR for submissions with presenting sign "wasting"

A: OVERALL FIGURES

SHEEP

During Q4 2008, the percentage of diagnostic submissions for GB where a diagnosis was not reached (DNR) was 12% compared with 13% in the same quarter in 2007. The change is not statistically significant ($Z = -1.08$). VLA recorded a decrease from 13% in 2007 to 10% in 2008 ($Z = -1.41$) whilst SAC recorded 15% DNR in Q4 in both years ($z = 0.19$).

For the whole year 2008 DNR for GB was 20% compared with 19% in 2007. The difference is not statistically significant. ($z = 1.70$).

- DNR for VLA showed a statistically significant decrease from 22% in 2007 to 19% in 2008 ($z = -3.28$)
- DNR for SAC showed a statistically significant increase from 13% in 2007 to 22% in 2008 ($z = 7.96$)

GOATS

There was a decrease in % DNR for caprine submissions from 23% in Q4 in 2007 to 17% in Q4 2008. The change is not statistically significant ($Z = -1.03$)

Overall DNR in 2008 was 21%, compared with 26% in 2007. The change is not statistically significant ($Z = -1.81$). SAC, with low numbers of submissions, showed an increase from 15% in 2007 to 24% in 2008 ($Z = 1.01$) whilst VLA showed a decrease from 27% in 2007 to 20% in 2008 ($Z = -2.21$). The change for VLA is statistically significant.

B: DNR ANALYSIS BY SYNDROME/BODY SYSTEM**SHEEP**

- For GB, a statistically significant increase was seen in the %DNR for the reproductive syndrome for 2008 as compared with 2007 (Table 1).
- SAC showed a statistically significant changes in %DNR for
 - musculoskeletal syndrome increased from 7% in 2007 to 23% in 2008 ($z = 2.12$)
 - skin syndrome decreased from 27% in 2007 to 15% in 2008 ($z = -2.13$)
- VLA showed statistically significant decreases for %DNR for:-
 - Nervous syndrome from 18% in 2007 to 10% in 2008 ($z = -2.18$)
 - Systemic and miscellaneous syndrome from 14% in 2007 to 11% in 2008 ($z = -2.01$)

Table 1: Summary of the changes in undiagnosed ovine disease (GB), by syndrome, between 2007 and 2008.

Syndrome/Body System	%DNR 2007 (n= 6,411)	Change	%DNR 2008 (n= 6,511)	z ‡
Circulatory	3	=	3	0.01
Enteric	13	↓	11	-1.50
Mastitis	0	=	0	
Musculoskeletal	15	↑	20	1.17
Nervous	14	↓	10	-1.43
Reproductive	29	↑	40	6.60
Respiratory	3	↑	4	1.10
Skin	22	↓	16	-2.66
Systemic & Miscellaneous	11	↓	10	-0.88
Urinary	10	↓	2	-2.37
Overall	19	↑	20	1.70

‡ statistically significant if $z > 1.96$ or $z < -1.96$ (not calculated if $N < 40$). Significant values in **bold**.

Reproductive Syndrome

The increase in %DNR for this syndrome for GB is related to a much larger increase for SAC than for VLA submissions (Table 2)

Table 2: Changes in undiagnosed ovine disease (GB) in the Reproductive Syndrome between 2007 and 2008 by data source.

Data Source	%DNR 2007 (n= 1,598)	Change	%DNR 2008 (n= 1,385)	z ‡
SAC (n= 926)	11	↑	44	11.12
VLA (n=2,057)	35	↑	38	1.32
Reproductive	29	↑	40	6.60

Significant increases in %DNR for SAC submissions were recorded in Q1 and Q2, with small numbers of submissions related to this syndrome in Q3 and Q4.

It was noted in the report for Q2 that the percentage of SAC submissions excluded from analysis as not having undergone testing giving a "reasonable" probability of reaching a diagnosis was markedly higher in Q1 and Q2 2007 than in the equivalent quarters in 2008. (Q1 2007 was the first quarter for which this assessment was recorded by SAC, whereas it has been used by VLA from 1999.) However, if submissions are re-analysed without excluding those subjected to "Limited" testing, there is still a statistically significant increase in %DNR for this syndrome for GB from 42% in 2007 to 53% in 2008 ($z = 3.54$). However, the increase is then statistically significant for VLA (47% DNR in 2007 and 53% in 2008 $z = 2.96$) but not for SAC (48% DNR in 2007 and 54% in 2007 $z = 1.92$).

Further analysis reveals statistically significant increases in % DNR for:-

- Regions "Scotland" (from 11% to 43% $z=10.5$) and Northern England (from 29% to 37% $z=2.19$)
- Clinical Sign "Abortion" from 29% to 39% $z= 5.78$ (but not "Reproductive not abortion")
- Age Categories adult and neonatal (as would be expected)
- Husbandry "Lowland" from 32% to 42% $z=4.09$ (which includes all holdings where grazing is fenced)
- Submission type "non-carcase" (unsurprisingly as most submissions would be placentae and foetuses which are not recorded as carcasses).

There have been some changes in the ranking of diagnoses reached in ovine abortion cases between 2007 and 2008 but there have been no decreases in proportions of particular diagnoses which would explain the increased proportion of submissions where no diagnosis was reached.

The Species Group SAC representative and reproductive system specialist indicate that it is not thought likely that results indicate the presence of new or emerging disease but data will be monitored in 2008 lambing season.

Musculo-skeletal syndrome

For GB there was no statically significant overall change in %DNR for submissions allocated to the musculoskeletal syndrome between 2007 and 2008 (Table 1). However, SAC submissions showed a statistically significant increase from 7% DNR in 2007 to 23% in 2008 ($z = 2.12$) Numbers of submissions were low at 46 in 2007 and 30 in 2008.

No individual quarter showed a significant change in % DNR for this syndrome. Once broken down by age category, submission type (carcase or non-carcase), management system or housing, the individual groups have insufficient submissions for valid statistical analysis using the z test. "Lame" was the predominant presenting sign. Predominantly affected age category was "adult" and predominantly affected management system was "lowland".

The diagnoses reached by SAC for musculo-skeletal syndrome submissions were broadly similar in 2007 and 2008, with low numbers of any single diagnosis, but there were fewer cases of arthritis due to *Streptococcus dysgalactiae*.

% DNR for VLA musculo-skeletal syndrome submissions was 19% in both 2007 and 2008, closer to the level for SAC in 2008 than in 2007. However, there is some evidence that %DNR for this syndrome in VLA has tended to increase since 2003.

The Species Group SAC representative and musculo-skeletal system specialist indicate that there is no reason to suspect the presence of new or emerging disease but data will be monitored in 2008.

GOATS

- There were no statistically significant changes in %DNR for any syndrome between Q4 2007 and Q4 2008.
- In the whole year, there was a statistically significant decrease in the percentage DNR for the enteric syndrome from 21% in 2007 to 12% in 2008 ($z = -2.68$)

C: DNR ANALYSIS BY PRESENTING SIGN

SHEEP

In Q4 there were no statistically significant changes for GB in %DNR between 2007 and 2008 for any presenting sign.

Predominant presenting signs in 2008 were "Abortion" (20%), "Found Dead" (18%), "Diarrhoea" (15%) and "Wasting" (11%). In comparison with 2007, there were increases in the proportion of submissions subjected to "reasonable testing" with clinical signs "abortion" and "ill-thrift" and a decrease in the proportion with "diarrhoea".

- There was a statistically significant increase in % DNR for clinical sign "abortion" from 28% in 2007 to 39 % in 2008 ($z = 5.91$)
 - VLA 35% in 2007 to 37% in 2008 ($z = 1.01$)
 - SAC 10% in 2007 to 42% in 2008 ($z = 10.65$)

This is related to the increase in %DNR for the reproductive syndrome (see above).

- For GB overall there was no significant change in % DNR for clinical sign "Ill-thrift/Wasting" with 12% DNR in both 2007 and 2008 ($z = 0.11$). However, VLA and SAC showed opposite trends.
 - VLA 10% in 2007 to 6% in 2008 ($z = -2.12$)
 - SAC 14% in 2007 to 21% in 2008 ($z = 2.08$)

The increase for SAC was associated with non-carcass submissions but not with any particular age category, husbandry type or housing status.

GOATS

- There were no statistically significant changes in %DNR for any presenting sign between Q4 2007 and Q4 2008.
- In the whole year, there were statistically significant decreases in the percentage DNR for:-
 - diarrhoea from 31% in 2007 prior years to 17% in 2008 ($Z = -2.6$)
 - malaise from 33% in 2007 to 6% in 2008 ($z = -2.70$)

D: EARLY DETECTION SURVEILLANCE (EDS) MODEL

EDS (VLA data only) did not indicate a significant increase in number of DNR submissions for any body system in any month in 2008.