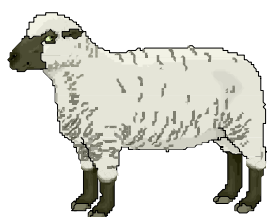


# GB surveillance

## Small ruminant diseases

Quarterly Report: Volume 13 No. 2

Date: April – June 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.

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### Highlights

- **Fasciolosis continues to cause disease outbreaks**
  - The relatively wet summers of 2007 and 2008 have produced conditions which have favoured the life cycle of *Fasciola hepatica* (page 12).
- **Overview of ovine abortion incidents - January to June 2009**
  - Enzootic abortion of ewes (EAE), toxoplasmosis and infection associated with *Campylobacter* sp. remain the three most common causes of abortion in sheep (page 16).
- **Increase in the number of incidents of abortion associated with E.coli in sheep**
  - Incidents of this usually sporadic cause of abortion were described in 22 flocks (page 16).
- **Unusual leucoencephalomyelopathy in Southdown lambs**
  - Neurological signs were seen in lambs either at birth or at 2-3 days of age. A genetic defect is a possible cause (page 15).
- **Lysosomal storage disease in pedigree Jacob lambs**
  - This is thought to be the first diagnosis of the disease in Jacob sheep in the UK (page 14)

## OVERVIEW

### Weather and climate

Mean temperatures across Great Britain in April, May and June were 0.5 to 2.0 °C above the average (of 1971-2000). In the first two months of the quarter, eastern England experienced the largest increases in temperature. In June, this occurred in western parts of Britain and western Scotland experienced the warmest June since 1992. By contrast, temperatures were close to the average in parts of northeast Scotland and England in June. In 2009, only in January have temperatures been below average in GB. The mild spring temperatures have provided good lambing conditions and are likely to have improved lamb survival.

The rainfall pattern in the quarter was less consistent: In April, rainfall ranged from above normal in the western fringes of Scotland, Wales and southwest England to well below normal in much of eastern Scotland and England, with less than 40% of average across East Anglia. Generally over England and Wales, April was the third consecutive month to be markedly drier than average.

In May, rainfall was above normal in northwest England and much of Scotland, with most of northwest Scotland receiving more than 160% of the average. By contrast, it was drier in southern England, with East Anglia and the southeast receiving less than 75%. Elsewhere, rainfall was mostly close to average.

Rainfall in June was below normal in most of GB, but above normal in a few small areas, with parts of the West Midlands receiving around double the long-term average for June. The driest regions included Kent and Cornwall with around a third of the June average.

### Economics of the small ruminant industries

The liveweight trade at English auction marts continued its upward trend throughout April, partially driven by an increase in demand during the Easter period. The combined old and new season SQQ\* price in April was almost 29% higher than a year earlier. Towards the end of May prices eased back slightly. By mid-June, the SQQ price of finished lambs fell significantly, as did the average deadweight price. However, despite the decrease, the SQQ was still 12% higher than in the corresponding week of 2008.

Domestic consumption of sheep meat during the second quarter was slightly reduced compared to the previous year, but there was a large increase in the purchase of less expensive stewing cuts.

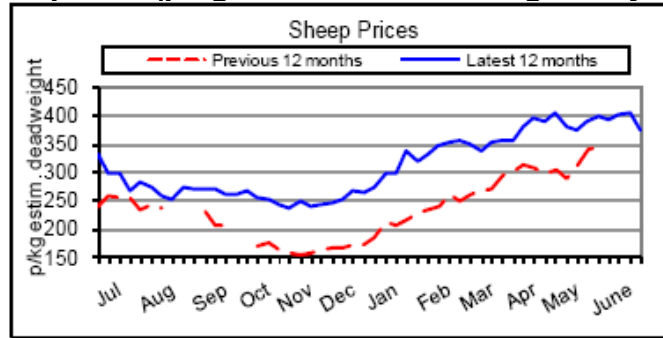
There have been favourable spring conditions this year followed by good summer grazing, factors which make it vital for producers to put special care and attention into selection of lambs for slaughter. Monitoring suggests that more lambs are being slaughtered in fatter classes than at the same time last year. Lambs can gain almost 2kg per week on high quality pastures, passing through a fat class in two weeks. Over-fat lambs will significantly reduce returns to the producer.

\* "SQQ" – "Standard Quality Quotation" - Light, Standard and Medium lambs averaged together

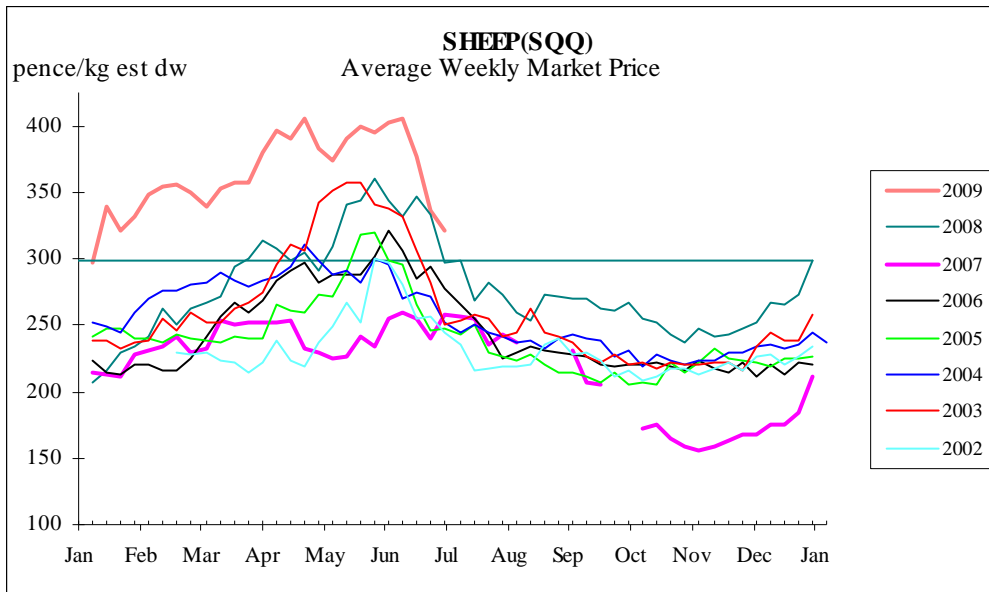
**Source: [www.eblex.org.uk](http://www.eblex.org.uk)**

UK Sheep meat prices are shown in Figures 1 and 2 and Table1.

**Figure 1: UK Sheep meat prices (p/kg estimated deadweight July 2007 – June 2009)**



**Figure 2: UK Sheep meat prices (p/kg estimated deadweight 2002 –2009)**



**Table1: UK Sheep meat prices (p/kg estimated deadweight March-June 2009)**

Year	Week ending	SHEEP(SQQ) (p/kg estim. deadweight)		
		price	annual change	%
2009	28 Mar	379.7	+ 21.2	
2009	04 Apr	395.8	+ 28.9	
2009	11 Apr	390.6	+ 31.0	
2009	18 Apr	405.3	+ 33.2	
2009	25 Apr	382.1	+ 31.5	
2009	02 May	373.6	+ 20.5	
2009	09 May	389.9	+ 14.5	
2009	16 May	399.0	+ 15.9	
2009	23 May	394.9	+ 9.6	
2009	30 May	403.1	+ 17.3	
2009	06 Jun	405.7	+ 22.2	
2009	13 Jun	376.4	+ 8.5	
2009	20 Jun	336.5	+ 1.0	
2009	27 Jun	321.6	+ 8.0	

<http://statistics.d.gov.uk/esg/datasets/wplivest.xls>

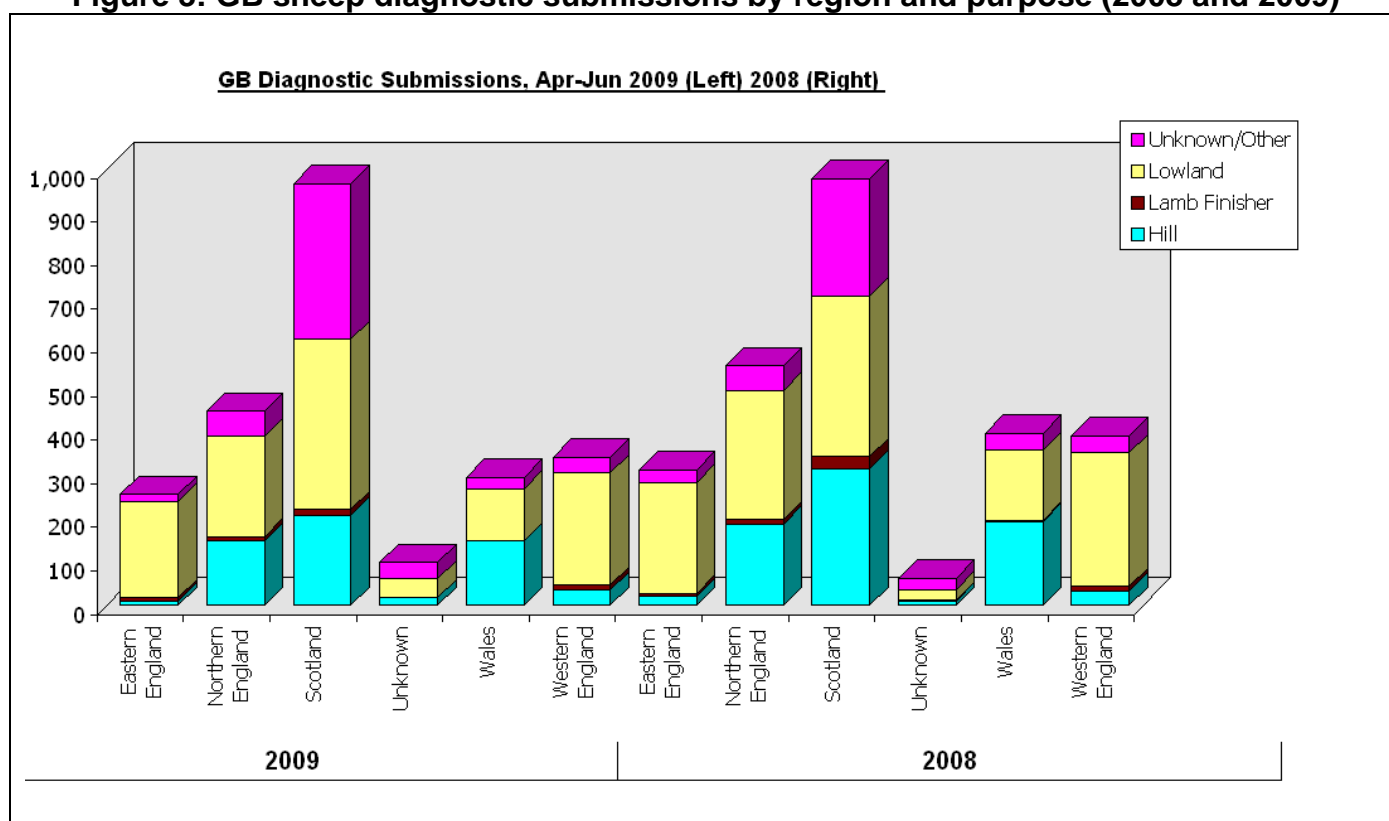
### Submissions for scanning surveillance

The number of sheep and goat diagnostic submissions are shown in tables 2 and 3 and the distribution of these submissions by region and purpose is shown in figures 3 and 4. The number of diagnostic sheep submissions in England and Wales fell by 19% to 1,275 and the number of submissions in Scotland increased slightly to 1,119. The reason for the fall in the number of submissions in England and Wales is unclear, but could reflect a mild spring which created conditions favourable to lamb survival.

**Table 2: Sheep Diagnostic Submissions in GB**

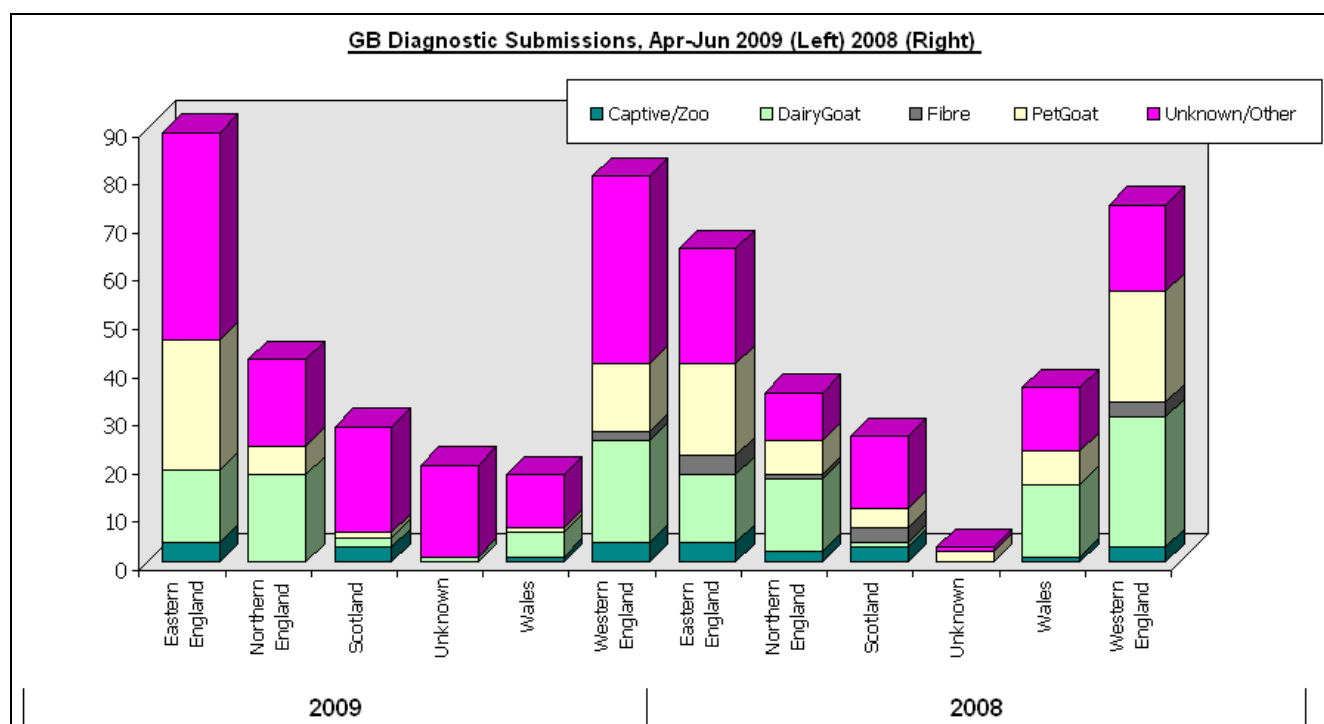
Apr-Jun	Submissions			Carcasses		
	E&W	Scotland	Total	E&W	Scotland	Total
2005	1,714	1,390	3,104	813	589	1,402
2006	2,104	1,386	3,490	1,045	690	1,735
2007	1,342	1,087	2,429	601	539	1,140
2008	1,582	1,101	2,683	807	503	1,310
2009	1,275	1,119	2,394	631	476	1,107

**Figure 3: GB sheep diagnostic submissions by region and purpose (2008 and 2009)**



**Table 3: Goat Diagnostic Submissions in GB**

Apr-Jun	Submissions			Carcasses		
	E&W	Scotland	Total	E&W	Scotland	Total
2005	158	38	196	42	4	46
2006	159	35	194	29	7	36
2007	175	19	194	44	2	46
2008	211	28	239	73	4	77
2009	183	94	277	35	4	39

**Figure 4: GB goat diagnostic submissions by region and purpose (2008 and 2009)**

**Notifiable Disease Reported:** No incidents of notifiable disease were identified following submissions to VLA RLs or SAC VS. VLA contacted Animal Health on two occasions when notifiable disease could not initially be excluded following submission of material to an RL. In one incident, lesions suspicious of Tb, which was subsequently ruled out following histopathology and culture, were seen in an adult ewe. In another incident, Animal Health was notified when bluetongue could not be excluded in a flock experiencing abortions and the birth of lambs with congenital deformities. The flock was vaccinated against BTV and further testing was not carried out.

***Brucella melitensis*:** A total of 379 sheep and goat abortion submissions were examined 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 4: Farm Investigation and Advisory Visits**

Apr-Jun	E&W	S	Total Visits
2005	26	NA	
2006	16	NA	
2007	20	NA	
2008	23	11	34
2009	7	2	9

## Potential Food Safety Incidents

The number of potential food safety incidents investigated by VLA and SAC are shown in table 5.

**Table 5: Potential Food Safety Incidents**

Apr-Jun	Total Incidents	Botulism	Lead	Copper	Other
2009	3	1	1		1 (Difenacoum)
2008	8		6	2	
2007	4		4		
2006	3	1		1	1 (diesel oil)
2005	1		1		

### Exposure to lead

A raised kidney lead concentration was detected in a five-week-old lamb which was submitted for postmortem examination. The lamb was one of a group of 60 ewes and lambs. The cause of death was confirmed to be due to coccidiosis. The kidney lead concentration was 26.6  $\mu\text{mol/kg}$  DM, equivalent to 0.94 ppm WW. The source of lead was suspected to be geochemical. The farmer was reminded of his responsibilities to the food chain and was advised to ensure that a 16 week withdrawal is observed for stock grazing this land prior to them entering the food chain.

### Exposure to Difenacoum

Difenacoum poisoning was suspected to be the cause of death in a cull ewe. The ewe was one of a group of two cull ewes and three fat lambs to escape into a barn which contained hay bales, straw bales and some loose grain. Two rat boxes containing 0.005% difenacoum had been placed in the barn to control a recent rodent problem. These containers were found displaced with a little of the content spilled onto the ground. Postmortem examination of the dead ewe confirmed the rumen to be full of grain. The cause of death of the ewe was confirmed as acidosis due to grain overload but it was not established whether the grain present was actually difenacoum-treated grain or simply spilled grain. There was no evidence of a bleeding disorder. The farmer agreed to an initial two week restriction on the ewes and fat lambs. Following this the sheep could only be presented to the food chain provided offal was removed.

**Botulism** – see page 8 (Systemic and Miscellaneous diseases)

## 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

### Salmonellosis

Provisional data indicate that a diagnosis of salmonellosis was recorded in 20 (13 VLA and 7 SAC) ovine diagnostic submissions in the second quarter of 2009, compared with 11 (8 VLA and 3 SAC) in the equivalent period in 2008

Salmonellosis was diagnosed more frequently in submissions with presenting sign "abortion" (2.4%) than submissions with other presenting signs (0.5%). The predominant presenting signs in non-abortion salmonellosis incidents were "found dead" and "diarrhoea".

Salmonellosis was not diagnosed in goats by either VLA or SAC.

Serotypes, where determined, in ovine salmonellosis incidents in Q2 in recent years are shown in Table 6.

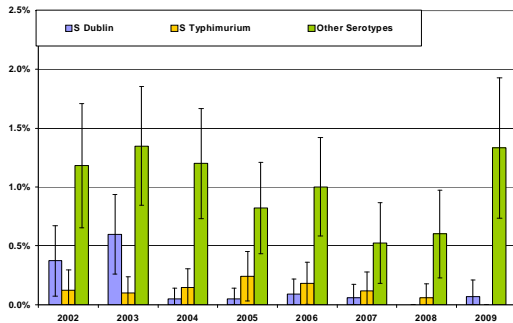
**Table 6: Serotypes in ovine salmonellosis incidents Q2, 2005 to 2009**

Serotype or Group	Phage Type	2005	2006	2007	2008	2009
Not determined						1
Structure only					1	
Group C						2
<i>S. Agama</i>				1		
<i>S. diarizonae</i>		12	17	9	6	12
<i>S. Dublin</i>		1	2	1		1
<i>S. Duesseldorf</i>		1				
<i>S. Montevideo</i>		3	5		3	4
<i>S. Stourbridge</i>				1		
<i>S. Typhimurium</i>	104	3	3	2	1	
	U302		1			
	UNTY	2				
		<b>23</b>	<b>28</b>	<b>14</b>	<b>11</b>	<b>20</b>

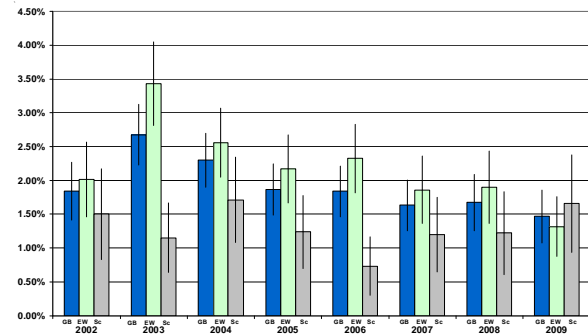
The percentage of appropriately tested submissions from which disease due to *Salmonella* was diagnosed is shown in figure 5a. It can be seen that on this basis diagnoses of salmonellosis due to serotypes other than *S. Dublin* and *S. Typhimurium* have increased this quarter, reversing a decreasing trend in recent years. However, cumulative data for Q1 and Q2 does not indicate a significant change for GB, although there is an increasing trend in Scotland since 2006 (figure 5b).

**Figure 5: VIDA Incidents of Salmonellosis in Sheep (as percentage of diagnosable submissions) 2002 to 2009**

**a) Q2 All Serotypes GB**



**b) Q1 & 2 Salmonella NOS (not Dublin or T'm) England & Wales, Scotland and GB**



(Vertical bars indicate 95% confidence limits)

*Salmonella diarizonae* was the most frequently isolated serotype in salmonellosis cases in Q2 2009.

- All *S. diarizonae* isolates were from England and Wales with none from Scotland.
- This organism has been recorded in association with ovine abortion but interpretation of isolates is sometimes difficult as the organism can be carried by healthy sheep, particularly in the reproductive and enteric tracts. This serotype is often isolated concurrently with other pathogens.
- Four isolates this quarter were from abortion submissions and there were no concurrent diagnoses in these cases. Similar numbers of isolates were obtained from abortion submissions in Q2 2005 to 2007, although this serotype was not isolated from abortion material in Q2 2008.
- There were seven *S. diarizonae* isolates from non-abortion submissions this quarter, compared with six in Q2 in both 2008 and 2009. Concurrent diagnoses were four of PGE and one of clostridial enterotoxaemia.
- *S. diarizonae* is a very infrequently recorded cause of human illness.

**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 a significant increase in diagnoses of salmonellosis in Q2 2009 using either the 5 or 12 year baseline.

**Botulism**

Botulism was diagnosed as the cause of death of 13 gimmers from two groups totalling 100 animals. The affected farm comprises a broiler unit and some surrounding grazing land, which is used by horses and sheep. Following depopulation of one of the broiler sheds, the litter was removed and taken to the farms arable land to be spread and ploughed in as usual. However, unusually, some of the material was spread on an adjacent grass field, and 60 gimmers were

turned out into this field approximately a week after the litter was spread. Several days after this, three sheep were observed to be recumbent and were treated for hypocalcaemia. Following the death of these animals, one was submitted for postmortem examination. Clinical signs included recumbency, flaccid paralysis and weakness. Botulism was suspected and it was advised that the sheep should be moved immediately out of the affected field. One further death occurred in these animals. Inspection of the field did not reveal any evidence of carcasses, although litter could be seen on the surface. *Clostridium botulinum* type D toxin was confirmed in small intestinal contents from the submitted sheep.

Deaths occurred in a second group of 40 gimmers, kept at a different farm under the same ownership, a few days later. Three were found dead that day. One was submitted for examination and a further six died overnight. Another sheep was examined at the time of a farm visit and had flaccid paralysis. A load of manure containing poultry litter had been stacked in the field shortly beforehand. The sheep were removed from the field at the time of the visit. Advice with regard to food safety issues and control of botulism was provided.

## ALIMENTARY TRACT DISEASES

### Cryptosporidiosis and Attaching and Effacing *E.coli* (AEEC)

The carcass of a three-week-old lamb was presented for postmortem examination with a history of diarrhoea and death. There had been 20 out of 700 lambs with similar signs. Postmortem examination revealed a carcass with yellow scour soaking the fleece at the perineum and hind legs. The small intestine contained a large amount of yellow-green liquid. Laboratory findings included detection of moderate numbers of *Cryptosporidium* oocysts and histopathological findings confirmed the likely significance of this finding and also revealed evidence of low-grade enteritis in the large intestine with several foci of intimately attached bacteria on detached villus epithelial cells consistent with AEEC infection. This was considered likely to have given rise to an enterotoxaemia and would account for the severity of the disease in this age of animal. Control measures recommended, included careful attention to hygiene. The combined infections of cryptosporidiosis and AEEC have been identified in the past and it has been speculated that AEEC is an opportunistic infection occurring due to prior damage with other infectious agents.

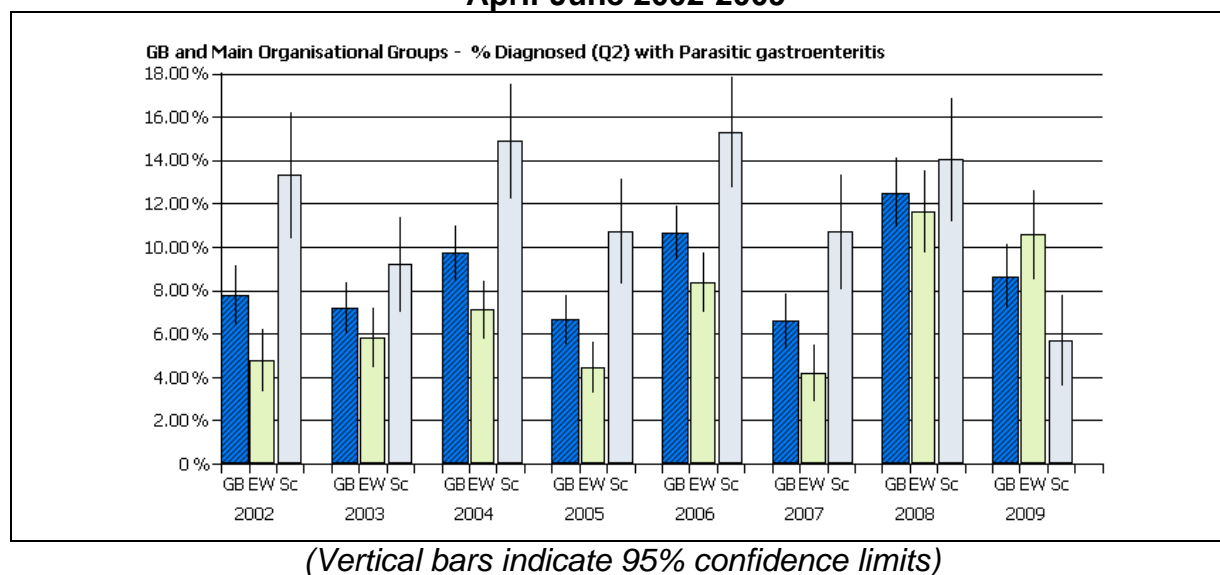
### Abomasal emptying defect and Caseous Lymphadenitis (CLA)

An adult Suffolk-cross ewe, which had recently been weaned from twin lambs, was found recumbent. It was noted by the owner that the ewe was fairly thin and that food material was present within the cheeks and that the animal appeared unable to swallow. When the ewe was subsequently euthanased postmortem examination revealed a dramatically enlarged abomasum, filled tightly with 9 kg contents, consistent with a diagnosis of abomasal impaction or abomasal emptying defect. This is a recognized syndrome, of unknown aetiology, seen particularly in adult Suffolk and Suffolk cross ewes. The involvement of neurotoxins, viruses or acquired dysautonomia have all been postulated. Additionally in this case, one of the mediastinal lymph nodes was markedly enlarged due to abscessation caused by *Corynebacterium pseudotuberculosis* (agent of CLA). It is possible the abscess had compressed branches of the vagus nerve, resulting in the abomasal dysfunction and impaction. Similar cases from the same small flock had been encountered previously, with approximately one ewe dying of abomasal emptying defect every year.

## Parasitic gastro-enteritis (PGE)

The number of incidents of PGE diagnosed in sheep in this quarter is slightly reduced in England and Wales when compared to the same time in 2008. The weather was generally much warmer than average throughout this quarter, but drier than average in April and June which may have reduced the survival of the infective stages of the parasite, compared to last year. However, PGE still accounted for over 10% of diagnosable submissions in England and Wales. In Scotland, diagnoses were significantly lower this quarter when compared to 2008 (figure 6, table 7).

**Figure 6: PGE in sheep, as a percentage of diagnosable submissions, April-June 2002-2009**

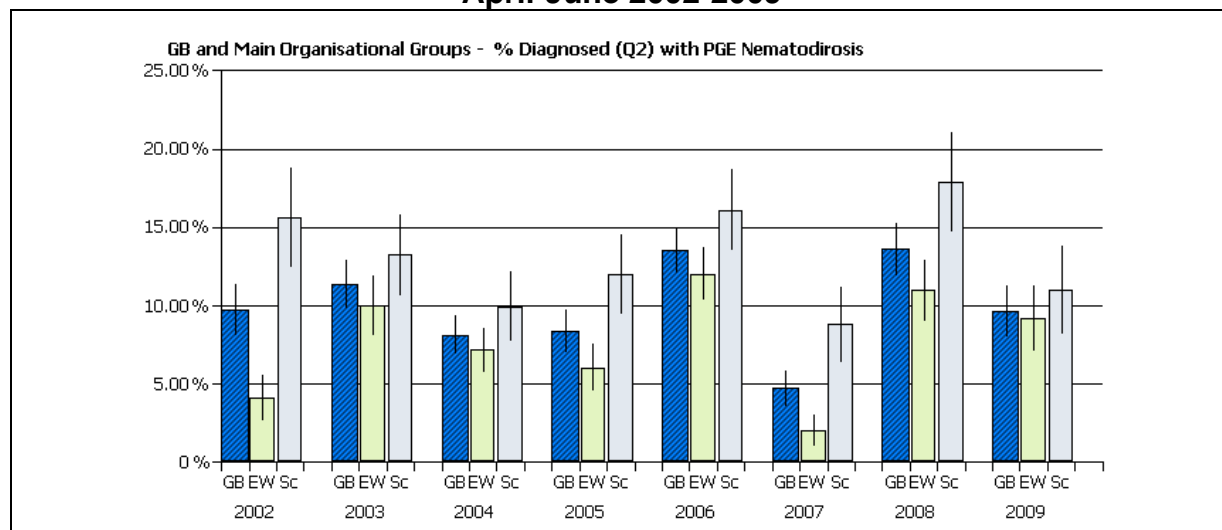


**Table 7: Number of incidents of PGE in sheep, April-June 2002-2009**

Year	Number of incidents of PGE in England and Wales	Number of incidents of PGE in Scotland	Total number of incidents of PGE (GB)
2002	41	69	110
2003	65	61	126
2004	100	102	202
2005	51	67	118
2006	133	118	251
2007	38	56	94
2008	130	80	210
2009	93	27	120

## PGE-Nematodirosis

This quarter of the year usually records the peak of diagnoses of nematodirosis due to *Nematodirus battus*. The number of incidents in 2009 was reduced in England, Wales and Scotland from the same period last year (figure 7, table 8). The clinical signs were of diarrhoea and subsequent death in lambs, with adult, egg - laying parasites present, rather than rapid death associated with the presence of immature stages which can occur in nematodirosis.

**Figure 7: PGE- Nematodirosis in sheep, as a percentage of diagnosable submissions, April-June 2002-2009**

(Vertical bars indicate 95% confidence limits)

**Table 8: Number of incidents of PGE-nematodirosis in sheep, April-June 2002-2009**

Year	Number of incidents of nematodirosis in England and Wales	Number of incidents of nematodirosis in Scotland	Total number of incidents of nematodirosis (GB)
2002	29	78	107
2003	95	88	183
2004	90	68	158
2005	60	75	135
2006	177	124	301
2007	16	46	62
2008	107	102	209
2009	68	52	120

### PGE-Haemonchosis

**Table 9: Number of incidents of PGE-haemonchosis in sheep, April-June 2002-2009**

Year	Number of incidents of haemonchosis in England and Wales	Number of incidents of haemonchosis in Scotland	Total number of incidents of haemonchosis (GB)
2002	1	1	2
2003	4	2	6
2004	10	9	19
2005	1	2	3
2006	11	4	15
2007	7	1	8
2008	10	3	13
2009	6	0	6

There were six incidents of haemonchosis due to *Haemonchus contortus* recorded in England and Wales this quarter (table 9). There were no incidents diagnosed in Scotland. Regional laboratories reported deaths in yearlings and adults, with the number of deaths varying from 3-7%. The peak of diagnoses of haemonchosis is usually the third quarter (July, August and September) of the year.

**Acute Fasciolosis**

Four incidents of acute fasciolosis (three in England and Wales and one in Scotland) were reported during the second quarter of 2009. This follows the large number of incidents (83) recorded in the first quarter of 2009 and is largely due to the two wet summers of 2007 and 2008 which increased the prevalence of fluke infection. Acute fasciolosis is more typically recorded in the autumn.

In one incident of acute fasciolosis in Wales, in April, thirty ewes had died since January in a group of 300 ewes that had been returned from tack. Necropsy examination of an adult Mule ewe revealed immature flukes and focal areas of necrosis in the liver parenchyma.

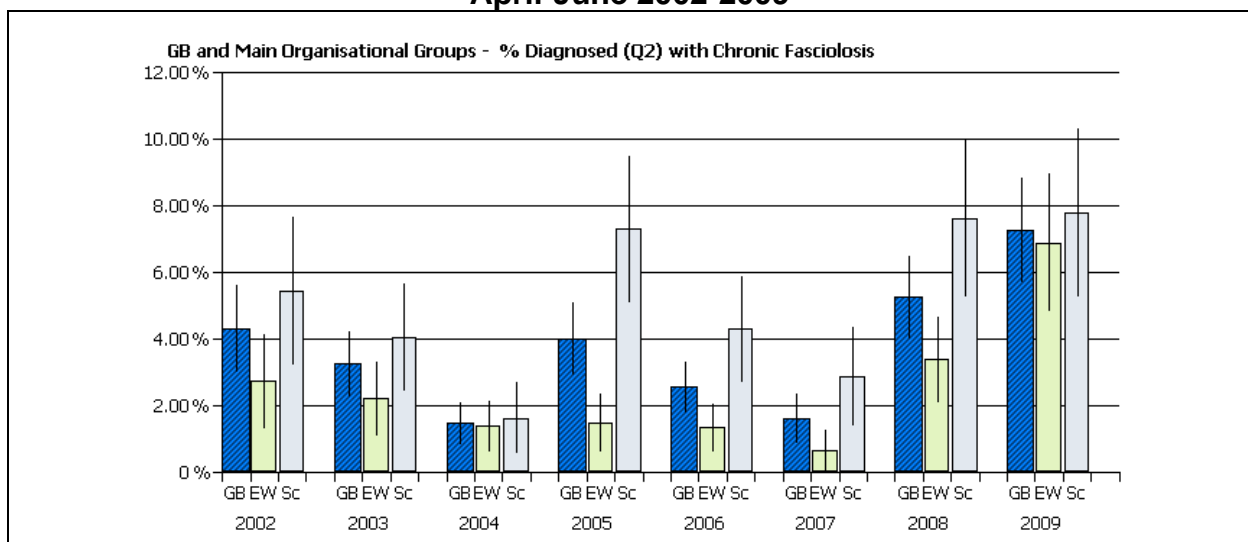
Cases of sub-acute fasciolosis were also reported in the southwest of England. There maybe increased survival of infective metacercariae on pastures in the milder winter conditions now experienced in the south of England.

**Chronic Fasciolosis**

There was an increase in VIDA diagnoses of chronic fasciolosis during this quarter compared to the same quarter last year (74 incidents compared with 63). The reason for this increase is the same as that for acute fasciolosis: two wet summers favouring the life cycle of the parasite, and of its intermediate snail host. Incidents of chronic fasciolosis as a percentage of diagnosable submissions are shown in figure 9.

High mortality was reported in some outbreaks during this quarter, which indicates that some farmers failed to heed warnings of the increased risk of fasciolosis and did not treat their animals over the winter with a flukicide product. This was demonstrated in an organic flock investigated in Wales, where ten sheep died over a two week period in a flock of 120 untreated ewes.

**Figure 9: Chronic fasciolosis in sheep, as a percentage of diagnosable submissions, April-June 2002-2009**



## RESPIRATORY DISEASES

### Maedi-visna

A single incident of maedi-visna (MV) infection was confirmed in the second quarter of this year. This was in a flock of Texel cross ewes where between three and six animals are affected each year with sudden onset hindlimb paralysis leading to recumbency. There were no reported cases of indurative mastitis, pneumonia or arthritis within the flock. Histopathology identified encephalomyelitis within the brain and spinal cord consistent with visna. The ewe was seropositive for MV by AGIDT. The history suggests the introduction of a neurotropic strain of the virus some years ago. Further investigation including serological screening of different age groups of ewes is in progress to determine the extent of infection in this flock and ascertain the possible source of infection.

### Ovine pulmonary adenocarcinoma (OPA)

The number of cases of (OPA) has been similar to previous second quarters, with 11 cases confirmed histologically, compared to ten during the same period in 2008.

### Parasitic pneumonia

There has been a relative increase in recorded cases of parasitic pneumonia in the first two quarters of the year. This has been mainly in adult sheep in lowland flocks. In some cases this was an incidental finding at necropsy.

## SKIN DISEASES

### Sheep scab and lice infestation

The rates of diagnosis for sheep scab and lice infestations are shown in table 10. There was a significant reduction in sheep scab diagnoses in Q2 in 2009. A sustained decrease over several quarters in the rate of diagnosis would be needed before this could be considered to represent a significant trend. There were no unusual or noteworthy skin disease cases described in monthly reports during the quarter.

**Table 10: GB diagnoses of sheep scab and pediculosis (April – June 2002 –2009)**

Year	Sheep Scab	Pediculosis
2002	25	0
2003	20	0
2004	20	3
2005	38	7
2006	25	10
2007	26	2
2008	26	18
2009	8	10

## MUSCULO-SKELETAL DISEASES

**Arthritis due to *Streptococcus dysgalactiae* subsp *dysgalactiae*:** This is the most common diagnosed cause of infectious arthritis in young lambs. There has been no significant change in the number of diagnoses as a percentage of diagnosable submissions this year when compared

to the same quarter in 2008 (17 cases in 2009 compared to 21 cases in 2009). However, the morbidity in some cases described has been very high. In one case up to 100 lambs were affected, clinical signs developing from two days of age, with several lambs requiring euthanasia due to poor welfare and poor response to antibiotic therapy.

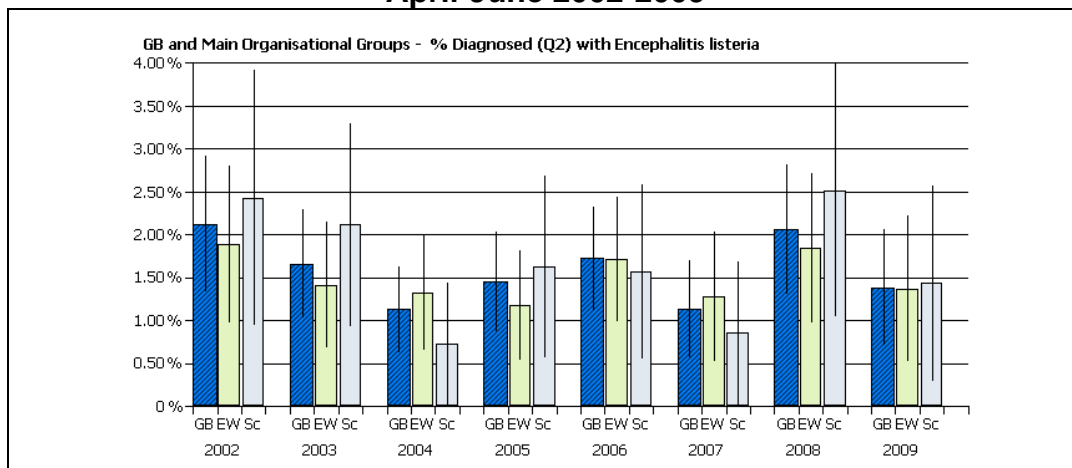
**Arthritis due to *Erysipelothrix rhusiopathiae*:** Five cases of arthritis due to *Erysipelothrix rhusiopathiae* in young lambs were recorded this quarter. Again, morbidity in the affected flocks was high with typical clinical signs including stiffness on the hind legs, swollen joints and a shuffling walk. In contrast to arthritis due to *Strep. dysgalatiae*, infection with *E. rhusiopathiae* occurs in older lambs, usually around two/three months of age.

## NERVOUS DISEASES

**Cerebro-cortical necrosis (CCN):** Diagnosed cases of CCN by VLA in Q2 of 2009 have remained at a consistent level with those recorded in 2007 and 2008. In contrast this year however, SAC in Scotland have recorded an increase in cases compared to the same quarter in 2008 (four cases in 2009 compared to a single case in 2008).

**Listerial Encephalitis:** This continues to be the most frequently diagnosed cause of nervous disease in sheep. Diagnoses of listerial encephalitis as a percentage of diagnosable submissions by both the VLA and SAC are lower in this quarter when compared to the same quarter in 2008 (figure 10). This may reflect a reduction in the feeding of silage as a result of flocks being turned out to grazing, which may have occurred earlier this year due to the good weather during April and May.

**Figure 10: Listerial encephalitis in sheep, as a percentage of diagnosable submissions, April-June 2002-2009**



**Louping ill:** There has been an increase in the number of louping ill cases diagnosed this quarter when compared to the same quarter in 2008 (13 cases versus six cases). The increase most notably occurring in Scotland (nine cases in 2009 compared to three cases in 2008).

### Unusual diseases:

**Lysosomal storage disease:** Lysosomal storage disease was confirmed in two pedigree Jacob lambs. Hind leg weakness and recumbency had been reported in three lambs in 2007 which were euthanased. Two lambs were similarly affected in 2008 and both were examined at the VLA. Histopathology revealed marked accumulation of material in the neuronal cytoplasm, characteristic of lysosomal storage disease. Tissues were also examined by electron microscopy. Histological and ultrastructural findings were typical of GM gangliosidosis, but they

did not distinguish between types 1 and types 2. Lysosomal storage disease results from dysfunction of the degradation of products of normal cellular metabolism within the lysosomes. This can be due to deficient activity of a specific enzyme due to a genetic defect. Further work is underway to identify the storage product in this case and review the breeding on the farm as the disease is known to be inherited in an autosomal recessive manner. This is thought to be the first diagnosis of the disease in Jacob sheep in the UK.

**Unusual leukoencephalomyelopathy in lambs:** Neurological disease was investigated in two lambs from a Southdown flock. A number of lambs were reported to show neurological signs including tremor, recumbency, inability to stand and at least one lamb was described as “walking backwards”. Lambs were either affected at birth or within two to three days of birth. This was apparently the second year that this problem had been identified in this flock and the same ewes had reportedly given birth to affected lambs in successive years. Histopathology confirmed a leukoencephalomyelopathy with motor neuron degeneration, however several features were atypical of congenital swayback, the most common cause of this histological appearance. In addition, the liver copper levels of both lambs were within acceptable limits. There was also no evidence of other possible causes such as border disease or hypoglycaemic encephalopathy. One possibility under consideration is a genetic defect and investigations into this continue.

**Tetanus:** Tetanus was diagnosed on the basis of typical clinical signs and exclusion of other disease on postmortem examination. Five lambs were affected out of several hundred. Rubber rings were applied to the tails and scrotum of lambs in the first few days of life. Clinical signs were seen at three weeks of age and included recumbency, stiff and extended hind legs with the head back and frothing at the mouth. The ewes did not receive clostridial vaccination.

Tetanus in sheep commonly occurs as a result of infections following docking, shearing, castration and vaccination or injection of pharmaceuticals. An outbreak of tetanus in lambs associated with ear tagging was also reported by Aslani and others (1998). The diagnosis has become uncommon in the UK due to a large proportion of the flocks vaccinating ewes/lambs against clostridial disease.

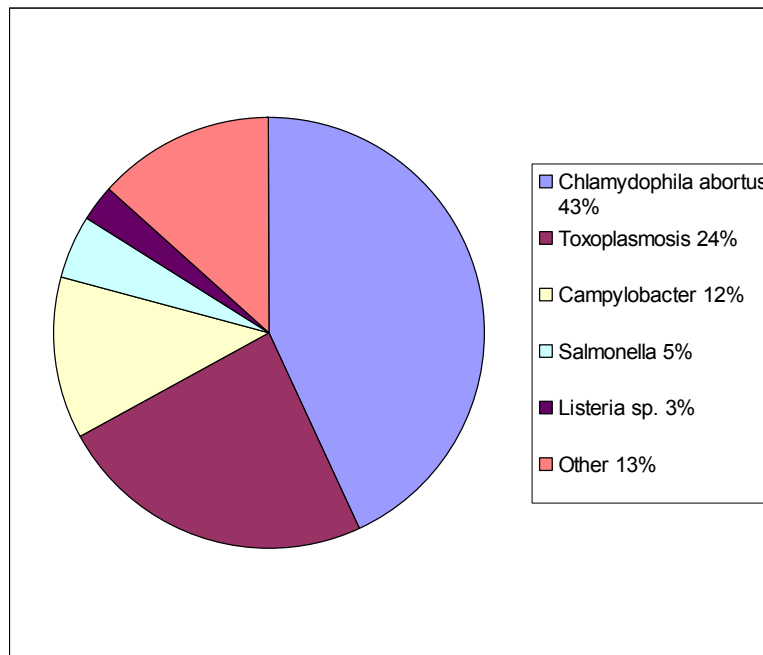
Aslani, M. R., Bazargani, T. T., Ashkar, A. A., Movasaghi, A. R., Raoofi, A. & Atiabi, N. (1998) *Veterinary Record* 142, 518-519

## REPRODUCTIVE DISEASES

The submission of abortion material from sheep occurs predominantly in the first two quarters of the year. Therefore data has been analysed for the months January to June 2009 and is presented below.

A diagnosis was reached in 59.5% of submissions where the presenting sign was recorded as abortion. Figure 11 shows the most common causes, with causes accounting for less than 3% of diagnoses grouped together as “other”. This includes sporadic causes of abortion such as, *Bacillus licheniformis*, *Yersinia pseudotuberculosis*, *E.coli* and *Arcanobacterium pyogenes*.

As in previous years abortion due to *Chlamydomphila abortus* (EAE) and *Toxoplasma gondii* account for over two thirds of diagnoses, with campylobacteriosis the third most frequent diagnosis reached.

**Figure 11: GB ovine abortion diagnoses 2009 (n=799)**

**Abortion associated with *E.coli*:** Interesting highlights this year include an increased incidence of abortion due to *E.coli*. This has been recorded in 22 flocks in England and Wales, predominantly in the northwest of England. A number of similar abortion outbreaks were also noted in Scotland. *E.coli* is generally considered a sporadic cause of abortion, however in most flocks where *E.coli* was recorded this year there have been several abortions ranging from 1% to 25% in one flock. Typically the incidence of abortion was 2 - 4%. Investigation of ovine abortions is advised when over 2% of ewes have aborted or when abortions occur in clusters. Abortions due to *E.coli* were generally close to full term. In one flock there were associated ewe deaths. The majority of cases were in lowland housed ewes. The diagnosis was made based on bacteriological culture of foetal stomach contents yielding pure profuse growths of *E.coli*, in the absence of advanced autolysis and where no other cause of abortion was identified. In several cases a placentitis, with gross thickening of the intercotyledonary areas and creamy pink exudate, was noted at necropsy. In the cases where histopathology was undertaken a bacterial placentitis was confirmed with special staining showing gram negative organisms.

Microarray testing was carried out on seven isolates from five flocks to identify virulence genes. There was no concordance between three isolates from a single flock where multiple abortions and ewe deaths had occurred, suggesting a single clonal *E.coli* isolate was not responsible for the multiple cases. Three isolates from different flocks had two virulence genes in common, *celb* (endonuclease colicon E2) and *lpfA* (long polar fimbriae). The significance of these virulence factors with respect to pathogenicity of the isolates and their potential for causing ovine abortion is unclear.

**Border disease virus (BDV) infection** has been diagnosed as a cause of abortions, stillbirths and congenital abnormalities in flocks in England and Wales in increased numbers in the first half of the year. The main clinical presentation was abortions affecting up to 15% of the flock in some cases. One flock had over half the lamb crop from a small pedigree flock of 60 Texel ewes destroyed due to domed heads, tremor and abnormal hair coats. There was also increased barren rate, abortions and stillbirths.

**Bluetongue surveillance:** Routine gross examination of fetal brains as part of BTV surveillance led to notification of Animal Health regarding a flock in Northumbria where there was a high incidence of congenital abnormalities in lambs born to Texel cross ewes. Lambs from Suffolk ewes and pure Texel ewes were not affected. Lambs examined had complex congenital anomalies including oedema of the limbs and tail, arthrogryposis of the forelimbs and hydranencephaly in one lamb; brachygnathia, severe arthrogryposis of forelimbs and hindlimbs, oedema of limbs and tail, hydranencephaly, abnormal haircoat in another lamb; kinked tail and meningocoele in a third lamb. Many other lambs were of low birthweight and appeared to have abnormal conformation. The flock had vaccinated against BTV-8 pre-tupping and testing for BTV was not sanctioned.

The most likely cause of this syndrome was considered to be BDV. However, PCR testing was negative for pestivirus RNA on eight lambs tested. BDV antibody testing was undertaken on foetal fluid from six lambs, with no antibodies detected. Despite full investigation no infectious cause of the congenital abnormalities was established. There were no pharmacological agents used during the stage of gestation that would correspond to the defects seen. A toxic insult (e.g. certain plants) could not be ruled out, although there was no apparent illness in the ewes. Management of all groups has been the same. A genetic / inherited aetiology remains the most likely.

Another flock was visited to investigate congenital abnormalities in ten of 95 Kerry Hill lambs. The abnormalities included swollen abdomen, hyper-extendable limbs, domed head and overshot lower jaw. Histopathological findings were somewhat unusual and pointed to an intrinsic, possibly genetic metabolic defect.

## GOAT DISEASES

**Yersiniosis:** Three separate RLs reported this condition which has been sporadically investigated by RLs over the past three to four years. In one of the affected herds, there had been over 50 cases of unilateral mucopurulent ocular discharge, chemosis, nodular swelling of the palpebral conjunctiva and corneal oedema. Enlargement of parotid and submandibular lymph nodes was also identified in some individuals. The isolate was confirmed as *Yersinia pseudotuberculosis* and this condition is referred to as oculoglandular syndrome, and a VLA paper describing an earlier outbreak is in preparation.

In two other yersiniosis incidents involving yearling goats and kids of seven weeks of age, the same organism was associated with enteric disease. There was gross thickening of the gut with small nodular and ulcerative lesions evident with histopathology confirming a moderate to severe sub-acute necro-suppurative entero-typhlitis. Mortality in the older group was reportedly 12/80 over a ten to 14 day period. The trigger for disease to develop is poorly understood but appears to be stress related.

**Goat abortion:** Very little material was received to investigate abortions in goats during the quarter, but one submission from a large 'open farm' with many mixed farm animal species did raise some concern. A placental *Toxoplasma* IFAT (validated in goats) gave a positive result, but there were also numerous acid-fast inclusions in placenta typical of *Chlamydophila* which was confirmed by PCR. This appeared to be a dual infection involving *Chlamydophila* and *Toxoplasma* and relevant husbandry and zoonotic advice was given to the farm.

**CLA:** Widespread CLA lesions were confirmed by the isolation of *Corynebacterium pseudotuberculosis* from submitted pus aspirate. Although textbooks describe this condition as mild and 'disfiguring' in goats, year-round housing of large numbers of goats together can

precipitate widespread disease. Although not validated in goats the currently available CLA ELISA test has been used in herds to identify infected/carrier animals.

## 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 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 a full account of the methodology, please consult:

<http://vla28/reports/diagnosis%20not%reached/default.asp>

Data recording by VLA and SAC was harmonised from 2007. In this report GB data from the second quarter of 2009 is compared with the data from the equivalent quarter in 2008. 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

This quarter, there were no changes in the percentage of submissions for which a diagnosis was not reached (DNR) which were thought to constitute evidence of new or emerging disease in sheep or goats.

However, continued monitoring of changes in percentage DNR is indicated for the reproductive syndrome in sheep in England and Wales and for systemic and miscellaneous disease in sheep in Scotland.

### GB

#### SHEEP

During Q2 2009, the percentage of diagnostic submissions where a diagnosis was not reached was 23% compared with 22% in Q2 2008. The difference is not statistically significant ( $z=0.31$ ).

**Figure 12: Summary of the changes in undiagnosed ovine disease between Q2 2008 and Q2 2009.**

System	%DNR Q2 2009 (n=1357)	Change	%DNR Q2 2008 † (n= 2,309)	z ‡
Circulatory	6	↓	9	-0.47
Enteric	15	=	15	-0.16
Mastitis	0	=	0	0.00
Musculoskeletal	15	↓	21	-0.71
Nervous	9	↑	7	0.31
Reproductive	45	↓	46	-0.25
Respiratory	3	↓	4	-0.04
Skin	34	↑	23	1.38
Systemic & Miscellaneous	16	↓	12	1.04
Urinary	2	↓	2	0.26
Overall	23	↑	22	0.31

† as data accumulates, comparison will be with values pooled across prior years  
‡ statistically significant if  $z > 1.96$  or  $z < -1.96$  (not calculated if  $N < 40$ )

### Reproductive syndrome

The previous report noted a statistically significant increase in % DNR for submissions related to the reproductive body system, when compared with Q1 2008. Results have now been recalculated to include submissions received during the first quarter for which a diagnosis was not achieved until after the earlier analysis date (20/04/2009). The increase in % DNR is no longer statistically significant.

- GB DNR in 37% of 1,007 sub<sup>n</sup> in 2008, 41% of 1,136 sub<sup>n</sup> in 2009 ( $z=1.76$ )
  - SAC 41% in 2008 & 44% in 2009 ( $z=0.91$ )
  - VLA 36% in 2008 & 40% in 2009 ( $z=1.64$ )

Similarly, recalculation for submissions with clinical sign “abortion”, which is the predominant presenting sign for submissions allocated to the reproductive syndrome, now indicates an increase in % DNR which is not statistically significant.

- GB DNR in 36% of 943 sub<sup>n</sup> in 2008, 40% of 1,083 sub<sup>n</sup> in 2009 ( $z=1.60$ )
  - SAC 40% in 2008 & 44% in 2009 ( $z=0.90$ )
  - VLA 35% in 2008 & 38% in 2009 ( $z=1.46$ )

In the second quarter of 2009 there was little change in % DNR for the reproductive syndrome as compared with 2008.

- GB DNR in 46% of 333 sub<sup>n</sup> in 2008, 45% of 294 sub<sup>n</sup> in 2009 ( $z=-0.25$ ).
  - SAC 48% in 2008 & 51% in 2009 ( $z=0.55$ )
  - VLA 44% in 2008 & 38% in 2009 ( $z=-1.09$ )

Changes in lambing dates can affect diagnostic rates in particular quarters, as a diagnosis may be more readily achieved in late gestation abortions than in early abortions. Comparison of pooled data for Q1 and Q2 may therefore give the most reliable indication of changes in %DNR for this syndrome. In this period, there was an increase in %DNR for the reproductive syndrome between 2008 and 2009 which was not statistically significant.

- GB DNR in 39% of 1,340 sub<sup>n</sup> in 2008, 42% of 1,432 sub<sup>n</sup> in 2009 (z =1.20).
  - SAC 43% in 2008 & 47% in 2009 (z=1.03)
  - VLA 37% in 2008 & 40% in 2009 (z=1.04)

%DNR for submissions with clinical sign “abortion” showed similar changes

- GB DNR in 38% of 1,244 sub<sup>n</sup> in 2008, 41% of 1,380 sub<sup>n</sup> in 2009 (z =1.29).
  - SAC 42% in 2008 & 47% in 2009 (z=1.42)
  - VLA 36% in 2008 & 38% in 2009 (z=0.73)

However, data has been recorded for a longer period by VLA than by SAC and %DNR in **Q1 and Q2** for the Reproductive Syndrome for VLA shows a statistically significant increase when compared with pooled data for 5 prior years.

- VLA DNR in 35% of 5,425 sub<sup>n</sup> 2004-08, 40% of 976 sub<sup>n</sup> 2009 (z=2.88)  
There was a similar increase in %DNR for submissions with clinical sign “abortion”.
- VLA DNR in 34% of 5,243 sub<sup>n</sup> 2004-08, 38% in 938 sub<sup>n</sup> 2009 (z=2.33)

There has been no significant change in the proportion of all Q1 & Q2 submissions to VLA which have principal clinical sign “abortion” between 2009 and prior years.

There have been no marked changes in the proportions of diagnoses reached for reproductive syndromes to VLA in Q1 & Q2 between prior years and 2009.

The changes in % DNR for the reproductive syndrome across years for VLA are shown in Figure 13 and the percentage of submissions with clinical sign “abortion” in Figure 14.

Figure 13

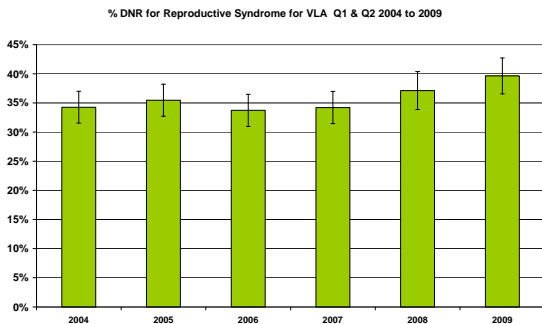


Figure 14



**Systemic and Miscellaneous Syndrome**

% DNR for SAC submissions allocated to this syndrome has shown a statistically significant increase between Q2 2008 and Q2 2009. There is no significant change for VLA submissions or for GB submissions.

- GB DNR in 13% of 362 sub<sup>n</sup> in 2008, 16% of 303 sub<sup>n</sup> in 2009 (z=1.04)
  - SAC 9% in 2008 & 18% in 2009 (z=2.35)
  - VLA 16% in 2008 & 14% in 2009 (z=-0.73)

For undiagnosed SAC submissions in this syndrome:-

- The predominant presenting sign was “found dead”
- Affected age groups included adult, preweaned and neonatal with no age group predominating.
- The increase in % DNR was associated with hill sheep (with %DNR for lowland sheep being similar in the two years)

- Affected sheep were predominantly outdoors, where housing status was known.
- % DNR had increased more for carcase submissions, with non-carcase submissions showing a smaller increase which was not statistically significant

However, differences in %DNR between categories must be interpreted with caution as numbers of submissions in each category are often small.

Cumulative results for Q1 and Q2 did not show a statistically significant increase in %DNR between 2008 and 2009 for GB or for VLA or SAC.

As the numbers of undiagnosed SAC submissions for this syndrome were relatively small in Q2, it is not thought that the increase in %DNR is likely to be an indicator of new and emerging disease but data will be closely monitored in coming quarters.

### **Early Detection Surveillance (EDS) Model**

EDS did not indicate a significant change in number of DNR submissions for any body system in any month in Q2 2008.

### **GOATS**

During Q2 2008, the change in percentage of caprine diagnostic submissions where a diagnosis was not reached (DNR) was not statistically significant.

GB 24% of 140 sub<sup>n</sup> Q2 2008 & 15% of 114 sub<sup>n</sup> in 2009 (z=-1.73).

- SAC 29% in 2008 & 22% in 2009 (low numbers)
- VLA 23% in 2008 & 14% in 2009 (z=-1.61)

There was no significant change in % DNR for any body system or clinical sign.