



HIGHLIGHTS FOR 2008

Notifiable disease - Samples from two llama herds tested positive for *Mycobacterium bovis*; while samples were received from 17 alpaca herds with suspected infection with nine testing positive for *M. bovis*.

Salmonella

Salmonella typhimurium was isolated from the carcase of an ostrich.

Zoonotic infections

Nematode eggs provisionally identified as a *Baylisascaris* species were found in the faeces of Common Striped Skunks (*Mephitis mephitis*) kept in a small zoo.

Yersiniosis was diagnosed in animals from several zoological collections.

Endemic, new emerging disease

- Demodex was diagnosed in South American camelids for the first time in the UK, in skin scrapes from an adult llama. Harvest mites and chewing lice have also been reported for the first time on camelids in 2008.
- Endoparasites have been a major feature of many camelid submissions especially liver fluke which can cause fatal disease and has been reported with concurrent severe endocarditis. Parasitic gastroenteritis has also been diagnosed including detection of particular pathogens including *Bunostomum* sp., *Camelostrongylus* sp., *Trichuris* sp. as well as *Haemonchus*, Trichostrongyles and *Nematodirus*.
- Farmed deer and bison were particularly affected by parasitic gastroenteritis, lungworm, Johne's disease, copper deficiency and Malignant Catarrhal Fever (MCF).

SUBMISSION INFORMATION

| Submission numbers | 2008 | 2007 | 2006 | 2005 | 2004 | 2003 |
|-------------------------|--------------|-------------|--------------|-------------|-------------|-------------|
| All species (carcasses) | 1789 (544) | 1476 (443) | 1517 (475) | 991 (344) | 1054 (338) | 805 (306) |
| Alpaca [% of all Sub] | 821 (163) 46 | 627 (90) 42 | 489 (100) 32 | 418 (74) 42 | 355 (48) 34 | 243 (42) 30 |
| Llama | 92 (16) | 87 (37) | 80 (28) | 60 (11) | 49 (9) | 26 (2) |
| Deer | 115 (40) | 74 (28) | 90 (40) | 58 (25) | 63 (28) | 30 (15) |
| Other | 761 | 688 | 858 | 697 | 587 | 506 |

| Submission numbers | 2008 Q1 | 2007 Q1 | 2008 Q2 | 2007 Q2 | 2008 Q3 | 2007 Q3 |
|-------------------------|------------|------------|------------|------------|------------|------------|
| All species (carcasses) | 431 (126) | 315 (97) | 410 (122) | 384 (96) | 506 (163) | 322 (115) |
| Alpaca | 195 (32) | 126 (16) | 176 (40) | 176 (32) | 241 (48) | 128 (18) |
| Llama | 24 (2) | 16 (2) | 20 (5) | 13 (0) | 16 (3) | 15 (4) |
| Deer | 30 (11) | 26 (9) | 46 (16) | 33 (7) | 43 (16) | 16 (8) |

1. Notifiable diseases

TUBERCULOSIS

In this quarter, *Mycobacterium bovis* infection was confirmed in three alpaca herds in the South West of England, including the first diagnosis of this infection in Cornish alpacas. In all three cases, clinical disease and pathology affected the respiratory tract. TB caused by *Mycobacterium microti* was also confirmed, in an 18-head alpaca herd that had no new stock since four years previously. A two-year-old female had lethargy and dyspnoea for 2 weeks, was found to have miliary radio-opaque lesions in the lungs by radiography of thorax, and was submitted for necropsy. Typical lesions were demonstrated in lungs, liver, spleen, and lymph nodes, including tracheobronchial, mediastinal and hepatic.

In 2008 samples were received from three llama herds of which two were positive for *M. bovis* and one for *M. avium*; while there have been samples from 17 alpaca herds with 9 testing positive for *M. bovis* and one for *M. microti*.

Since 1999 *Mycobacterium microti* infection has been diagnosed in alpacas from five herds including one in 2008 (*q.v.*), and in one llama herd. Since 1999 *Mycobacterium bovis* has been cultured from samples from 16 herds of alpacas, including nine in 2008; and from 12 farms with llamas including two in 2008. As of June 2007, there were 422 holdings with camelids registered with Animal Health in Great Britain. Since the first report in Great Britain in 1999 tuberculosis in camelids has become an increasingly recognized cause of none specific signs including wasting, loss of appetite, respiratory distress and sudden death. All cases of *M. bovis* infection diagnosed in camelids since 1999 have arisen in counties of England and Wales with a recognised high incidence of bovine TB.

In 2008 *M. bovis* was cultured from samples from farmed deer including two red and one fallow deer and *M. avium* from two red deer. *Mycobacterium kansasii* was isolated from one Bongo antelope and *M. avium* from a kangaroo, both in zoo collections.

2. Zoonotic Diseases

| Data for this quarter | Number of submissions | Species |
|------------------------------------|-----------------------|---|
| Baylisascaris | 1 | Skunk |
| Cryptosporidiosis | 2 | Alpaca |
| <i>Yersinia pseudotuberculosis</i> | 6 | Blackbuck, Corncrake, kangaroo, Touraco (Violet and red), Water buffalo |

A number of zoonotic conditions were diagnosed this quarter. For further information see the FZ2100 project summary reports on the VLA website http://www.defra.gov.uk/vla/reports/rep_surv_zoonoses.htm.

Baylisascaris

A visit was carried out after nematode eggs provisionally identified as a *Baylisascaris* species were found in the faeces of Common Striped Skunks (*Mephitis mephitis*) kept in a small zoo. *Baylisascaris* has been responsible for outbreaks of neural larva migrans in zoo animals. It is also a recognised zoonosis in some parts of the world. Most literature concerns the racoon species *Baylisascaris procyonis*, but the skunk species *B. columnaris* is also pathogenic. The disease syndromes caused are visceral larva migrans, ocular larva migrans and neural larva migrans. The disease is rare in humans, but can cause severe and even fatal nervous signs e.g. encephalitis, most commonly in young children. During the visit the zoonotic potential of this parasite was discussed, as was the management of the skunks and two marsh mongooses (*Atilax paludinosus*), which had been moved into an aviary originally occupied by the skunks. Faeces samples were taken from the skunks, raccoons (*Procyon lotor*) and marsh mongooses. No worm eggs were identified in either the raccoon or mongoose faeces, but eggs typical of *Baylisascaris* species were identified in the skunk faeces. Advice was given on the management of the zoonotic risk and the risk of larva migrans to other animals in the zoo.

Yersiniosis

Yersinia pseudotuberculosis was isolated in septicaemic distribution in a ten-week-old Violaceous Touraco (*Musophaga violacea*), which died following a short period of lethargy and fluffing up of feathers, and from the liver of a five-month-old Red Crested Touraco (*Tauraco erythrolophus*), found in a collapsed state at the same zoological collection. In both cases, there was hepatomegaly with multifocal creamy white foci present throughout the liver.

One of a group of three captive six-month-old corncrakes (*Crex crex*) was found dead. Congestion of the nasal mucosa with dark red solid lungs and dark red kidneys were seen at post mortem examination. *Yersinia pseudotuberculosis* was isolated from the liver, lung and nasal mucosa suggesting a septicaemia due to this organism. It is not uncommon to see this condition in outdoor aviaries during the winter period and may relate to contact with rodents. Appropriate advice was given because of the potential for zoonotic transmission.

An adult female blackbuck (*Antelope cervicapra*) was euthanased and submitted for post mortem examination after a 24 hour period of inco-ordination and difficulty standing. It was also reported to be straining. There was severe diarrhoea, with very watery faeces. *Yersinia enterocolitica* was recovered from caecal contents. This organism is recognised as a cause of scour in captive antelopes. No cause for the inco-ordination was found – there was no evidence of clostridial enterotoxaemia and histopathology of brain demonstrated only age-related changes.

Yersinia pseudotuberculosis infection was diagnosed in two of three, five month old water buffalos that had severe diarrhoea. Necropsy of the first one indicated

parasitic gastro-enteritis. All others in this group of 14 were then treated with an avermectin but one other died and a third was euthanased when it became recumbent. *Yersinia pseudotuberculosis* was cultured from the intestinal tract of both carcasses and from two further faeces samples from diarrhoeic animals presented at the same time. It is possible that debility caused by parasitic gastro-enteritis allowed this infection to become established. There was extensive sloughing of the mucosa of the small intestine and severe congestion of the mucosa of small and large intestine, and of the ileo-caeco colic junction in the third carcass. There were also pin-point ulcers in the caecum. Further investigations are under way including identification of the nematode parasites in the first buffalo to be necropsied. At a farm visit, environmental faeces samples were positive for *Y. pseudotuberculosis*.

Avian tuberculosis

A Lady Ross Touraco (*Musophaga rossae*) was presented from a local zoological collection after a period of wasting and malaise. Gross lesions included hepatomegaly and multifocal foci throughout the liver, spleen, kidneys and air sacs. Microscopic examination of a Ziehl Neelson stained impression smear of spleen detected numerous slender acidfast bacteria consistent with avian tuberculosis. This pathogen has zoonotic potential in immunocompromised people and the environment may become heavily contaminated once an infected animal is in the aviary.

3. Food safety and water buffalo with ergot poisoning

Ergot poisoning was suspected in a herd of water buffalo following the submission of four carcasses that had shown ill-thrift. The initial two animals presented for post-mortem had only minor abrasions on the skin of the fetlocks and it was thought likely that profound hyposelenaemia (identified earlier from blood screening of cohorts) and poor nutrition were the main problem. However, ergot poisoning was thought to be further complicating the clinical picture when some animals developed curling of the ear tips and tail-tip necrosis and two further carcasses were submitted. Again, these animals did not show the classic lesions of gangrene seen particularly in the hind legs (ergot typically causes a diminished blood supply to the extremities but can also be associated with gastro-intestinal irritation) but ulceration was noted in the abomasum and small intestine. One of the animals had slightly curling ear tips.

Ergot was found in a bag of silage submitted at the same time. It was thought likely that problems on this farm were due to a combination of hyposelenaemia and ergot toxicity. Grass silage had been fed to the animals since housing. The grass had been cut late in the year and had seeded. The farmer stopped feeding the silage and commented that the condition of the animals had improved (selenium supplementation had also been undertaken). It was recommended that the affected silage not be fed and the field from which the silage had been cut is likely to have ergot next year if conditions are similar and recommendations to prevent this include deep ploughing of affected land.

The food chain was protected because the herd consisted of rearing animals only. Ergot poisoning from silage feeding has been reported previously in cattle (Hogg RA, (1991) Poisoning of cattle fed ergotised silage. *Veterinary Record* 129, 313-314) and practitioners should be alert if gangrenous lesions are seen on the fetlocks (particularly hind legs), ear and tail tips. The wet summer and late cutting of grass for silage are likely to have been predisposing factors in this outbreak.

4. Endemic New and Emerging Disease - Camelids

PARASITIC DISEASES

Coccidia were demonstrated in faeces samples on three occasions, with coccidial oocyst counts of 43,050 (unspeciated coccidia), 5,700 *Eimeria macusaniensis*, and 2,350 oocysts (unspeciated coccidia) per gram of faeces. The latter case was a three year old alpaca with a history of ill thrift, which also had a moderate worm egg count.

Cryptosporidia were identified in two alpaca crias, both with a history of diarrhoea.

Parasitic gastroenteritis was diagnosed in a three year old female alpaca following a period of weight loss and intermittent diarrhoea for two months. 8,400 *Camelostrongylus*-type worms were identified in the lumen of the C3 stomach compartment, and 8,800 *Trichostrongylus*-type worms within the small intestine. Infection was associated with ulceration of the stomach wall.

Anthelmintic resistance was suspected in a case of haemonchosis affecting a two-year old alpaca. It had a two month history of ill-thrift and anaemia which failed to respond to supportive treatment and anthelmintic therapy. On post mortem examination, there was extensive subcutaneous oedema and mucous membranes were pale. There was also serosal oedema over much of the gastrointestinal tract and free fluid in the abdominal cavity. A total worm count on the C3 stomach compartment detected 2,700 *Haemonchus contortus*. The animal had been wormed with fenbendazole twice in the previous four weeks, including four days immediately preceding death with little change in faecal egg counts before and after worming on that occasion. This was strongly suggestive of benzimidazole resistance, which is not uncommon with *H. contortus* in other animal species.

There were 14 reports of fasciolosis in both alpacas and llamas, most of which were confirmed by post mortem examination. A variety of clinical signs were reported, including sudden death, poor condition, malaise, increased respiratory rate, pale mucous membranes, recumbency, diarrhoea, and reduced milk production. Pathological observations that were common to many of these included ascites, increased pericardial and pleural fluid, and the liver, as well as containing fluke parasites, often had abscesses and parasite migratory tracts. In one case, *Bibersteinia trehalosi* was also cultured from congested lung tissue. In one herd, the death of an adult alpaca occurred five weeks after treatment for liver fluke. The cause of death was severe peritonitis, which was believed to have been a sequel to parasite death (there was evidence of severe infestation) causing an inflammatory reaction with multiple abscess development, one of which had ruptured into the peritoneal cavity.

SEPTICAEMIA IN CRIAS

E. coli septicaemia was diagnosed in a neonatal cria which had been neglected by its dam. It died at two days of age. Post mortem findings included generalised congestion and enlargement of lymph nodes. *E. coli* was isolated in pure growth from lung, liver and meninges.

Septicaemia was also suspected in a five-week-old imported alpaca that had been in poor body condition and deteriorated dramatically over two weeks. It was euthanased when it did not improve following fluid and antibiotic treatment. Post mortem findings included mild to moderate effusions of serous fluid with fibrin clots into the pleural and pericardial cavity, a localised epicarditis, and the cortices of the kidneys were very pale with white miliary foci present. Histopathology confirmed the presence of a severe chronic tubulointerstitial glomerulonephritis. Unfortunately, it was not possible to identify a primary aetiology due to the chronic nature of disease.

A similar problem was seen in a six-week old alpaca cria, which had a short history of dullness and abdominal discomfort. At post mortem examination the kidneys were pale and aqueous humour urea was high, indicative of uraemia. However the precise cause of renal failure was not determined.

A two-month-old cria died following illness characterised by mainly neurological signs, including stargazing, ataxia, recumbency and hyperaesthesia. There had been an initial good response to antibiotic treatment. At post-mortem examination, a bacteraemic process was suspected. Lesions included a large abscess in the cranial lung and right cerebral hemisphere, with cloudy meninges. A second cria, which had been a poor feeder from birth, also died after a period of ill thrift. The second cria had a large abscess in the abdominal cavity associated with *Arcanobacterium pyogenes* infection.

NEOPLASIA

Lymphosarcoma, the most common neoplastic disease of South American camelids, was diagnosed in an alpaca cria which died after a 3-4 week history of intermittent pyrexia and respiratory signs. At necropsy there were numerous white foci in the liver and spleen, up to 4mm in diameter, generalised lymphadenopathy, heavy fluid-filled lungs, and a fibrinous exudate in the peritoneum and pericardial sac. Diagnosis was confirmed on histopathology.

An unusual tumour was seen in a yearling alpaca, which was euthanased following an episode of dyspnoea with reluctance to rise. At post mortem examination, the lung changes were surprisingly restricted to moderate congestion and oedema. However, multiple organs including kidneys (see Figure), liver, stomach C3 compartment, gingiva and pleura contained numerous tumours. These were variably sized and were homogenous cream-coloured circular or semi-circular in shape with a rubber-like consistency. Histopathology demonstrated a neoplastic cell typical of that seen in tumours of a neuroendocrine cellular origin. Examples of tissues containing such cells include the pancreatic islets, adrenal medulla and various cells of the Amine Precursor Uptake And Decarboxylation (APUD) series present in gastric and intestinal mucosa.



RESPIRATORY DISEASES

A five-month old alpaca was euthanased following loss of body condition with recurrent bouts of pneumonia over the previous few months, despite antibiotic treatment. Post mortem findings included cranial pulmonary consolidation and abscessation, with pleural and pericardial adhesions. *Arcanobacterium pyogenes* and *Mannheimia varigena* were isolated from the lungs; however, in this case the persistent and unresponsive pneumonia was considered to have been secondary to BVD virus type 1 infection which was confirmed by PCR examination of the spleen. There was no known contact between this herd and other BVD cases in camelid herds previously identified by VLA.

Tissues were received from a three-month-old alpaca with signs of acute onset diarrhoea, collapse and death. The private veterinary surgeon who undertook the necropsy described necrotic lesions at the lip margins, purple jejunum and lung abscessation. Histological examination of the lung detected mycotic bronchiolitis.

SKIN DISEASE

Demodex was diagnosed in South American camelids for the first time in the UK, in skin scrapes from an adult llama. Multiple skin nodules on the nose were an incidental finding at necropsy. Demodicosis has previously been described in New Zealand alpacas and North American llamas. Its clinical significance is currently unclear.

A four-year-old alpaca died after deteriorating with chronic sarcoptic mange, associated with large areas of thickened skin, crusting and alopecia in the ventral abdomen, inguinal and axillary areas. Concurrent haemonchosis was also confirmed at post mortem examination. Up to five other adults were similarly affected in a group of 25. The severe nature of skin disease is similar to that reported in another British herd (Twomey, D.F., Birch, E.S. and Schock, A. (2009) Outbreak of sarcoptic mange in alpacas (*Vicugna pacos*) and control with repeated subcutaneous ivermectin injections. *Veterinary Parasitology* (2009) **159**, 186-191).

An adult female alpaca with chronic mite dermatitis was submitted after unexpectedly being found dead. No diagnosis however was possible following gross pathology and wide-ranging tissue histopathology.

Two alpacas from a herd of 25 presented with pruritus, scaling and exudative dermatitis of the distal limbs. *Chorioptes* mites were demonstrated in a hair pluck. This clinical presentation is typical of *C. bovis* in South American camelids.

MISCELLANEOUS DISEASES

In addition to the case of gastric ulceration associated with parasitic gastroenteritis described above, there were two other cases in adult alpacas, not ascribed to parasitic diseases.

A dosing gun injury was considered to be the most likely cause of an infected pharyngeal lesion, affecting a 3½-month-old alpaca with ill-thrift.

Diaphragmatic paralysis was considered to be the cause of paradoxical abdominal breathing based on clinical examination, including fluoroscopy, in a ten-week-old alpaca cria. The cria had been referred in respiratory distress and was euthanased following a grave prognosis. The absence of obvious gross pathological findings was consistent with a diagnosis of diaphragmatic paralysis. The possibility of phrenic nerve degeneration was considered, but microscopic lesions were not detected by histopathology. However, this does not exclude the possibility of more subtle lesions (which might be visible on electron microscopy) or the possibility of lesions in other sections of the phrenic nerve not examined.

A farm visit was undertaken to extend an investigation into enteritis and acute deaths affecting adult and juvenile alpacas. A series of alpaca losses was investigated on the farm that had >100 alpacas (including adults and crias). From a group of approximately 100 alpacas there had been five cria deaths, three adult deaths, five adults with diarrhoea, and three adults with severe anaemia and ataxia, between late September and late November 2008. At post mortem examination, several cases had enteritis affecting the mid to distal small intestine. Laboratory findings were variable: *Eimeria macusaniensis*, cryptosporidiosis, *Clostridium perfringens* alpha toxin, parasitic gastro-enteritis and hypocupraemia have all been confirmed. Histological examination of intestine was often compromised by autolysis, but included mucosal congestion and haemorrhage with villus blunting and stunting. Multiple factors were concluded to have caused the deaths of these alpacas with overstocking likely to have been contributory.

A 7kg 2½-week-old cria was submitted with a history of weight loss over the previous week and a bout of diarrhoea and pyrexia in the last two days of life. It had been treated with antibiotics and intravenous fluids for dehydration but refused bottle milk. On post mortem examination it had significantly depleted adipose tissue reserves. The stomach lumen was impacted by a solid mass of white contour feathers and the cranial duodenum was similarly obstructed. The origin of the feathers was unknown but may have been from bedding material or insulation.

A seven-month-old alpaca had been inappetent for approximately one week and had lost weight. A heart murmur was detected on auscultation and the animal died in spite of supportive treatment. There were few specific post mortem findings and no cardiac pathology detected. Erosions in C3, enlargement of the adrenal glands and the small size of spleen and thymus were all indicators of a chronic disease process. The urea level in the vitreous humour of the eye was markedly elevated to 74mmol/l (serum reference range: 3.9-10.2mmol/l), consistent with kidney disease and histopathology is being carried out to try to identify potential aetiologies.

A nine-year-old llama was submitted after it had shown malaise and ventral oedema. Post mortem findings included a large volume of peritoneal fluid, pale irregular liver lesions, the heart was large and flabby, and much of the aorta was hard and inflexible. Histopathology showed severe aortic mineralisation with a secondary hepatopathy. The exact aetiopathogenesis of the mineralisation could not be determined.

5. Endemic New and Emerging Disease - Zoological Collections

Ungulates

Parasitic disease

A nine-month-old female Arabian oryx (*Oryx leucoryx*) had a three week history of diarrhoea leading to marked weight loss and collapse. There was no history of anthelmintic treatment. A faecal worm egg count revealed 1,350 *Trichuris* spp. eggs, 2,550 Trichostrongyle type eggs and 2,000 coccidial oocysts per gram. Treatment and improved husbandry were recommended.

A five-month-old Burchell's zebra (*Equus quagga burchellii*) stallion was found looking uncomfortable and bloated in the morning. He deteriorated rapidly and abdominocentesis revealed much red, clear fluid in the abdomen. He died that evening. Post mortem examination revealed several *Parascaris equorum* in the stomach and 525 *P. equorum* in the jejunum. One dead worm was found in the caecum. There was also a small, mid-jejunal perforation. A worm egg count revealed 800 *Trichostrongyle*-type eggs per gram and 6,250 *P. equorum* epg. The findings were consistent with peritonitis, and it was likely the very heavy worm burden affected gut motility.

Severe lungworm infestation was diagnosed in eland (*Taurotragus oryx*) in a zoological collection. One animal was 8 weeks old and presented with vague malaise. The second was 13 weeks old, and shallow breathing had been noted. In both cases, large numbers of *Dictyocaulus* sp. worms were found in the trachea and bronchi. In-feed anthelmintic treatment had been administered to the group. It was thought that the juveniles may have been unable to obtain sufficient feed to ensure adequate dosing.

Bacterial disease

A two-week-old female scimitar horned oryx (*Oryx dammah*) calf was submitted having been found dead. There was pleuropneumonia, pericarditis and peritonitis with a fibrin clot covering the left lung and diffuse fibrinous exudate over the heart, with adhesion to the pericardium. Routine cultures failed to recover any likely pathogens, but histopathology suggested a clostridial organism as the cause. Fluorescent antibody tests on sections of fixed heart showed positive fluorescence for *Clostridium chauvoei*, confirming the cause of the necrotising myocarditis.

A two-year-old male blackbuck (*Antilope cervicapra*) was lame on the rear right leg. It was sedated for examination and an open wound with swelling of the surrounding tissue was found. The following day the animal was unable to stand and died. An extensive cellulitis of the right quadriceps was found at post mortem that was characterised by ecchymotic haemorrhages, emphysema and oedema. The affected muscle was positive by FAT for *Clostridium chauvoei*.

Neoplasia

A 16½-year-old female eland (*Taurotragus oryx*) was found dead in its paddock without premonitory signs of illness. The most significant finding at post mortem was a large multi-lobular mass (1.6kg) surrounding the heart. The mass was gelatinous in consistency and appeared to arise from both the epicardium around the base of the heart and the pericardium. Excess fluid was present within the pericardial sac and free in the thoracic cavity. The lungs were diffusely congested. Histopathological findings were suggestive of a myxoma/ myxosarcoma, albeit in an unusual location. In humans and other ruminants, benign myxomas are more commonly seen in the endocardium. The size of the lesion in this case and its histological features are more suggestive of myxosarcoma. Further differentiation would require staining for cell surface markers by immunohistochemistry.

An adult female nilgai antelope (*Boselaphus tragocamelus*) had been losing condition for a period of time despite selective feeding. On post mortem examination, a large solid mass (20cm x 12cm diameter) was present in the pelvic inlet, which appeared to originate in the wall of the ileum. The latter had formed a tortuous, sacculated and partially obstructed channel through the mass and there was necrosis and perforation of the wall. There were many smaller mural masses along the remainder of the ileum as far as the caecal junction. The gross and histopathological features of the lesions were consistent with a severe neoplasia originating from the ileum and spreading to the lymph nodes. Lack of cytokeratin staining of neoplastic cells in the ileum together with the histopathological appearance ruled out intestinal adenocarcinoma. Some carcinoids/ neuroendocrine neoplasms have been reported to be cytokeratin positive, but labelling with neuron specific enolase would be necessary to further investigate this. As this diagnosis would be quite rare, the most likely cell type of origin for this tumour is lymphoid cells from the Peyer's patches of the ileum. The final diagnosis was therefore malignant lymphoma of intestinal origin.

Felids

A seven-month-old male white Ongoshi lion (*Panthera leo*) cub was submitted after it died following a two day illness. The clinical signs included lethargy, dysentery and blood stained urine with progression to recumbency and death. At post mortem, it had pale mucous membranes and blood stained fur around the perineum and tail. The most significant finding was purulent peritonitis with mesenteric lymphadenopathy. There were foci of necrosis in the liver and some fibrinous exudate in the pleural cavity. The gastric mucosa was erythematous and numerous *Toxocara leonina* were detected in the lumen. *E. coli* was isolated in pure culture from liver, spleen, peritoneum and pleura and presumably was the cause of peritonitis and septicaemia in this cub. The heavy endoparasitic burden may have contributed to the aetiology.

Birds

A Blue Fronted Amazon parrot (*Amazona aestiva*) was recovered after escaping from a zoological collection; on its return, four ticks were present on the bird's head. The ticks were removed but the bird died a few days later. Post mortem examination revealed evidence of severe subcutaneous haemorrhage and oedema of the head, particularly around the right eye. These gross findings raise the possibility that the

cause of death of this bird was severe reaction to the tick bites (so-called tick toxicity), which has been reported in psittacines and birds of prey.

Reference: Forbes, N.A. and Simpson, G.N. (1993). Pathogenicity of ticks on aviary birds. *Veterinary Record* 133, 532.

6. Endemic New and Emerging Disease – Deer & Bison

Fallow deer - systemic disease

Bloods and several faeces were submitted from farmed fallow deer where the culling rate of breeding does due to poor condition had increased over the previous 24 months and carcasses of 18 month old finishers were generally leaner than expected. Analysis of fresh liver revealed very low copper concentrations, supporting hypocupraemia as the likely cause of poor condition.

Reindeer

Enteric Diseases

The diet of a group of six reindeers was abruptly changed from reindeer pellets to goat pellets and maize. The two dominant (one 12 year old and her calf, 6 months old) animals were found very dull and depressed. Ruminal acidosis was diagnosed with the ruminal pH reaching as low as 4.4, and blood pH was 6.9.

A 2½-year-old male reindeer (*Rangifer tarandus*) was presented for post mortem with a short history of weight loss. The carcass was emaciated with serous atrophy of all fat reserves. Histopathology revealed severe, peracute, zonal to massive necrotising hepatopathy; suppurative tubulointerstitial nephritis with mild nephrocalcinosis; and fibrinonecrotising lymphadenitis. After extensive testing for infectious and parasitic agents no specific aetiology could be attributed to the necrotising hepatopathy or ill-thrift.

An 18-month-old male reindeer that died shortly after it was discovered in a recumbent state was submitted for post-mortem investigation. The animal was in a poor body condition. The most marked findings were in the lungs which were dark red/purple in colour and oedematous with widespread pinpoint haemorrhages and ecchymoses. The mucosa of the abomasum was thickened with a multi-nodular profile, and a total worm count revealed 18,900 *Ostertagia leptospicularis*. In a study by A. Stien *et al.* (*Journal of Animal Ecology* 2002; 71: 937-45), it was demonstrated that *Ostertagia gruehneri* had a negative effect on body condition and fecundity in Svalbard reindeer. The *Ostertagia* parasites may therefore explain the poor condition of the animal. Histology revealed large numbers of lungworm larvae with an associated inflammatory response in sections of the lung.

Bison and Malignant Catarrhal Fever (MCF)

The carcass of one 2½-year-old home-bred bison heifer was submitted for post-mortem examination after it died, following a short illness featuring malaise, depression and a mucopurulent discharge from the nose. This animal was one of a commercial herd of approximately 21 bison on a mixed livestock unit. Previous bison had been submitted and diagnosed with MCF. Infection with ovine herpesvirus 2 (OvHV-2) was suspected to have arisen from the nearby flock of sheep on the farm. Gross post-mortem findings were severe in many organs, reflecting the systemic

vasculitis caused by this virus, to which bison appear particularly susceptible. OvHV-2 DNA was detected in spleen by PCR, confirming the diagnosis of MCF.

Red deer

Severe lungworm infestation was the cause of death of a yearling female red deer. 6/40 had shown signs of gradual weight loss and three had died. Clumps of *Dictyocaulus viviparus* worms were present in the mouth, pharynx, trachea and bronchi. The unit is run organically. This case illustrates the importance of monitoring for parasitic conditions on organic units, so that treatment can be instigated before losses occur.

Articles/papers published

1. Barnett JEF, Preston GD, Steele LM, Gibbons LM, Scholes SFE, Schock A, Higgins RJ. (2008) Parasite-induced leucomyelopathy in llamas (*Lama glama*). *Veterinary Record* 163 (17) 516-517.

This case was briefly reported to the British Veterinary Camelid Society meeting autumn 2007.

2. Twomey DF, Boon JD, Hume MJ, Schock A, Wood R. (2008) Concurrent coccidiosis and listeriosis in a Bennetts' wallaby (*Macropus rufogriseus*). *Veterinary Record* 163 (21) 635-636.
3. Twomey DF, Birch ES, Schock A. (2009) Outbreak of sarcoptic mange in alpacas (*Vicugna pacos*) and control with repeated subcutaneous ivermectin injections. *Veterinary Parasitology* (2009) 159, 186-191.

This study describes the potential for mange to lead to death in some alpacas and highlights the risk to owners of zoonotic spread.