



HIGHLIGHTS for the Quarter and 2009

Notifiable disease

In 2008 an increase in the number of alpaca and llama herds diagnosed with TB was observed, compared with previous years, and in 2009 this trend has continued with fourteen alpaca herds affected.

Zoonotic infections

- ◆ In 2009 yersiniosis was diagnosed for the first time in the UK in two separate Buffalo herds with calves showing signs of diarrhoea, ill thrift and death. Yersinia infection was also diagnosed in farmed red deer and reindeer, and in samples from zoological collections from a Blackbuck, a Gouldian Finch, Mara, Sitatunga, and Waterbuck.
- ◆ A large red deer herd had major calf losses in 2008 associated with cryptosporidiosis. In 2009 large numbers of calves were also lost with the same condition. There was no zoonotic spread. A farm visit was carried out to advise on a control program with particular regard to avoiding contaminated ground used for calving hinds.
- ◆ Also in 2009 an outbreak of *Campylobacter fetus fetus* infection was investigated in an alpaca herd with an abortion problem, this is considered to be the first report of such infection in the UK.
- ◆ In none of these outbreaks was human infection reported and the possible risks of zoonotic spread, albeit low for *Yersinia* and *Campylobacter*, was mentioned to the submitting practices.

Endemic, new & emerging diseases

- ◆ A survey of gut parasites of alpacas and llamas was carried out by VLA Winchester in 2008-2009 and revealed *Camelostrongylus* sp, *Haemonchus* sp, *Ostertagia/Teladorsagia* sp, *Trichostrongylus axei*, *Trichostrongylus colubriformis*, *Trichostrongylus* sp, *Nematodirus battus*, *Nematodirus* sp, *Cooperia* sp, *Capillaria* sp, *Trichuris tenuis* and *Trichuris ovis*. The survey confirmed that nematode worms are common in camelids submitted to the VLA, including some that cause disease in farmed ruminant livestock. In at least 11/28 of those submissions, parasitic gastroenteritis was considered to have contributed substantially to the death of the animal confirming that intestinal parasitism is a significant cause of mortality in VLA submissions.

- ◆ In 2008 a rise in the number of **reindeer** submissions was observed compared with previous years and the number of submissions in 2009 was similar to 2008. The most common diagnoses included parasitic gastroenteritis and Malignant Catarrhal Fever (MCF), both of which were associated with death. In several submissions it was apparent that inappropriate diets were fed. These issues were highlighted in an article published in the Smallholder magazine December 2009, by Aiden Foster.
- ◆ A number of **North American bison** submissions led to diagnoses of copper deficiency and death due to MCF. Susceptible species such as bison and reindeer should be kept well away from sheep the natural host for Ov-VH2 – the cause of MCF.

Submission numbers

The numbers refer to diagnostic and monitoring samples

Submission numbers annual	2009	2008	2007	2006	2005	2004	2003
All species (carcasses)	1886 (516)	1789 (544)	1476 (443)	1517 (475)	991 (344)	1054 (338)	805 (306)
All birds	240 (121)	269 (145)	266 (160)	364 (144)	131 (76)	157 (104)	157 (114)
Alpaca	997 (187)	821 (163)	628 (90)	489 (100)	401 (70)	355 (48)	243 (42)
Llama	73 (13)	92 (16)	87 (37)	80 (28)	60 (11)	49 (9)	26 (2)
Deer	122 (48)	153 (57)	106 (37)	121 (49)	72 (31)	96 (35)	43 (20)
Other	454 (147)	454 (163)	389 (119)	463 (154)	327 (156)	397 (142)	336 (128)

Submission numbers quarterly	2008 Q1	2009 Q1	2008 Q2	2009 Q2	2008 Q3	2009 Q3
All species (carcasses)	431 (126)	436 (106)	410 (122)	485 (135)	506 (163)	401 (126)
Alpaca	195 (32)	227(26)	176 (40)	235 (45)	241 (48)	221(52)
Llama	24 (2)	20 (3)	20 (5)	16 (3)	16 (3)	14 (4)
Deer	30 (11)	33 (16)	46 (16)	32 (10)	43 (16)	32 (8)

1. Notifiable Diseases

TUBERCULOSIS

From January to the end of December 2009, *Mycobacterium bovis* has been isolated from fourteen alpaca herds, including two with infection initially detected in 2008. There were two submissions in which *M. microti* and a single submission in which *M. avium* were isolated from alpacas.

2. Zoonotic Diseases

Yersiniosis

A four-week-old **blackbuck** (*Antelope cervicapra*) fawn was submitted from a zoological collection having been found dead with no premonitory signs. At postmortem examination, there were some signs of trauma to the head as well as several 1mm diameter white foci scattered throughout the liver parenchyma. The mesenteric lymph nodes were prominent and some contained foci of coagulated/inspissated pus. A ZN smear did not detect mycobacterial organisms but lesions and Gram-negative coccobacilli typical of *Yersinia pseudotuberculosis* were found by histopathology. This organism was also cultured from the large intestine. *Yersinia pseudotuberculosis* is a common cause of enteritis, lymphadenitis and multifocal hepatitis within exotic species and is often associated with adverse weather conditions, stress, changes in feeding practice and endoparasitism, with infection more often noted in the colder winter months. A range of severity of

disease can be seen, from sudden death through to a chronic enterocolitis. The head trauma may have been the ultimate cause of death in a weakened animal or may have been a stressor that contributed to the effects of yersiniosis.

Yersiniosis was diagnosed in a four-month-old **Water Buffalo** calf, one of a group of housed water buffalo in which individual calves appeared to be chronically wasting with diarrhoea. *Yersinia pseudotuberculosis* was isolated in association with typical histopathological findings. In other species, this condition can be seen in immune-compromised animals, or where there is heavy environmental contamination with wild bird or rodent faeces, or in association with parasitic gastroenteritis. This is the second case of Yersiniosis in buffalo reported by the VLA in 2009; infection has also been reported in Brazil and Australia. Yersiniosis should be considered as a possible cause of diarrhoea in buffalo calves.

Martins CHG *et al.* (1998) Characteristics of *Yersinia pseudotuberculosis* isolated from animals in Brazil. *Journal of Applied Microbiology* 85, 703-7.

Hum S *et al.* (1997) Enteritis associated with *Yersinia pseudotuberculosis* infection in a buffalo. *Australian Veterinary Journal* 75, 95-7.

Toxoplasmosis

A 6-month-old meerkat (*Suricata suricatta*) was submitted from a safari park after a number of sudden deaths of individuals of differing age over a period of 2-3 weeks. On gross examination the animal was in good body condition and showed slight hepatomegaly and moderate splenomegaly with the latter containing multifocal 1mm diameter pale foci. Histological examination of a variety of tissues found non-suppurative myocarditis, necrotic splenitis, interstitial nephritis, interstitial pneumonia and a non-suppurative meningoencephalitis. Immunohistochemistry for *Toxoplasma gondii* on the brain found numerous zoites supporting a diagnosis of systemic toxoplasmosis. This is a recognised problem associated with Meerkats often presenting as sudden death. Sporadic outbreaks of disease have been reported in captive populations in Argentina and Spain (Juan-Sallés *et al.* 1997; Basso *et al.* 2009) and cases also have occurred in zoos in Australasia.

Juan-Sallés C *et al.* (1997) Epizootic Disseminated Toxoplasmosis in Captive Slender-tailed Meerkats (*Suricata suricatta*) *Veterinary Pathology* 34, 1-7.

Basso W *et al.* (2009) Isolation and molecular characterization of *Toxoplasma gondii* from captive slender-tailed meerkats (*Suricata suricatta*) with fatal toxoplasmosis in Argentina. *Veterinary Parasitology* 161, 201–206.

3. Endemic New and Emerging Diseases: South American Camelids

PARASITIC DISEASES

Gastroenteric nematode infection was diagnosed in seven herds. In two of these anaemia was associated with *Haemonchus contortus*. Other clinical signs included weight loss, diarrhoea and death, and nematodes isolated from carcasses included *Ostertagia circumcincta*, *Trichostrongylus* spp, *Nematodirus battus* and *Trichuris vitrinus*. In one twelve week old llama cria, concurrent problems included coccidiosis and gastric ulceration (see below).

Coccidiosis was diagnosed four times, including the llama cria mentioned above. Clinical signs included illthrift, diarrhoea, malaise and death. In one herd, 5/33 cria died and were submitted for necropsy. Coccidia were isolated from three of these, including *Eimeria lamae* and *Eimeria macusaniensis*. In the other two cria, necrotic enteritis was present although coccidia were not identified.

Fasciolosis was confirmed or suspected on six premises, mostly from carcass submissions of adult camelids. The associated clinical signs included poor body condition, pain, malaise, recumbency, and one animal had been found dead with no previous clinical signs. Severe pathological changes

were seen in five cases, including significant blood loss into the peritoneal cavity, which may have contributed to death.

A survey of internal parasites was carried out over 2008-2009. Twenty-eight diagnostic submissions of alpaca and llama carcasses were included. Nematode parasites were identified in 25 of these, including *Camelostrongylus* sp, *Haemonchus* sp, *Ostertagia/Teladorsagia* sp, *Trichostrongylus axei*, *Trichostrongylus colubriformis*, *Trichostrongylus* sp, *Nematodirus battus*, *Nematodirus* sp, *Cooperia* sp, *Capillaria* sp, *Trichuris tenuis* and *Trichuris ovis*. Coccidia were present in several submissions and *E macusaniensis* was identified in five. Liver fluke was diagnosed twice. *Cryptosporidium* sp was seen once. The survey confirmed that nematode worms are common in camelids submitted to the VLA, including some that cause disease in farmed ruminant livestock. In at least 11/28 of those submissions, parasitic gastroenteritis was considered to have contributed substantially to the death of the animal confirming that intestinal parasitism is a significant cause of mortality in VLA submissions.

SEPTICAEMIA AND RELATED DISEASES

Listeriosis was diagnosed four times. In three cases (2 adults and 1 cria) the septicaemic form was seen in animals with poor body condition, suggesting that listeriosis was a terminal event. *Listeria monocytogenes* was also isolated from heart valve lesions in a three month old alpaca, and was suspected of causing left sided heart failure.

Starvation was the cause of death in three alpaca crias from different herds. On one holding, a seven day old cria had not been fed by its own dam and had tried to feed off other females. On another, a hand-reared cria died at four months of age. The third case involved a three month old cria which had been orphaned two months previously, lost body condition, developed diarrhoea and became recumbent shortly prior to death. The diagnosis was confirmed at post mortem examination with minimal normal ingesta present in all three cases.

An adult llama gelding had colic and respiratory distress before it died. Post mortem findings included a ruptured abscess on the body wall near the xiphisternum, purulent peritonitis, fibrinous pericardial effusion and widespread subcutaneous petechial haemorrhages. It was speculated that the abscess was a sequel to penetration of the overlying skin by trekking equipment.

Other bacterial diseases included colisepticaemia in an eight month old alpaca. *E. coli* nephritis (see below), *Staphylococcus xylois* associated cerebral abscess in a six month old alpaca that was blind and recumbent, *Streptococcus bovis* infection in a jaw abscess from an adult alpaca, and clostridial enterotoxaemia in an adult alpaca.

KIDNEY DISEASES

A five-year-old alpaca was submitted for necropsy with suspicion of kidney disease following ultrasound examination. Post mortem examination revealed swollen kidneys, pale cortices, multiple large areas of haemorrhage extending from the surface into the medulla, and localised extensive necrosis of the medulla. Histopathology identified renal papillary necrosis with renal tubular nephrosis and interstitial nephritis. The cause for these renal changes could not be specifically identified.

An eight-year-old female alpaca was submitted with a history of ill-thrift and submandibular oedema prior to death. Post mortem examination revealed large accumulations of peritoneal, thoracic and pericardial fluid. Glomerulonephritis was diagnosed on histopathology. Although the underlying cause could not be determined, it was suggested that deposition of immune complexes as a result of infectious or autoimmune disease was the most likely explanation.

Fixed kidney and a renal swab were submitted from an alpaca of unknown age with severe anaemia. *E. coli* was isolated from the swab and histopathology revealed a severe, chronic active, necrotising and suppurative tubulointerstitial nephritis, characteristic of bacterial infection.

CONGENITAL PROBLEMS

Ventricular septal defect was associated with pulmonary congestion in a male, 18 month old alpaca that died following acute onset of respiratory disease and collapse.

SKIN DISEASES

Skin samples were submitted from alpacas with a history of mange that was unresponsive to moxidectin treatment. Both *Sarcoptes* and *Chorioptes* mites were identified. On histopathological examination, in addition to mites, many yeasts and bacteria were also present. Further investigation is being carried out to establish effective control.

A skin biopsy was submitted from an adult alpaca which had lesions described as 'scabby mouth'. Only one animal from a group of 12 was affected. The cause of scabby mouth in alpacas is unclear. In this case, no viruses were detected by electron microscopy.

A possible *Actinobacillus* sp. was isolated from a three month old alpaca cria, reported as a starvation case above, that had swelling of the upper lip with several pustules.

MISCELLANEOUS

Gastric ulceration (or necrotic gastritis) was diagnosed five times (3 adults and 2 crias). In three cases, C3 ulcers had perforated and resulted in peritonitis and one cria had concurrent gastrointestinal parasitic disease (see above).

Volvulus of the large intestine was diagnosed twice in adult alpacas. Both cases were associated with necrosis of the intestinal wall.

A yearling alpaca with poor growth was submitted for post mortem examination. The main observation was pulmonary consolidation, and a severe, subacute, necrotising and suppurative bronchopneumonia was diagnosed on histopathology. These changes were suggestive of bacterial infection, but no aetiology could be established in this case.

Kyphosis and deformity of the 7th cervical vertebra compromised spinal cord function and caused neurological signs including ataxia and difficulty feeding in a four month old cria. The diagnosis was confirmed by radiography and necropsy. The affected animal was from a different premises to the case of kyphosis mentioned in the previous quarter report.

Hyposelenaemia was identified in an adult alpaca in poor body condition.

4. Endemic New and Emerging Disease - Zoological Collections

Vitamin A deficiency

Vitamin A deficiency is a known cause of nervous disease in young captive lions (*Panthera leo*) and has been recorded on numerous occasions. The lesions produced are variable and depend on the duration and severity of the deficiency, the amount of hepatic vitamin A reserves and the stage of skeletal growth. Increased cerebrospinal fluid pressure is believed to lead to the pathological changes which include severe symmetrical encephalomyelopathy, herniation of the

cerebellar vermis, cerebellar haemorrhages and occasionally syringomelia. Extra neural changes include osteodystrophy of skull bones (thickening of the cranial vault and mandibular bones).

At a UK zoological collection young lions between a few months of age and 2½ years had shown a variety of clinical signs including hindlimb ataxia, head tilt and rolling, often intermittent and very subtle and some for prolonged periods of time (from as young as 4 months of age). Two affected individuals of 1 and 2½ years of age were submitted for post mortem examination and with one showing cerebellar coning and herniation into the foramen magnum on gross examination and in both histological lesions suggestive of vitamin A deficiency were seen. Vitamin A analysis gave a result of 3.1mmol/kg wet matter confirming deficiency. As a group these animals were fed beef with a vitamin supplement but changes in vitamin supplementation occurred when manufacture of the preferred supplement ceased. Unbeknown to the owners the levels of vitamin A in the newer product were much lower and it was felt prolonged deficiency accounted for the clinical presentation and the lesions seen in both of these animals. Corrective action has now been taken to prevent future problems.

5. Endemic, New and Emerging Disease

Deer

Malignant catarrhal fever was diagnosed as the cause of death in single reindeer from two premises. In one case sheep and other domestic species were kept on the same premises and advice was given to prevent further contact between deer and sheep on the farm. In a second case clinical signs and post mortem findings were typical of the disease which is a well recognised cause of mortality in a wide range of ruminants and deer species.

Lungworm (*Dictyocaulus viviparus*) was diagnosed as the cause of death of a four-month-old red deer – red deer are very susceptible to disease.

Bison

A fifteen-year-old female bison that had been found dead was diagnosed with chronic gastritis consistent with chronic parasitic gastroenteritis.

Five adult Bison had died from a group of 16 over a period of several months. The most recently affected animal was 4½ years old and had been purchased in February 2009. It was noticed to be deteriorating in condition but not showing any specific clinical signs. Post mortem findings were suggestive of either pestivirus or MCF. Histological findings were consistent with a diagnosis of MCF with a non-suppurative meningo-encephalitis, moderate interstitial non-suppurative nephritis with vasculitis, multifocal non-suppurative cystitis and multifocal non-suppurative oesophagitis. A BVD PCR was negative and MCF PCR positive confirming a diagnosis of malignant catarrhal fever.

One of a group of 20 adult bison showed gradual loss of condition. Lungworms were noted in the trachea. The liver copper was extremely low compared to levels seen in cattle suggesting copper deficiency was the cause of the weight loss.

Publications

Foyle LK, Fuller HE, Higgins RJ, Russell GC, Willoughby K, Rosie WF, Stidworthy MF, Foster AP (2009) Malignant catarrhal fever in sika deer (*Cervus nippon*) in the UK. *Veterinary Record* 165, 445-7. This study was a joint collaboration with the Moredun Research Institute and a second zoo was identified which led to the collaboration with Dr Stidworthy. Both zoos were grateful for the liaison and publication.