

Disease Surveillance and Investigation Branch

DISEASE SURVEILLANCE REPORT

Northern Ireland Disease Surveillance Report, January to March 2014

- Listerial encephalitis in adult cattle
- Ragwort poisoning in adult cattle
- Oxalate nephrosis in Zwartble ewes and lambs
- Nematodirosis in lambs
- Histomonosis in chickens
- Feline tuberculosis caused by *Mycobacterium bovis*

These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for January to March 2014

CATTLE:

Respiratory diseases

Respiratory disease was identified in 95 cattle post-mortem submissions between January and March 2014. The most common pathogens identified included *Mannheimia haemolytica* (twenty five cases), *Mycoplasma bovis* (twenty four cases), *Pasteurella multocida* (eleven cases), *Histophilus somni* (eight cases) *Trueperella pyogenes* (seven cases) and bovine respiratory syncytial virus (three cases).

Necrotic laryngitis was diagnosed on gross post-mortem examination of a twelve-month-old bull which died after showing apparent nervous signs. There was severe bilateral ulcerative and suppurative laryngitis causing marked narrowing and obstruction of the laryngeal inlet (Figure 1). Such lesions are usually due to infection with *Fusobacterium necrophorum* subsp *necrophorum*.



Figure 1

Bilateral ulcerative and suppurative laryngitis causing marked narrowing and obstruction of the laryngeal inlet in a bull.

Fibrino-purulent pleurisy and hydrothorax was seen in a one-month-old calf submitted with a history of sudden death. Ascites and fibrinous peritonitis were also present and *M. haemolytica* was recovered from multiple tissues.

Alimentary diseases

Of 4,150 blood samples that were tested for bovine viral diarrhoea virus (BVDV) by virus isolation or antigen capture ELISA 311 (7.5 per cent) were positive. In addition, 4 of 355 (1.1 per cent) submitted tissues and nasal mucus samples were positive by immunofluorescence. Five cases of mucosal disease were confirmed at post mortem examination during this period.

Abomasal torsion was diagnosed in a four-year-old Friesian cow submitted for post-mortem examination after becoming recumbent within a week of calving. A distinctive feature of this case was involvement of the omasum and reticulum.

Abomasal ulceration with perforation and peritonitis was diagnosed in a three-day-old calf.

At necropsy there were fibrinous adhesions between the loops of intestine. The abomasum was distended by yellow flocculant fluid and there were a cluster of mucosal ulcers with black haemorrhagic bases, one of which had perforated. Rotavirus was detected by ELISA in the caecal contents and *E. coli* was recovered in septicaemic distribution. *Sarcina ventriculi* which has been associated with abomasitis, was not recovered from cultures in this case and tissues including abomasum were negative for the presence of bovine viral diarrhoea virus.

A strangulated intestinal hernia was diagnosed in a three-year-old cow submitted with a history of abdominal pain. On gross examination there was blood stained excess free fluid in the abdominal cavity. The omentum was congested with fibrin and ingesta on the internal surfaces of the omental sac. There was a 10 cm diameter hole in the omentum through which loops of small intestine had herniated and become incarcerated. The intestines were congested and deep purple with a tear in the wall of one of the loops.

Jejunal haemorrhagic syndrome (JHS)

Possible jejunal haemorrhage syndrome (JHS) was diagnosed on gross post-mortem examination of a three-year-old cow submitted with a history of dullness, inappetance and foetid diarrhoea. There was a 20 cm long section of jejunum to which a firm, 8 cm diameter, 20 cm long cylinder of clotted blood was closely adhered. The small intestine proximally contained firm clotted blood in the lumen and the jejunal wall and associated mesentery was discoloured brown and poorly preserved, while distally clotted blood was mixed with bloody fluid. *Clostridium perfringens* was recovered from small intestine cultures but no alpha toxin was detected by ELISA. Further work on this case is ongoing.

Neonatal enteritis

The pathogens identified in neonatal bovine faecal samples during the quarter are shown in Table 1. Overall, *Cryptosporidium* species and rotavirus were the most common pathogens identified.

TABLE 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, January to March 2014

Pathogen	Number	
	Tested	Positive (per cent)
<i>Cryptosporidium</i> species	484	154 (27.7%)
Rotavirus	508	168 (33.1%)
Coronavirus	503	28 (5.6%)
<i>Escherichia coli</i> K99	195	2 (1.0%)

Other enteric conditions

Parasitic ova found in ruminant faeces samples submitted during the period are shown in Table 2.

Table 2: Endoparasitic infections in ruminants in Northern Ireland, January to March 2014

	Total	No of parasitic ova					% positive
		Negative	+	++	+++	++++	
Liver fluke							
Bovine	870	691	138	31	7	3	20.6%
Ovine	233	144	31	16	3	6	24.0%
Paramphistome							
Bovine	873	426	132	164	72	79	51.2%
Ovine	233	133	42	44	8	6	42.9%
Coccidia							
Bovine	1006	892	84	15	4	11	11.3%
Ovine	274	146	85	26	8	9	46.7%
Strongyle worm egg count	Total	<500 epg	≥500 epg			% Positive	
Bovine	957	840	17			1.8%	
Ovine	260	222	38			14.6%	

≥500 eggs per gram of faeces (epg) was considered of likely clinical significance
+ Low, ++ Moderate, +++ High, ++++ Very high

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out by microscopic examination, with Ziehl-Neelsen staining, on 240 bovine faecal samples. Eight samples (3.3 per cent) contained acid-fast organisms typical of MAP. Of 10144 bovine blood samples that were tested for antibodies to MAP 769 (7.6 per cent) were positive.

Nutritional and metabolic disease

Poisoning due to pyrrolizidine alkaloids following ingestion of ragwort (*Senecio jacobaea*) was diagnosed in a fifteen-month-old heifer, one of a group of ten which had died following a period of dullness and lethargy. At gross post-mortem examination excess clear fluid was seen in the abdomen and there was marked gelatinous oedema of the sub cutis and connective tissue throughout the body. The liver was firm, pale, and fibrous. Histologically there was hepatic fibrosis and marked megalocytosis, characteristic of pyrrolizidine poisoning.

Reproductive and mammary diseases

Abortion

Specimens from 164 bovine abortions and stillbirths were examined during the first quarter. Significant pathogens were detected in 71 cases (43.3 per cent). Of these, *Bacillus licheniformis* (21 cases, 12.8 per cent) was the most commonly identified pathogen. Other pathogens identified included *T. pyogenes* (12 cases, 7.3 per cent), *Leptospira* (11 cases, 6.7 per cent), *Listeria monocytogenes* (8 cases, 4.9 per cent), *Neospora caninum* (7 cases, 4.3 per cent), BVD (7 cases, 4.3 per cent), *E. coli* (6 cases, 3.7 per cent) and *Salmonella* Dublin (3 cases, 1.8 per cent).

Other reproductive diseases

Mastitis

A total of 358 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. 38 (10.6 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 46 samples. *E. coli* was the most frequently isolated organism and accounted for 27.4 per cent of isolates cultured. Other frequently identified organisms included *Streptococcus uberis* (13.4 per cent), *Staphylococcus aureus* (7.3 per cent), *Streptococcus dysgalactiae* (5.3 per cent), coagulase negative Staphylococci (4.5 per cent) and *B. licheniformis* (3.4 per cent).

Neurological diseases

Clostridium botulinum type C / D toxicosis was diagnosed in three cases during the first quarter of 2014. All cases were associated with silage feeding in housed cows

Listerial encephalitis

Two cases of listerial encephalitis were diagnosed during the reporting period and both occurred in adult cows being fed silage indoors. In each case the history was suggestive of listerial encephalitis and the gross findings were unremarkable. Characteristic histological changes were present in the brainstem with peri-vascular cuffs of lymphocytes and neutrophils and micro-pyogranuloma formation in the neuropil. *Listeria monocytogenes* was recovered from brain tissue in each case.

Gross and histological changes consistent with thrombo-embolic meningoencephalitis were seen in a nine-month-old calf submitted following acute collapse and nervous signs. At necropsy there was pus in the right frontal sinus. The brain was swollen with herniation of the cerebellum into the foramen magnum. There were blotched foci of haemorrhage on the lateral surface of the left frontal lobe and multiple large and small foci of haemorrhage and malacia in the cerebrum, midbrain, hindbrain and cerebellum.

Histologically there were multiple foci of neuropil rarefaction associated with vasculitis, blood vessel wall necrosis and fibrinoid degeneration of blood vessel walls. Dense clumps of neutrophils surrounded many affected blood vessels and were seen infiltrating into the neuropil. In adjacent tissue there are occasional small peri-vascular cuffs of mononuclear cells.

H. somni could not be recovered from tissues including the brain, possibly due to antibiosis prior to submission. However the histological lesions were considered to be consistent with thrombo-embolic meningoencephalitis due to infection with this organism.

SMALL RUMINANTS: SHEEP

Respiratory diseases

Respiratory disease was identified in 12 ovine post mortem submissions during this quarter. *M. haemolytica* (three cases), parasitic pneumonia (two cases), laryngeal chondritis (one case) and fibrinous pleurisy (one case) were the most common diagnoses.

Jaagsiekte

Jaagsiekte (ovine pulmonary adenocarcinoma / OPA) was diagnosed in an aged ewe which became inappetent and recumbent around one month prior to lambing. On gross post-mortem examination there was pale consolidation of the right left antero ventral lung which was overlain by fibrin. There was deep / purple consolidation of the left middle lobe and right apical lobe. There were multiple pale soft foci throughout the right and left diaphragmatic lobes.

Histologically there were multiple variably sized foci in which alveoli were lined by tall columnar cells and there was a mild to moderate interstitial fibroplasia. Alveoli adjacent to these acinar type foci contained many neutrophils and macrophages. In some sections there was severe infiltration of neutrophils, macrophages and oat cells into most alveolar spaces. These changes were considered consistent with secondary pasteurellosis although no *M. haemolytica* was recovered from lung cultures. There were sub- pleural foci of numerous nematodes and nematode eggs in alveolar spaces and bronchioles with a lymphoid infiltrate and local thickening of the interstitium consistent with lungworm infection.

**Figure 2**

Osteitis of the maxilla, maxillary sinusitis, erosion of bone between the maxillary sinus and nasal cavity, necrosis of turbinates, deviation of the nasal septum and rhinitis in a ewe with cheek tooth disease.

Alimentary diseases

Ovine mandibular and dental abnormalities

Cheek tooth disease and emaciation were considered to be the cause of death in a very thin four-year-old ewe which presented with a history of weight loss of six – weeks duration and dropping of the cud. There was bilateral upper cheek tooth disease, with loose molars and infected tooth roots. There was osteitis of the maxilla associated with the roots of the loose molars, maxillary sinusitis, erosion of bone between the maxillary sinus and nasal cavity, necrosis of turbinates, deviation of the nasal septum and rhinitis (Figure 2). Several other sheep were reported as being similarly affected and full inspection of the flock was advised. There is no known cause for this condition; a pathogenesis similar to broken mouth may be a possibility. Once molar disease becomes severe enough to induce clinical disease, the condition should be considered to be irreversible and affected sheep should be euthanased on welfare grounds.

Seven ewes in a sheep flock presented with recumbency, hypothermia, apparent blindness and ruminal reflux after a breakout through an open gate. Large numbers of Forest Flame (*Pieris*) leaves were found in the rumen of two ewes examined and a diagnosis of Forest Flame poisoning was made. Poisoning by *Pieris* is the most commonly identified cause of plant poisoning in sheep in Northern Ireland.

Listerial abomasitis and septicaemia

Abomasitis was seen on gross post mortem examination of a four-year-old ewe presented with a history of short duration diarrhoea and sudden death. *L. monocytogenes* was recovered from multiple tissues.

Johne's disease

14 ovine faecal samples were examined microscopically using Ziehl-Neelsen staining for MAP. One sample (7.1 per cent) contained acid-fast organisms typical of MAP. 3 ovine blood samples were tested for antibodies to MAP 1 (33.3 per cent) were positive.

Nematodirosis in lambs

Nematodirosis was diagnosed in lambs in mid-March with egg counts of up to 3000 epg being seen in first season early lambs. Two six-week-old lambs submitted for post-mortem examination following sudden death showed pre-patent infection with two hundred worms present in small intestine washings but no eggs present in the faeces.

Nutritional and metabolic disease

Starvation and mismothering in lambs

A three-week-old lamb was submitted with a history of sudden death. A large trichophytobezoar was found to be impacting the abomasum at the pylorus. These concretions of wool and plant material are reported in young lambs which do not receive adequate nutrition from their dam and thus sometimes begin inappropriate solid feeding.

Reproductive diseases

Abortion

Specimens from 217 ovine abortions and stillbirths were examined during the 1st quarter. Significant pathogens were detected in 129 cases (59.4 per cent). Pathogens identified included *Chlamydophila abortus* (46 cases, 21.2 per cent) *Toxoplasma* (45 cases, 20.7 per cent), *Leptospira* (12 cases, 5.5 per cent), *E. coli* (11 cases, 5.1 per cent) and *L. monocytogenes* (7 cases, 3.2 per cent).



Figure 3

Epitheliogenesis imperfecta in a term ovine foetus.

Epitheliogenesis imperfecta and cleft palate were seen in a term foetus submitted as part of an abortion investigation to rule out Schmallerberg virus infection (Figure 3).

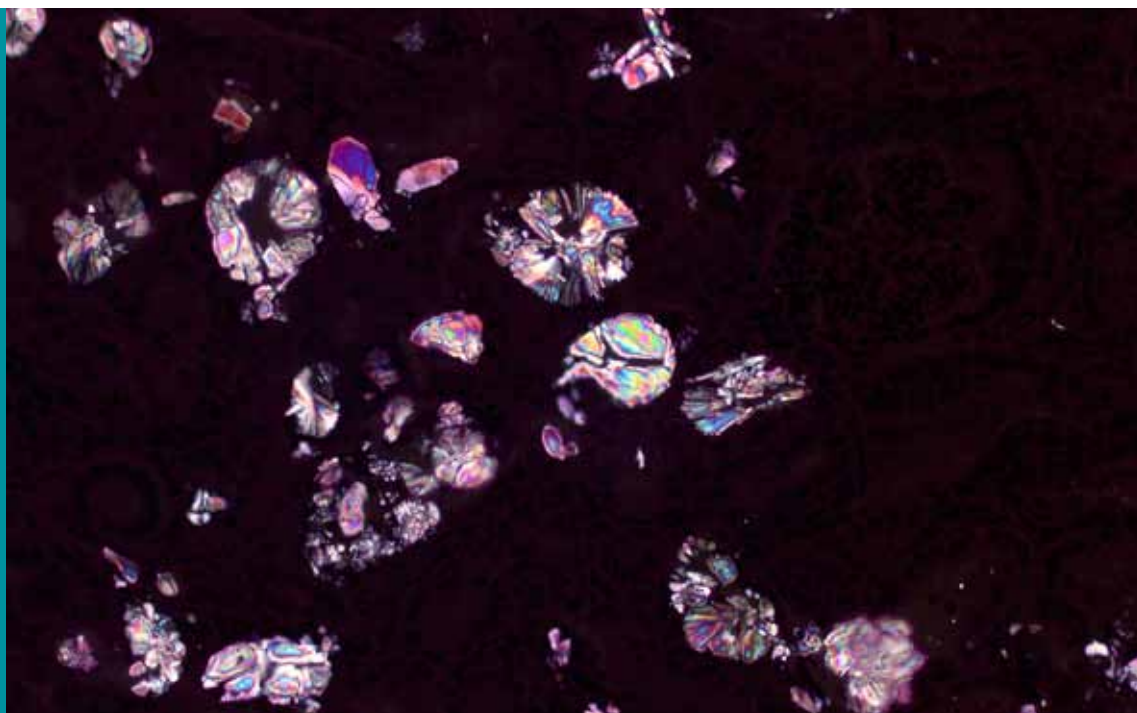
On examination, the lower jaw was seen to be under-shot. The epidermis was absent from the muzzle and limbs and also irregularly so over the shoulders. The medial cleats were absent from the hind feet. The epidermis was absent from both pinnae with distortion of the cartilage and there was a cleft palate present. RT – PCR was negative for the presence of Schmallerberg virus nucleic acid.

Neurological diseases

Three cases of listerial encephalitis were confirmed in sheep by post mortem examination during the first quarter of 2014

Urinary tract disease

Urolithiasis was diagnosed in a four-month-old ram lamb which had been inappetent for several days. The prepuce was swollen, there was uroperitoneum and the terminal part of the penile urethra including the urethral process was obstructed by fine white crystals typical of struvites.

**Figure 4**

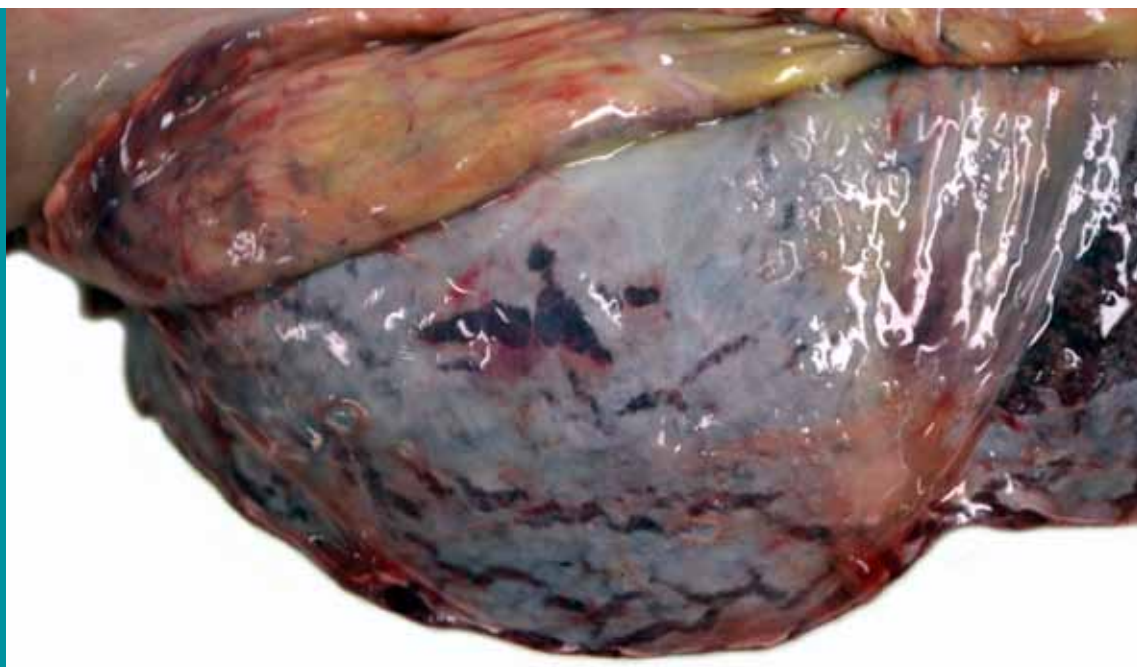
Bi-refringence of calcium oxalate crystals in a section of kidney, viewed under polarised light in a Zwartble ewe with oxalate nephrosis.

Oxalate nephrosis in Zwartble sheep

During the reporting period, a three-year-old Zwartble ewe and a three-week-old Zwartble lamb from different flocks were presented with a history of sudden death following a period of dullness and inappetence. At necropsy the kidneys were pale and shrunken with poor demarcation between cortex and medulla. Histological examination showed interstitial fibrosis, urolithiasis and nephrocalcinosis with the presence of intra-luminal and some intra-cellular, yellow, translucent, bi-refringent, calcium oxalate crystals in the renal tubules (Figure 4).

These cases are notable because of the rarity of oxalate nephrosis in sheep, a possible breed predisposition to the condition in Zwartbles (Zwartble nephrosis) and a likely similarity to other inherited primary hyperoxalurias (especially PH 2 or L-glyceric aciduria) described in human patients and in some breeds of cats, dogs and cattle.

Bilateral renal enlargement due to suppurative glomerulonephritis was seen in a three-year-old ram. At necropsy both kidneys were markedly enlarged and mild perirenal oedema was present. There were multiple tears in the renal capsule (Figure 5). The cortical surface was speckled with multiple raised 1mm diameter foci which radiated down through the cortex.

**Figure 5**

Multiple tears in the renal capsule of a ram with histological lesions of glomerulonephritis.

Histologically, multiple radiating groups of nephrons, packed with bacteria and eosinophilic debris were seen. There was loss of tubular epithelium with an associated dense interstitial infiltrate of degenerate inflammatory cells. Many glomeruli had degenerate inflammatory cells in the glomerular tufts and many affected tufts were necrotic with accumulation of inflammatory cells in the Bowman's space. *E.coli* was recovered in septicaemic distribution.

Skin diseases

Four cases were examined for sheep scab during the 1st quarter of 2014, one of which was positive.

Other diseases

A one-week-old ram lamb was submitted with two puncture marks on the ventral neck (Figure 6). This was one of several similarly affected lambs from a field bordering a waterway suspected to be a mink habitat. The puncture marks were 10 mm apart and 18 mm apart, corresponding to the inter-canine gap for mink and were therefore considered to be possibly due to predation by mink. At necropsy there was blood staining of the wool with sub-cutaneous and soft tissue haemorrhage and fractures of the transverse processes of the vertebrae. Caution was advised in the interpretation of the findings because there is individual variation in inter-canine distance within a species.



Figure 6

Puncture marks in the ventral neck of a lamb, possibly due to mink predation.

HORSES:

174 swabs were examined for the presence of *Taylorella equigenitalis* during this quarter, all of which were negative. 6 swabs were cultured from horses with a history suggestive of strangles during this quarter, all of which were negative.

PIGS;

Meningitis due to *Streptococcus suis* infection was diagnosed in two twelve-week-old piglets. On gross examination there appeared to be flattening of the cerebral gyri. On histology there was a severe infiltrate of neutrophils and lymphoid cells into the meninges and perivascularly affecting vessels of the outer cerebral cortex.

BIRDS: Poultry

P. multocida infection (fowl cholera) was diagnosed in ten laying hens from a large flock showing a sudden increase in mortality. Gross post mortem examination showed peritonitis, pericarditis, hepatic necrosis and splenomegaly. *P. multocida* was recovered in septicaemic distribution for 70% (per cent) of the birds examined.

Histomonosis in chickens

Histological examination of caecae submitted from twenty-seven-week-old hens showed severe necrotising typhlitis, featuring fibrinonecrotic cores and heavy bacterial colonisation. Within the necrotic material, there were numerous vacuolated bodies with pale-staining contents. Due to autolysis and the chronicity of the caecal cores, it was not possible to confirm with certainty that histomonad trophozoites were present in Periodic- Acid- Schiff (PAS) stained histological sections. However the presence within distended macrophages of oval, apparently nucleated granules up to approximately 20 µm in diameter with various staining properties, including Schiff-positive, was taken to indicate the likelihood of *Histomonas meleagridis* infection.

BIRDS: Exotic

A twenty-two-month-old Roul – roul or crested partridge (*Rollulus rouloul*) which had been found dead was submitted from a zoological collection.

On gross examination the caecae were grossly distended and contained a large amount of cheesy necrotic debris with clear serous fluid present. Histologically there was a severe necrotising typhlitis, with multiple pyogranulomatous foci in the crypts. There was severe hepatic necrosis and fibrosis with accumulation of brown granular pigment in the hepatocytes these changes were considered to be consistent with histomonosis, although the chronicity of the lesions made examination of PAS stained sections for the presence of trophozoites unrewarding. Intercurrent *Heterakis gallinarum* infection was detected. It was noted that this nematode is often present in the caecae of birds with histomonosis, there being well defined role for *H. gallinarum* eggs in the transmission of histomonad trophozoites.

COMPANION ANIMALS:

Feline tuberculosis due to *Mycobacterium bovis* infection was diagnosed in an adult, male, neutered domestic shorthaired cat. The cat had a history of respiratory distress and presented with a pyogranulomatous mass on the forehead.

On gross post-mortem examination there was no enlargement of the peripheral or deep lymph nodes. The left frontal region of the skull showed bone necrosis with suppurative sinus tracts penetrating the frontal sinus. The lungs were heavy, moist and oedematous but there was no enlargement of the bronchomediastinal lymph nodes.

Histologically there was suppurative bronchointerstitial pneumonia with numerous macrophages present in the alveolar airspaces. However, as is usual in cats no classical lesions of pulmonary tuberculosis were seen in the lungs. Ziehl – Neelsen (ZN) stained sections of lung tissue were negative for the presence of acid fast organisms.

There was necrotising osteomyelitis of the frontal skull and acid fast organisms were detected in ZN stained sections of bone.

The lesions were considered consistent with the usual cutaneous lesions of feline TB with extension of the granulomatous tissue into subcutaneous structures including bone. The diagnosis was confirmed by further investigation of this case by spoligotyping which revealed the presence of *M. bovis* in the skin, sinuses and lung tissue.