



SRUC VS Surveillance Activities – Quarterly Report

July to September 2021

SRUC Veterinary Services (SRUC VS) carries out animal disease surveillance activities on behalf of Scottish Government. These include regular communications to veterinary practices on a range of animal health matters and responding to requests for expert advice and support in relation to disease investigations as well as provision of a necropsy and clinical pathology service.

Stakeholder contact and outreach

From 1st July to 30th September 2021 SRUC VS recorded a total of 294 contacts, 258 of which were with 79 Scottish vet practices. We received a further 21 calls and emails from a range of national bodies including QMS, APHA, Police Scotland, RSPB and SSPCA, as well as 15 calls from nine vet practices in the north of Cumbria and Northumberland. Over 85% of queries related to the main livestock species cattle, sheep and pigs; 8.5% concerned poultry, gamebirds and goats to equal parts and the remainder was split between native wildlife and camelids. Contacts by email and social media increased compared to the previous quarter, but almost 80 percent of recorded contacts were by phone.

Most requests (248 of 294) involved support with disease investigations. Of the 134 clinical issues in cattle discussed with practitioners, diarrhoea, respiratory disease and sudden death were the most common topics. For the 57 sheep cases, sudden death was the most commonly discussed clinical finding followed by respiratory disease, skin conditions and nervous signs, the latter two with the same number of calls.

Webinars

SRUC VS offered three nationwide webinars this quarter.

Date	Title	Attendees	Registrants
1 July 21	Dairy beef systems, challenges and opportunities for vets	27	110
28 July 21	Leading the fight against lung worm in cattle	36	79
29 Sep 21	Dynamic health planning	25	82

All webinars were recorded and are available to registrants who were not able to attend the live webinar. A programme for the coming half year is in preparation.

Submissions and diagnostic rates

Abortion and post-mortem (PM) material are handled by our network of PM centres throughout Scotland, while clinical pathology samples and material arising from carcass examinations by private veterinary surgeons (PVS) are submitted to our veterinary and analytical laboratory near Edinburgh.

2,212 laboratory submissions were received from 107 vet practices in the SRUC VS catchment area. In the last quarter this included 93 practices based in Scotland and 14 practices in Cumbria and Northumberland, which carry out work on both sides of the border. Further diagnostic samples were submitted from the two vet schools as well as law enforcement bodies such as Police Scotland and SSPCA. Ninety five percent of samples were submitted from cattle and small ruminants, followed by birds, pigs, camelids, and native wildlife. 1,510 submissions were for diagnostic (disease investigation) and 702 for monitoring (screening of healthy animals) purposes.

The most common clinical presentations for diagnostic submissions across all main livestock species are shown below. The three most common presenting signs for cattle in this quarter were diarrhoea, wasting and abortion. For sheep it was wasting, sudden death and diarrhoea.

The clinical signs discussed with PVS (paragraph 2, above) did not fully match the presenting signs of animals that were sampled for diagnostic investigations. A possible explanation for this is that PVS commonly investigate conditions like abortion and ill thrift by using standard diagnostic packages and no further advice is required. On the other hand, prior discussion on the most promising diagnostic approach is more likely to be sought when investigating a skin condition or nervous signs.

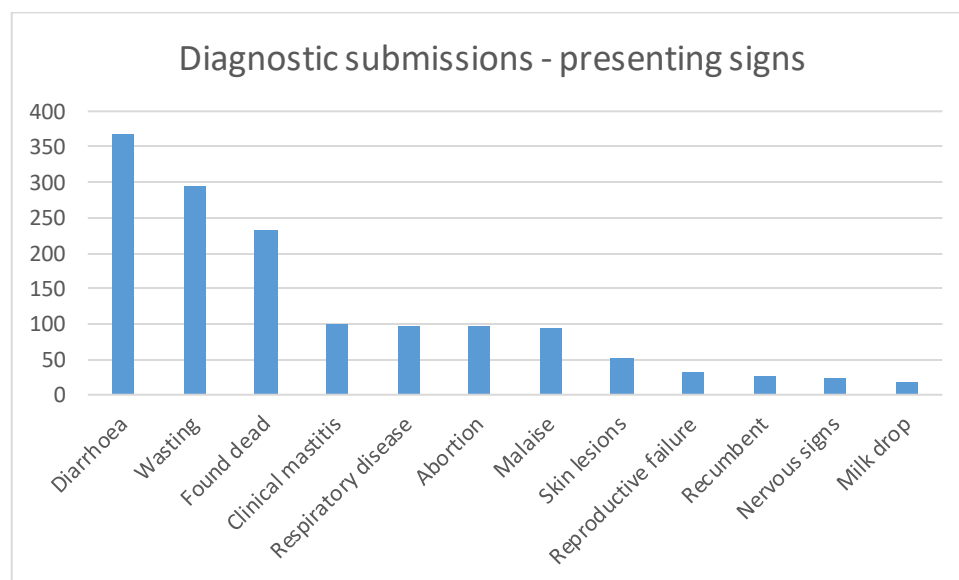


Figure 1: The 12 most common presenting signs of 1,510 diagnostic submissions received from 1st July to 30th September 2021.

Submissions by species groups

SRUC VS receive mostly submissions from cattle and sheep, yet significant numbers come also from poultry, pigs, camelids and native wildlife. Whilst more carcasses of small ruminants (103) were submitted than of cattle (62), far fewer clinical pathology submissions (e.g., blood and faeces) were submitted from small ruminants (632) than from cattle (1,163).

	Birds	Camelids	Cattle	Native wildlife	Pigs	Small ruminants
No. of submissions	65	17	1310	10	28	782

Table 1: Submission count by species groups received in the last quarter.

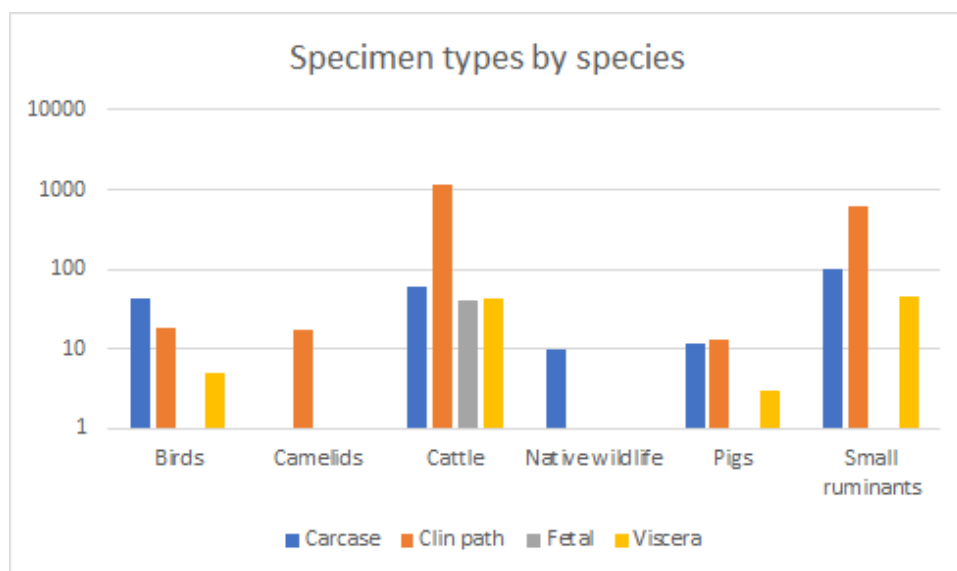


Figure 2: Submissions received in the last quarter by species groups and specimen.
Please note the logarithmic scale for the submission count.

Diagnostic rates

Diagnostic rates in last quarter are shown below for carcasses examined by SRUC VIOs (carcase); clinical pathology submissions i.e., mainly blood and faeces (clinical pathology); abortion investigations by SRUC VIOs (foetal); submissions of viscera from PM and abortion examinations by vets in practice (viscera). While the highest number of diagnoses were reached on submissions for clinical pathology, PM examination (PME) offered the highest chance to reach a diagnosis. Arguably PMEs and clinical pathology investigations don't necessarily aim for the same goal. Samples taken from live animals are not necessarily tested simply to reach a diagnosis but to exclude specific differential diagnoses, explore exposure to certain pathogens or to determine the severity of the clinical state to inform prognosis. On the other hand, PMEs offer more

ways of diagnostic investigation and are conducted with the clear goal to reach a diagnosis so to exclude or detect exotic and re-emerging diseases. The diagnostic rate consequently is lower in clinical pathology submissions.

	Diagnosis reached	Diagnosis not reached	Total	Percentage
Carcase	199	28	227	88%
Clin path	410	742	1152	36%
Foetal	20	21	41	49%
Viscera	37	53	90	41%

Table 2: Comparison of 1,510 diagnostic submissions by specimen type for which a diagnosis was reached (DR) and no diagnosis was reached (DNR), respectively.

To take full advantage of the diagnostic possibilities PME's are also subsidised. The value of PME's for national surveillance shows for example when comparing disease surveillance in camelids and wildlife. SRUC VS received more submissions from camelids, but more diagnoses were reached for wildlife submissions, in the former case SRUC VS received exclusively clin path submissions whereas from the latter group it was carcasses.

Across all species groups parasitic and bacterial infections accounted for most diagnoses.

Species	Diagnosis	Count	Species	Diagnosis	Count
Birds	Spironucleosis/ Hexamitiasis	7	Native wildlife	Trauma and predation	5
Birds	Marek's disease	5	Native wildlife	Salmonellosis	1
Birds	Trauma/fracture	2	Native wildlife	Poisoning	1
Camelids	No diagnoses reached		Pigs	Erysipelas	3
			Pigs	Intestinal torsion	3
			Pigs	<i>Streptococcus suis</i>	2
Cattle	Johne's disease	64	Small ruminants	Parasitic gastroenteritis	49
Cattle	Coccidiosis	44	Small ruminants	Pneumonia	25
Cattle	Mastitis dt <i>Str. uberis</i>	32	Small ruminants	Pine/cobalt deficiency	15

Table 3: Most commonly reached diagnoses in the last quarter by species groups.

Selected Cases from the Quarter

CATTLE

Babesiosis

A four-year-old stabiliser cow was submitted for post-mortem examination after it became the third to die in five days from a group of 35 cows with calves at foot. It was noted to be dull, lethargic, hypothermic and slightly unsteady the previous day and had been treated with B vitamins, NSAIDs and antibiotics. Several ticks were found on the carcass which was pale and yellow-tinged. Organisms suspicious of *Babesia* species were detected on a blood smear and PCR testing carried out on blood and spleen proved positive for *Babesia divergens* confirming the diagnosis. The cattle were grazing a field providing suitable habitat for ticks and where babesiosis had been diagnosed in previous years. Moving to a field with less tick habitat was advised. Hypocuprosis was also diagnosed based on a liver copper result of 162 $\mu\text{mol/kg}$ dry matter (DM) (reference range 314 to 7850 $\mu\text{mol/kg}$ DM). It has previously been suggested, but not proved, that concurrent copper deficiency may reduce the therapeutic value of imidocarb, the preferred treatment for babesiosis.

A beef cow on rough grazing with a calf at foot was found recumbent and trembling and died the same day. Pallor, large numbers of ticks and dark red urine were noted by the farmer. A second cow was dull, trembling and appeared slightly jaundiced. Ticks were evident and a packed cell volume of 0.08 l/l (reference range 0.25 to 0.45 l/l) confirmed severe anaemia. Examination of a blood smear suggested a diagnosis of babesiosis and infection with *Babesia divergens* was confirmed by PCR. Babesiosis had not previously been diagnosed on this farm. Heifers were purchased annually from an area where babesiosis cases had been identified in the past. None of these animals were affected and it was suggested that the disease may have been introduced via cattle movements.

Alkaloid Toxicity

Three yearling bullocks were found dead over a ten-day period three weeks after turnout at the end of May. Subsequently, seven of the remaining nine animals then developed signs of weakness, with an unsteady gait, anorexia and diarrhoea and three went on to die. A fourth animal was euthanased, and an on-farm post-mortem examination was carried out assisted by SRUC VS over a video call. Significant findings included photosensitisation, rectal prolapse, ventral subcutaneous oedema, ascites and marked oedema of the abomasal mucosa. Bacteriology failed to identify any infectious agents. Histopathology detected a subacute to chronic hepatopathy characterised by megalocytosis, bile duct hyperplasia and portal and perivenous fibrosis consistent with pyrrolizidine alkaloid toxicity. Further history confirmed that silage fed over the housing period had contained ragwort and this was the likely cause.

Suspect Botulism

Ten adult beef cattle developed hindlimb weakness progressing to recumbency over a 24- to 48-hour period. Clinical examination revealed flaccid paralysis of the tail, loss of anal sphincter tone, generalised muscle weakness, tongue protrusion and mild ruminal atony. Botulism was suspected despite there being no history of exposure to poultry litter. All clinically affected animals died. Two animals were examined post-mortem with no significant abnormalities found. While no botulinum toxin was detected in the small intestinal contents this did not exclude the diagnosis in the face of such well-defined clinical signs. Wet, four-year-old red clover clamp silage was being fed and considered the most likely source of toxin. Baled silage was substituted, and the problem resolved with the last known case occurring three weeks after the initial onset. This is similar to the incubation time of up to 18 days reported in an outbreak of botulism associated with grass silage.

Coccidiosis In Adult Cattle

A group of dry cows developed diarrhoea after being turned out to grass. Second calvers that hadn't previously grazed were the most severely affected. The farm had owned the land for three years and prior to that it was used by a calf rearing enterprise. A faecal sample was submitted and found to contain 450 strongyle eggs and 60,600 coccidial oocysts per gram. Coccidial oocyst speciation was carried out and *Eimeria alabamensis* accounted for 100 per cent of the oocysts detected. The clinical signs resolved without treatment, and it was assumed that the cows had not previously encountered *E. alabamensis* which is most often reported as a cause of coccidiosis in youngstock at grass. It was suggested that the calf rearing unit may have been the original source of infection, with a subsequent annual increase in oocyst challenge.

Poor Silage Quality

A 200-cow dairy herd reported pyrexia, milk drop and diarrhoea affecting 25 per cent of the herd, with the milk yield in individual animals decreasing by around 30 per cent. The farmer and vet commented that the silage feed face was spoiling quickly becoming black and slimy within one day of exposure. The silage fields had been heavily fertilised, and the possibility of high nitrate levels was raised. Excess nitrates can lead to a restricted fermentation, an elevated pH and a risk of overgrowth with bacteria and moulds. Blood and faecal samples were submitted and screening for *Salmonella*, *Yersinia*, and *Listeria* species proved negative. No evidence of Schmallenberg virus infection was detected by PCR. Paired serology was not required as clinical signs resolved following a reduction in the amount of silage fed combined with the addition of straw pellets to the ration.

SHEEP

Cerebrocortical Necrosis

An albendazole drench was administered to a group of 168 un-weaned mule lambs at the start of June as a prophylactic treatment against nematodiosis. Approximately one month later two lambs died rapidly after developing diarrhoea. A third lamb was also diarrhoeic but presented with neurological signs including opisthotonos and bruxism over a period of three days prior to death. The remaining lambs were then treated with oral moxidectin and seven days later a three-month-old lamb was found scouring and aimlessly wandering just before death. The carcass was submitted for post-mortem examination and total worm counts indicated that the recent anthelmintic treatment had been successful. The brain fluoresced under ultra-violet light and histopathology detected laminar necrosis consistent with a diagnosis of cerebrocortical necrosis (CCN). Diagnoses of CCN in lambs peak at three and six months of age which may reflect ruminal dysbiosis with increased numbers of thiaminase-producing bacteria associated with factors such as diet changes at weaning.

CCN was also diagnosed in a flock of 250 crossbred ewes that reported the loss of three ewes and three lambs all of which presented with blindness and incoordination progressing to recumbency and death. The lambs were all from one group of 60 ewes with lambs at foot while the ewes were grazing different fields. A similarly affected three-month-old Texel cross lamb was submitted live and central blindness was confirmed based on a positive pupillary light reflex and a negative menace response. A moderate worm burden was found on post-mortem examination and the brain auto-fluoresced when viewed under ultra-violet light. CCN was confirmed on brain examination which revealed severe laminar cerebrocortical necrosis. No predisposing factor was identified in this case.

Orf

Two, four-month-old Scottish blackface lambs were euthanased for investigation of severe orf lesions. 1,500 lambs had been vaccinated with a live orf virus vaccine and at least ten had died after developing large reactions at the vaccine site and head with lesions on the ventral abdomen and legs in some cases. Lymph nodes were not detectable on post-mortem examination. Parapox virus was detected by PCR from lesions on the lips and sequencing showed it to be vaccinal strain in one lamb and wild type in the other. A farm visit was carried out and investigations are ongoing. The possibility of a hereditary immunodeficiency was suggested.

Nematodiosis

The carcass of a six-month-old Texel cross lamb was submitted for post-mortem examination to investigate a problem with deaths and scour in a group of weaned lambs. They had been treated with a benzimidazole drench eight weeks earlier. The lamb was in average body condition with liquid abomasal and intestinal contents. A total of 43,800 *Nematodirus battus* worms were recovered from the small intestines confirming

autumn nematodirosis. 1,850 *Nbattus* eggs per gram were detected in faeces. The diagnosis indicates that the lambs had not been sufficiently exposed to *Nbattus* earlier in the year to develop immunity and suggests that an autumn hatch of *Nbattus* eggs had occurred on the pasture.

Mesenteric Torsion Post-Embryo Collection

Three pedigree Texel ewes from a group of 18 were found dead following routine embryo collection the previous afternoon. Access to food and water had been restricted for just over 24 hours prior to the procedure. Afterwards the sheep recovered in a pen with access to hay and were then allowed to walk back to the field in their own time. Clockwise 360-degree mesenteric torsions were found in all three cases. It was suggested that a combination of reduced rumen size, introduction of gas into the abdomen and manoeuvring into dorsal recumbency had predisposed to the torsions. Post-operative ileus may also have contributed.

PIGS

The ongoing problems of reduced staffing in processing plants associated with the Covid-19 pandemic has continued to have an impact on Scottish pig farmers, with batches of pigs held back on farm due to reduced slaughter availability. Maintaining the flow of finishers due to leave the farm is vital to avoid over-stocking and to market pigs in accordance with the narrow band of acceptable weight stipulated by supply chain contracts. Reduced abattoir capacity in Scotland has led to many pigs being transported to abattoirs in England for slaughter. Changes in overseas supply contracts have also had major financial impacts on farmers.

Oedema Disease

Oedema disease was confirmed in two 6-week-old pigs from a unit which had seen occasional sudden death in recently weaned pigs. In both cases there was marked pulmonary oedema with expansion of interlobular septae (Figure 3), serous pericardial fluid, mucosal and serosal intestinal congestion, and submucosal oedema in the colon. Bacterial culture of the colon identified a haemolytic *E. coli* in both animals, and both isolates were positive by PCR for the following targets – F18 (fimbrial adhesion factor), two heat-stable enterotoxins STaP and STb (heat stable enterotoxin) and Stx2 (Shiga toxin) virulence factors, the latter supporting a diagnosis of oedema disease. In our experience it is unusual to get the combination of STaP and STb with F18 and Stx2 targets, however we have recorded this previously in other similar situations.

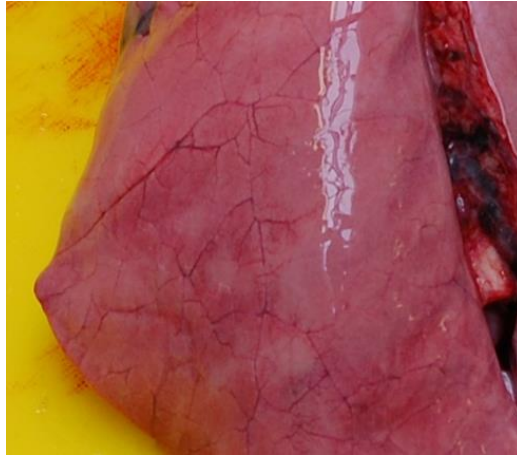


Figure 3: Pulmonary oedema including prominent interlobular oedema.

***Clostridium difficile* Enterotoxaemia**

Clostridium difficile enterotoxaemia was confirmed as the cause of scour and death in piglets at 7–12 days of age. The diagnosis was also suspected in two previous submissions from the same holding. In this case, *C. difficile* antigen was detected in intestinal contents of 5 of the 6 pigs submitted, and *C. difficile* toxin was detected in intestinal contents of one pig. Ulcerative colitis was identified grossly (Figure 4) and confirmed histologically. Taken together, the findings were consistent with *C. difficile* enterotoxaemia. Culture was not successful in this case, possibly due to the fastidious nature of the bacteria. In previous similar situations, anecdotal information is that autogenous vaccines have been found helpful in controlling *C. difficile* enterotoxaemia. Lesions consistent with exudative facial dermatitis were also found in five of the six piglets and it was thought these lesions may have interfered with the ability of these piglets to suckle.



Figure 4: Severe ulcerative colitis associated with *Clostridium difficile*

Mulberry Heart Disease

The second five-month-old Oxford sandy and black pig to die in a 10-day period was submitted for post-mortem examination. A group of five pigs had been purchased in March and were grazing an area of beech woodland with access to additional concentrate feed, fruit and veg. The submitted pig was reported to have a reduced appetite prior to

death but appeared bright. Body condition was good. There was a moderate serous pleural effusion containing fibrin strands and an increased volume of pericardial fluid. Fluid exuded from the cut surface of the lung and the myocardium had a slightly mottled appearance. Histopathology revealed acute and subacute myocardial necrosis and degeneration (Figure 5), with early fibrosis, indicating that the process likely started 1 – 2 weeks prior to the final fatal episode. The findings were consistent with nutritional-type cardiomyopathy (mulberry heart disease). Traditionally, this condition is associated with low vitamin E levels, however in this case liver selenium and vitamin E levels were within normal limits. This scenario is occasionally observed, and one possible explanation is that the measurable vitamin E in the body is not always physiologically available. Mineral supplementation of the remaining three pigs was advised. The bone marrow was well populated ruling out bracken toxicity.

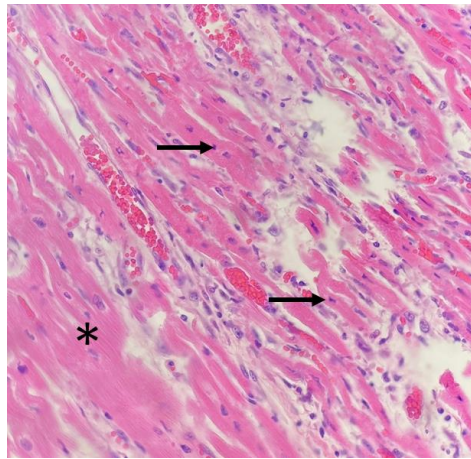


Figure 5: Subacute myocardial necrosis and degeneration (black arrows).
Adjacent unaffected myocardium (asterisk)

***Mycoplasma hyosynoviae* Polyserositis**

Polyserositis associated with *Mycoplasma hyosynoviae* infection was diagnosed in an 18-week-old rearing gilt with clinical signs of being hunched up and “walking on the toes”. Extensive chronic pleuritis and pericarditis and mild synovitis was detected on gross and histological examination (Figures 6 and 7) and *Mycoplasma hyosynoviae* was detected by PCR/DGGE on joint fluid. *Pasteurella multocida* and *Erysipelothrix rhusiopathiae* were isolated from lung and joint fluid, respectively, and were thought to represent secondary infection.

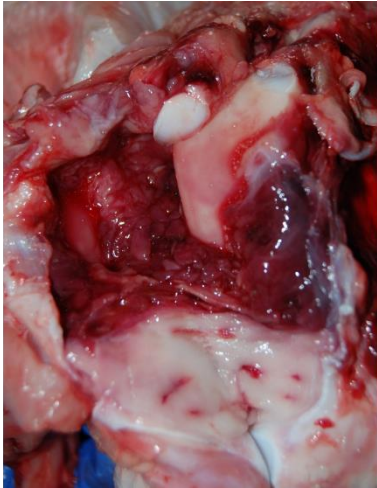


Figure 6: Opened joint to reveal synovitis.

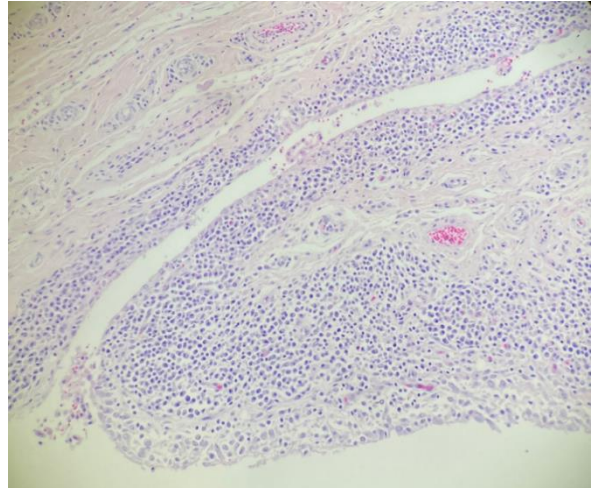


Figure 7: Synovial membrane showing synovitis with synovial epithelial hyperplasia (H+E, x200).

Pancreatic Fat Necrosis

Pancreatic fat necrosis in Tamworth sow which died 2 weeks after a hyperthermic episode. Two other pigs in the same group had died suddenly on the day due to presumed hyperthermia. The group had been let outside for the first time on a very hot day with no provision of shade or wallow. Heat stroke and DIC giving rise to pancreatitis and release of pancreatic enzymes giving rise to fat necrosis in surrounding fat.

WILDLIFE

Avian Influenza

Avian influenza (H5N1) was found to be the cause of marked increased mortality in great skuas (*Stercorarius skua*) in Fair Isle and St Kilda and was also detected on the Flannan Isles. At the time of the skuas' departure on migration, ranger's estimates were that up to 10% of the breeding population in both locations could have been lost – further data will become available next year when the birds return, and this estimate may change. This outbreak is being written up in greater detail for publication with contributions from APHA, SRUC, National Trust for Scotland and Nature.Scot.

Seabird Wrecks

Notable North Sea guillemot and razorbill "wrecks" occurred this autumn. From 7th September to 29th September inclusive SRUC Edinburgh received 12 batches of seabirds consisting of 39 guillemots (*Uria aalge*), 18 razorbills (*Alca torda*) and one gannet (*Morus bassanus*) that had washed up on the east coast from Northumberland to Moray. From 1st September to 11th October inclusive SRUC Aberdeen received 10 batches of seabirds consisting of 53 guillemots, one razorbill and two gannets that had washed up on the east coast from Banff, Aberdeenshire to North Berwick, East Lothian. At least two

more batches of guillemots were submitted to the Royal (Dick) School of Veterinary Studies. Starvation was the presumed cause of death.

Urinary Tapeworm Infection

Nephritis and nephrosis, possibly secondary to urinary tapeworm infection, was diagnosed in a six-week-old male mute swan (*Cygnus olor*) which was one of three cygnets to die following the death of the adult female swan in a community park. The adult female had been picked up for treatment and died at a wildlife centre, and since then, three of the five cygnets – which had remained with the adult male – had also died or been euthanased. The examined cygnet was found emaciated, very weak and unable to rise. After euthanasia, necropsy revealed an enlarged right kidney with pale and mottled parenchyma. The ureter was markedly distended and filled with mucoid material. *Escherichia coli* was isolated from kidney tissue, and histopathology identified nephrosis, a multifocal granulocytic nephritis and ureteritis with cestode infection. Given the ureteral dilation seen, it was considered likely that the tapeworms present in the distal ureters were causing a reduction in passage of urine.

SRUC Veterinary Services noted that tapeworms of the genus *Cloacotaenia* were reported to be relatively common in the ureters of mallards and pintails (Wobeser, 1974, 1981). These parasites cause inflammation and pronounced swelling of the ureters. The identity of the tapeworms in the ureters of this cygnet remain unknown.

This case was of interest given the multiple mortalities of a waterfowl species, and the location in a public park.

Salmonellosis in a Hedgehog

Salmonella meningitis and septicaemia caused by *Salmonella* Enteritidis was diagnosed in an adult female hedgehog (*Erinaceus europaeus*) which was found dead in a garden. The hedgehog was thin and appeared aged, as all four canine teeth were well worn and no longer had points. The necropsy was unremarkable, and the brain was grossly normal. Histopathology found a subacute meningitis in which bacteria were present, some of which have been phagocytosed, indicating that this was an ante-mortem invasion. The findings were consistent with bacterial meningitis. There were also microvascular thrombi within renal glomeruli and liver sinusoids, pulmonary oedema, and some small foci of necrosis in the adrenal cortex, findings consistent with septicaemia. An incidental residue of difenacoum, a rodenticide, was also detected.