Great Britain miscellaneous and exotic farmed species quarterly report

Disease surveillance and emerging threats

Volume 30: Quarter 3 to July to September 2021

Highlights

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Introduction and overview

This quarterly report reviews disease trends and disease threats for the third quarter of 2021 (July to September).

It contains analyses carried out on disease data gathered from Animal and Plant Health Agency (APHA), Veterinary Services division of Scotland's Rural College (SRUC) and partner postmortem providers and intelligence gathered through the Miscellaneous Species Expert Group networks.

In addition, links to other sources of information including reports from other parts of the APHA and Defra agencies are included.

A full explanation of how data is analysed is provided in the annexe available on GOV.UK.

Issues and trends

New postmortem providers join APHA's Scanning Surveillance Network in England and Wales

The APHA's postmortem examination and diagnostic testing service provides a major component of the Great Britain (England, Scotland and Wales) Scanning Surveillance Network. The network works closely with vets and farmers to detect and investigate new or re-emerging disease, and diagnose endemic diseases in farm animals.

The APHA Surveillance Intelligence Unit and Surveillance and Laboratory Services Department are very pleased to announce that since January and February 2021, three additional postmortem examination (PME) providers have joined the Scanning Surveillance Network. These are the Universities of Cambridge, Liverpool and Nottingham.

This broadens the expertise of, and contributors to, livestock disease surveillance in England and Wales and also brings livestock premises in the areas they cover closer to a postmortem provider.

The new PME providers join the seven current PME Providers (Royal Veterinary College, Universities of Surrey, Bristol, Cambridge and Liverpool, the Wales Veterinary Science Centre, and SRUC Veterinary Services St Boswells) that work together with the six APHA Veterinary Investigation Centres, all of which will continue their valued contribution to scanning surveillance.

Key points about accessing PME in APHA's Scanning Surveillance Network:

- each PME Provider has an assigned area as shown in colour on the APHA disease survilleance map within each assigned area, the hatched area shows where premises are eligible for free carcase collection and delivery of animals to the PME provider. Premises within non-hatched areas need to arrange to deliver animals themselves
- our postcode search tool identifies and provides contact details for the allocated PME provider and indicates if the premises is eligible for free carcase collection. This is based on the postcode of the premises from where an animal is to be submitted rather than a veterinary practice
- to arrange a PME, the vet calls the relevant PME provider to speak to the duty Veterinary investigation Officer or PME Veterinary Surgeon
- there will be some livestock premises for which the allocated PME provider has changed, and the free carcase collection service may no longer be provided for some holdings. The APHA postcode search tool allows farmers and vets to see the situation for individual premises.

More information about APHA's scanning surveillance and diagnostic services is available on the Vet Gateway.

If you have queries which are not addressed in this communication, or contact the APHA Surveillance Intelligence Unit (SIU) by emailing SIU@apha.gov.uk for more information.

Diagnostic submission trends

Table 1: diagnostic submissions in quarter 3 (July to September) for alpacas, llamas and farmed deer. The APHA figures include submissions to partner post mortem providers (PPP). Other miscellaneous and exotic species may also be received in small numbers

Year	Non Carcase Submissions			Carcase Submissions			
July to Sept	**APHA**	**SRUC**	**Total**	**APHA**	**SRUC**	**Total**	**Overall total of submissions**
2017	26	19	45	24	3	27	72
2018	14	13	27	35	5	40	67
2019	24	16	40	28	4	32	72
2020	14	22	36	21	1	22	58
2021	29	25	54	28	1	29	83

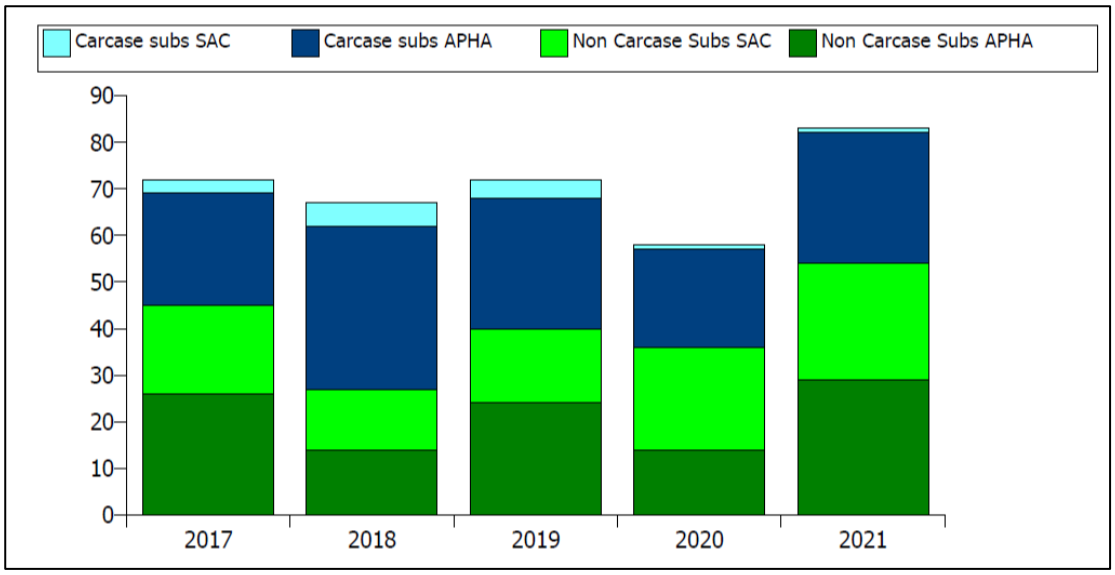

Figure 1: carcase and non-carcase submissions for Quarter 3 (July to September) for all years (2017 to 2021)

Table 2: Total diagnostic submissions for quarter 3 for all years (2017 to 2021) for each main species covered by this report and also for each main geographical area

Areas	Alpaca	Deer	Llama	Total number of animals
East England	59	16	8	83
North England	52	10	2	64
Scotland	31	17	7	55
Wales	21	2	20	25
West England	56	15	7	78
Unknown	38	8	1	47
Total for all areas	257	68	27	352

New and re-emerging diseases and threats

Nothing to report this quarter.

Unusual diagnoses

Neoplasia in Alpacas

Pancreatic Adenocarcinoma in an Alpaca

Following a history of ketosis and possible hepatic lipidosis leading to euthanasia, the carcase of a 20 year old castrate Alpaca was submitted for post mortem examination. There was an excess of straw-coloured fluid in the abdomen with the liver pale and with a reticulated appearance on the surface.

The pancreas was grossly enlarged and infiltrated by pale-coloured tissue. The kidneys also showed a reticulated surface pattern and urine dipstick testing showed the presence of ketones, glucose and excess protein. However, blood glucose was within the normal camelid range.

There was a likely incidental heavy intestinal worm burden and histopathology revealed a multifocal, exocrine pancreatic acinar adenocarcinoma together with severe, diffuse glomerulopathy and interstitial fibrosis, the renal changes being secondary to chronic antigenic stimulation from the primary neoplasia.

Laryngeal Squamous Cell Carcinoma in an Alpaca

An adult alpaca was submitted for post mortem examination after displaying malaise, upper respiratory tract noise, submandibular lymph node swelling and condition loss over a period of five days.

The animal was given antibiotics and steroids however after a slight improvement the animal was found dead. The epiglottal region was markedly swollen and severely occluded the tracheal lumen.

The left aryepiglottic fold was thickened, with raised, yellow, irregular tissue extending over the hyoid bone (see figure 2). Circular raised lesions were also noted over the right aryepiglottic fold and caudal soft palate. The left submandibular lymph node was enlarged and completely replaced by cream-coloured greasy material.

Histopathology diagnosed a laryngeal squamous cell carcinoma (SCC) with metastatic spread to the lymph node. SCC is the second most common neoplasm of camelids but usually is located on skin or mucocutaneous junctions.

The aetiology of this tumour is uncertain but likely multifactorial. In humans, SCC has been linked to chronic consumption of irritant agents.

Figure 2: Laryngeal squamous cell carcinoma with multiple metastases

Epithelial Tumour in an Alpaca

Histopathology of a lump removed from the tail base of an alpaca (see figure 3) diagnosed a benign epithelial tumour arising from either follicular or ductal structures.

Differentials included pilomatrixoma or apocrine ductal adenoma with osseous metaplasia. Both these tumours are considered rare in companion animals and limited reports exist in camelids.

Full excision was reportedly difficult due to haemostasis and wound closure factors and it was advised that local recurrence may occur.

Figure 3: Epithelial Tumour in an Alpaca

Farmed Deer

Nothing to report this quarter.

Horizon scanning

Effects of the COVID-19 pandemic

As described in previous quarterly reports, the current COVID-19 pandemic had continued to have an impact on the number of camelid and farmed deer carcase submissions to the Great Britain Scanning Surveillance Network.

However, carcase submissions have improved compared to quarter 3 of 2020 and non-carcase submission numbers have improved in quarter 3 of 2021 compared to the previous two years.

Communications have been sent to veterinary practices to indicate that the Veterinary Investigation Centres and Post mortem partners are continuing to function throughout and encouraged veterinary practitioners to make contact to discuss cases.

The situation will hopefully continue to improve over the coming months as COVID-19 restrictions continue to be eased and are finally lifted completely.

Chronic Wasting Disease and Adenovirus infections in the USA

An interesting posting on ProMED (21 Jun 2021) relating to Adenovirus Haemorrhagic disease (AHD) in Canada which is a useful reminder of the clinical signs and background to this disease. The promed post relates to an article in The Science Times which describes:

- A deadly disease that initially started to affect deer on Vancouver Island, British Columbia in 2020 is still spreading in local populaces, the provincial government recently announced.

A CTV News report said, according to a spokesperson for the Ministry of Forests, Land, Natural Resource Operations and Rural Development, out of 36 dead deer examined by the ministry since the beginning of the year (2021), 22 have had adenovirus hemorrhagic disease or AHD.

AHD was originally detected in 1993 in California, although it had never been discovered in British Columbia (BC) until September last year (2020), as reported in British Columbia News.

The province officials said this disease typically kills deer fast by leading to impairment to small blood vessels in the lungs and intestines.

Nonetheless, it can result in chronic diseases, including ulcers and abscesses in the mouth and throat of a deer.

According to the BC government, there is no evidence of AHD transmission to humans, pets, or livestock. Nonetheless, hunters are still being cautioned not to eat any meat from deer, specifically, those that have been found dead, appear ill, or are acting abnormally before they died.

The ministry said it continues to investigate the transmission and persistence of the disease, and it is asking whoever sees dear with AHD to contact the ministry.

In an email, the spokesperson said the province remains interested in collecting more specimens for ongoing investigation and welcome reports of deer, regardless of age, with clinical indications of foaming and drooling at the mouth, dark-colored diarrhea, and difficulty breathing.

Promed moderators also commented that:

- this adenovirus (CdAdV-1 or OdAdV-1) was 1st recognised in California in 1993, as stated in the text, where it caused fatal hemorrhagic disease in black-tailed deer (Odocoileus columbianus). The virus is closely related to bovine adenovirus-3, but the biologic properties of both viruses are clearly distinct, and CdAdV-1does not cause disease in other animals than deer.
- mortalities are due to CdAdV-1 infection have been documented in black-tailed deer and moose. Wild populations of other cervid species, such as white-tailed deer, mule deer, and elk, are also sporadically infected.

A further ProMED post (22 June 2021) detailed cases of Chronic Wasting Disease in Pennsylvania, New York and Texas and included a useful summary of the disease taken from the Chronic Wasting Disease page on the Texas Parks and Wildlife Department website:

"Chronic wasting disease (CWD) is a neurological disease in deer, elk, moose, and other members of the deer family, known as ‘cervids’. The disease was first recognised in 1967 in captive mule deer in Colorado and has since been documented in captive and free-ranging deer in states and two Canadian provinces.

The first case of CWD in Texas was discovered in 2012 in free-ranging mule deer in an isolated area of far West Texas.”

"This disease presents numerous challenges for state wildlife agencies across North America. Of concern is the potential for decline within deer, elk, or other susceptible cervid populations. In addition, CWD could have indirect impacts on hunting, hunter participation, and economic benefits derived from big-game hunting.

In Texas, hunting is a 2.2 billion US dollars economic engine, supporting many rural towns across the state.”

"Because eradication is thought to be impossible once CWD becomes established in a population, it is imperative that a sound CWD management program is established to reduce the severity of implications resulting from the disease. Of course, disease

prevention is the best approach to protect cervid populations and prevent social and economic repercussions.

Texas Parks and Wildlife Department (TPWD) and Texas Animal Health Commission (TAHC) have developed a cooperative CWD management plan to guide both agencies in addressing risks, developing management strategies, and protecting big game resources from CWD in captive or free-ranging cervid populations."

Chronic wasting disease continues its march across much of North America and parts of Europe. So far, no method of effective control or prevention has been found. Slaughtering animals in regions where positive animals exist may temporarily reduce the number of positives, but ultimately, the disease marches on.

Publications of interest

Anthelmintic use in South American camelids

French, S., Sawran, A., Betson, M. (2021). "Survey of anthelmintic use in South American camelids in the UK." Veterinary Record **n/a**(n/a): e774.

Gastrointestinal helminths are common in South American camelids in the UK. However, there are no anthelmintics currently licenced for camelids, leading to a limited evidence base for treatment. The aim of this study was to assess the usage of anthelmintics among UK camelid farmers.

Johne’s disease in Deer

Kubala, A., et al. (2021). Development of a Method to Detect Mycobacterium paratuberculosis in the Blood of Farmed Deer Using Actiphage(R) Rapid. Front Vet Sci 8: 665697.

Mycobacterium avium subsp paratuberculosis (MAP) is the causative agent of Johne's disease, which is an economically and clinically relevant pathogen for commercial deer production. The purpose of this study was to develop a method that could be used to rapidly detect MAP infection in deer using the Actiphage Rapid blood test.

This test has previously been used to detect MAP in cattle blood following the purification of buffy coat using Ficoll gradients, however this method is quite laborious and costly.

The purpose of this study was to develop a simpler method of blood preparation that was also compatible with deer blood and the Actiphage test.

Initially differential lysis of RBCs using Ammonium Chloride-Potassium (ACK) blood lysis buffer was compared with the Ficoll gradient centrifugation method using cattle blood samples for compatibility with the Actiphage reagents.

It was found that the simpler ACK method did not have an impact on the Actiphage test reagents, producing an equivalent sensitivity for detection of low levels of MAP.

When the two methods were compared using clinical blood samples from farmed deer, the ACK lysis method resulted in a cleaner sample.

When a blinded test of 132 animals from 4 different production groups was carried out, the majority of the positive test results were found to be from animals in just one group, with a small number identified in a second group.

The test results were found to be reproducible when a small set of positive animals were tested again 1 month after their initial testing. Finally a set of negative animals which had been previously screened using an enzyme-linked immunosorbent assay (ELISA) test, all animals gave a negative Actiphage result.

This study shows that this improved sample preparation method and Actiphage blood testing can be used to test blood samples from deer, and the full diagnostic potential of the method can now be evaluated.

Chronic wasting disease

Roh, I.-S., et al. Polymorphisms of the prion-related protein gene are strongly associated with cervids' susceptibility to chronic wasting disease. Veterinary Record n/a: e940.

Chronic wasting disease (CWD) is a cervid prion disease that is caused by abnormal prion protein (PrP^{Sc}). Recent studies have reported that prion family genes showed a strong association with the susceptibility of several types of prion diseases.

To date, an association study of the prion-related protein gene (PRNT) has not been performed in any type of cervid prion disease.

SARS-Cov-2 in deer

There was a recent interesting comment in Veterinary Times about SARS-Cov-2 in deer, the US government confirming the world's first cases in wild white deer in Ohio, with the animals showing no clinical signs of infection. The source of the exposure to the deer remains unclear.

A more detailed article from ProMED posted on 1 November 2021 (Archive Number: 20211102.8699412) saying that:

Many animal species are susceptible to SARS-CoV-2 and could potentially act as reservoirs, yet transmission in non-human free-living animals has not been documented.

White-tailed deer (Odocoileus virginianus), the predominant cervid in North America, are susceptible to SARS-CoV-2 infection, and experimentally infected fawns transmit the virus to other captive deer.

To test the hypothesis that SARS-CoV-2 may be circulating in deer, we evaluated 283 retropharyngeal lymph node (RPLN) samples collected from 151 free-living and 132 captive deer in Iowa from April 2020 through December 2020 for the presence of SARS-CoV-2 RNA. 94 of the 283 deer (33.2% and 95%, confidence interval (CI) of 28 and 38.9) samples were positive for SARS-CoV-2 RNA as assessed by Real Time Polymerase Chain Reaction (RTPCR).

Notably, between 23 Nov 2020 and 10 Jan 2021, 80 of 97 (82.5% and 95%, CI 73.7 and 88.8) RPLN samples had detectable SARS-CoV-2 RNA by RT-PCR.

Whole-genome sequencing of the 94 positive RPLN samples identified 12 SARS-CoV-2 lineages, with B.1.2 (n = 51, 54.5%), and B.1.311 (n = 19, 20%) accounting for around 75% of all samples. The geographic distribution and nesting of clusters of deer and human lineages strongly suggest multiple zooanthroponotic spillover events and deer-to-deer transmission.

The discovery of sylvatic and enzootic SARS-CoV-2 transmission in deer has important implications for the ecology and long-term persistence, as well as the potential for spillover to other animals and spillback into humans.

These findings highlight an urgent need for a robust and proactive One Health approach to obtaining a better understanding of the ecology and evolution of SARS-CoV-2.

White-tailed deer (Odocoileus virginianus) is the cervid most widely distributed east of the Rocky Mountains. The ACE2 receptor (where SARS-CoV-2 binds to enter the cell) of white-tailed deer is very similar to that of humans.

An experimental study (Palmer, M. V., et al. (2021) Susceptibility of White-Tailed Deer (Odocoileus virginianus) to SARS-CoV-2. Journal of Virology, 95) showed that this species, after intranasal inoculation, becomes infected by SARS-CoV-2, sheds the virus, and transmits it to non-inoculated contact deer.

A report by the United States Geological Survey (USGS) in July 2021 stated that about 30% of free-ranging white-tailed deer sampled had antibodies against SARS-CoV-2.

Which strongly suggested that transmission is occurring among deer, as it would be very unlikely that 30% of wild deer came in close enough contact to acquire the infection from humans.

The findings reported in this preprint (not peer reviewed as yet) add support to this hypothesis and highlight the importance of paying attention to the wildlife-human interface in a pandemic context.

It is crucial that more research is conducted in this species to prevent the virus finding in white-tailed deer a niche where it may be maintained and evolve, circulating endemically.

References

None.

Statement regarding use of this material

This publication is available at:

https://www.gov.uk/government/collections/animal-disease-surveillance-reports

Any enquiries regarding this publication should be sent to us at SIU@apha.gov.uk

http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm

The Animal and Plant Health Agency (APHA) is an executive agency of the Department for Environment, Food & Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.