PROCEEDINGS OF THE
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DENMARK

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In Denmark, there has been active regulation and health surveillance of raccoon dogs (Nyctereutes procyonoides) until 2018. The number of necropsied raccoon dogs has increased from 72 in 2011 to 669 in 2018, and most animals are healthy and in very good body condition. Due to the increasing number of raccoon dogs it is not possible to get rid of them in Jutland, instead it is attempted to avoid them from establishing on the islands of Funen and Zealand. One of the explanations for the population increase is that the Danish raccoon dogs have a high litter size of around 11 pups, compared to e.g. Poland and Finland, where the litter size is 8-9. In a diet preference study (using morphology and DNA analysis) no vulnerable prey species were detected, but it cannot be ruled out that the growing population of raccoon dogs will have a negative impact on vulnerable species of birds and amphibians in Denmark in the future.

Since 2015, three golden jackals (Canis aureus), a carnivore migrating from Asia have been reported in Denmark – one of them was shot by accident in 2017. This jackal carried meadow ticks (Dermacentor reticulatus) that were infected with Rickettsia raoultii – neither tick nor rickettsia species have been seen in wildlife in Denmark before. This example clearly shows that migration of large carnivores poses a risk for introduction of exotic pathogens to new areas.

In a study of parasites in the Danish deer populations, the subcutaneous filaria, Onchocerca flexuosa was found in red deer (Cervus elaphus), mainly older animals, but not in other deer species. The parasites are not zoonotic but are contained in subcutaneous lumps and therefore pose an aesthetic problem.

Two fallow deer (Dama dama) had plastic residues in the rumen. The plastic that probably was from wrap hay bales took up space in the rumen, but there were no signs of indigestion.

In the winter of 2018 a juvenile, male sei whale (Balaenoptera borealis) entered the narrow Mariager fjord and stayed there for 2 weeks, where it was found dead. Size (7.7 m long, 2.6 ton) and lens examination indicated that the whale was around 0.5 years. It had several skin parasites (Penella spp.), was emaciated and showed signs of drowning. Based on other reports it is not unusual that juvenile sei whales lose their orientation and strand alive.

In 2017, 17/154 wild birds were positive for the highly pathogenic avian influenza (HPAI) H5N8 that was also detected in 2016. The positive birds were mainly raptors and gulls. In 2018, HPAI H5N6 circulated among wild birds - 42 birds (several species) out of 148 examined were positive. This influenza outbreak continued during the summer of 2018.

NORWAY

Wildlife diseases in Norway 2017-2018, a summary

Knut Madslien, Turid Vikøren, Carlos das Neves, Jørn Våge; Norwegian Veterinary Institute, Oslo, Norway
In Norway, the wildlife disease diagnostics and surveillance is done at the Norwegian Veterinary Institute (NVI). After NVI detected the first case of CWD in Norway in 2016, the main focus has been diagnostics and surveillance of cervids throughout the country. Since 2016, about 75 000 cervids have been tested for CWD and a total of 24 positive cervids (19 wild tundra reindeer, four moose and one red deer) are so far found in Norway. The four cases of CWD found in old, female moose in Norway represent a novel type of CWD.

In 2017 and 2018, several cases of important wildlife diseases were reported, including tularemia in hares (13 and 7 cases, respectively), salmonella and trichomoniasis in garden birds and toxoplasmosis in hares. In 2018, five cases of rabies (four polar foxes and one Svalbard reindeer) were detected on the Svalbard archipelago.

Active disease surveillance and studies in 2017-2018 include studies such as anticoagulant rodenticides in eagle owls and carnivores, TBE in cervids, liver flukes, nodular onchocercosis and copper deficiency in red deer, keratoconjunctivitis in musk ox, as well as surveillance for avian influenza in wild birds, Echinococcus multilocularis and Angiostrongylus vasorum in red foxes, viral diseases in wild boar and the Health Surveillance Programme for Cervids and Musk Ox (HOP).

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SWEDEN

Wildlife diseases in Sweden 2017-2018, a summary

Aleksija Neimane & Henrik Uhlhorn, National Veterinary Institute (SVA), Sweden

The main wildlife disease diagnostics and surveillance activities in Sweden are done at the National Veterinary Institute (SVA). In 2017 and 2018, a total of 1618 and 1753 wild animal carcasses or tissues were examined or sampled. In 2017, Sweden reported 146 cases or outbreaks of important wildlife diseases to the OIE, including 34 cases of H5N8 HPAI in eight different avian species. In 2018, 106 cases or outbreaks of important wildlife diseases were reported to the OIE including 17 cases of H5N6 HPAI, most of them in White tailed eagles. The end of 2017 and autumn of 2018 saw large outbreaks of pigeon Avian avulavirus-1 (paramyxovirus) in rock doves. Outbreaks occurred on the Baltic island of Gotland in 2017 and throughout the southern third of the country in 2018. Large scale outbreaks of Salmonella Typhimurium were observed in passerines, primarily redpolls and bullfinches, as well as in domestic cats in early 2018 and 2019.

There have only been a few tularemia cases reported in European brown hares only. Within the CWD surveillance program, the first two cases of CWD in Sweden were detected in two 16-year-old female moose in March and May 2019.

In addition to wildlife disease surveillance, SVA also carried out a number of research projects. PhD projects on tularemia and rabbit hemorrhagic disease were completed in 2017 and 2018, respectively, and a European ANIHWA project (ECALEP) studying the origins of pathogenic lagoviruses was completed in 2019. The Swedish Environmental Protection Agency financed numerous investigations including health surveillance of invasive muskrats, ulcerative dermatitis in moose, antimicrobial resistance in seals and early detection, diagnosis and pathology of African Swine Fever.
Wildlife disease surveillance in Finland 2017-2018

Marja Isomursu, Finnish Food Authority, Finland

The Finnish Food Authority conducts national general and targeted wildlife disease surveillance in Finland. Diseases in targeted surveillance include rabies, echinococcosis, trichinellosis and African swine fever (ASF). In total, 2765 animal samples (747 birds and 2018 mammals) were examined in 2017-2018. Sylvatic rabies was not found (943 wild animals examined) but one case of bat rabies was detected in a Brandt’s bat *Myotis brandtii* in south-east Finland in 2017. The lyssavirus turned out to be a new virus, tentatively named Kotalahti virus. Red foxes (420) and raccoon dogs (665) were examined for *Echinococcus multilocularis*, all with negative results. Finland remained free from *E. multilocularis*. The endemic *E. canadensis* was found in 20% of examined wolves (N=74) and in nine semi-domesticated reindeer and six moose. *Trichinella* spp. continued to be prevalent in small and large carnivores with highest prevalences in lynx (57% in 2017) and in wolves (53% in 2018). ASF was not detected in wild boar. Hunters provided tissue samples from 1191 wild boar and 52 individuals were road-kills or otherwise found dead.

A three-year surveillance programme for chronic wasting disease (CWD) was initiated in 2018. The first case of transmissible spongiform encephalopathy (TSE) in moose was confirmed in March 2018. The moose was an old (estimated 15 years) female that was found dead in eastern Finland. In further studies, the prion was found not compatible with the North American CWD prion strain. Highly pathogenic avian influenza viruses caused mortality mainly in white-tailed eagles. In 2017, the strain was H5N8 and in 2018, H5N6. Salmonellosis (*Salmonella* Typhimurium) cases in small passerines, particularly in common redpolls, peaked in February-March 2018. Some birds of prey (northern goshawk, Ural owl, sparrow hawk) were also found salmonella positive. Lead poisoning affected eagles and swans, as in many earlier years. In 2017-2018, 16 white-tailed eagles, 13 whooper swans, 2 golden eagles and 1 mute swan were diagnosed with lead poisoning (toxic lead concentration in liver and typical pathology).
B. SCIENTIFIC PRESENTATIONS

Norwegian CWD status and management

Jørn Våge, Norwegian Veterinary Institute, Oslo, Norway

In the period of March 2016 until June 2019, the Norwegian Veterinary institute has tested about 76,000 cervids to detect current prevalence of CWD. Nineteen wild reindeer (Rangifer tarandus), four moose (Alces alces) and one red deer (Cervus elaphus) have tested positive for presence of PrPSc in brain tissue and/or lymphatic tissue. Nine of the reindeer and all moose/red deer presented with PrPSc only in brain tissue. Further, the moose and red deer show different characteristics concerning distribution (brain vs lymphatics, within the brain) and protein traits. From 2018 there is publication (Pirisinu et al. EID 2018 Dec;24 (12):2210-2218) describing the atypical appearance of CWD detected in the Norwegian moose. By bioassays, results show that there are strain differences between Norwegian reindeer and North American cervids. Culling of the infected reindeer sub-population of South-Norway was completed by April 2018 and no new reindeer cases have been detected since. To minimize chances of infection from environmental contamination, the area of the culled population is fallowed prior to a possible re-introduction of reindeer. Norway practice differential management towards CWD of classic (reindeer) and atypical (moose and red deer) appearance, as potentially new cases of classic type will elicit establishment of regulated management zones. The scheduled surveillance of CWD in Norway is about 30,000 tested cervids in 2019.

Use of rectal biopsy in the search for CWD

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Tord Erik Lien & Øystein Os, Private veterinarian officers

Antemortem testing for chronic wasting disease (CWD) has as far as we know, not been performed in cervid populations in Europe. In classical CWD and scrapie, the disease-associated form of the prion protein, PrPSc, is usually found in lymphoreticular tissues. Lymphoid tissues in the tonsil and rectal mucosa are available for biopsy in live animals and thus antemortem CWD testing. In this study, we implemented and adjusted methods used in domestic sheep and North-American cervids for collecting antemortem rectal biopsies from Norwegian cervids. The NVI rectal biopsy procedure was tested in the field on immobilized reindeer (Rangifer tarandus), red deer (Cervus elaphus), and moose (Alces alces) during GPS collaring studies in the winters of 2017 and 2018. The fieldwork had focus on animal welfare, avoiding spread of infectious material and practical issues like biopsy collection and proper sample handling. In the laboratory, methods for preparing biopsy tissue and examining them were standardized. The biopsies were examined for CWD by immunohistochemical analysis for detection of PrPSc. Preliminary results and further plans regarding antemortem CWD testing will be presented.

Aleksija Neimanis, National Veterinary Institute (SVA), Sweden

African Swine Fever (ASF), caused by ASF virus, currently is one the biggest threats to pig production worldwide. Wild boar (Sus scrofa) are important in the epidemiology of ASF in Europe and early detection of disease is critical for control following incursion into new areas. Passive surveillance of ASF in dead wild boar is considered the most effective and efficient method for early detection and requires a robust and sustained surveillance program. Wildlife disease surveillance laboratories therefore have a key role to play. They can encourage and facilitate public engagement in reporting and submitting dead wild boar for analysis and pathologists can recognize disease in routine case submissions and contribute to our understanding of natural infection in wild boars through systematic and standardized descriptions of findings. Examples of the range of gross and microscopic lesions detected in experimental infections are presented. Although disease presentation can vary among animals and tissues, lesions reflect the common pathogenesis of infection and activation of cells of the mononuclear phagocyte system and damage to lymphocytes and endothelial cells.

10 years of corvid mortalities

Henrik Uhlhorn, National Veterinary Institute, Sweden

A retrospective investigation of Swedish Wildlife Disease Surveillance records found 30 mortality events each encompassing three to several hundred, jackdaws or mixed jackdaws and rooks, over the last ten years. Mortalities amongst jackdaws and rooks, forming large colonies in urban environments are more likely to receive public attention than mortalities in other corvid species that almost exclusively appeared as single cases.

There was no trend over time, but events peaked in the cold winter months and in summer. A plausible cause behind the mortalities was discovered in approximately half the events. Causes were evenly distributed between the categories: trauma, infection and intoxication. In approximately half the events a definite diagnosis could not be reached. This could partly be explained by difficulties in getting representative material to investigate from these low-profile mortalities. Another possibility is that a large proportion of the events occurred in wintertime in connection with low night temperatures when otherwise minor metabolic disturbances might lead to fall injuries and death from hypothermia.

More than 80% of the investigated birds did show signs of trauma. The recorded injuries could be secondary to weakness, birds falling from their roost at night, but the significance of these traumatic injuries may have been underestimated and a greater proportion of the injuries could represent primary traumatic events.

High Concentrations of Environmental Contaminants in Eagle Owl Liver

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The Eurasian eagle owl (Bubo bubo) is Norway’s largest owl, and the population has declined since the end of the 19th century, probably due to anthropogenic activity. The eagle owl is now listed as endangered by Norwegian authorities, and an action plan has been developed, identifying measures for the management of these birds. Environmental contaminants are considered as one of several factors threatening the
population. The present study aims to map levels of environmental contaminants in eagle owl across Norway. 100 birds have been opportunistically collected between 1998 and 2014, geographically distributed throughout Norway as far north as the Helgeland coast. Organohalogenated contaminant (OHC) groups analysed were dichlorodiphenyltrichloroethane, its isomers and metabolites (DDTs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), other brominated flame retardants (BFRs), hexachlorobenzene (HCB), hexachlorocyclohexanes (HCHs), Mirex and chlordane. In general, high concentrations of OHCs were found in the birds. Certain individuals had especially high concentrations, contributing to the high mean values. Median values were also regarded as high, indicating that a considerable number of individuals had generally high concentrations of OHCs. The standard deviations of the sample indicate a large variability among individuals. ∑PCB, ∑DDT, ∑BDE were the compound groups showing the highest concentrations with medians 35215, 17068 and 1857 ng/g respectively. The concentrations found in this study can possibly cause adverse health effects. They are comparable to the few previous studies on Norwegian eagle owls from periods 1965-1976 and 1996-1999. The most contaminated birds, with few exceptions, comes from coastal municipalities, suggesting that these birds have preyed in the marine food chain. Preliminary statistics show a downward trend for almost all contaminant groups, but the decrease is not significant.

Echinococcus canadensis from Sápmi to southern suburbs

Antti Oksanen, Finnish Food Authority (FINPAR), Finland

During the 1950s, hydatid cysts were common findings in reindeer lungs. Sporadically, also reindeer herders were infected, which was demonstrated by chest x-ray. The causative agent was obviously Echinococcus canadensis G10, although at that time it could not be genotyped. The definitive host was the herding dog which typically received reindeer offal after slaughter. The introduction of the snowmobile in the early 1960s made the herding dog soon redundant, which very much precluded the life cycle. Especially in Norway, the parasite’s life was also hampered by official control measures banning the feeding of the remaining dogs with raw offal and ordering mandatory regular antiparasitic treatment to dogs.

In the 1990s, after a couple of decades’ hiding, the parasite gradually re-emerged in the eastern part of the Finnish reindeer husbandry area, and in the early 2000s, it was also discovered in the moose (elk) in Eastern Finland. Now, the definitive host was the wolf, with a prevalence of up to 30 %. The only genotype identified was E. canadensis G10. While the wolf during the 2000s and 2010s expanded its distribution range to southwestern Finland, echinococcosis did not follow but only remained in the eastern “wolf core area”. The reason for the absence of the parasite from western Finland may be that the diet there is more diverse, including, in addition to moose, also white-tailed deer, which have never been found infected in Finland. Also in Canada, white-tailed deer is regarded as a rather “incompetent” host with low intensity of hydatid cysts.

However, during the last couple of years, moose infected with echinococcosis have been sporadically found also in the densely populated southern Finland. This may cause some public health concern, which should not be exaggerated. During the last half-century, just one autochthonous human infection has been recorded in Finland.

The Finnish Food Authority – wildlife diseases in a new institute

Riikka Holopainen, Finnish Food Authority
The Finnish Food Safety Authority, the Agency for Rural Affairs and part of the IT services of the National Land Survey of Finland were merged into one single institute, the Finnish Food Authority, 1st January 2019. The Authority operates under the Finnish Ministry of Agriculture and Forestry and it has offices and operation in nearly 20 locations. Among many of its duties, the Finnish Food Authority monitors and studies the safety and quality of food and the health and wellbeing of animals.

Wild and aquatic animal pathology section of the Finnish Food Authority carries out the disease surveillance and diagnostics for the cause of disease of wildlife and aquatic animals. The section operates in three different cities in Finland, but the wild animals are studied mainly in Oulu. The disease surveillance for wildlife consists of targeted and general surveillance, and the goal is to get up-to-date information about the disease situation and to notice epidemics as early as possible. In addition, information on dead wildlife is collected via web query on the institute’s website. Data on wildlife surveillance for selected diseases and pathogens (Trichinella spp., African swine fever and Echinococcus multilocularis) is publicly available in the Authority’s open data portal.

Visiting Säppi, the lighthouse island near Luvia on June 5th, 2019.