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REPORT OF THE MEETING OF THE OIE WORKING GROUP ON WILDLIFE DISEASES

Paris, 12 – 15 February 2007

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The meeting of the OIE Working Group for Wildlife Diseases (WGWD) was held from the 12 to 15 February, 2007, at the OIE headquarters in Paris. The meeting was chaired by Dr Roy Bengis. Drs Torsten Mörner and Ted Leighton were appointed as rapporteurs.

The Group was welcomed by Dr Bernard Vallat, Director General of the OIE. He emphasised the growing importance of wildlife and their diseases internationally, and the commitment of the OIE as outlined in the 4th Strategic Plan to attend to the important linkages between diseases in wildlife, domestic animals and zoonosis. These included the improvement of worldwide disease information gathering and dissemination, improved knowledge transfer and providing Member Countries with updated methods on disease control, and health safety in international trade in animals and animal products. He emphasised the important role to be played by the WGWD in striving for these goals. In addition Dr Vallat stressed the importance of convincing governments and international organisations to consider animal health systems as an international public good and not only of commercial or trade concern. Protection of habitats and biodiversity has a high international profile and increased societal interest should be used to promote the importance of animal health in this context. He also stressed the need for capacity building among animal health policy makers, and the need for greater awareness of the potential role of wildlife in disease epidemiology. A better understanding of the worldwide occurrence of wildlife diseases should be a priority of the WGWD by promoting better surveillance in developing countries, and to encourage transparency in reporting.

Dr Vallat informed the Group that provision has been made in the budget of the OIE for creating *ad hoc* Groups to support when necessary specific activities of the Group. The Group should also consider promotion of linkages with other Working Groups, *ad hoc* Groups and Commissions on cross-cutting issues. Dr Vallat thanked the WGWD for its continuous excellent work, and wished them success with their deliberations.

Dr Gideon Brückner, Head of the Scientific and Technical Department outlined the policy of the OIE in Scientific Conferences and encouraged the Group to consider possibly initiating either a full scientific conference on wildlife diseases or to get involved on specific themes related to wildlife in other scientific conferences organised by the OIE. He also explained to the Group the reason for the inviting the Group to discuss their working programme with the Scientific Commission to whom they are responsible. The main reason for discussions with the Scientific Commission is to align the priorities of the WGWG with that of the Commission and the needs of member Countries related to diseases in wildlife.

The Agenda and list of participants of the Working Group for wildlife diseases are given in Appendices I and II.

1. Matters arising from the 2005 report to the International Committee

Dr. Marc Artois presented the Wildlife Disease Working Group Report to the 74th General Session of the OIE International Committee, in Paris on 24 May, 2006. The presentation was well received and resulted in an extended question and answer session, mainly related to Highly Pathogenic Avian Influenza. There was also support from delegates for the WGWD to be more involved in developing guidelines for disease surveillance in wildlife, compartmentalisation and biosecurity guidelines related to the interface between animal production enterprise and wildlife.

2. Global disease situation in wildlife in 2006

One of the missions of the OIE Working Group on Wildlife Diseases is the collection, analysis and dissemination of vital information regarding diseases in wildlife, including those that cross the interface between wildlife, domestic animals and humans. Emerging diseases, such as those caused by the current highly pathogenic avian influenza H5N1 lineage, illustrate the importance of communicating this wildlife information to OIE, Member Countries, and institutions working with wildlife, domestic animal and public health.

Although the global distribution of reports received has never been uniform, the quality and coverage of reporting from several regions has been excellent. There is however a need to improve reporting from several regions, including South America, Asia, the Middle East and the western and equatorial regions of Sub-Saharan Africa. This suggests that the Official Delegates of some Member Countries may not have appointed wildlife disease contact persons and that reporting wildlife diseases to OIE Wildlife Working Group has therefore not been afforded the priority required to be effective. The Working Group resolved to request the Director General to once again urge Member Countries to appoint focal points for wildlife diseases where this has not already been done.

A total number of 55 questionnaires reporting disease events in 2006 were received from Member Countries. Most countries reported by using the Excel file, which made the work of summarising the information much easier (Appendix V). Diseases in wildlife were not observed in 11 of those Member Countries that submitted reports. Thirty-four countries that had reported in previous years did not submit a report for 2006. A total of 1047 different cases of disease or events were reported.

2.1. OIE-listed diseases reported

Anthrax

In the northern region of the Kruger National Park in South Africa, a localised outbreak of anthrax was detected. Twenty positive carcasses were confirmed on blood-smear examination. The species involved included greater kudu (*Tragelaphus strepsiceros*), nyala (*Tragelaphus angasi*), buffalo (*Syncerus caffer*) and giraffe (*Giraffa camelopardalis*).

In Botswana, at least 130 cases of anthrax were confirmed, in and around the Chobe National Park. Victims included mainly buffalo and zebras (*Equus burchelli*), but the disease also was confirmed in elephants (*Loxodonta africana*), wildebeest (*Connochaetes taurinus*), waterbuck, (*Kobus* ellipsiprymnus), greater kudu, Lechwe (*Kobus leche*), roan antelope (*Hippotragus equinus*) and sable antelope (*Hippotragus niger*). Control measures included mass vaccination of cattle and burning of carcasses.

In Namibia, anthrax was reported to have spilled over from the outbreak in Chobe National park in Botswana to the Caprivi region of Namibia. Cases were reported in elephants and zebras. Mass vaccination of cattle was undertaken as a control measure.

An outbreak of anthrax involving the endangered Grevy's zebra (*Equus grevyi*), in the area of the Samburu, Buffalo Springs and Shaba, in the northern districts of Kenya was successfully controlled by mass vaccination of livestock and the endangered zebras. Over 60,000 head of livestock and 62% of the Grevy's zebra population in the core area were successfully vaccinated in a highly motivated and successful campaign.

The largest epidemic of anthrax ever recorded in Canada occurred in domestic and wild ungulates in summer 2006. Among wild ungulates, occurrence was documented in American bison (*Bison bison*), white-tailed deer (*Odocoileus virginianus*) and moose (*Alces alces*). The epidemic occurred over a broad zone of the Great Plains and its northward extensions into parkland and boreal forest habitats.

Avian Influenza (*See agenda item #8 for the full report.*)

Bluetongue

In the United States, bluetongue virus-1 was detected for the first time in the country in November 2004 in southern Louisiana. Follow-up serosurveillance has been conducted in wild white-tailed deer and domestic cattle in 2005-2006 and preliminary results indicate that if BTV-1 is present in the USA, it is localised in the immediate area where it was initially detected.

Brucellosis

Brucella abortus is endemic in free-roaming herds of bison (*Bison bison*) in and around Wood Buffalo National Park in Northern Canada. *Brucella suis* biotype-4 is endemic in caribou herds (*Rangifer tarandus*) in Arctic and sub-Arctic Canada.

In the United States, *Brucella abortus* is endemic in free-roaming elk (*Cervus elaphus*) and bison in the Greater Yellowstone Area including portions of Idaho, Montana, and Wyoming.

Nine cases of brucellosis with typical carpal hygromata were seen in buffalo in the Kruger National Park, South Africa. The organism isolated from buffalo is *Brucella abortus* biotype-1.

In France a comprehensive sero survey was carried out between 2000 and 2004, in order to assess the distribution of *Brucella suis* biotype-2 in the free ranging wild boar (*Sus scrofa*) population. Together with results of previous bacteriological surveys, it confirms the large distribution of the infection among wild boars over the whole country. In addition, the infection appears to be endemic in the brown hare (*Lepus europaeus*) from which 6 isolates have been obtained in five "departements". As a consequence the infection is sporadically transferred to domestic pigs bred in open air operations: 52 outbreaks have been recorded in 28 departments from 1993 to 2006. Despite popular consumption of hunted boar meat, the number of zoonotic infections remains extremely low, limited to one case in 2004 and one case in 2005.

Avian chlamydiophilosis

There were three reports of mortalities due to Chlamydiophilosis in mixed, wild Psittacine (parrot) species from West Australia in the last two weeks of January.

***Classical Swine Fever* (*CSF*)**

In South Africa, the classical swine fever outbreak in domestic pigs is still being controlled by means of a "stamping out" campaign. Good progress is being made using an area –wide approach. To date, no CSF infection has been detected in indigenous wild suids in the outbreak area. A research project is currently underway to evaluate the susceptibility of indigenous wild suids to CSF virus infection, and determine whether they may play an epidemiological role under free range conditions.

Classical swine fever was reported in wild boar from France, Germany where vaccination is ongoing, as well as the Slovak Republic.

***Foot and Mouth Disease* (*FMD*)**

In the Kruger National Park in South Africa, which is an endemic FMD infected zone, 133 African buffalo were sampled for FMD as part of routine disease surveillance activities. 100% of these buffalo were sero-positive for FMD, with most animals having antibodies to SAT1, SAT2 and SAT3 virus types.

All three virus types were also isolated from probang samples. In addition, 28 buffalo that were sampled from the western part of the adjoining Limpopo National Park in Mozambique showed an identical FMD profile. This exercise once again graphically illustrates the endemic nature and close association between most African buffalo populations and the SAT viruses.

Botswana also reported that 19 buffalo tested in a survey were also all sero-positive for SAT group viruses.

Malignant Catarrhal Fever

In Canada, there was an unusual occurrence of malignant catarrhal fever in a wild moose in 2006. The cause was the sheep-associated strain of the virus. Susceptibility of wild cervids to this viral disease is well known, but transmission to wild cervids from the domestic livestock reservoir appears to be rare.

Newcastle disease

Newcastle disease was reported from double-crested cormorants (*Phalacrocorax auritius*) in Canada and USA. Avian paramyxovirus-1 was reported from pigeons (*Columba livia domestica*) in Latvia, from pigeons (*Columba livia* and *Streptopelia decaocto*) in Portugal and from pigeons, ducks and swans in Turkey.

In Africa, Newcastle disease in farmed ostriches (*Struthio camelus*) was confirmed in four different localities in South Africa, and in Zimbabwe. Mortalities in doves and a single ground hornbill (*bucorvus cafer*) also were confirmed to be as a result of Newcastle disease infection. Newcastle disease was also reported in unspecified doves and wild ducks in Botswana.

Rabies

In South Africa, sporadic cases of rabies involving the viverid biotype were confirmed in 36 yellow mongoose (*Cynictus penicillata*), two marsh mongooses (*Atilax paludinosus*), 12 unspecified mongooses, 10 zorillas (*Ictonyx striatus*), five African wildcats (*Felis* lybica), three suricates (*Suricata suricata*), two common genets (*Genetta genetta*), a caracal (*Felis caracal*) and a honey badger (*Mellivora capensis*). Also in South Africa, sporadic cases of rabies involving the canid biotype were diagnosed in 16 bat-eared foxes (*Otocyon* megalotis), 20 black backed jackals (*Canis mesomelas*) 1 side striped jackal (*Canis adustus*) 6 aardwolfs *(Protoles cristata*), an eland (*Taurotragus oryx*) and a grey duiker (*Sylvicapra grimmiae*).

Namibia reported rabies in 24 greater kudu in 2005. However, in 2006, kudu rabies increased dramatically in incidence and spatial distribution throughout the savannah areas of the country.

In Zimbabwe, rabies was reported in an impala (*Aepyceros melampus*) and a common reedbuck (*Redunca arundinum*).

Botswana reported rabies in black backed jackal and unspecified mongooses.

Rift Valley fever

A major epidemic of Rift Valley fever has been reported in livestock and humans in the north eastern Province of Kenya (Garissa and Ijara districts), and in southern Somalia. These areas have experienced extremely heavy rainfalls with flooding, which stimulates the hatch of dormant Aedine mosquito eggs which are infected with the RVF virus. To date there have been no reports of wildlife infections.

***Tuberculosis (Mycobacterium bovis*)**

Bovine tuberculosis (BTB) in wild animals continues to be an important disease worldwide and was reported from 29 different countries.

In the United States, bovine TB infection was confirmed in Minnesota in six wild white-tailed deer out of 1040 sampled, in addition to one animal detected in 2005. All infected deer were from a geographical area in north-western Minnesota in which seven infected cattle herds have been found and depopulated since July 2005. The *M. bovis* isolates from deer and cattle are similar and genetically consistent with strains from the south-western USA and Mexico. The deer infections are believed to be due to spill-over from infected cattle herds; the original source of infection in Minnesota is unknown. Efforts are underway to reduce the deer population in the affected area in order to reduce exposure of susceptible deer and to prevent potential deer to deer and deer to cattle transmission of *M. bovis*. Bovine TB remains endemic in wild white-tailed deer in the northeast portion of Michigan's Lower Peninsula where it has spilled over into more than 40 cattle herds as well as numerous wildlife species including wapiti and carnivores/omnivores.

In Canada, bovine TB was detected in only one animal in 2006. However, this disease remains endemic in free-roaming herds of wood bison in and around Wood Buffalo National Park in Northern Canada and in a small population of elk and white-tailed deer in the centre of Canada.

In South Africa, bovine TB in buffalo has now spread throughout the Kruger National Park (KNP), with clinical cases finally being detected in the far north, close to the Limpopo River. Bovine TB also was confirmed in 11 lions (*Panthera leo*), one spotted hyaena (*Crocuta crocuta*) and a bushbuck (*Tragelaphus scriptus*) in the KNP. In the Hluhluwe / Imfolozi Park in South Africa, a capture, test and slaughter technique is being used to manage BTB in buffalo. *Mycobacterium bovis* infection has been confirmed to be circulating and maintained in a suricate subpopulation in the Kalahari district of Northern Cape Province in South Africa.

The disease continues to be reported in the Kafue/Lochinvar region of Zambia, as well as in the Queen Elizabeth National Park in Uganda, where it continues to evolve in buffalo and warthog.

In Eastern Africa, bovine TB has been detected opportunistically in the Serengeti ecosystem, where passive surveillance is being carried out.

In Europe, bovine TB was reported in red deer (*Cervus elaphus*), fallow deer (*Dama dama*) and roe deer (*Capreolus capreolus*) from several different countries, as well as from badger (*Meles meles*) in UK and Ireland.

Since 2002 a focus of bovine TB has been recorded in the forest of "Bretonne" (Normandy), France. At this stage the infection was detected in 14% of sampled Red deer and 28% in wild boars. Despite control measures, the epidemiological situation is getting worse. The proportion of deer and boars with visceral gross (pulmonary as well as mesenteric) lesions increased to 25% in deer and more than 7% in boars. The surveillance of 2005/2006, based on lymph node cultures confirmed the increase in both species and the high prevalence of infection (23% in deer and 30% in boars). For the first time *M. bovis* has been isolated from a roe deer and a red fox (*Vulpes vulpes*).

The culling the entire deer population in the affected area, considered as the main local reservoir, is now under course and preliminary results of the surveillance in culled carcasses showed a decline of the proportion of infected deer but not in boars. Several other suspected foci of bovine TB are being investigated in France, but none is considered as serious as the one in Normandy.

Recommendations

Considering the insidious evolution of bovine TB observed among large wild herbivores in continental Europe for several years, the Working Group recommends that the Director General request an update from the Regional representative on the epidemiological situation of bovine TB in continental free ranging wildlife to allow a trend analysis in time to anticipate further aggravation of the epidemiological situation and to consider cooperation for the control of this growing concern.

2.2. Wildlife-listed diseases

Bat lyssaviruses

A fatal human case of Duvenhage virus (Lyssavirus-Genotype 4) was confirmed in South Africa. The victim apparently was scratched by a bat 6 weeks earlier, and did not seek medical attention. This is only the second case of human Duvenhage virus infection ever recorded. The previous case also was recorded from South Africa in 1970.

Lyssaviruses in bats were also reported from Australia, Denmark, Germany and UK.

Crocodile diseases

Approximately 500 cases of crocodile pox were reported in farmed crocodiles (*Crocodylus niloticus*) in Zimbabwe.

An outbreak of Mycoplasmal polyarthritis, caused by *Mycoplasma crocodyli* was seen on one crocodile farm in Zimbabwe.

Adenovirus infection was reported in farmed crocodiles in Zimbabwe. Coccidiosis was also diagnosed in farmed crocodiles in Zimbabwe

In Australia, in mid June there were reports of an unusual number of sick and dying hatchling Salt Water crocodiles (*Crocodylus porosus*) on two crocodile farms near Darwin. The cumulative morbidity and mortality within the eight week to five months age range was inconsistent with previous disease outbreaks in Australia. Sporadic cases also occurred in the one to three year old age group on a third property and on one of the two properties with outbreaks in the hatchlings. More than 60 affected hatchling and older crocodiles were examined and necropsied at the Berrimah Veterinary Laboratories. Affected animals were observed to be lethargic with bilaterally swollen eyelids. There was a pale ocular discharge which was either fibrin-like or mucopurulent. The nictitating membrane was thickened and opaque but the cornea generally remained unaffected in acute cases. Most animals with conjunctival lesions also had diffuse erosion/ulceration of the pharynx with formation of a pale, often detached, diphtheritic membrane or with pale mucosal plaques. During late June and early July PCR assays conducted at Oonoonba Veterinary Laboratory on specimens of conjunctiva and/or pharynx were positive for the family Chlamydiaceae in 13 of 13 animals tested. June 2006 was the coldest month in the Northern Territory for 50 years. It is possible that the cold temperatures and ineffective water heating systems were important risk factors. Water temperatures less than 27°C are known to initiate stress and depress immunity in crocodiles. Specimens have been forwarded to Queensland University of Technology for speciation and typing of the Chlamydia.

Ebola hemorrhagic fever

Researchers claim that during the past decade, the Zaire ebola virus has had a significant impact on the gorilla (*Gorilla gorilla*) populations in and around the Lossi Sanctuary in the Democratic Republic of Congo. Their study reports that the virus transmits horizontally between individuals, but that there is also evidence of group-to-group transmission. Their data suggests that more than 5000 gorillas may have died in their study area in recent years.

Several human mortalities as a result of Ebola virus infection were reported from the Bumba area of the Democratic Republic of Congo in March 2006.

Toxoplasmosis

Seven cases were reported from wildlife in Tasmania. Affected animals included: three Rufous-bellied Pademelons (*Thylogale billardierii*) from Collinsvale, Kingston and Hastings; a Brushtail possum (*Trichosurus vulpecula*) from New Norfolk; two Common Wombats (*Vombatus ursinus*) from Blessington and Franklin; and a Bennett's Wallaby (*Macropus rufogriseus*) from Deddington. Diagnosis was based on histology and serology.

***Transmissible spongiform encephalopathy (Chronic Wasting Disease*)**

Chronic wasting disease (CWD) in wild deer continues to gradually expand its range in Canada. In 2006 it was found in the same regions as detected in 2005, but in areas beyond the boundaries of the zones considered to be the limit of infection. Approximately 8000 hunter-killed wild deer were tested for this disease in 2006 in provincial surveillance programmes.

In the United States, Chronic wasting disease was found in two wild hunter-killed moose (*Alces alces*) in Colorado bringing the total to three since 2005; all have come from the same area in the state. No new foci of CWD were found in the USA during 2006, although expansion of previously identified areas was observed in Wisconsin and Wyoming.

Trichinellosis

Trichinella zimbabwensis infection is still present on a few non-exporting crocodile farms in Zimbabwe, and has also been detected in free-ranging monitor lizards (*Varanus niloticus*) adjacent to these farms.

An unspecified *Trichinella* was also detected in a lion in Zimbabwe. In the KNP in South Africa, a *Trichinella spp* was found in muscle tissues of two of three lions tested – using the pepsin digestion test.

Algeria reported trichinellosis in wild boar and jackal. Trichinosis was frequently reported from carnivores, wild boars and in a beaver (*Castor fiber*) from Latvia.

West Nile virus

This virus remains established and endemic across most of southern Canada with the exceptions of British Columbia and Newfoundland. Recording of wild bird mortalities is used for monitoring virus activity in several regions. In 2006, fatal West Nile virus infection was found in the American White Pelican (*Pelicanus erythrorhynchos*) for the first time in Canada.

A recent publication reported the death of several goshawks (*Accipiter gentilis*) and one sparrowhawk (*Accipiter nisus*) in southeastern Hungary during the summers of 2004 and 2005. These birds died of an acute neurological disease that was subsequently shown to be caused by a lineage 2 strain of West Nile virus. Avian mortality as a result of West Nile virus infection is highly unusual in Europe.

2.3. Miscellaneous wildlife morbidity and mortality events

Adenovirus haemorrhagic disease of deer

This disease and virus was detected for the first time in Canada in summer 2006, in free-ranging mule deer (*O. hemionus*) along the US border. It is known from the same species in the United States, where it was first described.

Tasmanian Devil Facial Tumour Disease

A new steering committee was formed by the Tasmanian Department of Primary Industries and Water to guide the Tasmanian Devil (*Sarcophilus harrisii*) Facial Tumour Disease (DFTD) programme. Significant funding and resources have been committed by the Commonwealth Government of Australia and Tasmanian State Government to combat the problem. Transmission trials are underway and preliminary results support the growing scientific acceptance that the infective agent is a rogue cell-line passed between devils by allograft. This has implications for control and suppression of the disease[1].

1 For more information see http://www.dpiw.tas.gov.au/inter.nsf/WebPages/JCOK-65X2Y6?open.

Monkey pox

An outbreak of monkey pox in humans was reported from Kasai Occidental Province in the Democratic Republic of Congo. This zoonotic infection appears to be related to the bush meat trade, when infected primates, rodents and squirrels are butchered or eaten.

Ophidian paramyxovirus – OPMV

The first presumptive diagnoses of OPMV based on clinical history and histological grounds were made in Australia in several captive collections in Queensland, New South Wales and South Australia in 2004. An informal OPMV focus group has been formed to prioritise research questions and activities and a PhD thesis has commenced, the primary goal of which is to develop a diagnostic test that can be used within Australia.

Renal Coccidiosis

In late September, 30 Black Swans (*Cygnus atratus*) were found weak or dead in the Bowen district of Queensland (Australia). Tests for infectious diseases, including avian influenza, Newcastle disease and also Botulism (by ELISA) were negative. Laboratory investigations of two birds demonstrated renal coccidiosis and heavy intestinal burdens of cestodes.

2.4. Undiagnosed wildlife morbidity and mortality events

Paralysis, paresis and mortality of unknown cause occurred in wild birds of multiple species, primarily Australian Magpies (*Gymnorhina tibicen*) in Sydney basin, New South Wales, Australia. Since 12 February 2006 about 250 reports of bird deaths (numbers ranging from 1 to 15 in each report, mostly clusters of 2–6 birds) centred around the Sydney basin. No obvious cohort or sex predilection. About 70% of total numbers were Australian Magpies, 15% were Currawongs (*Strepera versicolor*). Many birds were found dead and others were either unable to stand, often with a characteristic sequence: unable to fly, then unable to stand, then unable to hold their head up, then acute respiratory problems, then death. Birds generally died within about 6–8 hours of presentation, though there were reports of some birds surviving for up to 10 days. Histology included vasculopathy with non-suppurative myocarditis/myositis, and localised encephalitis or myelitis. Avian influenza, West Nile virus and Kunjin, Newcastle disease, Murray Valley Encephalitis, Japanese Encephalitis, Enteroviruses, intoxication and common avian diseases were ruled out.

Avian influenza and West Nile virus were excluded as the cause of death in a small number of multiple avian species (mostly Australian ravens – *Corvus coronoides*) found dead at a beach-side suburb in Perth, WA in February. Intoxication was suspected.

Avian influenza was excluded as the cause of mortality noted in a sub-sample of about 100, mostly adult, Flesh-footed Shearwaters (*Puffinus carneipes*) found dead around the Albany area of Western Australia in April. No gross lesions were noted. The cause of death is unknown, however infectious disease appeared very unlikely and accidental by-catch (i.e caught in the fishing nets) associated with the local pilchard fishery was suspected.

Non-suppurative encephalitis was evident histologically in an Australian Raven (*Corvus coronoides*) from Gembrook, Victoria in early April. Several ravens from this area have previously been diagnosed with non-suppurative encephalitis. Avian influenza, Newcastle disease and West Nile virus infections were ruled out. The cause of the encephalitis is unknown.

Deaths in a small number of neonatal, endangered Orange-bellied Parrots (*Neophema chrysogaster*) from a captive breeding colony in Tasmania are currently under investigation. Preliminary results suggest a herpes virus and the investigation is continuing. (Orange-bellied parrots are one of the world's most endangered species.)

Over a two week period in September a small cluster of bird deaths (n ~ 45) consisting of mostly Australian Ravens (*Corvus coronoides*), Feral Pigeons (*Columba livia*) and some others, was reported in central Canberra, ACT. Infectious diseases, including avian influenza, West Nile virus and Newcastle disease were ruled out. The birds died from organophosphate poisoning.

Chimpanzee deaths – Mahale Mountain National Park –Tanzania

A significant number of chimpanzee (*Pan troglodytes*) mortalities are reported to have occurred in the Mahale National Park in Tanzania. The mortalities are suspected to be related to human respiratory infections transmitted during primate tourism activities, when infected humans are in close proximity to habituated apes.

2.5. Surveys for diseases in wildlife

Surveillance to monitor flying foxes (Megachiroptera) for novel and zoonotic viruses, including Nipah, Hendra and Australian bat lyssavirus, is carried out throughout the year in the Kimberley region of Australia. Surveillance involves opportunistic sampling of flying foxes under the care of wildlife rehabilitators and clinical cases submitted from the Western Australian Department of Land Management. There is no evidence to suggest Nipah virus is present in Australia.

3. Matters arising from the Scientific Commission and OIE's future needs

The Working Group reviewed the information received from the Scientific Commission at its meeting of 20 September 2006 at which the future work programme (2007-2010) of the Working Group had been presented and discussed. It is the view of both the Scientific Commission and the Working Group that the work of the Group should be more directly integrated with the work of the other Commissions and Working Groups of the OIE, and thereby serve the OIE mandate more directly and efficiently. The collaboration of the Working Group is needed in many areas of OIE activity, for example in revision and additions to relevant chapters of the Code(s) and Manual(s), and policy documents on compartmentalisation, zoning, and standards for preparedness to manage trans-boundary disease outbreaks and emerging diseases, and assessment of appropriate laboratory procedures for the diagnosis of diseases in wild animal species.

The Working Group requests the Director General that the Group be made more aware of relevant OIE activities, be invited to participate in relevant *ad hoc* Groups, and receive for review and comment within their field of competence the draft reports of the Scientific Commission and the Commissions on:

- Terrestrial Animal Health Standards
- Aquatic Animal Health Standards
- Biological Standards

The Working Group will present its working plan for 2007 to the Scientific Commission at its meeting on 26-28 February 2007 and will seek advice from the Commission on aspects of that plan regarding linkages to other *ad hoc* Groups and Commissions and to the priorities of the Commissions and the OIE.

The Working Group will propose to the Scientific Commission initiatives that may require development of *ad hoc* groups, international consultation or other activities that will substantially extend the Working Group's capacity to serve the OIE and its mandate.

The Working Group will revisit some of its past recommendations and consider whether or not some of these should be updated.

The Working Group has identified, during its February 2007 meeting, the following topics reported on in the past and to be brought forward to the Scientific Commission in the context of the Working Group's 2007 work plan:

– National preparedness to respond to and manage important diseases in wild animals
– The disease risk posed by international trade in wild animals and wild animal products

4. The Need to Improve Regional Communication for the Working Group of Wildlife Diseases

With regard to the continuing difficulties experienced in obtaining wildlife disease information from certain regions, the Working Group recommends that the Director General consider appointing two additional members, one from South America and one from Asia to the Working Group.

The Working Group recommends that the Director General endorse and encourage a global network for wildlife disease surveillance under the auspices of the OIE. This network would link together institutions and individuals knowledgeable about wild animal diseases. For example the network would include OIE delegates, OIE Regional Offices, the OIE Animal Health Information Department, the joint FAO-OIE-WHO Global Early Warning and Response System, IUCN, etc. The Working Group envisages managing the establishment and monitoring of the operation of the network on behalf of the OIE. An OIE Collaborating Centre should be tasked with the day-to-day operation and management of the network.

5. Preparedness to respond to foreign (transboundary) animal diseases

The Working Group has considered this agenda item at its annual meeting in each of the past several years. A report on this topic was made to the International Committee by the Working Group in 2004. The Working Group has considered developing a full set of guidelines on this topic, similar to the FAO's *Manual on the Preparation of National Disease Emergency Preparedness Plans* (1999), and has prepared a draft of an addition to the 2004 report.

It is the consensus of the members of the Working Group that any programme of national disease management and contingency planning must include preparedness to respond to important diseases when they occur in wild animals, as well when they occur in domestic animals and humans. The Working Group wish to take steps to facilitate such planning and preparedness by Member Countries, but wishes to do so with advice and direction from the Scientific Commission, and in association, as appropriate, with the *ad hoc* Group on Epidemiology and its documents on emergency planning and responses for disease occurrences. The WDWG suggests that this important topic should form the theme of a full scientific conference aimed at focusing on preparedness, surveillance and management of foreign animal diseases in wildlife.

The Working Group will provide its 2004 report (Preparedness for Response to a Trans-Boundary Animal Disease in Wildlife) and its recent draft addition of that report (Managing Significant Emerging Diseases Involving Wildlife) to the Scientific Commission for review, comment and direction on this issue.

The Working Group will also provide two documents on wild animal disease preparedness to the *ad hoc* Group on Epidemiology for comment and consideration as to whether or not further work on this topic, as may be advised by the Scientific Commission, should be a joint initiative with this *ad hoc* Group (Appendices II and IV).

6. Wildlife health education and training

The Group took note of Resolution XXXIV of the 74th General Session of the OIE and specifically the recommendation that *OIE should develop standards and guidelines for the continuing education of the agents of the veterinary services to assure the quality of veterinary services* and that the OIE *should intensify its action to help prevent and control zoonotic diseases*.

The Group considers most emerging human infections to be zoonotic and that, in recent years, a significant proportion emerged from a wildlife reservoir. For this reason wildlife disease and health, training should be made available to officials and private veterinarians because of the public health implications.

The Group request that the Director General ask the relevant OIE Collaborating Centres in Teramo, Lyon and Buenos Aires to prepare education programmes related to wildlife disease and health, and prepare an inventory of the documents and media already available in member countries, and specialised training programmes in line with continuous education aims.

The WDWG expressed its availability to assist Collaborating Centres for wildlife diseases to analyse the needs of veterinary services regarding wildlife health and risks associated with wildlife diseases, as well as available surveillance technology, natural history of diseases and any relevant topic linked to its mandate.

7. Avian Influenza Global Situation - 2006

Europe

Highly pathogenic avian influenza mortalities due to the H5N1 strain of the virus occurred in wild birds in twenty-four countries in Europe. Countries affected were: Albania, Austria, Bosnia, Bulgaria, Croatia, Czech Republic, Denmark, France, Georgia, Germany, Greece, Hungary, Italy, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine and United Kingdom.

More than 80% of the wildbirds mentioned in reports were Anseriformes, (ducks, geese and swans) the other orders represented in a significant number are Pelecaniformes (large cormorants, but coming mostly from a focus in Ukraine), Charadriiformes (sea gulls), Falconiformes (diurnal raptors).

Among Anseriformes, swans (mainly Mute swans (*Cygnus olor*) accounted for 75% of the birds in infected foci. The tufted duck (*Aythya fuligula*) and the common pochard (*Aythya ferina*) were the only ducks present in significant numbers and only a single mallard (*Anas platyrhynchos*) was recorded in Sweden, even though this is the most common duck in Europe.

HPAI H5N1 also was reported in three domestic cats and one stone marten (*Martes foina*) from Germany, and from one mink (*Mustela vison*) from Sweden.

Wild bird mortalities associated with H5N1 began in autumn 2005 and lasted until June, 2006. The number of cases peaked at the end of February and then decreased slowly until June. A total of 261 mortality events were recorded in wild birds.

The two European OIE Reference Laboratories found closely related sequences from wild bird samples collected in Croatia, Romania, Russia, and Turkey when compared with isolates from Qinghai Lake in China.

Four countries (Denmark, France, Germany, and Sweden) that experienced significant outbreaks in wild birds only recorded a single flock of infected domestic poultry.

In summary, the Group concluded that the highly pathogenic H5N1 virus probably reached Europe via wild birds, and caused numerous cases in wild birds in central Europe. However, the spread of the disease in domestic poultry appears to be linked to the movement of avian products and people rather than to wild birds.

North America

In the United States, surveillance of wild birds for highly pathogenic H5N1 avian influenza virus was conducted in all 50 states and American Samoa, Guam, Marshall Islands, Midway Islands, Palau, and Puerto Rico. All results have been negative for this virus, although low pathogenicity viruses were found. The current surveillance season began 1 April 2006 and extends to 31 March 2007. As of 9 February 2007, samples were collected from 41,060 live birds, 21,628 hunter-killed birds, 1,537 dead wild birds, and 456 sentinel birds. In addition to these 64,681 samples from birds, 9,825 environmental samples were collected and tested. The greatest number (17,609) of samples tested came from Alaska, which was identified to be at higher risk because of possible migratory bird movements from affected areas in Asia.

In Canada a National survey of nearly 12,000 live water-associated birds and of all species of bird found dead was carried out across the country in late summer and fall of 2006. Approximately 37% of live wild ducks were infected with one or more Influenza A viruses while infection rates were lower in other species[2]. H5 sub-type avian influenza viruses isolated from wild birds in 2006 were one H5N9, five H5N2, one H5N1. All were

[2] Survey results can be viewed on the Internet at <http://wildlife1.usask.ca/en/aiv/aiv_reports_2006.php>

of low pathogenicity (LP) and were North American lineage viruses. No H7 subtypes were detected. In addition, one H5N1 LPAI was detected based on PCR and sequence only; no isolate was obtained. In total, 1712 of 12,848 wild birds tested positive for Influenza A virus (13%).

Africa

On the African Continent, highly pathogenic avian influenza (HPAI) involving the H5N1 virus has been reported in poultry in Nigeria, Egypt, Niger, Cameroon, Burkina Faso, Cote d'Ivoire and Sudan. In Cote d'Ivoire, a single case was also confirmed in a sparrowhawk (*Accipiter nisus*).

Several cases in unspecified wild ducks also were reported in Nigeria.

In South Africa, two outbreaks of H5N2 infection were detected in farmed ostriches in the Western Cape Province. The first outbreak involved a highly pathogenic that caused clinical disease and mortalities in young ostriches. This outbreak was localised to three adjacent properties and control was achieved with stamping out and quarantine and testing of all ostrich farms within a 10km radius. This outbreak strain differed significantly from the strain that caused the 2004 ostrich outbreak.

The second outbreak in 2006 involved a low path (LPNAI) H5N2 strain, which caused sero-conversion, but no overt disease. This outbreak was more widespread in the Western Cape, and was detected as a result of ongoing sero-surveillance in ostriches in that area, since 2004. South Africa was declared free of HPNAI on 26 Oct 2006.

Zimbabwe also reported H5N2 infection in farmed ostriches, with low clinical expression and mortality.

Australia / New Zealand

Australia has enhanced the surveillance of avian influenza in wild birds. During the period July 2005 to December 2006, cloacal swabs and blood samples have been collected from 5252 wild birds, from 59 bird species. The majority of samples were collected from shorebirds (e.g. ducks, magpie geese, waders), with a smaller number from other species like shearwaters. Evidence of a number of low pathogenic subtypes was detected: H4N6 and H13N6 strains were isolated; serological and PCR evidence of other low pathogenic strains was found. No pathogenic strains have been isolated. Avian influenza virus has also been excluded as a cause of eight wild bird mortality events in Australia between July 2005 and December 2006. Major surveillance activities for avian influenza in wild birds are continuing. Similar results have been recorded in New Zealand.

Asia

Highly pathogenic virus was found in 17 cases following dead bird investigations, mainly resident birds / passerines, in Hong Kong. Vietnam reported cases in egrets (*Egretta garzetta, Casmerodius albus*)

The Group recommends that:

- Passive surveillance based on mortality investigations gave the best yield of HPAI viruses and is strongly recommended.

- Active surveillance of live migratory birds is an important tool because it yields a variety of low pathogenicity strains of AI virus. This type surveillance is also valuable for epidemiological studies.

- The Working Group recommends that OIE support publication of a Scientific and Technical Review article on the HPAI outbreak in Europe in conjunction with FAO and WHO.

8. Paratuberculosis in wildlife

The WDWG agenda included a review of the global situation of paratuberculosis in free ranging wildlife. A comprehensive review on paratuberculosis was already presented in 2001 by Gerhold and Fischer and included in the report of the Group in 2001. Nevertheless the epidemiological situation of this chronic infection evolves with time and needs a regular re-assessment. The current paratuberculosis status was reviewed by Dr Artois, Fisher, Bunn and Mörner and discussed by the Group.

Diagnostics of paratuberculosis infection is complicated by frequent non clinical cases. Moreover lesions are not pathognomonic due to gross and microscopic similarities with lesions caused by other *Mycobacterium* subspecies (*tuberculosis* and, or *M. avium subsp. avium*). In addition, several clinical presentations have been seen which are related to different strains of *M. avium subsp.paratuberculosis.* Molecular techniques are needed for the specific identification of *M. avium* subsp. *paratuberculosis.* These tools are absolutely required when a mixed mycobacterial infection occurs, as has been observed in Red deer.

In general, paratuberculosis (Johne's disease) is a chronic granulomatous disease of the intestinal tract and associated lymphoid tissues caused by *Mycobacterium avium paratuberculosis*. Clinical signs of paratuberculosis are progressive emaciation, associated with diarrhoea.

Paratuberculosis infection of free-ranging wildlife and captive deer species is relatively common, but usually limited to localised or regional foci of infection. Domestic cattle seem quantitatively to be the most important source of environmental contamination; wild ungulates can be infected from that source. Infection has been documented in a broad range of terrestrial wild mammals, predominantly herbivores and their predators.

In Europe Paratuberculosis infection is known to occur and is regularly reported from Austria, Belgium, Czech Republik, France, Italy, Spain and the UK. Red and Fallow deer (*Cervus elaphus* & *Dama dama*) are most frequently involved. Smaller mammal species can also play a role in the epidemiology of the infection.

In Wisconsin and Georgia (USA) a survey for *Mycobacterium avium* subsp. *paratuberculosis* infection in free-ranging mammals and birds was recently conducted on nine dairy and beef cattle farms. The prevalence of infection in wild animals by premises ranged from 0 to 8.3%. Shedding of bacteria was documented in only seven (0.9%) animals, including raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), opossum (*Didelphis virginiana*), and feral cat (*Felis catus*). This study documented the fact that compared to the volume of contaminated manure produced by infected domestic ruminant livestock, contamination of the farm environment by infected wildlife was negligible.

In addition, in Scotland, regional "hot spots" of *Mycobacterium avium* subsp. *paratuberculosis* in wild rabbits (*Oryctolagus cuniculi*) have been recently detected, and there is increasing evidence of a link between paratuberculosis infections in rabbits and cattle. The overall prevalence of *M. avium* subsp. *paratuberculosis* in rabbits was close to 40%; the temporal distribution of infection in rabbits follows a cyclical pattern, with a peak in spring decreasing in summer. The risk of interspecies transmission appears to be spatially clustered in the environment, mostly due to the clustered distribution of rabbits.

Following this information from Scotland, studies have been carried out on the prevalence of paratuberculosis in eastern grey kangaroos, because of their high population densities in many sheep growing areas of Australia and the frequency of shared grazing between sheep and kangaroos. A major survey to determine the prevalence of *M. paratuberculosis* in macropods by culture and histopathology was undertaken on Kangaroo Island The prevalence was 1.7%. A second phase of the research focused on whether macropods were excreting *M. paratuberculosis* in faeces, but the pathogen could not be identified by either individual or pooled faecal culture.

The Working Group expressed concern that annual notification to OIE do not cover all outbreaks of paratuberculosis and that the prevalence is probably underestimated in wildlife. Diagnostic testing still poses technical difficulties and the Biological Standard Commission should take note on the need for improvement. A sensitive and specific serological test could be of great value for epidemiological surveillance and risk analysis in wildlife.

Currently monitoring of infection is difficult which makes management difficult. Veterinary services should realise that livestock is both a victim of as well as a source of paratuberculosis infection for wildlife species sharing the same ecosystem. The Group considered it important to ban the introduction of captive deer into the wild before proof of the freedom from infection of the whole group of animals to be released can be demonstrated by an appropriate investigation.

The persistence of outbreaks on farms and their premises, despite efficient control, may lead to the hypothesis that a wild reservoir maintains the paratuberculosis infection locally. As no vaccine has been approved for free-ranging wild species, and provided that:

- a focus is well delimited by natural barriers,
- the wild reservoir is correctly identified,
- the wild reservoir species is not under threat of extinction,
- culling is feasible with humane and environmental friendly methods,
- and finally that the management of the focus can be integrative (both domestic and wild compartments are to be considered together),

culling can be an option to achieve the long lasting control of a paratuberculosis focus.

9. Commercial Wildlife Trade Issues

Global trade in wildlife and wildlife products is extensive and although accurate figures are unavailable, estimates indicate that approximately 40,000 live primates, 4 million birds, 640,000 reptiles and 350 million tropical fish are traded each year. Tens of millions of wild animals are estimated to be shipped each year regionally and from around the world for food or use in traditional medicine in East and Southeast Asia. This trade increases risk for the development and spread of emerging and re-emerging infectious diseases that threaten wildlife, domestic animals, and humans. Several examples demonstrate that this risk is not only theoretical.

- In 2003, clinical monkey pox infections were confirmed in 37 persons from six states in the United States following contact with pet prairie dogs (*Cynomys* spp.) that had been exposed to imported African rodents carrying the virus. Previous infections documented in the United States among pet prairie dogs, which often are vacuumed from their burrows in the wild to be sold through animal dealers, include tularemia and plague. No actions were taken previously because human illness did not occur following contact with infected prairie dogs; however, the human monkey pox infections in 2003 precipitated new federal regulations that prohibited the importation, sale, transport, and release of six species of African rodents, as well as prairie dogs.

- The emergence of severe acute respiratory syndrome (SARS) in 2003 in Asia was associated with wild animals in commercial trade. The coronavirus associated with SARS has been linked to international trade in small carnivores and a study comparing antibody evidence of exposure to this virus showed a dramatic increase from 0% or low prevalence among civets at farms to approximately 80% in civets tested at markets.

- Chytridiomycosis is a fungal disease identified as a major cause of the extinction of 30% of amphibian species worldwide that has been spread by international trade in African clawed frogs (*Xenopus laevis*).

- Highly pathogenic H5N1 avian influenza virus was isolated from two hawk eagles (*Spizaetus nipalensis*) illegally imported to Belgium from Thailand in 2004.

- Many native wildlife species that enter commercial wildlife trade have been linked to zoonotic diseases, such as salmonellosis associated with reptiles, including chelonians.

The abbreviated list of examples is strong evidence that wildlife trade provides opportunities for disease establishment, transmission, and spread that can cause human disease outbreaks and threaten livestock, international trade, rural livelihoods, native wildlife populations, and ecosystems. The disease risks associated

with wildlife trade should be assessed and managed appropriately. Further, with the exception of situations in which unacceptable levels of risk are inherent, the Working Group believes that total bans involving particular species or geographic areas may encourage illegal animal trafficking and remove animals from regulatory oversight.

The Working Group recommends that the Director General should consider formalising arrangements to develop and implement strategies to assess and manage risks associated with commercial wildlife trade such as through Agreements with non-governmental organisations, particularly with the World Conservation Union (IUCN) and others with expertise in wildlife issues.

10. Accessibility of Wildlife Disease Information

The Working Group was informed by the Head of the OIE Animal Health Information Department on the OIE's World Animal Health Information System (WAHIS and then discussed how the Working Group's annual questionnaire on global wild animal disease occurrences could be transferred to the WAHIS system so that Member Countries and their wildlife disease focal points could enter these data directly into the WAHIS system.

This possibility was greeted with enthusiasm by the Working Group. One member had used WAHIS for other purposes and reported it to be an excellent system for data entry and retrieval. The current WAHIS system appears to have all of the functions required to receive and report to the Working Group, Official Delegates and others the information currently gathered by the Working Group each year via its questionnaire. WAHIS now has special sections for data regarding diseases in terrestrial animals and in aquatic animals. It will be necessary for the Working Group to work with the Animal Health Information Department of the OIE to develop a third section for wildlife. It then will be possible to view, report and analyse together important diseases in domestic and wild animals. Some diseases that occur in wild animals are of immediate and urgent interest to OIE and its member countries. Direct reporting of these diseases to the OIE through WAHIS should be the first priority of this wildlife disease reporting initiative. Reporting of other diseases in wild animals may be achieved in the next few years by a mixture of the new WAHIS approach and the current method of gathering disease occurrence data through the Working Group's own questionnaire which is sent to focal points in the global network for wildlife disease surveillance. The Working Group's questionnaire can be modified so that there is no duplication in the reporting requested of focal points by the two reporting systems (direct reporting via WAHIS and the Working Group questionnaire).

The Working Group has received important feedback from persons who receive its wildlife disease questionnaires each year and send data back to the OIE. An important observation made was that some data providers are losing interest in doing this work because they receive no information in return. Data providers expect to receive a compilation of the global annual disease occurrence data in return for the data each provides annually. Although the Annual Report of the Working Group to the International Committee eventually is placed on the OIE website in due course (web page of the Working Group on Wildlife Diseases), it is very difficult to locate the wildlife pages on the OIE website[3] and its availability is not announced to data providers. The Working Group considers it essential that all data providers should receive direct communication from the OIE about the global wildlife disease situation as gathered each year by the Working Group, and that this should occur at the earliest possible moment after the International Committee has received and approved the annual report of the Working Group each year.

The Working Group discussed its web pages on the OIE website. The Working Group is very pleased to have these web pages, and wishes to make these a focal point for communication and access to wildlife disease information from the OIE. However, the Working Group identified significant and important problems with these web pages and navigation of the OIE website to gain access to these web pages. The web pages are very hard to find within the current OIE web site structure. The Working Group web pages themselves also are not well indexed for navigation to find the Working Group reports and related documents. The Working Group requests that specific attention be given by the relevant Department in the OIE to making the webpage more user-friendly.

[3] http://www.oie.int/wildlife/eng/en_wildlife.htm

The Working Group requested:

- that the OIE ensures that all institutions and persons who provide wildlife disease occurrence data to the OIE be provided with the full annual report of the Working Group, the summary made each year of that report, and the compiled global disease occurrence data appended to that report. This can best be achieved by ensuring that these three items are placed on the web page of the Working Group on Wildlife Diseases as soon as possible after the documents are received and approved by the International Committee in May of each year, and then by also ensuring that each data provider receives a communication explaining that these documents now are available and giving the precise URL where they are located. The Working Group would be pleased to assist the OIE in making these communications.

The Working Group recommends:

- that the Director General consider to establish an *ad hoc* Group to work together with the Animal Health Information Department to develop a new section of WAHIS specifically for diseases in wild animals. This work should be completed within a 6-month period. The mandate of this *ad hoc* Group should be limited to addressing the requirements of WAHIS design to permit entry of wildlife disease data into WAHIS. This should include selection of the limited number of diseases to be reported in this direct manner by Delegates or their wildlife disease contact points, the data fields to be included, arrangements for complete lists of host animal species and of the diseases to be included, and other technical details of database design and function.

- that the Working Group recommends that a limited number of diseases occurring in wild animals be reported in 2007 directly into WAHIS by Delegates and their wildlife disease contact points, while data on all other diseases occurring in wildlife be gathered through the Working Group Questionnaire as modified and distributed through the global wildlife health surveillance network and reported to the OIE through the Working Group on Wildlife Diseases. Over time, these two systems should be progressively integrated.

- that the Working Group recommends that the web pages of the Working Group on Wildlife Diseases be recognised by the OIE as an essential component of the OIE wildlife disease surveillance programme, and, as such, that the needs of the Working Group for improvements in the web pages and their navigation be accorded a high priority for implementation.

11. OIE international responsibilities related to invasive alien species and the Convention on Biological Diversity (CBD)

The Wildlife Disease Working Group was requested by the OIE Central Bureau to comment on recent correspondence between the OIE and the WTO, CBD and FAO /IPPC regarding the issue of alien and invasive species. The Wildlife Disease Working Group fully supports the OIE's position with regard to alien and invasive species in that its mandate and responsibilities are limited to controlling the spread of animal and zoonotic pathogens and disease vectors. The Working Group indicated that invasive alien pathogen or vector lists would vary from country to country, region to region, and that it may be useful when explaining these complexities to the relevant NGOs that are associated with Biodiversity Conservation, to categorise pathogens or vectors according to the following groupings:

1) **Alien pathogens or vectors known to have very invasive properties and which have never previously occurred in a country or region, OR have been eradicated from that country or region:** In this case, every effort must be made to keep these pathogens out of a country or region. These would include most OIE listed pathogens which do not naturally occur in a specific country or region:

2) **Alien pathogens or vectors that have become established in a country or region**: active control / eradication mechanisms are required to manage these invasive organisms.

3) **Extra-limital pathogens or vectors:** are important indigenous pathogens that have moved or spread outside of their natural distribution range or established control zone(s) in a specific country or region.

4) **Endemic pathogens and vectors**: are part of the indigenous microbial /parasitic biodiversity in a specific country or region.

5) **Ubiquitous pathogens**: occur on most continents and frequently have broad host ranges.

The Group resolved that this attempt at logical categorisation of pathogens or vectors should go a long way in clarifying the position of the OIE on control of invasive alien organisms. Furthermore, the Group is of the opinion that the mandate for control of invasive alien animals should logically be the responsibility of the Environmental Conservation Agencies and NGOs, particularly IUCN/WCU. The Group does however take note that an alien or invasive animal may carry important pathogens, and would be willing to assist or advise countries on animal or zoonotic disease risk related to the incursion.

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…/Appendices

Appendix I

MEETING OF THE OIE WORKING GROUP ON WILDLIFE DISEASES

Paris, 12 – 15 February 2007

Agenda

1. **Matters arising from the 2005 report to the International Committee**

2. **Global disease situation in wildlife in 2006**

   2.1. OIE-listed diseases reported
   2.2. Wildlife-listed diseases
   2.3. Miscellaneous wildlife morbidity and mortality events
   2.4. Undiagnosed wildlife morbidity and mortality events
   2.5. Surveys for diseases in wildlife

3. **Matters arising from the Scientific Commission and OIE's future needs**

4. **The Need to Improve Regional Communication for the Working Group of Wildlife Diseases**

5. **Preparedness to respond to foreign (transboundary) animal diseases**

6. **Wildlife health education and training**

7. **Avian Influenza Global Situation - 2006**

8. **Paratuberculosis in wildlife**

9. **Commercial Wildlife Trade Issues**

10. **Accessibility of Wildlife Disease Information**

11. **OIE international responsibilities related to invasive alien species and the Convention on Biological Diversity (CBD)**

MEETING OF THE OIE WORKING GROUP ON WILDLIFE DISEASES

Paris, 12 - 15 February 2007

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Preparedness for Response to a Trans-Boundary Animal Disease in Wildlife

Many pathogens of socio-economic and human health importance are present in wild animals. These pathogens can be transmitted between wild animals, domestic animals and people, and each of these groups of hosts may serve as a reservoir and source of infection for the others. A great many of the pathogens of greatest concern to the WOAH/OIE infect wild animals. Infection of wildlife can make disease control efforts difficult or impossible, and can greatly increase the duration of trade sanctions. Pathogens also can have impacts on wild animal populations themselves, with important social, economic and ecological consequences. As scientific understanding of the transmission and ecology of these pathogens has advanced, it has become clear that countries can not control or manage many of the pathogens of greatest importance unless such management is carried out with respect to all three host groups: humans, domestic animals and wildlife. Thus, for both internal health management and international trade, it has become imperative that countries take the steps and establish the procedures required to respond to and manage major pathogens when they occur in wild animals.

The Working Group on Wildlife Diseases has reviewed the issues associated with achieving national preparedness to manage diseases in wildlife in order to provide member countries with a general overview of the infrastructure, activities and inter-department linkages required. This review was originally provided to the WOAH/OIE in 2004. It is now being brought to the Scientific Commission for its review and consideration of what further work should be undertaken by the WOAH/OIE on this issue.

Five documents pertaining to national preparedness for management of Transboundary Animal Diseases (TAD) in wild animals were reviewed:

1. *Manual on the Preparation of National Animal Disease Emergency Preparedness Plans (1999).* W.A.Geering, P.L. Roeder and T.U. Obi; Food and Agriculture Organization of the United Nations, Rome.

2. *Animal Health Australia (2003). Wild Animal Response Strategy (Version 3.1).* Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 3, Primary Industries Ministerial Council of Australia and New Zealand (PIMCANZ), Canberra, ACT.

3. *Partnership, priorities and professionalism: A strategy for enhancing veterinary surveillance in the UK. (2003)*. Department of Environment, Food and Rural Affairs, London.

4. *Canada's National Wildlife Disease Strategy (Draft M-2, November 2003)*. Canadian Wildlife Directors Committee, c/o Canadian Wildlife Service, Environment Canada, Ottawa.

5. *National Emergency Response to a Highly Contagious Animal Disease* (United States Department of Agriculture, Updated March 30, 2001). The USDA's emergency response manuals currently are undergoing revision and a final draft is pending.

The review was undertaken to identify common elements in relevant disease management plans that might be used in the future as background for preparation of WOAH/OIE guidelines for development of national preparedness plans for management of TAD involving wildlife.

Only the Australian and Canadian documents are directed specifically at wild animal disease management. The FAO, UK, and USA documents are more general animal disease management plans in which wild animals are included explicitly (FAO) or implicitly (UK). By its nature and intent, the FAO document is structured precisely as guidelines to preparedness planning and, as such, is a model document for the WOAH/OIE, should the WOAH/OIE decide to establish preparedness guidelines relevant specifically to management of TAD in wildlife. The Australian

and Canadian documents are clear examples of the importance placed on wildlife in national TAD preparedness planning by two WOAH/OIE-member countries. While the five documents differ in detail and focus, the essential components of preparedness planning with respect to TAD in all five are highly similar and are identified and discussed here.

Justification for Management of TAD in Wild Animals

The documents justify all animal health management planning on the basis of their contribution to ensuring public health and food safety, viable animal-based economies, social and cultural well-being and the welfare of the animals themselves. The diseases of concern thus conform largely to those now being referred to as Transboundary Animal Diseases or TAD. Wild animals may be both reservoirs and sensitive indicators of important human and domestic animal diseases, and wild animals themselves may be important to local and regional economies and ecological stability. Wild animals can carry infectious disease-causing agents across national borders and can be negatively affected by the arrival of new pathogens. There is general agreement among the documents that it is not possible to manage TAD without full consideration of wildlife in preparedness and contingency planning.

Goals of Transboundary Animal Disease Management in Wild Animals

The documents all enunciate two primary goals:

1. Early warning of disease outbreaks
2. Early and rapid responses to disease outbreaks

These two general goals of TAD management in wild animals are to be achieved through the same programmes and processes as are widely adopted for TAD control in domestic animals. However, the details of the necessary programmes and processes applied to wildlife differ in some respects from those applied to livestock or other domestic species, and thus specific processes and procedures that assure extension of national TAD management programmes to wildlife species must be planned and implemented.

Essential Elements of preparedness to Manage Transboundary Animal Diseases in Wildlife

1. *Animal Demography* - The number, density and distribution of wild animal species associated with risk from TAD must be known. Response planning is impossible without this information. Species of greatest concern must be identified and accurate estimates of their demography must be made regularly. Alternatively, the methods and resources to immediately gather this information in the face of an outbreak (Australian plan) must be assured.

2. *Wildlife Disease Surveillance* - This is the overarching, key element in TAD preparedness.

   "Wildlife disease surveillance must not be overlooked. Wildlife may provide a reservoir of infection for some diseases, but may also act as a sensitive indicator of diseases that are not clinically apparent in adjacent livestock populations. The latter has occurred recently with African Lineage 2 rinderpest virus in East Africa. Close cooperation is required between veterinary and wildlife authorities." (FAO - Chapter 4)

   Disease Detection: The documents uniformly require surveillance for diseases in wildlife that includes full use of samples of opportunity ("passive" or "scanning" surveillance) and also statistical surveys for particular diseases in particular species or groups of species ("active" or "targeted" surveillance). The former is essential to detect new or unexpected disease occurrences while the latter is needed to assess presence or absence of specific diseases and to measure their prevalence.

Laboratory Capability: The documents give particular attention to the requirement that local, regional and national disease testing capacity must be in place for all diseases of possible concern, and that relationships between these laboratories and appropriate international Reference Laboratories and Collaborating Centres should be established to assure immediate, correct identification of TAD. Laboratories also must be capable of identifying new or unexpected diseases; their expertise and capability must not be restricted to lists of known TAD.

Information Technology: Great emphasis is placed on information technology capable of immediate data entry, centralisation of data, and distribution and analysis of disease occurrence information. These IT systems must link all participants. This aspect of surveillance is tightly linked to the overall communications requirements of national TAD management plans.

Risk Analysis: Surveillance information must be reviewed and analysed. Any occurrence of a TAD that may require a management response must receive immediate risk analysis to guide the decision on whether or not to implement a response programme and the nature of that response programme.

3. *Contingency Response Plans*

Plans for responses to outbreaks of TAD must be made in detail and in advance of detection of important TAD through surveillance.

Generic and Specific Response Plans - TAD response plans should be of two different kinds:

i. *Generic Response Plans*: These plans are made with reference to possible outbreaks in a range of species, habitats and geographic locations, and for a range of infectious agents with different characteristics of transmission, persistence and other epidemiological factors. Generic plans facilitate responses to outbreaks of new or unanticipated diseases.

ii. *Response Plans for Specific Diseases*: Risk analysis must be undertaken to identify TAD with the greatest likelihood of occurrence in a country or region. Response plans specifically for these diseases in susceptible wild species then must be made. These plans can be highly detailed with respect to susceptible species, control or eradication measures or use of vaccination, while generic plans must remain more general.

Integration with National Disaster Plans: The documents emphasise the requirement that emergency responses to TAD should be fully integrated with the more general national plans for responding to disasters of various different kinds. National disaster plans normally include the crucial elements of planning for support by military, police and civilian authorities in carrying out the response.

Financial Plan: Funds to initiate responses to TAD outbreaks must be identified and made available for this purpose in advance of the occurrence of a disease outbreak.

> *"Experience has shown that delay in obtaining finances is one of the major constraints to the rapid response to emergency disease outbreaks. The application of even modest funds immediately will certainly save major expenditure later. Forward financial planning is therefore an essential component of preparedness"* (FAO - Chapter 6)

Environmental and Ecological Factors: Response plans must acknowledge local environmental conditions, ecological issues and the economic value of wildlife to local and regional economies when planning response strategies. Wild animals may be of greater economic value than livestock in many regions (direct local use, tourism, ecosystem stability). In addition, disturbance of wildlife by disease control procedures may destabilise local environments in costly ways and disperse infected animals, thereby spreading the disease.

Realistic Expectations for Control of Diseases in Wildlife

"Wild animals often live in areas where their control and containment are both difficult and expensive. Moreover, control and containment could take months to achieve, and in some cases might prove impossible. Wild animals can often pass through fences designed for livestock, and their movements could frustrate attempts to contain or eliminate an emergency disease. Infected wild animals might evade and disperse a considerable distance away from attempts to contain and eliminate them. Few elements in an emergency disease outbreak will be less tractable or predictable. In some cases, a disease may change the normal behaviour of wildlife. There should be no false expectations about the ability to control wild animal populations should they become involved in an emergency disease outbreak." (PIMCANZ pg. 37)

4. *Communication Planning*

Communications among participants in the wildlife TAD programme, and with external stakeholders and the public, is complex and requires advance planning. Internally, communication requirements include establishment of channels for rapid exchange of essential information and a command structure for decisions and response implementation. Externally, risk communication and public relations are essential to compliance in all aspects of the programme by major and minor participants, and thus, to the programme's success and effectiveness.

5. *Education*

All documents highlight the need to provide varying degrees of training and instruction to participants in TAD management programmes. Educational needs range from general instruction to maintain competence of field personnel, to a national strategy to build the scientific capacity to plan and operate the programme. Shortage of trained personnel at all levels has been highlighted as a major potential constraint on planning and implementation of TAD management strategies. Educational needs and person-power requirements must be assessed and met.

6. *Collaboration*

All documents consulted emphasise the complex nature of animal disease management. This is particularly true with respect to wild animals because the veterinary services normally responsible for animal disease management most often are within departments of agriculture, while expertise and authority for wildlife often isare located elsewhere within the government structure and may rest largely with regional authorities. Thus, successful programmes of TAD management in wildlife must proceed by means of close and transparent collaboration among diverse government agencies operating under different Acts and regulations: wildlife, fisheries, agriculture, environment and public health. Non-government organisations and the public also have strong interests in wild animals and must be considered major stakeholders in wildlife TAD management planning.

Managing significant emerging diseases involving Wildlife

Introduction

Emerging disease agents associated with wildlife are a major challenge to the biological safety of the world in the 21st century. Diseases originating or sustained in wild animals are having an increasingly serious impact on human health, agricultural production, biodiversity and economies worldwide. Avian influenza, West Nile virus, classical swine fever and rabies are a few examples. Renewed response efforts, as well as better integration of roles and responsibilities are required to meet this challenge.

Disease Management Strategies

Wobeser (1994 and 2002) has previously considered disease management strategies in detail for wildlife. He concluded that management of disease in wild animals must be based on a sound knowledge of the species affected and the population ecology of the disease process. The author also stressed the need to have clear objectives and to identify in advance available resources.

This paper considers potential approaches to planning and managing an emerging disease situation involving wildlife. It concludes that the most important aspect is to have developed a contingency plan, even if the response may occur over an extended period.

How should we manage wildlife diseases?

Countries need an overarching nationally-agreed framework that involves all the key government agencies, affected industries, interested parties and the community at large, with clearly defined responsibilities; a common vision; agreed priority of objectives, clearly written operating procedures and a funding mechanism.

Plans need to be comprehensive covering strategic, tactical and operational command structures and include roles and management arrangements. Staff involved with wildlife need to be included as an integral part of any animal disease response.

Plans should be:

- scientifically based,
- identify critical issues and options; and
- provide policy recommendations.

Even if the plans conclude that control or eradication is not possible, it is still worthwhile to have worked through an ordered procedure to reach that conclusion.

When is a management response required?

The most important aspect of preparedness is to define accurately the circumstances under which an occurrence of disease in wild animals requires a response. What are the triggers that would activate a reaction? What are the initial roles and responsibilities of the agencies and organisations potentially involved? Have these been clearly decided?

Criteria that could trigger a response to a disease (or disease agent) in wild animals include:

- Massive or unexpected mortalities/ morbidities of wildlife due to unknown cause
- Significant clusters of wildlife deaths
- A significant livestock-associated disease to which wildlife are susceptible
- Undiagnosed continuing syndromes

- Suspected human illness associated with contacts with wildlife
- Diseases likely to spread and be difficult to eradicate if they become established
- Suspected exotic diseases (to the country or region)
- Diseases with overseas events or international drivers
- Diseases listed as key threatening processes to endangered wildlife

It is difficult to be precise, as a lot will depend on the specific circumstances. However, some examples are classical swine fever (a significant livestock disease associated with wildlife; west Nile virus (a human and livestock disease associated with wild birds that once established would be extremely difficult to eradicate); chytridiomycosis (a disease of amphibians recognised as the cause for extinction of a number of species); and some subtypes of avian influenza virus.

An example of a management response:

A number of countries have now developed contingency plans aimed to manage serious diseases of livestock that are exotic to the country or diseases that if introduced or emerge in a more active pattern cause serious disease in humans[4]. Many of the principles in these livestock plans can also be considered for inclusion into serious emerging wildlife disease strategies, either as part of the original livestock plan or in their own right. However, in relation to wildlife, information is often grossly inadequate. For example, issues such as the adequacy of laboratory tests to detect the disease agent in wildlife, the ability of the disease agent to spread among different wildlife species, and variation of clinical signs in affected wild species are insufficiently documented.

The North American plans for chronic wasting disease (CWD) provide an example of contingency plans that recognise and attempt to address these shortfalls in knowledge.

CWD is a transmissible spongiform encephalopathy (TSE) affecting elk and deer (cervids) in North America. Task forces in the USA and in Canada, each engaging federal and state/provincial wildlife, agriculture and public health agencies and aboriginal organisations have developed management plans. These plans have established a coordinated approach to performing research and management actions and for sharing information across geographic boundaries and agency jurisdictions. They include information on communications, scientific and technical information dissemination, diagnostics, disease management, research, and surveillance.

Research is focused on understanding:

- how the disease is distributed and transmitted among wild elk and deer
- how infection rates differ according to age, sex and location
- how feeding and baiting may affect transmission patterns
- genetic influences and resistance.

Surveillance programmes include three objectives:

- detection of CWD in areas not known to be affected,
- assessment of the spatial distribution and prevalence of CWD in affected areas, and
- monitoring changes in prevalence and distribution of the disease over time in response to management actions or in conjunction with research programmes.

[4] For example, AUSVETPLAN, a series of technical response plans that describe the proposed Australian approach to an exotic disease incursion. The documents provide guidance based on sound analysis, linking policy, strategies, implementation, coordination and emergency-management plans. Of special interest are plans for: Australian bat Lyssavirus, Avian influenza, Wild animals and Zoos.
(See http://www.animalhealthaustralia.com.au/).

Control programmes so far have included:

- banning translocating and artificially feeding cervids in endemic areas; and
- selective culling of clinical suspects and larger general population reductions

with the overall management strategies aimed at:

- containment of CWD; and
- reducing transmission rates in affected areas.

Legal framework

Legislation for controlling exotic animal diseases has been enacted in many countries at the national level. National legislation is primarily concerned with preventing the introduction and establishment of disease or of things that may carry disease.

Usually the statutory provisions provide for controls over animal movements, treatment, decontamination, slaughter and compensation. Government inspectors may have wide powers, including the authority to enter premises, test animals and order the destruction of animals and animal products suspected of being infected or contaminated. Usually the term 'animal' is defined very widely, for example legislation in Australia defines **livestock** as "any non-human animal, and any fish or bird, whether wild or domesticated, egg intended for hatching or bee" (State of Victoria 1994). Under the OIE Terrestrial Animal Health Standards animal is defined to mean any mammal, bird or bee (while the aquatic code defines an aquatic animal to mean all life stages (including eggs and gametes) of fish, molluscs and crustaceans).

However, traditionally, application of livestock disease control programmes in most countries has been limited to traditional agricultural species and national veterinary services seldom consider they have either the expertise or the mandate to apply these regulations to wild animals. In many national legal frameworks, veterinary services also lack the legal authority to do so. This may lead to misunderstandings when determining areas of responsibility. It is important that planning addresses both the legal obligations and the actual capacities and expertise of agencies. Consideration also needs to be given to other legislation that may confound a response by affecting jurisdictional responsibility over various species of animals. This is of special relevance when managing incursions that may affect endangered or listed wildlife species.

Stages in a response

Regardless of the legal framework, a number of steps must be planned for as part of a response preparation for an actual disease occurrence.

These are:

Step 1 Determine the distribution and density of susceptible wild animals

Sound knowledge of the distribution and habits of the wild animal species in the region is essential. Wildlife biologists familiar with the wildlife species should conduct appropriate surveys on a regular basis to obtain current information. These surveys should encompass all animal species likely to be exposed to the diseases of concern. Parameters such as home range sizes, regular and exceptional movements, and habitat features (e.g. natural barriers to animal movements, vegetation and topographical features and watering sources) should be documented.

Step 2 Disease surveillance in wild animals

Early detection of disease, determination of the wild animal species involved, and the geographical extent of the disease, are key requirements for managing an outbreak. Sampling is used to test for the presence and geographical extent of the disease agent (or absence of the disease agent) in wild animal populations, and in some cases to give an indication of prevalence, (i.e. the proportion of the population affected).

The epidemiologist and wildlife biologist, if appropriate, should determine the area and intensity of disease sampling, following the population survey. In some situations (eg for species known to be uniformly distributed over wide areas), sampling may begin before the population survey or be carried out at the same time. The aim is to obtain an indication of the extent of the disease spread.

At the end of a campaign, sampling of wild animals may be required to prove freedom from the disease.

Step 3 Contain wild animals that may transmit the disease

If disease is detected in wild animals, the primary aim is to stop infection spreading, by preventing contact between animals in the infected area and other susceptible populations.

Containment of the disease will usually require defining a wild animal control zone by surrounding the known extent of disease, based on the estimated rate of lateral spread, and allowing for the incubation period of the disease. Outward movements risk disease dissemination and inward movements seriously compromise the ability to demonstrate the effectiveness of depopulation and the absence of potential carrier species

Containment may involve the use of natural barriers to restrict the inward and outward movements of people and animals. In the situation with the Tasmanian Devil Facial Tumour disease, unaffected animals have been placed in special isolation facilities (http://www.tassiedevil.com.au/). Alternatively, containment may involve rapidly destroying all susceptible animals within the wild animal control area to establish an animal-free zone. If rapid depopulation is not possible, which often is the case; disease spread may be prevented or slowed by depopulation or immunisation through vaccination in the area's outer margins. In some situations, disease control may involve doing nothing — that is, if the area is well contained, the disease will run its course and die out naturally.

Containment may be impractical for diseases in which insect vectors disperse the causal agent irrespective of the behaviour of populations of the vertebrate host animals.

Step 4 Control susceptible wild animals to eradicate disease and prevent its transmission

Eradicating the disease could entail the depopulation of some or all susceptible hosts within the wild animal control area or vaccination of some predetermined proportion of the population or other manipulations appropriate to the species and disease in question. Such manipulations are effective only when the transmission dynamics of the disease in question are understood in some detail. If wild animals are considered a risk factor in the dissemination or persistence of infection to domestic species, then programmes aimed at reducing contact between infected animals and uninfected susceptible animals should be instigated as soon as possible. However, in all disease situations, unrealistic expectations of wild animal control or depopulation success must be avoided. Furthermore, the removal of wild animals from an area may create a 'sink' into which healthy and infected animals might immigrate. Aerial and ground shooting or other forms of disturbance may cause unnatural dispersal of the wild animals and spread the disease agent. *In many wildlife disease events, the most effective strategy may be to leave wild animals untouched and undisturbed, limiting any control activities to those that will not cause their dispersal*.

In summary, the first requirement in any response is to ascertain what susceptible wild animal species are present in the area and whether infection is present in them. If disease is present, the aim should be to control or restrict those species that are most likely to transmit disease.

In the longer term, wild animal carriers or reservoirs of disease will make it more difficult to demonstrate disease eradication. Therefore, the long-term aim should be to eradicate disease from these species. This may necessitate local elimination of the entire population or, if this is not feasible, containment and reduction of the population to levels, where infection is unlikely to persist. Increasing population immunity by the use of vaccine may also eliminate infectious agents or reduce the spread of infection. Threshold densities for disease persistence in wild animal populations will rarely be known in advance.

Wild animals often live in areas where their control and containment are both difficult and expensive. Moreover, control and containment could take months to achieve, and in some cases might prove impossible.

A comparison of some methods used for livestock disease control, and possible methods used for wildlife is presented in Table 1.

Table 1 ***A comparison of some methods used for livestock disease control, and possible methods used for wildlife.***

Methods used for livestock disease control	Possible methods for wildlife disease control
Apply quarantine	Very difficult to apply but utilise natural or manmade boundaries
Apply biosecurity measures to stop the entry and establishment of identified target agents into a defined location	Biosecurity measures can be applied to reduce the chance of transmission between livestock and wild animals into a defined location
Movement Controls	Minimise dispersal
Stamping out	Reduce density
Disinfection	Sometimes applicable, especially in relation to people movements
Treatments	Use of vaccines or drugs
Surveillance	Surveillance Surveillance in livestock
Vector control	Vector control
Legal backing	Do we have the necessary powers?

Step 5 Demonstration of freedom from disease

If demonstration of disease freedom is required, a wildlife biologist and epidemiologist should determine the most appropriate methods to use.

The size of the sample required for demonstrating freedom depends on:

- the size of the population;
- the likely prevalence of the disease, if present;
- the reliability required of the conclusions (i.e. the confidence level); and
- the sensitivity of the test used.

The larger the sample, the greater the confidence with the results. Provided the above variables are known or can be estimated, tables (eg Cannon and Roe, 1982) and various computer software packages are available for determining sample size.[5] Alternatively, having tested a random proportion of animals in a population and found no positives, the confidence level can be determined. For proving freedom from a disease, OIE guidelines for diseases such as rinderpest and contagious bovine pleuropneumonia suggest that the sampling strategy for domestic stock should be designed to have a 95% confidence level for detecting the disease at a prevalence of 1% (see Cannon and Roe, 1982).

Where the population distribution is not uniform, it may be necessary to stratify it into sections that have a similar risk of maintaining the disease. For wild animal populations, in most cases, stratification will be by geographical areas. This means that once the target sample size to provide the desired level of confidence has been calculated, the actual number of samples required, by area, will be proportional to the (estimated) numbers of animals present in these areas.

[5] For example: EpiInfo - http://www.cdc.gov/epiinfo/, Win Episcope - http://www.clive.ed.ac.uk/winepiscope/, and FreeCalc - http://www.ausvet.com.au.

The Decision making process

An important consideration is to work through a decision-making process. Otherwise, precipitous action could be instituted that does not achieve the objective of disease control and could, in fact, make matters worse.

Four factors should be considered when deciding what action, if any, will be taken against disease occurrences in wild animals. They will aid selection of the techniques, or combination of techniques, to be used for surveying, sampling, containing and reducing wild animal populations. The factors are:

- epidemiology (include: characterisation of the disease and disease agent; and the importance of different animal species in facilitating disease transmission)
- ecology (include: location; season; initial density of susceptible species, attainability of desired density, other susceptible species present in the same area and: likely movements of susceptible animals)
- resources (include: availability of resources; costs and benefits of different techniques; availability of expertise and knowledge and; availability of vaccine)
- socio-political factors (include: cost-benefit considerations; economy; legal ramifications; public opinion; status of the species involved[6] public safety and occupational safety for operational staff).

Given the uncertainties associated with an emerging disease, it is better to aim for a robust decision-making pathway that aims to maximise the chance of an acceptable outcome while maintaining flexibility to modify actions as more data becomes available, rather than necessarily waiting for an optimal decision (McCallum 2006).

The first requirement is to ascertain what susceptible wild animal species are present in the area and whether infection is present in them. If disease is present, the next step is to determine whether the threat is severe enough to warrant action — "no action" is a valid management decision, but needs to be associated with ongoing monitoring of the circumstances.

In the longer term, wild animal carriers or reservoirs of disease will make it more difficult to demonstrate zone or country disease freedom. Therefore, the long-term aim may be to eradicate disease from these species. This may necessitate local elimination of the entire population or, if this is not feasible, containment and reduction of the population to levels, where infection is unlikely to persist. Threshold densities for disease persistence in wild animal populations will rarely be known in advance. Increasing population immunity by the use of vaccine may also eliminate infectious agents or reduce the spread of infection.

Wild animals often live in areas where their control and containment are both difficult and expensive. Moreover, control and containment could take months or years to achieve, and in some cases might prove impossible.

Communications and training

Regardless of the plan, developed efficient and effective communications processes and prior education and training underpin execution. Staff, often from different agencies, should be included in training/ exercise programmes where appropriate.

The way forward

To develop such plans a number of key questions need to be addressed within countries and internationally. These include:

- Who has the responsibility for making decisions?
- How do we achieve better collaboration?
- Do we need better operational plans, especially for specific diseases?
- How should the beneficiaries contribute?
- Where do the resources come from?

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[6] For example koalas generate more public sympathy than reptiles

Canada has already shown the way forward by developing a national wildlife disease strategy (Canadian Wildlife Directors Committee, 2003). Federal, provincial and territorial Ministers responsible for wildlife, forests and fisheries and aquaculture agreed in September 2003 on the need to develop a National Wildlife Disease Strategy. The strategy provides a disease response and management framework that aims to minimise the negative impacts of wildlife diseases, by coordinating jurisdictions in managing wildlife diseases. The strategy also identifies current gaps in capacity to prevent, detect, manage and respond to wildlife diseases while identifying existing capacities and areas for enhancement.

To develop these ideas further discussion of Canada's and other countries approaches need to be developed further in appropriate international forums.

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Monday, 8 January 2007

Reports were received from OIE Member Countries

Country	Disease	Animal species	Dis. seen 2006	# of animals	
Albania	**Rabies**	**Red fox (*Vulpes vulpes*)**	**yes**	**4**	
Albania	Avian Influenza	Mute swan (*Cygnus cygnus*)	yes	Not given	
Albania	Avian Influenza	Anser anser	yes	Not given	
Albania	Avian Chlamydiosis	*Columba palumbus*	yes	30	
Albania	Rabbit Haemorrhagic Disease	European rabbit (*Oryctolagus cuniculus*)	yes	5	
Algeria	**Babésiose**	**Cervidés**	**yes**	**Not given**	
Algeria	Paramyxovirus	Chacal	yes	Not given	
Algeria	Paramyxovirus	Renard	yes	Not given	
Algeria	Trichinellosis	Chacal	yes	Not given	
Algeria	Trichinellose	Wild boar (*Sus scrofa*)	yes	Not given	
Andorra	**Trichomoniasis**	***Accipiter gentilis, Falco tinnunculus***	no		
Andorra	Brucellosis	*Capreolus capreolus*	no	1/15 seropositive	
Andorra	Avian Chlamydiosis	*Columba* sp.	yes	3/13 (23%)	
Andorra	Contagious Ecthyma,	Ovis musimon	no		
Andorra	Cysticercosis	*Ovis musimon, Rupicapra pyrenaica*	yes	39/205 (19%)	
Andorra	Pasteurellosis	*Ovis musimon, Rupicapra pyrenaica*	yes	3/205 (1,46%)	
Andorra	Pestiviruses	*Rupicapra pyrenaica pyrenaica*	yes	1/46 (2,1%)	
Andorra	Bovine tuberculosis	*Sus scrofa*	no		
Andorra	Trichinellosis	*Sus scrofa*	yes	> 10%	
Andorra	Sarcoptic Mange	*Vulpes vulpes*	yes	> 25%	
Angola	**No report**				
Argentina	**Bovine herpesvirus**	**Guanaco (*Lama guanicoe*)**	**si**	**8/65**	
Argentina	Leptospirosis	Guanaco (*Lama guanicoe*)	si	10/65	
Argentina	Rabies	Roedor	si	2/6	
Argentina	Rabies	*Tadarida* sp.	si	1/1	
Argentina	Rabies	*Myotis* sp	si	1/1	
Argentina	Rabies	zorro (sin dato de especie)	si	1/1	
Argentina	Tuberculosis (bovina y humana)	*Sus crofa* (jabalí)	si	1/1	
Argentina	Tuberculosis aviar	*Rhea americana* (Ñandu)	si	1/1	
Argentina	Toxoplasmosis	Guanaco (*Lama guanicoe*)	si	1/61	
Argentina	Cercopithecine herpesvirus 1	Alouata Carayá (*Mono aullador*)	si	1/2	
Argentina	Botulismo	Aves silvestres	si	2/38	
Argentina	West Nile	Aves silvestres	si	2/286	
Argentina	Clostridium	*Anas georgica* (Pato Maicero)	si	2/27	
Argentina	Bat lyssavirus	Sin dato de especie	si	0/2*	
Argentina	Bat lyssavirus	*Tadarida* sp.	si	1/1	
Argentina	Bat lyssavirus	*Myotis* sp.	si	1/1	
Argentina	Pestivirus	*Axis axis* (*Ciervo axis*)	si	2/55	
Argentina	Pestivirus	Guanaco (*Lama guanicoe*)	si	0/65	
Armenia	**No diseases reported in wildlife**				
Australia	**Avian chlamydiosis**	**Endemic in wild psittacine birds in Australia**	**yes**		
Australia	Avian Chlamydiosis	Captive Red-browed Finch (*Neochmia temporalis*)	yes	Totally 53 AC	
Australia	Avian Chlamydiosis	Common Bronzewing (*Phaps chalcoptera*)	yes	Totally 53 AC	
Australia	Avian Chlamydiosis	Crimson Rosella (*Platycercus elegans*)	yes	Totally 53 AC	
Australia	Avian Chlamydiosis	Red-capped Parrot (*Purpureicephalus spurius*)	yes	Totally 53 AC	
Australia	Avian Chlamydiosis	*Rosella* sp., (*Platycercus*)	yes	Totally 53 AC	
Australia	Avian Chlamydiosis	Sulphur Crested Cockatoo (*Cacatua galerita*)	yes	Totally 53 AC	
Australia	Avian Chlamydiosis	Superb Lyrebird (*Menura novaehollandiae*)	yes	Totally 53 AC	
Australia	Avian cholera	Southern Boobook Owl (*Ninox scutulata*)	yes	1	
Australia	Avian cholera	Squirrel Gliders (*Petaurus norfolcensis*)	yes	3	
Australia	Avian influenza, LPAI	H13N6 in a Silver Gull (*Larus novaehollandiae*) chick	yes	1	
Australia	Avian influenza, LPAI	H4N6 in a juvenile/adult Pacific Black Duck (*Anas superciliosa*)	yes	1	
Australia	Avian influenza, LPAI	Other low pathogenic strains have been detected by PCR		11	
Australia	Avian Malaria	Captive blue-faced Parrot-finches (*Erythrura trichroa*)	yes	2	
Australia	Avian Malaria	Captive Metallic Starling (*Alonis metallica*)	yes	2	
Australia	Avian Pox	Australian Magpie (*Gymnorhina tibicen*)	yes	1	

Australia	Avian Tuberculosis	Not given	yes	11	
Australia	Bat Lyssaviruses	Grey-headed Flying-fox (*Pteropus policephalus*)	yes	2	
Australia	Bat Lyssaviruses	Little Red Flying-fox (*Pteropus scapulatus*)	yes	2	
Australia	Bat Lyssaviruses	Spectacled Flying-fox (*P. conspicillatus*)	yes	2	
Australia	Caprine Arthritis/Encephalitis	Not given	yes		
Australia	Circoviruses	Rainbow lorikeet (*Trichoglossus haematodusand*)	yes	8	
Australia	Circoviruses	Sulphur-crested cockatoo (*Cacatua galerita*)	yes	7	
Australia	Inclusion Body Disease	Not given	yes	1	
Australia	Inclusion Body Hepatitis	Captive Ruppell's Parrot (*Poicephalus ruepelli*)	yes	2	
Australia	Myxomatosis	European rabbit (*Oryctolagus cuniculus*)	yes	1	
Australia	Sarcoptic Mange	Common Wombat (*Vombatus ursinus*)	yes	7	
Australia	Sarcoptic Mange	Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*)	yes	7	
Australia	Trichomoniasis	Common Bronzewing Pigeon (*Phaps chalcoptera*)	yes	3	
Australia	Trichomoniasis	Peregrine Falcon (*Falco peregrinus*)	yes	1	
Australia	Trichomoniasis	Southern Boobook Owl (*Ninox novaeseelandiae*)	yes	1	
Australia	Avian Cholera	Southern Boobook Owl (*Ninox scutulata*)	yes	1	
Australia	Leptospirosis		endemic		
Australia	Rabbit Haemorrhagic Disease		endemic		
Australia	Chytridiomycosis		endemic		
Austria	**Avian Influenza**	**Waterfowl**	**yes**	**4**	
Austria	Avian Influenza	*Anas platyrhynchos*	yes	28	
Austria	Avian Influenza	*Cygnus* spp.	yes	82	
Austria	Avian Influenza	*Egretta* sp.	yes	1	
Austria	Avian Influenza	*Fulica atra*	yes	1	
Austria	Avian Influenza	*Larus* spp.	yes	1	
Austria	Avian Influenza	Wild goose	yes	2	
Austria	Avian Tuberculosis	*Anas platyrhynchos* (2), *Cervus elaphus*	yes	3	
Austria	Brucellosis	*Lepus europaeus*	yes	1	
Austria	Leptospirosis	*Lepus europaeus*	yes	1	
Austria	Paramyxoviruses	*Meles meles*	yes	1	
Austria	Paramyxoviruses	*Vulpes vulpes*	yes	5	
Austria	Paratuberculosis	*Cervus elaphus*	yes	1	
Austria	Sarcoptic Mange	*Rupicapra rupicapra*	yes	> 50	
Austria	Sarcoptic Mange	*Vulpes vulpes*	yes	> 50	
Austria	Trichomoniasis	*Columba* spp.	yes	1	
Austria	Bovine tuberculosis	*Cervus elaphus*	yes	3	
Austria	Tularemia	*Lepus europaeus*	yes	10	
Belarus	**Rabies**	**Red fox (*Vulpes vulpes*)**	**yes**	**142**	
Belarus	Rabies	Racoon dog (*Nycter. procyonides*)	yes	23	
Belarus	Rabies	Wolf (*Canis lupus*)	yes	2	
Belarus	Rabies	Polecat	yes	8	
Benin	**No report**				
Bolivia	**No report**				
Botswana	**Foot and Mouth Disease**	**African buffalo (*Syncerus caffer*)**	**yes**	**19**	
Botswana	Anthrax	Zebra	yes	Total of 130	
Botswana	Anthrax	Buffalo	yes	Total of 130	
Botswana	Anthrax	Blue wildebeast	yes	Total of 130	
Botswana	Anthrax	Waterbbuck	yes	Total of 130	
Botswana	Anthrax	Greater Kudu	yes	Total of 130	
Botswana	Anthrax	Lechwe	yes	Total of 130	
Botswana	Anthrax	Roan antilope	yes	Total of 130	
Botswana	Anthrax	Elefant (*Loxodonta africana*)	yes	Not given	
Botswana	Anthrax	Sable antilope	yes	Not given	
Botswana	Rabies	Black backed jackal (*Canis mesomelas*)	yes	Not given	
Botswana	Rabies	Mongoose	yes	Not given	
Botswana	Newcastle disease	Ducks	yes	Not given	
Botswana	Newcastle disease	Doves	yes	Not given	
Bosnia Herzeg	**Avian Influenza**	***Cygnus olor***	**yes**	**2**	
Bosnia Herzeg	Rabies	*Canis lupus*	yes	Total of 57	
Bosnia Herzeg	Rabies	*Vulpes vulpes*	yes	Total of 57	
Bosnia Herzeg	Rabies	*Mustela*	yes	Total of 57	
Bosnia Herzeg	Trichinellosis	*Sus scrofa*	yes	19	
Brazil	**Rabies**	**Quiróptero**	**si**	**109**	
Brazil	Rabies	Raposa	si	34	
Brazil	Rabies	Raposa	si	2	
Brazil	Rabies	*Canídeo selvagem*	si	1	
Brunei	**No report**				

Bulgaria	**No report**				
Canada	**Avian influenza, LPAI**	***Anas platyrhynchos***	**yes**	**Total of 1712[1]**	**PCR/Culture**
Canada	Avian influenza, LPAI	*Anas rubripes*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Anas americana*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Sterna paradisaea*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Branta hutchinsii*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Fratercula arctica*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Larus tridactyla*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Anas discors*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Branta canadensis*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Anas strepera*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Anas acuta*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Aythya collaris*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Chen rossii*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Calidris pusilla*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Chen caerulescens*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Corvus brachyrhynchos*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Turdus migratorius*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Pelecanus erythrorhynchos*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Haliaeetus leucocephalus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Cyanocitta cristata*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Larus californicus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Quiscalus quiscula*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Gavia immer*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Corvus corax*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Accipiter cooperii*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Junco hyemalis*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Phalacrocorax auritus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Sturnus vulgaris*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Larus marinus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Ardea herodias*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Bubo virginianus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Larus argentatus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Melospiza lincolnii*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Zenaida macroura*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Cygnus olor*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Colaptes auratus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Falco peregrinus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Larus delawarensis*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Columba livia*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Accipiter striatus*	yes	Total of 1712[1]	PCR/Culture
Canada	Avian influenza, LPAI	*Nyctea scandiaca*	yes	Total of 1712[1]	PCR/Culture
Canada	Newcastle Disease	*Phalacrocorax auritus*	yes	2	PCR/Culture
Canada	Anthrax	*Alces alces*	yes	>20	Culture
Canada	Anthrax	*Odocoileus virginianus*	yes	>20	Culture
Canada	Anthrax	*Bison bison*	yes	>20	Culture
Canada	Avian Chlamydiosis	*Columba livia*	yes	1	Culture
Canada	Avian Cholera	*Turdus migratorius*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Somateria mollissima*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Family Sylviidae*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Calidris pusilia*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Cygnus columbianus*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Phalacrocorax auritus*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Falco sparverius*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Larus marinus*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Cyanocitta cristata*	yes	Total of 1550	Culture
Canada	Avian Cholera	*Branta bernicla*	yes	Total of 1550	Culture
Canada	Avian Tuberculosis	Order *Strigiformes*	yes	1	Pathology
Canada	Bovine Tuberculosis	*Cervus elaphus*	yes	1, endemic [2]	Culture
Canada	Brucella abortus		yes	endemic [2]	
Canada	Brucella suis	*Rangifer tarandus*	yes	224	Serology
Canada	Echinococcus granulosus	*Alces alces*	yes	endemic	Pathology
Canada	Echinococcus granulosus	*Rangifer tarandus groenlandicus*	yes	endemic	Pathology
Canada	Leptospirosis		yes	endemic	
Canada	Malignant Catharral Fever	*Alces alces*	yes	1	Pathology/PCR
Canada	Paratuberculosis	*Bison bison*	yes	1	Culture
Canada	Rabies	*Vulpes vulpes*	yes	Total of 161[3]	Immunoflourescense
Canada	Rabies	Family *Vespertilionidae*	yes	Total of 161[3]	Immunoflourescense
Canada	Rabies	*Procyon lotor*	yes	Total of 161[3]	Immunoflourescense
Canada	Rabies	*Martes pennanti*	yes	Total of 161[3]	Immunoflourescense
Canada	Rabies	*Mephitis mephitis*	yes	Total of 161[3]	Immunoflourescense
Canada	Tularemia	*Castor canadensis*	yes	1	Culture
Canada	Botulism		yes	Total of 90	Mouse test

Canada	Botulism	*Anas platyrhynchos*	yes	Total of 90	Mouse test
Canada	Botulism	*Anas rubripes*	yes	Total of 90	Mouse test
Canada	Botulism	*Anas acuta*	yes	Total of 90	Mouse test
Canada	Botulism	*Larus delawarensis*	yes	Total of 90	Mouse test
Canada	Botulism	*Branta canadensis*	yes	Total of 90	Mouse test
Canada	Botulism	*Calidris bairdii*	yes	Total of 90	Mouse test
Canada	Botulism	*Phalacrocorax auritus*	yes	Total of 90	Mouse test
Canada	Botulism	*Larus argentatus*	yes	Total of 90	Mouse test
Canada	Botulism	*Sterna caspia*	yes	Total of 90	Mouse test
Canada	Botulism	*Larus marinus*	yes	Total of 90	Mouse test
Canada	Botulism	*Larus philadelphia*	yes	Total of 90	Mouse test
Canada	Botulism	*Gavia immer*	yes	Total of 90	Mouse test
Canada	Botulism	*Mergus serrator*	yes	Total of 90	Mouse test
Canada	Botulism	*Podiceps grisegena*	yes	Total of 90	Mouse test
Canada	Botulism	*Podiceps auritus*	yes	Total of 90	Mouse test
Canada	Botulism	*Podilymbus podiceps*	yes	Total of 90	Mouse test
Canada	Botulism	*Clangula hyemalis*	yes	Total of 90	Mouse test
Canada	Botulism	*Fulica americana*	yes	Total of 90	Mouse test
Canada	Botulism	*Anas crecca*	yes	Total of 90	Mouse test
Canada	Botulism	*Larus pipixcan*	yes	Total of 90	Mouse test
Canada	Botulism	*Larus californicus*	yes	Total of 90	Mouse test
Canada	Salmonellosis	*Passer domesticus*	yes	Total of 23	Culture
Canada	Salmonellosis	*Carduelis pinus*	yes	Total of 23	Culture
Canada	Salmonellosis	*Carduelis flareroe*	yes	Total of 23	Culture
Canada	Salmonellosis	*Cardinalis cardinalis*	yes	Total of 23	Culture
Canada	Salmonellosis	*Malanerpes carolinus*	yes	Total of 23	Culture
Canada	Salmonellosis	*Anas platyrhynchos*	yes	Total of 23	Culture
Canada	Salmonellosis	*Corvus brachyrhynchos*	yes	Total of 23	Culture
Canada	Salmonellosis	*Plectrophenax nivalis*	yes	Total of 23	Culture
Canada	Toxoplasmosis	*Canis latrans*	yes	1	Pathology
Canada	West Nile Virus	*Corvus brachyrhynchos*	yes	Total of 300	Virology
Canada	West Nile Virus	*Pica pica*	yes	Total of 300	Virology
Canada	West Nile Virus	*Corvus corax*	yes	Total of 300	Virology
Canada	West Nile Virus	*Cyanocitta cristata*	yes	Total of 300	Virology
Canada	West Nile Virus	*Bubo virginianus*	yes	Total of 300	Virology
Canada	West Nile Virus	*Aegolius acadicus*	yes	Total of 300	Virology
Canada	West Nile Virus	*Pelecanus erythrorhynchos*	yes	Total of 300	Virology
Canada	Baylisascaris spp.	*Mephitis mephitis*	yes	Total of 24	Parasitology
Canada	Baylisascaris spp.	*Ursus americanus*	yes	Total of 24	Parasitology
Canada	Baylisascaris spp.	*Procyon lotor*	yes	Total of 24	Parasitology
Canada	Besnoitiosis	*Rangifer tarandus*	yes	6	Pathology
Canada	Feline Panleucopenia,	*Procyon lotor*	yes	<12	Pathology
Canada	Large Liver Flukes	*Odocoileus virginianus*	yes	<12	Parasitology
Canada	Large Liver Flukes	*Cervus elaphus*	yes	<12	Parasitology
Canada	Large Liver Flukes	*Alces alces*	yes	<12	Parasitology
Canada	Meningeal worms of cervids	*Alces alces*	yes	total of 7	Parasitology
Canada	Meningeal worms of cervids	*Rangifer tarandus terranovae*	yes	total of 7	Parasitology
Canada	Paramyxoviruses	*Mephitis mephitis*	yes	Total of 9	Pathology
Canada	Paramyxoviruses	*Canis latrans*	yes	Total of 9	Pathology
Canada	Paramyxoviruses	*Procyon lotor*	yes	Total of 9	Pathology
Canada	Paramyxoviruses	*Columba livia*	yes	Total of 9	Pathology
Canada	Sarcoptic Mange	*Vulpes vulpes*	yes	Total of 10	Parasitology
Canada	Sarcoptic Mange	*Canis lupus*	yes	Total of 10	Parasitology
Canada	Sarcoptic Mange	*Canis latrans*	yes	Total of 10	Parasitology
Canada	Sarcoptic Mange	*Procyon lotor*	yes	Total of 10	Parasitology
Canada	TSE, CWD	*Odocoileus virginianus*	yes	35	Immunohistochemistry
Canada	TSE, CWD	*Odocoileus hemionus*	yes	35	Immunohistochemistry
Canada	Avian Pox	*Corvus brachyrhynchos*	yes	Total of 69	Pathology, virology
Canada	Avian Pox	*Corvus corax*	yes	Total of 69	Pathology, virology
Canada	Avian Pox	*Bucephala albeola*	yes	Total of 69	Pathology, virology
Canada	Avian Pox	*Larus marinus*	yes	Total of 69	Pathology, virology
Canada	Avian Pox	*Passer domesticus*	yes	Total of 69	Pathology, virology
Canada	Avian Pox	*Euphagus cyanocephalus*	yes	Total of 69	Pathology, virology
Canada	Avian Pox	*Aquila chrysaetos*	yes	Total of 69	Pathology, virology
Canada	Circoviruses	*Columba livia*	yes	<12	Pathology
Canada	Circoviruses	*Larus delawarensis*	yes	<12	Pathology
Canada	Paramyxoviruses	*Columba livia*	yes	12	Pathology,Virology
Canada	Trichomoniasis	*Falco peregrinus*	yes	Not given	
Canada	Trichomoniasis	*Columba livia*	yes	Not given	
Canada	Trichomoniasis	*Zenaida macroura*	yes	Not given	
Canada	Adenovirus	*Odocoileus hemionus*	yes	8	Immunohistochemistry
Canada	Walleye dermal sarcoma	*Stizostedion vitreum*	yes	3	Pathology
Canada	Viral Hemorrhagic Septicemia	*Aplodinotus grunniens*	yes	Not given	

Canada	Viral Hemorrhagic Septicemia	*Micropterus dolomieu*	yes	Not given	
Canada	Viral Hemorrhagic Septicemia	*Lepomis macrochirus*	yes	Not given	
Canada	Viral Hemorrhagic Septicemia	*Pomoxis sp.*	yes	Not given	
Chile	**Botulism**	**Wild birds**	**yes**	**Not given**	
Chile	Paratuberculosis	Captive pudú (*Pudu puda*)	yes	Not given	
Chile	Hantavirus	Wild rat	yes	Not given	
Chile	Psoroptic mange	Hares, rabbits	yes	Not given	
Chile	Sarcoptic mange	Hares, rabbits	yes	Not given	
Chile	Sarcóptic mange	Fox	yes	Not given	
Colombia	**Anaplasmosis**	**Two toed sloth**	**si**	**1**	
Colombia	leptospirosis	Primates	si	3	
Colombia	Psoroptic mange	*Hidrochcerys h.*(chiguiro)	si	12	
Colombia	Sarcoptic mange	Racoon	si	2	
Colombia	Sarcoptic mange	*Cebus Apella* (mico maicero carinegro)	si	10	
Congo	**No report**				
Cook islands	**No report**				
Côte d'Ivoire	**No report**				
Croatia	**Rabies**	***Vulpes vulpes***	**yes**	**497**	
Croatia	Rabies	*Martes martes*	yes	1	
Croatia	Rabies	*Capreolus capreolus*	yes	1	
Croatia	Paramyxoviruses	*Cygnus olor*	yes	1	
Croatia	Avian Influenza	*Cygnus olor*	yes	4	
Croatia	Avian Influenza	*Larus ridibundus*	yes	8	
Cyprus	**No diseases reported in wildlife**				
Czech Rep.	**Avian Influenza**	**Swans (*Cygnus*)**	**yes**	**14**	
Czech Rep.	Brucellosis	Hares (*Lepus*)	yes	24	
Czech Rep.	Circoviruses		yes		
Czech Rep.	Cysticercosis	Dama, *Capreolus*	yes	3	
Czech Rep.	Echinococcus multilocularis	*Vulpes*	yes	174	
Czech Rep.	Histomoniasis	*Pavo*	yes	2	
Czech Rep.	Large Liver Flukes	*Dama*	yes	1	
Czech Rep.	Maedi/Visna	*Ovis*	yes	8	
Czech Rep.	Myxomatosis	*Oryctolagus*	yes		
Czech Rep.	Paramyxoviruses	*Columbidae*	yes	39	
Czech Rep.	Rabbit Haemorrhagic Disease	Rabbits (*Oryctolagus cuniculi*)	yes	14	
Czech Rep.	Trichomoniasis		yes		
Czech Rep.	Tularemia	Hares (*Lepus*)	yes	70	
Denmark	**Avian Influenza**	**Tufted ducks (*Aythya fuligula*)**	**yes**	**26**	
Denmark	Avian Influenza	Common buzzards (*Buteo buteo*)	yes	6	
Denmark	Avian Influenza	mute swans (*Cygnus olor*)	yes	4	
Denmark	Avian Influenza	whooper swans (*Cygnus cygnus*)	yes	3	
Denmark	Avian Influenza	Peregrin falcon (*Falco peregrinus*)	yes	1	
Denmark	Avian Influenza	grey goose (*Anser anser*)	yes	1	
Denmark	Avian Influenza	magpie (*Pica pica*)	yes	1	
Denmark	Avian Influenza	Great Crested Grebe (*Podiceps cristatus*)	yes	1	
Denmark	Bat Lyssaviruses	10 bats (unidentified species)	yes	10	
Denmark	Bat Lyssaviruses	1 fox (*Vulpes vulpes*)	yes	1	
Denmark	European Brown Hare Syndrome (EBHS)	European brown hare (*Lepus europaeus*)	yes	3	
Denmark	Paramyxoviruses (Bat, Canine, Cetacean, Phocine)	Badger (*Meles meles*)	yes	1	
Denmark	Sarcoptic Mange	Fox (*Vulpes vulpes*)	yes	1	
Denmark	Trichomoniasis	Woodpigeon (*Columba palumbus*)	yes	2	
Estonia	**Cysticercosis**	**Wild boar**	**yes**	**1**	
Estonia	Rabies	*Vulpes vulpes, Procyonides nycterrectes*	yes	101	
Estonia	Trichinellosis	Lynx (*Lynx lynx*)	yes	2	
Estonia	Trichinellosis	Brown bear (*Urus arctos*)	yes	7	
Estonia	Trichinellosis	Wild boar (*Sus scrofa*)	yes	12	
Estonia	Paramyxoviruses	Wild pigeons	yes	10	
Ethopia	**No report**				
Finland	**Avian pox**	**Great tit Parus major**	**yes**	**1**	
Finland	Avian tuberculosis	wood pigeon *Columba palumbus*	yes	1	
Finland	Cysticercosis	moose *Alces alces*	yes	2	
Finland	Echinococcus granulosus	grey wolf *Canis lupus*	yes	2	
Finland	European Brown Hare Syndrome	mountain hare *Lepus timidus*, European brown hare *L. europaeus*	yes	4	
Finland	Hantaviruses	bank vole *Clethrionomys glareolus*	yes	prevalence 20-40%	
Finland	Sarcoptic Mange	red fox *Vulpes vulpes*, raccoon dog *Nyctereutes procyonoides*	yes	18	
Finland	Trichinellosis	badger *Meles meles*	yes	Total of 125	
Finland	Trichinellosis	brown bear *Ursus arctos*	yes	Total of 125	
Finland	Trichinellosis	grey wolf *Canis lupus*	yes	Total of 125	
Finland	Trichinellosis	lynx *Lynx lynx*	yes	Total of 125	

Finland	Trichinellosis	otter *Lutra lutra*	yes	Total of 125	
Finland	Trichinellosis	pine marten *Martes martes*	yes	Total of 125	
Finland	Trichinellosis	raccoon dog *Nyctereutes procyonoides*	yes	Total of 125	
Finland	Trichinellosis	red fox *Vulpes vulpes*	yes	Total of 125	
Finland	Tularemia	European brown hare *L. europaeus*	yes	Total of 15	
Finland	Tularemia	mountain hare *Lepus timidus*	yes	Total of 15	
France	**Anaplasmose**	***Rupicapra pyrenaïca pyrenaïca***	**oui**	**plusieurs**	**PCR et immunofluorescence indirecte**
France	Arthrite/encéphalite caprine	*Rupicapra rupicapra*	oui	2	sérologie ELISA
France	Babésiose à *Babesia capreoli*	*Capreolus capreolus*	oui	6	isolement par culture cellulaire sur 15 chevreuils testés
France	Babésiose à *Babesia* sp EU1	*Capreolus capreolus*	oui	2	isolement par culture cellulaire sur 15 chevreuils testés
France	Brucellose à B suis 2	*Oryctolagus cuniculus*	oui	6	bactériologie
France	Chlamydiose aviaire	*Streptopelia decaocto*	oui	1	
France	Choléra aviaire à *Mannheimia haemolytica*	*Anas sp*	oui	1	bactério classique
France	Choléra aviaire à *Mannheimia haemolytica*	*Phasianus sp.*	oui	1	bactério classique
France	Choléra aviaire à *Pasteurella multocida*	*Anas platyrhynchos*	oui	3	bactério classique
France	Choléra aviaire à *Pasteurella multocida*	*Columba palumbus*	oui	1	bactério classique
France	Choléra aviaire à *Pasteurella multocida*	*Scolopax rusticola*	oui	1	bactério classique
France	Choléra aviaire à *Pasteurella multocida*	*Turdus*	oui	1	bactério classique sur une grive (espèce ??)
France	Choléra aviaire à *pasteurella sp.*	*Anas platyrhynchos*	oui	2	bactério classique
France	Cysticercose	*Capreolus capreolus*	oui	5	observation
France	Cysticercose	*Oryctolagus cuniculus*	oui	5	observation
France	Cysticercose	*Ovis ammon musimon*	oui	1	observation
France	Cysticercose	*Rupicapra rupicapra*	oui	15	observation
France	Cysticercose	*Sus scrofa*	oui	1	observation
France	Échinococcose (*E. multilocularis*)	*Vulpes vulpes*	oui	28	grattage intestins
France	Ecthyma contagieux	*Rupicapra rupicapra*	oui	9	microscopie électronique (cf Afssa Sophia antipolis)
France	Fièvre Q	*Capreolus capreolus*	oui	1	sérologie
France	Gale Psoroptique	*Vulpes vulpes*	oui	1	
France	Sarcoptic Mange	*Martes foina*	oui	1	
France	Sarcoptic Mange	*Sus scrofa*	oui	5	
France	Sarcoptic Mange	*Vulpes vulpes*	oui	18	
France	Grande douve du foie	*Capreolus capreolus*	oui	1	
France	Herpèsvirus bovin	*Capreolus capreolus*	oui	1	immunoflourescence (recherche d'Ag)
France	Infestation à *Alaria* sp et *Alaria alata*	*Sus scrofa*	oui	8	premier isolement en France de ce parasite musculaire, sur 359 sangliers examinés dans le département de l'Aube.
France	Avian influenza	*Anser anser*	oui	1	H5N1HP
France	Avian influenza	*Ardea cinerea*	oui	1	H5N1HP
France	Avian influenza	*Aythia ferina*	oui	6	dans 4 pools positifs H5N1HP
France	Avian influenza	*Aythia fuligula*	oui	1	H5N1HP
France	Avian influenza	*Buteo buteo*	oui	1	H5N1HP
France	Avian influenza	*Cygnus olor*	oui	54	dans 33 pools positifs H5N1HP
France	Avian influenza	*Podiceps cristatus*	oui	1	H5N1HP
France	Lyssavirus des chiroptères	*Eptesicus serotinus*	oui	3	(1 par Afssa Nancy et 2 par Institut pasteur)
France	Maladie hémorragique du lapin (VHD)	*Oryctolagus cuniculus*	oui	29	ELISA Ag
France	Myxomatose	*Oryctolagus cuniculus*	oui	17	
France	Paratuberculose	*Capreolus capreolus*	oui	1	PCR
France	Classical swine fever	*Sus scrofa*	oui	4230	sur 7855 sérologies dans les dép 57 et 67 (vaccination en cours dans les Vosges)
France	Classical swine fever	*Sus scrofa*	oui	5	positifs en isolement viral sur 8652 animaux, testés dans les dép 57 et 67 (screening PCR et confirmation par isolement sur PCR +)
France	Pestivirus	*Capreolus capreolus*	oui	1	RT PCR
France	Pestivirus	*Rupicapra pyrenaïca pyrenaïca* et *Rupicapra rupicapra*	oui		sérologies positives dans les Pyrénées et les Alpes
France	Syndrome du lièvre européen (EBHS)	*Lepus europaeus*	oui	63	ELISA Ag
France	Trichinellose	*Sus scrofa*	oui	2	digestion barreau magnétique sur > 7000 sangliers
France	Trichinellose	*Vulpes vulpes*	oui	5	digestion pepsique

France	Trichomonose	*Columba palumbus*	oui	7	
France	Trichomonose	*Cygnus* sp.	oui	1 (*Trichomonas columbae*)	
France	Trichomonose	*Streptopelia decaocto*	oui	3	
France	Bovine Tuberculosis	*Capreolus capreolus*	oui	1	isolement *M. bovis*
France	Bovine Tuberculosis	*Cervus elaphus*	oui	43	isolement *M. bovis*
France	Bovine Tuberculosis	*Sus scrofa*	oui	76	isolement *M. bovis*
France	Bovine Tuberculosis	*Vulpes vulpes*	oui	1	isolement *M. bovis*
France	Avian Tuberculosis	*Anas platyrhynchos*	oui	2	1 par PCR, autre par coloration de Ziehl
France	Avian Tuberculosis	*Anser anser*	oui	1	coloration de Ziehl
France	Avian Tuberculosis	*Ardea cinerea*	oui	1	coloration de Ziehl
France	Avian Tuberculosis	*Capreolus capreolus*	oui	2	bactériologie
France	Avian Tuberculosis	*Cervus elaphus*	oui	3	bactériologie
France	Avian Tuberculosis	*Columba palumbus*	oui	3	coloration de Ziehl
France	Avian Tuberculosis	*Meles meles*	oui	3	bactériologie
France	Avian Tuberculosis	*Vulpes vulpes*	oui	10	bactériologie
France	Avian Tuberculosis	*Sus scrofa*	oui	9	bactériologie
France	Tularémie	*Lepus europaeus*	oui	48	43 par bactériologie, 5 par PCR dans plus de 15 départements
France	Tularémie	*Oryctolagus cuniculus*	oui	2	par PCR
Germany	**Aujeszky´s Disease**	***Sus scrofa***	**yes**	**unknown**	
Germany	Avian Chlamydiosis	Species not specified	yes	unknown	
Germany	Avian Influenza	*Accipiter gentilis*	yes	1	
Germany	Avian Influenza	*Anas platyrhynchos*	yes	4	
Germany	Avian Influenza	*Anas* spec.	yes	21	
Germany	Avian Influenza	*Anas streptera*	yes	1	
Germany	Avian Influenza	*Anser anser*	yes	7	
Germany	Avian Influenza	*Anser fabalis*	yes	1	
Germany	Avian Influenza	*Anser* spec.	yes	4	
Germany	Avian Influenza	*Ardea cinerea*	yes	1	
Germany	Avian Influenza	*Ardea* spec.	yes	1	
Germany	Avian Influenza	Aves (unidentifiable)	yes	1	
Germany	Avian Influenza	*Aythya ferina*	yes	8	
Germany	Avian Influenza	*Aythya fuligula*	yes	18	
Germany	Avian Influenza	*Aythya marila*	yes	1	
Germany	Avian Influenza	*Branta canadensis*	yes	21	
Germany	Avian Influenza	*Branta leucopsis*	yes	2	
Germany	Avian Influenza	*Bubo bubo*	yes	2	
Germany	Avian Influenza	*Bucephala clangula*	yes	1	
Germany	Avian Influenza	*Buteo buteo*	yes	20	
Germany	Avian Influenza	*Buteo* spec.	yes	8	
Germany	Avian Influenza	*Ciconia ciconia*	yes	2	
Germany	Avian Influenza	*Circus cyaneus*	yes	1	
Germany	Avian Influenza	*Corvus corone cornix*	yes	1	
Germany	Avian Influenza	*Cygnus atratus* (zoo animal)	yes	1	
Germany	Avian Influenza	*Cygnus cygnus*	yes	32	
Germany	Avian Influenza	*Cygnus olor*	yes	130	
Germany	Avian Influenza	*Cygnus* spec.	yes	20	
Germany	Avian Influenza	*Falco peregrinus*	yes	2	
Germany	Avian Influenza	*Falco* spec.	yes	1	
Germany	Avian Influenza	*Falco tinnunculus*	yes	1	
Germany	Avian Influenza	*Felis catus*	yes	3	
Germany	Avian Influenza	*Fulica atra*	yes	2	
Germany	Avian Influenza	*Garrulus glandarius*	yes	1	
Germany	Avian Influenza	*Larus argentatus*	yes	3	
Germany	Avian Influenza	*Larus canus*	yes	1	
Germany	Avian Influenza	*Larus marinus*	yes	2	
Germany	Avian Influenza	*Larus* spec.	yes	4	
Germany	Avian Influenza	*Martes foina*	yes	1	
Germany	Avian Influenza	*Melanitta fusca*	yes	1	
Germany	Avian Influenza	*Melanitta nigra*	yes	1	
Germany	Avian Influenza	*Mergus merganser*	yes	5	
Germany	Avian Influenza	*Mergus serrator*	yes	1	
Germany	Avian Influenza	*Phalacrocorax carbo*	yes	3	
Germany	Avian Influenza	*Podiceps cristatus*	yes	4	
Germany	Avian pox	Other bird species (zoo animals)	yes	2	
Germany	Avian Tuberculosis	*Anatidae*	yes	2	
Germany	Avian Tuberculosis	*Ciconia ciconia*	yes	1	
Germany	Avian Tuberculosis	*Cygnus* sp	yes	4	
Germany	Avian Tuberculosis	Falconiformes	yes	2	
Germany	Avian Tuberculosis	Galliformes	yes	4	
Germany	Avian Tuberculosis	*Gruinae*	yes	2	
Germany	Avian Tuberculosis	*Hirundinidae*	yes	1	

Germany	Avian Tuberculosis	*Lyrurus tetrix*	yes	1	
Germany	Avian Tuberculosis	*Mergus* sp	yes	2	
Germany	Avian Tuberculosis	Other bird species	yes	5	
Germany	Avian Tuberculosis	*Phasianus colchicus*	yes	1	
Germany	Avian Tuberculosis	Psittaciformes (zoo animals)	yes	2	
Germany	Avian Tuberculosis	*Rheidae* sp (zoo animals)	yes	1	
Germany	Avian Tuberculosis	*Sturnidae*	yes	2	
Germany	Avian Tuberculosis	*Turdidae*	yes	1	
Germany	Bat Lyssaviruses	*Microchiroptera*	yes	9	
Germany	Baylisascaris spp.	*Procyon lotor*	yes	unknown	
Germany	Bluetongue	*Bison bonasus* (zoo animal)	yes	1	
Germany	Bluetongue	*Bos grunniens* (zoo animal)	yes	1	
Germany	Bluetongue	*Camelus* sp (zoo animal)	yes	1	
Germany	Bluetongue	*Cervidae*	yes	6	
Germany	Bluetongue	*Ovis gmelini musimon*	yes	3	
Germany	Classical Swine Fever	*Sus scrofa*	yes	38	
Germany	*Echinococcus multilocularis*	*Nyctereutes procyonoides* (final host)	yes	13	
Germany	*Echinococcus multilocularis*	Primates (zoo animal; intermediate host)	yes	1	
Germany	*Echinococcus multilocularis*	*Vulpes vulpes* (final host)	yes	247	
Germany	Hantaviruses	*Murniae*	yes	unknown	
Germany	Malignant Catharral Fever	*Bovidae* (zoo animals)	yes	7	
Germany	Q-fever	*Bovidea* (zoo animal)	yes	1	
Germany	Q-fever	*Equus* (zoo animal)	yes	1	
Germany	Rabies	*Vulpes vulpes*	yes	3	
Germany	Trichinellosis	*Sus scrofa*	yes	1	
Germany	Trichinellosis	*Vulpes vulpes*	yes	unknown	
Germany	Tularemia	*Lepus europaeus*	yes	3	
Germany	Tularemia	Rabbit (*Oryctolagus cuniculus*)	yes	1	
Ghana	**No diseases reported in wildlife**				
Greece	**European Brown Hare Syndrome (EBHS)**	**Hare**	**yes**	**1**	
Guatemala	**No diseases reported in wildlife**		**no**		
Guinea Bissau	**No diseases reported in wildlife**		**no**		
Iceland	**No diseases reported in wildlife**		**no**		
India	**No report**				
Iran	**No report**				
Ireland	**Bovine tuberculosis**	**Fallow deer, *Dama dama***	**yes**	**11**	
Ireland	Bovine tuberculosis	Badger, *Meles meles*	yes	Endemic	
Ireland	Rabbit Haemorrhagic Disease	Rabbit (*Oryctolagus cuniculus*)	yes	4	
Israel	**Avian Chlamydiosis**	**pet parrots**	**yes**	**~120**	
Israel	Avian Cholera	not specified	yes		
Israel	Avian Tuberculosis	*Balearica regulorum, Falco tinnunculus*	yes	2	
Israel	Newcastle Disease	*Gyps fulvus, other birds*	yes		
Israel	Peste des Petits Ruminants	pigmy goat	yes		
Israel	Rabbit Haemorrhagic Disease	*Oryctolagus cuniculus*	yes	1	
Israel	Rabies	*Vulpes vulpes*	yes	1	
Israel	Trichinellosis	***Hyaena hyaena, Canis lupus, Canis aureus***	yes		
Israel	Sarcoptic Mange	***Vulpes vulpes***	yes	3	
Israel	Avian Pox	*raptors, Haliaeetus albicilla, Columba livia domestica*	yes		
Israel	Avian Malaria	*Spheniscus demersus*	yes	3	
Italy	**Borréliose de Lyme**	***Capreolus capreolus***	**oui**	**47**	
Italy	Borréliose de Lyme	*Lepus europaeus*	oui	1	
Italy	Borréliose de Lyme	*Rupicapra rupicapra*	oui	8	
Italy	Brucellose	*Alectoris graeca saxatilis*	oui	3	
Italy	Brucellose	*Capreolus capreolus*	oui	2	
Italy	Brucellose	*Cervus elaphus*	oui	2	
Italy	Brucellose	*Myocasto coypus*	oui	2	
Italy	Brucellose	*Sus scrofa*	oui	101	
Italy	Brucellose	*Ursus arctos marsicanus*	oui	2	
Italy	Brucellose	*Vulpes vulpes*	oui	15	
Italy	Chlamydiose aviaire	*Cardelius cardelius*	oui	1	
Italy	Chlamydiose aviaire	*Columba livia*	oui	3	
Italy	Chlamydiose aviaire	*Turdus pilaris*	oui	1	
Italy	Cysticercose	*Capreolus capreolus*	oui	3	
Italy	Cysticercose	*Rupicapra rupicapra*	oui	8	
Italy	Cysticercose	*Sus scrofa*	oui	15	
Italy	Ecthyma contagieux	*Rupicapra rupicapra*	oui	5	
Italy	Fièvre catarrhale du mouton	*Camelus bactrianus*	oui	1	
Italy	Fièvre catarrhale du mouton	*Cervus elaphus corsicanus*	oui	1	
Italy	Fièvre catarrhale du mouton	*Dama dama*	oui	1	
Italy	Fièvre catarrhale du mouton	*Lama glama*	oui	3	

Italy	Fièvre catarrhale du mouton	*Watussi*	oui	5	
Italy	Fièvre Q	*Canis lupus*	oui	2	
Italy	Fièvre Q	*Cervus elaphus*	oui	1	
Italy	Sarcoptic Mange		oui		
Italy	Sarcoptic Mange	*Capra ibex*	oui	4	
Italy	Sarcoptic Mange	*Rupicapra rupicapra*	oui	35	
Italy	Sarcoptic Mange	*Vulpes vulpes*	oui	26	
Italy	Hépatite à corps d'inclusion		oui		
Italy	Histomonose	*Perdix perdix*	oui	1	
Italy	Avian Influenza	*Anas plathyryncos*	oui	2	
Italy	Avian Influenza	*Cygnus cygnus*	oui	14	
Italy	Avian Influenza	*Buteo buteo*	oui	1	
Italy	Avian Influenza	*Phorphirio phorphirio*	oui	1	
Italy	Leishmaniose	*Vulpes vulpes*	oui	30	
Italy	Leptospirose	*Cervus elaphus*	oui	1	
Italy	Leptospirose	*Lepus europaeus*	oui	1	
Italy	Leptospirose	*Sus scrofa*	oui	47	
Italy	Leptospirose	*Vulpes vulpes*	oui	1	
Italy	Leptospirose (L. bratislava)	*Cervus elaphus*	oui	1	
Italy	Leptospirose (L. hardjo)	*Cervus elaphus*	oui	1	
Italy	Maladie d'Aujeszky	*Sus scrofa*	oui	811	
Italy	Maladie de Newcastle	*Buteo buteo*	oui	1	
Italy	Maladie hémorragique du lapin	*Oryctolagus cuniculus*	oui	40	
Italy	Paramyxovirus	*Streptopelia decaocto*	oui	3	
Italy	Paramyxovirus (des chauves-souris, des chiens, des cétacés, des phoques)	*Canis lupus*	oui	1	
Italy	Paramyxovirus (des chauves-souris, des chiens, des cétacés, des phoques)	*Vulpes vulpes*	oui	6	
Italy	Paratuberculose	*Cervus elaphus*	oui	2	
Italy	Paratuberculose	*Dama dama*	oui	1	
Italy	Paratuberculose	*Lepus europaeus*	oui	1	
Italy	Paratuberculose	*Rupicapra rupicapra*	oui	1	
Italy	Peste porcine africaine	*Sus scrofa meridionalis*	oui	87	
Italy	Pestivirus	*Capreolus capreolus*	oui	5	
Italy	Pestivirus	*Rupicapra rupicapra*	oui	9	
Italy	Pestivirus		oui		
Italy	Salmonellosis (*S. abortusovis*)	*Cervus elaphus corsicanus*	oui	1	
Italy	Salmonellosis (*S. altona*)	*Larus ridibundus*	oui	1	
Italy	Salmonellosis (*S. ball*, *S. bovismorbificans*, *S. coeln*, *S enterica* sub. *Diarizonae* O:50, *S. ilungun*, *S. thompson*, *S. typhimurium*, *S. veneziana*)	*Sus scrofa*	oui	92	
Italy	Salmonellosis (*S. bonariensis*)	*Martes foina*	oui	1	
Italy	Salmonellosis (*S. bredeney*)	*Columba livia*	oui	1	
Italy	Salmonellosis (*S. choleraesuis*)	*Sus scrofa*	oui	2	
Italy	Salmonellosis (*S. coeln*)	*Martes foina*	oui	1	
Italy	Salmonellosis (*S. coeln*)	*Meles meles*	oui	1	
Italy	Salmonellosis (*S. coeln*)	*Vulpes vulpes*	oui	1	
Italy	Salmonellosis (S. corvallis)	*Larus ridibundus*	oui	2	
Italy	Salmonellosis (*S. corvallis*)	*Meles meles*	oui	1	
Italy	Salmonellosis (*S. enterica sub diarizonae*)	*Martes foina*	oui	1	
Italy	Salmonellosis (*S. enterica sub houtenae*)	*Vulpes vulpes*	oui	1	
Italy	Salmonellosis (*S. enterica sub salamae*)	*Vulpes vulpes*	oui	1	
Italy	Salmonellosis (*S. essarek*)	*Sturnus vulgaris*	oui	1	
Italy	Salmonellosis (*S. fyris*)	*Phasianus colchicus*	oui	1	
Italy	Salmonellosis (*S. infantis*)	*Larus ridibundus*	oui	1	
Italy	Salmonellosis (*S. london*)	*Anser anser*	oui	1	
Italy	Salmonellosis (*S. muenchen*)	*Vulpes vulpes*	oui	1	
Italy	Salmonellosis (*S. napoli*)	*Capreolus capreolus*	oui	1	
Italy	Salmonellosis (*S. napoli*)	*Meles meles*	oui	1	
Italy	Salmonellosis (*S. napoli*)	*Sus scrofa*	oui	2	
Italy	Salmonellosis (*S. typhimurium*)	*Columba livia*	oui	4	
Italy	Salmonellosis (*S. typhimurium*)	*Larus ridibundus*	oui	2	
Italy	Salmonellosis (*S. typhimurium*)	*Rattus*	oui	1	

Italy	Salmonellosis (*S. typhimurium*)	*Tordus Merula*	oui	1	
Italy	Salmonellosis (*S. typhimurium*)	*Vulpes vulpes*	oui	1	
Italy	Salmonellosis (*S. umbilo*)	*Athene noctua*	oui	1	
Italy	Salmonellosis *S. stanleyville* (4,5,12:z,z23:-) GR O:4 (B)	*Sus scrofa*	oui	1	
Italy	Syndrome du lièvre européen	*Lepus europaeus*	oui	169	
Italy	Trichinellose	*Canis lupus*	oui	5	
Italy	Trichinellose	*Martes foina*	oui	2	
Italy	Trichinellose	*Sus scrofa*	oui	2	
Italy	Trichinellose	*Vulpes vulpes*	oui	5	
Italy	Trichomonose	*Streptopelia decaocto*	oui	4	
Italy	Bovine Tuberculosis	*Sus scrofa*	oui	44 (M. bovis)	
Italy	Bovine Tuberculosis	*Sus scrofa*	oui	16 (M. microti)	
Italy	Avian Tuberculosis	*Buteo buteo*	oui	2	
Italy	Avian Tuberculosis	*Columba livia*	oui	1	
Italy	Avian Tuberculosis	*Falco tinnuculus*	oui	1	
Italy	Avian Tuberculosis	*Sus scrofa*	oui	4	
Italy	Variole aviaire	*Columba palumbus*	oui	1	
Japan	**Echinococcus multilocularis**	**Red fox (*Vulpes vulpes*)**	**yes**	**90**	
Kenya	**No report**				
Kuwait	**No diseases reported in wildlife**		**no**		
Latvia	**Newcastle Disease**	**Pigeon (*Columba livia domestica*)**	**yes**	**9**	
Latvia	Rabies	Badger (*Meles meles*)	yes	8	
Latvia	Rabies	Beaver (*Castor fiber*)	yes	3	
Latvia	Rabies	Ermine (*Mustela erminea*)	yes	1	
Latvia	Rabies	Hedgehog (*Erinaceus europeus*)	yes	1	
Latvia	Rabies	Moose (*Alces alces*)	yes	3	
Latvia	Rabies	Otter (*Lutra lutra*)	yes	1	
Latvia	Rabies	Pine marten (*Martes martes*)	yes	6	
Latvia	Rabies	Polecat (*Mustela putorius*)	yes	9	
Latvia	Rabies	Racoon dog (*Nycter. procyonides*)	yes	153	
Latvia	Rabies	Red fox (*Vulpes vulpes*)	yes	187	
Latvia	Rabies	Roe deer (*Capreolus capreolus*)	yes	9	
Latvia	Rabies	Wild boar (*Sus scrofa*)	yes	1	
Latvia	Rabies	Wolf (*Canis lupus*)	yes	1	
Latvia	Trichinellosis	Beaver (*Castor fiber*)	yes	1	
Latvia	Trichinellosis	Wild boar (*Sus scrofa*)	yes	3	
Lesotho	**No report**				
Lithuania	**Rabies**	**Red fox, *Vulpes vulpes***	**yes**	**687**	
Lithuania	Rabies	Racoon dog, *N. procyonides*	yes	987	
Lithuania	Rabies	Polecat (*Mustela putorius*)	yes	43	
Lithuania	Rabies	Badger, *M. meles*	yes	12	
Lithuania	Rabies	Marten (*Martes foina*)	yes	139	
Lithuania	Rabies	Wild boar, *S. scrofa*	yes	1	
Lithuania	Rabies	Otter, *Lutra lutra*	yes	1	
Lithuania	Rabies	Roe deer (*Capreolus capreolus*)	yes	10	
Lithuania	Rabies	Mink (*Mustela lutreola*)	yes	1	
Lithuania	Trichinellosis	Wild boar, *S. scrofa*	yes	56	
Lithuania	Trichinellosis	Red fox, *Vulpes vulpes*	yes	2	
Luxembourg	**Echinococcus multilocularis**	**Red fox, *Vulpes vulpes***	**yes**	**22%**	
Luxembourg	Sarcoptic Mange	Wild boar, *Sus scrofa*	yes	5%	
Madagascar	**No report**				
Marocco	**Rabies**	**Red fox, *Vulpes vulpes***	**yes**	**2**	
Mauritius	**No diseases reported in wildlife**		**No**		
Moldavia	**No report**				
Mozambique	**No report**				
Myanmar	**Anthrax**	***Axis procinus***	**yes**	**3**	
Myanmar	Avian Tuberculosis	Pheasant	yes	1	
Myanmar	Avian Tuberculosis	Guinea fowl	yes	1	
Myanmar	Feline Panleucopenia,	*Panthera tigris*	yes	1	
Myanmar	Large Liver Flukes	*Cervus unicolor*	yes	2	
Myanmar	Leptospirosis	*Panthera tigris*	yes	1	
Myanmar	Psoroptic Mange	*Cervus eldi thamin*	yes	20	
Myanmar	Sarcoptic Mange	*Ursus thibetanius*	yes	1	
Myanmar	Bovine Tuberculosis	*Cervus eldi thamin*	yes	4	
Myanmar	Bovine Tuberculosis	Pig tailed monkey	yes	2	
Myanmar	Bovine Tuberculosis	Rhegus monkey	yes	2	
Myanmar	Bovine Tuberculosis	Gibbon	yes	1	
Myanmar	Bovine Tuberculosis	Crab eating macaque	yes	1	
Myanmar	Tuberculosis Human	*Macaca mullata*	yes	6	
Myanmar	Filariaisis	Elephants	yes	149	
Myanmar	Filariaisis (Heartworm)	Red panda	yes	1	
Myanmar	Fasciolides	Elephants	yes	203	

Namibia	**Anthrax**	***Antidorcus marsuplis***	**yes**	**12**	
Namibia	Anthrax	*Connochaetes taurinus*	yes	8	
Namibia	Anthrax	*Equus burchelli*	yes	53	
Namibia	Anthrax	*Loxodonta africana*	yes	2	
Namibia	Rabies	Bat eared fox (*Vulpes chama*)	yes	2	
Namibia	Rabies	Honey badger (*Mellivora capensis*)	yes	1	
Namibia	Rabies	Hyena (*Crocuta crocuta*)	yes	3	
Namibia	Rabies	Jackal (*Canis audustus*)	yes	11	
Namibia	Rabies	Kudu (*Tragelaphus strepsiceros*)	yes	72	
Namibia	Rabies	Mongoose (*Suricata suricata*)	yes	1	
Namibia	Botulism	*Ostrich* (Struthio camelus)	yes	1	
Netherlands	**Caprine Arthritis/Encephalitis**	***Capra hircus***	**captive**	**3**	**serology + clinical**
Netherlands	Bovine Tuberculosis	*Tapisus indicus*	captive	1	skintest, Elisa, ERT, MAPIA
Netherlands	Botulism	Anseriformes	free	2	necrosy suspect + culture
Netherlands	Salmonellosis	*Callosciurus prevostii*	captive	1	culture.
Netherlands	Toxoplasmosis				Salmonella typhimurium
Netherlands	Avian Influenza	*Aythya ferina* (real-time RT-PCR)	1 LPNAI(H7)	1 of 5	
Netherlands	Avian Influenza	*Anas crecca* (real-time RT-PCR)	LPAI & 1 LPNAI(H5)	11 of 146	
Netherlands	Avian Influenza	*Anser albifrons* (real-time RT-PCR)	LPAI & 2 LPNAI(H5)	38 of 2344	
Netherlands	Avian Influenza	*Anas platyrhynchos* (real-time RT-PCR)	LPAI & 5 LPNAI(H7) & 37 LPNAI(H5)	346 of 4864	
Netherlands	Avian Influenza	*Anas acuta* (real-time RT-PCR)	only LPAI	7 of 317	
Netherlands	Avian Influenza	*Anas clypeata* (real-time RT-PCR)	only LPAI	2 of 58	
Netherlands	Avian Influenza	*Anas penelope* (real-time RT-PCR)	only LPAI	19 of 1412	
Netherlands	Avian Influenza	*Anas strepera* (real-time RT-PCR)	only LPAI	6 of 205	
Netherlands	Avian Influenza	*Anser anser* (real-time RT-PCR)	only LPAI	2 of 491	
Netherlands	Avian Influenza	*Anser brachyrhynchus* (real-time RT-PCR)	only LPAI	6 of 209	
Netherlands	Avian Influenza	*Aythya fuligula* (real-time RT-PCR)	only LPAI	1 of 9	
Netherlands	Avian Influenza	*Branta bernicla* (real-time RT-PCR)	only LPAI	4 of 140	
Netherlands	Avian Influenza	*Branta canadensis* (real-time RT-PCR)	only LPAI	3 of 77	
Netherlands	Avian Influenza	*Branta leucopsis* (real-time RT-PCR)	only LPAI	5 of 566	
Netherlands	Avian Influenza	*Cygnus olor* (real-time RT-PCR)	only LPAI	6 of 819	
Netherlands	Avian Influenza	*Larus argentatus* (real-time RT-PCR)	only LPAI	8 of 323	
Netherlands	Avian Influenza	*Larus canus* (real-time RT-PCR)	only LPAI	2 of 247	
Netherlands	Avian Influenza	*Larus ridibundus* (real-time RT-PCR)	only LPAI	3 of 1776	
Netherlands	Avian Influenza	*Somateria mollissima* (real-time RT-PCR)	only LPAI	8 of 99	
Netherlands	Avian Influenza	Unspecified *Anatidae* (RT-PCR)	only LPAI	11 of 3002	
Netherlands	Avian Influenza	Unspecified aquatic birds (RT-PCR)	only LPAI	1 of 131	
Netherlands	Avian Influenza	Unspecified *Laridae* (RT-PCR)	only LPAI	5 of 885	
Netherlands	Botulism (type C +/-D)	*Fulica atra*	yes	2 of 7	
Netherlands	Botulism (type C)	*Alopochen aegyptiacus*	yes	2 of 2	
Netherlands	Botulism (type C)	*Anas strepera*	yes	1 of 1	
Netherlands	Botulism (type C)	*Aythya fuligula*	yes	1 of 2	
Netherlands	Botulism (type C)	*Branta leucopsis*	yes	1 of 1	
Netherlands	Botulism (type C)	*Cygnus olor*	yes	2 of 5	
Netherlands	Botulism (type C)	*Larus ridibundus*	yes	3 of 8	
Netherlands	Botulism (type C)	*Pisces spp.*	yes	1 of 11	
Netherlands	Botulism (type C +/-D)	*Anas platyrhynchos*	yes	101 of 163	
Netherlands	Echinococcus multilocularis	*Vulpes vulpes* (microscopy & PCR on faeces)	yes	3 of 49	
Netherlands	Myxomatosis	*Oryctolagus cuniculus* (gross necropsy & histology)	yes	2 of 2	
Netherlands	Bat Lyssaviruses	*Chiroptera* (fluorescent antibody test)	yes (*)	9 of 121	
Netherlands	Rabies	*Chiroptera* (fluorescent antibody test)	yes(*)	9 of 121	
Netherlands	Avian Malaria	*Spheniscus demersus*	captive	1	necropsy-histology
Netherlands	Histomoniasis	*Acryllium vulturinum*	captive	1	necropsy
Netherlands	Trichomoniasis	*Columbidae, Bubo scandiacus*	captive	4	microscopy ingluvius swab
New Caledonia	**No report**				
New Zealand	**Ciontagious ecthyma**	***Ovis aries, Capra hircus***	**yes**	**1**	
New Zealand	Avian pox	*Haematopus*	yes	Total of 6	
New Zealand	Avian pox	*Petroica australis australis*	yes	Total of 6	
New Zealand	Avian pox	*Thinornis novaseelandiae*	yes	Total of 6	
New Zealand	Avian malaria	*Megadyptes antipodes*	yes	Total of 10	
New Zealand	Avian malaria	*Philesturnus carunculatus*	yes	Total of 10	
New Zealand	Avian malaria	*Megadyptes antipodes*	yes	Total of 10	
New Zealand	Avian malaria	*Eudyptula minor*	yes	Total of 10	
New Zealand	Circoviruses	*Cacatua galerita*	yes	Total of 6	
New Zealand	Circoviruses	*Platycercus eximius*	yes	Total of 6	

New Zealand	Circoviruses	*Larus dominicanus*	yes	Total of 6	
New Zealand	Chytriomycosis	*Litoria aurea*	yes	1	
New Zealand	Chytriomycosis	*Litoria raniformis*	yes	1	
Niger	**No diseases reported in wildlife**				
Norway	**Cysticercosis**	***Alces alces, Rangifer tarandus***	**yes**	**2**	
Norway	Malignant Catharral Fever	*Alces alces, Cervus elaphus*	yes	3	
Norway	Meningeal worms of cervides	*A. Alces*	yes	Total of 8	
Norway	Meningeal worms of cervides	*C. Elaphus*	yes	Total of 8	
Norway	Meningeal worms of cervides	*R. tarandus*	yes	Total of 8	
Norway	Pasteurellosis	*Aythya fuligula*	yes	1	
Norway	Pasteurellosis	*Columba livia*	yes	1	
Norway	Pasteurellosis	*Pica pica*	yes	1	
Norway	Pasteurellosis	*Bombycilla garrulus*	yes	4	
Norway	Pasteurellosis	*Ovibos moschatus*	yes	Appr. 10	
Norway	Pseudotuberculosis	*Lepus timidus*	yes	1	
Norway	Salmonellosis (S. Typhimurium)	*Carduelis chloris*	yes	4	
Norway	Salmonellosis (S. Typhimurium)	*Plectrophenax nivalis*	yes	1	
Norway	Salmonellosis (S. Typhimurium)	*Ardea cinerea*	yes	1	
Norway	Salmonellosis (S. Typhimurium)	*Carduelis spinus*	yes	1	
Norway	Salmonellosis (S. Typhimurium)	*Pyrrhula pyrrhula* (10)	yes	10	
Norway	Sarcoptic Mange	*Lynx lynx*	yes	2	
Norway	Sarcoptic Mange	*Vulpes vulpes*	yes	2	
Norway	Trichomoniasis	*Columba livia*	yes	1	
Pakistan	**No diseases reported in wildlife**				
Peru	**Leptospirosis**	***Hydrochoerus hydrochoerus***	**yes**	**2**	
Peru	Rabies	*Desmodus rotunus*	yes	1	
Peru	Feline Panleucopenia	*Felis jacovita*	yes	2	
Peru	Fasiola hepatica	*Masama sp.*	yes	2	
Peru	Chytriomycosis	*Telmatobius breviceps*	yes	1	
Peru	Chytriomycosis	*Telmatobius jeslkii*	yes	1	
Peru	Chytriomycosis	*Phrynopus sp.*	yes	1	
Peru	Sarcoptic Mange	*Trematerus ornatus*	yes	8	
Peru	Sarcoptic Mange	*Vicuna vicuna*	yes	3501	
Peru	Sarcoptic Mange	*Tapirus pinchaque*	yes	3	
Peru	Sarcoptic Mange	*Tyassu tajacu*	yes	5	
Peru	Sarcoptic Mange	*Tyassu pecari*	yes	9	
Philliphines	**No report**				
Poland	**No report**				
Portugal	**Leptospirose**	**à indiquer**	**oui**	**20**	
Portugal	Avian influenza, LPAI	*Anas sp.*	oui	3	
Portugal	Bovine Tuberculosis	*Cervus elaphus*	oui	14	
Portugal	Newcastle Disease	*Columba livia*	oui	1	
Portugal	Newcastle Disease	*Streptopelia decaocto*	oui	1	
Portugal	Maladie d'Aujeszky	*Sus scrofa*	oui	à indiquer	
Portugal	Bovine Tuberculosis	*Sus scrofa*	oui	10	
Portugal	Avian Tuberculosis	*Sus scrofa*	oui	2	
Quatar	**No report**				
Rep of Guinée	**Large Liver Flukes**	**Buffalo, *Syncerus caferananus***	**yes**	**1**	
Romania	**No report**				
Saudi arabia	**No report**				
Serbia	**Avian Influenza**	***Cygnus olor***	**yes**	**11**	
Serbia	Large Liver Flukes	*Cervidae*	yes	on-going investigation	
Serbia	Rabies	*Vulpes vulpes*	yes	66	
Serbia	Rabies	*Meles meles*	yes	1	
Serbia	Rabies	*Mustela putorius*	yes	1	
Serbia	Rabies	*Mustela nivalis*	yes	1	
Serbia	Trichinellosis	*Sus scrofa*	yes	11	
Sierra Leone	**No report**				
Slovakia	**Avian Influenza**	***Mergellus albellus***	**yes**	**1**	
Slovakia	Avian Influenza	*Falco peregrinus*	yes	1	
Slovakia	Babesiosis	*Canis familiaris*	yes	18	
Slovakia	Classical Swine Fever	*Sus scrofa*	yes	17	
Slovakia	*Echinococcus multilocularis*	*Vulpes vulpes*	yes	342	
Slovakia	*Echinococcus multilocularis*	*Ondatra zibethicus*	yes	1	
Slovakia	Lyme borreliosis	*Lacerta viridis*	yes	19	
Slovakia	Lyme borreliosis	*Lacerta agilis*	yes	5	
Slovakia	Lyme borreliosis	*Canis familiaris*	yes	10	
Slovakia	Lyme borreliosis	*Equs caballi*	yes	14	
Slovakia	Lyme borreliosis	*Apodemus flavicolis*	yes	16	
Slovakia	Lyme borreliosis	*Apodemus agrarius*	yes	9	
Slovakia	Lyme borreliosis	*Apodemus microps*	yes	8	
Slovakia	Lyme borreliosis	*Cletrionomys glareolus*	yes	5	
Slovakia	Lyme borreliosis	*Mus musculus*	yes	5	

Slovakia	Lyme borreliosis	*Ovis musimon*	yes	7	
Slovakia	Rabies	*Vulpes vulpes*	yes	4	
Slovakia	Trichinellosis	*Vulpes vulpes*	yes	99	
Slovakia	Trichinellosis	*Sus scrofa*	yes	7	
Slovakia	Trichinellosis	*Putorius putorius*	yes	1	
Slovakia	Trichinellosis	*Martes martes*	yes	1	
Slovenia	**Contagious ecthyma**	***Rupicapra rupicapra***	**yes**	**1**	
Slovenia	European Brown Hare Syndrome	*Lepus europeaus*	yes	1	
Slovenia	Rabies	*Vulpes vulpes*	yes	2	
Slovenia	Sarcoptic Mange	*Rupicapra rupicapra*	yes	16	
Slovenia	Trichomoniasis	*Columba livia domestica*	yes	46	
Slovenia	Avian Chlamydiosis	*Columba livia domestica*	yes	1	
Slovenia	Avian Cholera	*Phasianus colchicus*	yes	5	
Slovenia	Avian Influenza	*Cygnus olor*	yes	44	
Slovenia	Avian Influenza	*Ardea cinerea*	yes	2	
Slovenia	Avian Influenza	*Anas plathyrhynchos*	yes	1	
Slovenia	Avian Influenza	*Anas acuta*	yes	1	
South Africa	**African Swine Fever**	**wild suids and tampans**	**yes**	**Endemic**	**Endemic in the 3 Northern Provinces**
South Africa	Anthrax	Kudu, Nyala, buffalo and giraffe	yes	20	
South Africa	Avian Influenza	Farmed ostriches (H5N2)	yes		Two outbreaks (1 high path & 1 low path)
South Africa	Avian Malaria	Multi - species	yes		Clinical cases in penguins
South Africa	Babesiosis	Zebra, White & black rhino, mongoose, sable	yes	Endemic	Endemic
South Africa	Bat Lyssaviruses	Insectivorous bat	yes	1	
South Africa	Besnoitiosis	Wildebeest and impala are infected with a mild strain	yes	Endemic	Endemic
South Africa	Brucellosis	Buffalo in KNP	yes	9	
South Africa	Cysticercosis	Buffalo, impala	yes	Endemic	Endemic
South Africa	Echinococcus granulosus	Lions, Leopards and hyaenas	yes	Endemic	Endemic
South Africa	Elephant Herpesvirus	Elephants	yes	Endemic	Endemic
South Africa	Foot and Mouth Disease	Buffalo	yes	Endemic	Endemic in Greater KNP
South Africa	Immunodeficiency viruses (Feline, Simian)	Lions	yes	Endemic	Endemic
South Africa	Malignant Catharral Fever	Wildebeest	yes	Endemic	Endemic
South Africa	Newcastle Disease	Farmed ostriches, ground hornbill, doves	yes	24	
South Africa	Psoroptic Mange	Buffalo	yes	Endemic	Endemic
South Africa	Rabies	Detected in 15 species of wildlife in 2006	yes	113	
South Africa	Sarcoptic Mange	Jackal, wildebeest, leopards & lions	yes	Endemic	Endemic
South Africa	Trichinellosis	Lions	yes	2	
South Africa	Trichomoniasis	Pigeons, doves and raptors	yes	Endemic	Endemic
South Africa	Bovine Tuberculosis	Buffalo, lions, kudu and bushbuck	yes	Endemic	Endemic in KNP and HIP
Spain	**No report**		**yes**		
Sri Lanka	**No report**				
Sudan	**No report**				
Swaziland	**Immunodeficiency viruses (Feline, Simian)**	**Felis leo with FIV in past years**	**no**	**4**	
Sweden	**Avian cholera**	**Blackbird (*Turdus merula*)**	**yes**	**1**	
Sweden	Avian Influenza HPAI: H5N1	Mink (*Mustela vison*)	yes	1	
Sweden	Avian Influenza HPAI: H5N1	Bird	yes	1	
Sweden	Avian Influenza HPAI: H5N1	Mute swan (*Cygnus olor*)	yes	7	
Sweden	Avian Influenza HPAI: H5N1	Canada goose (*Branta canadensis*)	yes	3	
Sweden	Avian Influenza both LPAI and HPAI	Mallard (*Anas platyrhynchos*)	yes	3	
Sweden	Avian Influenza both LPAI and HPAI	Tufted duck (*Aythya fuligula*)	yes	44	
Sweden	Avian Influenza HPAI: H5N1	Scaup (*Aythya marila*)	yes	3	
Sweden	Avian Influenza HPAI: H5N1	Smew (*Mergus albellus*)	yes	3	
Sweden	Avian Influenza HPAI: H5N1	Red-brested merganser (*Mergus serrator*)	yes	1	
Sweden	Avian Influenza HPAI: H5N1	Goosander (*Mergus merganser*)	yes	9	
Sweden	Avian Influenza HPAI: H5N1	Buzzard (*Buteo buteo*)	yes	2	
Sweden	Avian Influenza HPAI: H5N1	Herring gull (*Larus argentatus*)	yes	2	
Sweden	Avian Influenza HPAI: H5N1	Eagle owl (*Bubo bubo*)	yes	4	
Sweden	Avian Influenza LPAI	Long-eared owl (*Asio otus*)	yes	1	
Sweden	Avian pox	Great tit (*Parus major*)	yes	1	
Sweden	Botulism	Mallard (*Anas platyrhynchos*)	yes	5	
Sweden	Botulism	Shoveler (*Anas clypeata*)	yes	1	
Sweden	Cysticercosis	Watervole (*Arvicola terrestris*)	yes	1	
Sweden	Cysticercosis	Brown hare (*Lepus europaeus*)	yes	1	
Sweden	European Brown Hare Syndrome	Brown hare (*Lepus europaeus*)	yes	1	
Sweden	Meningeal worms of cervides	Moose (*Alces alces*)	yes	1	
Sweden	Rabbit Hemorrhagic Disease	Wild rabbit (*Oryctolagus cuniculus*)	yes	1	

Sweden	Salmonellosis	Brown hare (*Lepus europaeus*)	yes	1	
Sweden	Salmonellosis	Bullfinch (*Pyrrhula pyrrhula*)	yes	6	
Sweden	Salmonellosis	Redpoll (*Carduelis flammea*)	yes	3	
Sweden	Salmonellosis	Siskin (*Carduelis spinus*)	yes	1	
Sweden	Salmonellosis	Black-headed gull (*Larus ridibundis*)	yes	1	
Sweden	Salmonellosis	Herring gull (*Larus argentatus*)	yes	1	
Sweden	Salmonellosis	Tawny Owl (*Strix aluco*)	yes	1	
Sweden	Salmonellosis	Golden eagle (*Aquila chrysaetos*)	yes	1	
Sweden	Sarcoptic mange	Red fox (*Vulpes vulpes*)	yes	11	
Sweden	Sarcoptic mange	Lynx (*Lynx lynx*)	yes	8	
Sweden	Sarcoptic mange	Wolf (*Canis lupus*)	yes	1	
Sweden	Sarcoptic mange	Pine marten (*Martes martes*)	yes	1	
Sweden	Trichinellosis	Red fox (*Vulpes vulpes*)	yes	2	
Sweden	Trichinellosis	Lynx (*Lynx lynx*)	yes	5	
Sweden	Trichinellosis	Wolf (*Canis lupus*)	yes	2	
Sweden	Tularemia	Brown hare (*Lepus europaeus*)	yes	4	
Switzerland	**Babesiosis**	***Rupicapra rupicapra* (free ranging)**	**yes**	**3**	
Switzerland	Echinococcus multilocularis	*Castor fiber*	yes	1	
Switzerland	Inclusion Body Disease,	*Boa constrictor*	yes	3	
Switzerland	Sarcoptic Mange	*Canis lupus* (free ranging)	yes	1	
Switzerland	Sarcoptic Mange	*Vulpes vulpes* (free ranging)	yes	9	
Switzerland	Tularemia	*Saimiri sciureus* (Captive)	yes	2	
Taipei China	**No diseases reported in wildlife**				
Tanzania	**No report**				
Thailand	**No report**				
Tunisia	**No report**				
Turkey	**Rabies**	***Vulpes vulpes***	**yes**	**3**	
Turkey	Avian Influenza	wildduck	yes	5	
Turkey	Avian Influenza	wild swan	yes	4	
Turkey	Avian Influenza	owl	yes	5	
Turkey	Avian Influenza	starling	yes	2	
Turkey	Avian Influenza	pigeon	yes	16	
Turkey	Avian Influenza	dove	yes	1	
Turkey	Avian Influenza	sparrow	yes	3	
Turkey	Avian Influenza	hawk	yes	2	
Turkey	Avian Influenza	quail	yes	1	
Turkey	Avian Influenza	cormorant	yes	1	
Turkey	Avian Influenza	seagull	yes	2	
Turkey	Avian Influenza	unknown species	yes	3	
Turkey	Newcastle Disease	Pigeon	yes	17	
Turkey	Newcastle Disease	Wildduck	yes	2	
Turkey	Newcastle Disease	wild swan	yes	7	
Turkey	Newcastle Disease	unknown species	yes	1	
Uganda	**No report**				
UK	**Avian Influenza HPAI: H5N1**	**Whooper swan (*Cygnus cygnus*)**	**Virus detected**	**1**	
UK	Avian Influenza LPAI: H10N7	Mallard	virus detected	1	
UK	Avian Influenza LPAI: H11N9	Mallard - H11N9	virus detected	1	
UK	Avian Influenza LPAI: H1N1	Wigeon (*Anas penelope*)	virus detected	1	
UK	Avian Influenza LPAI: H2N3	Mallard	virus detected	1	
UK	Avian Influenza LPAI: H5N?	Mallard	virus detected	1	
UK	Avian Influenza LPAI: H5N?	Mallard	virus detected	1	
UK	Avian Influenza LPAI: H5N?	Teal	virus detected	1	
UK	Avian Influenza LPAI: H5N?	Teal	virus detected	1	
UK	Avian Influenza LPAI: H5N?	Whooper swan	virus detected	1	
UK	Avian Influenza LPAI: H5N3	Mallard (*Anas platyrhynchos*)	virus detected	1	
UK	Avian Influenza LPAI: H5N3	Teal	virus detected	1	
UK	Avian Influenza LPAI: H6N1	Teal (*Anas crecca*)	virus detected	1	
UK	Avian Influenza LPAI: H6N2	Teal	virus detected	1	
UK	Avian Influenza LPAI: H6N8	Grey lag goose (*Anser anser*)	virus detected	1	

UK	Avian Influenza LPAI: H6N8	Pink-footed goose (*Anser brachyrhynchus*)	virus detected	1	
UK	Avian Influenza LPAI: H8N4	Teal - legally shot	virus detected	1	
UK	Avian Influenza LPAI: H9N2	Mallard	virus detected	1	
UK	*Amidostomum* sp. Parasitism	Shelduck (*Tadona tadona*)	yes	25	
UK	*Angiostrongylus vasorum* helminhs	Fox	yes	8	
UK	Arboviruses (Louping ill)	Mountain Hare (*Lepus timidus*)	yes	18	
UK	Arboviruses (Louping ill)	Red and Roe deer	yes	23	
UK	Arboviruses (Louping ill)	Red grouse (*Lagopus lagopus* ssp *scoticus*)	yes	76	
UK	*Ascarid helminthiasis* infestation	Fox	yes	1	
UK	Aspergillosis	Blackbird, Great spotted woodpecker (*Dendrocopus major*)	yes	2	
UK	Aspergillosis	Rook (*Corvus frugilegus*)	yes	1	
UK	Avian botulism	Black headed gull	yes	10	
UK	Avian botulism	Black headed gull (*Larus ridibundus*)	yes	5	
UK	Avian botulism	Canada goose	yes	20	
UK	Avian botulism	Herring gull (*Larus argentatus*)	yes	15	
UK	Avian botulism	Lesser Black backed gull (Larus fuscus)	yes	10	
UK	Avian botulism	Mallard	yes	68	
UK	Avian botulism	Mallard	yes	68	
UK	Avian Cholera	Mute swan (Cygnus olor)	yes	1	
UK	Avian Cholera	Robin (*Erithacus rubecula*)	yes	1	
UK	Avian pox	Dunnock (*Prunella modularis*)	yes	1	
UK	Avian pox	Woodpigeon	yes	1	
UK	Avian tuberculosis	Bewicks swan (*Cygnus columbarius*)	yes	1	
UK	Avian tuberculosis	Black headed gull (*Larus ridibundus*)	yes	2	
UK	Avian tuberculosis	Buzzard (*Buteo buteo*)	yes	1	
UK	Avian tuberculosis	Coot (*Fulica atra*)	yes	4	
UK	Avian tuberculosis	Gadwall (*Anas strepera*)	yes	1	
UK	Avian tuberculosis	Grey lag goose	yes	1	
UK	Avian tuberculosis	Mallard	yes	5	
UK	Avian tuberculosis	Moorhen (*Gallinula chloropus*)	yes	3	
UK	Avian tuberculosis	Mute swan (Cygnus olor)	yes	1	
UK	Avian tuberculosis	Pochard (*Aythya ferina*)	yes	1	
UK	Avian tuberculosis	Shelduck	yes	2	
UK	Avian tuberculosis	Teal	yes	1	
UK	Avian tuberculosis	Woodpigeon (*Columba livia*)	yes	1	
UK	Babesiosis *B. divergens* infection	Roe deer	yes	Several	
UK	Babesiosis *Babesia microti* infection	Field Vole - *Babesia microti* infection	yes	30% PCR positive	
UK	Bat Lyssaviruses	Daubenton's bat (*Myotis daubentonii*)	yes	1	
UK	Calcium deficiency	Collared dove	yes	48	
UK	*Capillaria* (*Eucoleus*) *aerophila* helminths	Fox	yes	61% of 96 foxes examined	
UK	Cnemidocoptes mite infestation	Chaffinch	yes	multiple incidents	
UK	Coccidiosis	Blackbird (*Turdus merula*)	yes	8	
UK	Coccidiosis	Hedgehog	yes	8	
UK	Colibacillosis (E coli 086 infection)	Chaffinch, Goldfinch, Greenfinch, Siskin	yes	Endemic	
UK	Colisepticaemia	Chaffinch (*Fringilla coelebs*)	yes	1	
UK	Cowpox virus infection	Bank Vole (*Clethrionomys glareolus*)	yes	429/559 (75%) seropositive	
UK	*Crenosoma vulpis* helminths	Fox	yes	10% of 96 foxes examined	
UK	Cryptosporidiosis	Hedgehog	yes	4 juveniles	
UK	Duck Plague (DVE)	Feral ducks	yes	several	
UK	Duck Plague (DVE)	Mallard	yes	several	
UK	Duck Plague (DVE)	Mute swan (*Cygnus olor*)	yes	several	
UK	Haemoparasites in bats, *Babesia vesperuginis*, *Bartonella species; Trypanosoma dionisii* was detected in one bat	Bat species Northern England	yes	Detected by PCR and blood smears	
UK	Helminthiasis (intestinal)	Roe deer	yes	1	
UK	*Hepatazoon* sp infection	Red Squirrel	yes	3	
UK	*Hepatazoon* sp infection	Red Squirrel	yes	3	
UK	Hepatic capillariasis	Red Squirrel	yes	1	
UK	Hepatic coccidiosis	Rabbit	yes	4	

UK	Hepatic coccidiosis	Rabbit	yes	4	
UK	Herpes virus infection	Common seal	yes	3	
UK	Leporine dysautonomia	Brown hare	yes	1	
UK	Leptospirosis	Badger (*Meles meles*)	yes	1	
UK	Leptospirosis	Fox (*Vulpes vulpes*)	yes	2	
UK	*Listeria ivanovii* enteritis	Red Squirrel	yes	1	
UK	*Listeria ivanovii* enteritis	Red Squirrel	yes	1	
UK	Liver fluke	Roe deer	yes	1	
UK	Marine Brucellosis (Brucella sp. Infection	Otter (*Lutra lutra*)	yes	4/92 weakly seropositive	
UK	Marine Brucellosis (*Brucella* sp. Infection)	Bottle nose dolphin (*Tursiops truncatus*)	yes	1	
UK	Marine Brucellosis (Brucella sp. Infection)	Common dolphin (*Delphinus delphis*)	yes	2	
UK	Marine Brucellosis (Brucella sp. Infection)	Harbour porpoise (*Phocoena phocoena*)	yes	11/52 seropositive	
UK	Mycobacterium avium (avian TB in wild mammals)	Fallow deer	yes	2	
UK	Mycobacterium avium (avian TB in wild mammals)	Red deer	yes	1	
UK	Mycobacterium avium (avian TB in wild mammals)	Roe deer	yes	2	
UK	*Mycoplasma phococerabrale* isolated from bite wounds	Grey seal (*Halichoerus grypus*)	yes	2	
UK	Myxomatosis	Rabbit	yes	15	
UK	Myxomatosis	Rabbit (*Oryctolagus cunniculus*)	yes	60	
UK	Myxomatosis	Rabbit (*Oryctolagus cunniculus*)	yes	132	
UK	Paramyxoviruses PMV 7	Collared dove	yes	1	
UK	Paramyxoviruses PMV1	Collared dove (*Streptopelia decaocto*)	yes	2	
UK	Paramyxoviruses PMV1	Feral pigeons (*Columba livia*)	yes	16	
UK	Paramyxoviruses PMV1	Woodpigeons (*Columbia livia*)	yes	1	
UK	Parasitic broncho-pneumonia	Common seal (*Phoca vitulina*)	yes	26	
UK	Parasitic broncho-pneumonia	Grey seal	yes	28	
UK	*Pasteurella* sp. Pneumonia	Red Squirrel	yes	1	
UK	*Pasteurella* sp. Pneumonia	Red Squirrel	yes	1	
UK	Pasteurellosis *P. multocida* pneumonia	Brown hare	yes	1	
UK	Pasteurellosis *P. multocida* pneumonia	Fox	yes	1	
UK	*Pseudamphistomum truncatum* bile flukes	Otter	yes	10	
UK	Renal coccidiosis	Whiskered bat	yes	1	
UK	Renal coccidiosis	Whiskered bat (*Myotis mystacinus*)	yes	1	
UK	Respiratory capillariasis	Hedgehog	yes	1876	
UK	Respiratory capillariasis	Hedgehog	yes	2199	
UK	*Ringworm* (*Trichophyton erinacea*) infection	Hedgehog	yes	17	
UK	*Ringworm* (*Trichophyton erinacea*) infection	Hedgehog	yes	78	
UK	Salmonellosis	Brown Rat (*Rattus norvegicus*)	yes	9	
UK	Salmonellosis = Salmonella typhimurium DT 56	Otter	yes	1	
UK	Salmonellosis *S enteritidis*	Hedgehog	yes	30	
UK	Salmonellosis *S. durham*	Badger	yes	1	
UK	Salmonellosis *S. enteritidis*	House mouse (*Mus musculus*)	yes	12	
UK	Salmonellosis S. enteritidis DT 20	Hedgehog	yes	1	
UK	Salmonellosis, *Salmonella typhimurium* DT 40	Garden birds, Greenfinch, Chaffinch, Goldfinch, Siskin, House sparrow	yes	10	
UK	Salmonellosis, *Salmonella typhimurium* DT 41	Water birds	yes	4	
UK	Salmonellosis, *Salmonella typhimurium* DT 56 and 56 variant	Garden birds, Greenfinch, Chaffinch (*Fringilla coelebs*), Goldfinch (*Carduelis carduelis*), Siskin, House sparrow	yes	27	
UK	Sarcoptic Mange	Fox	yes	6	
UK	Sarcoptic Mange	Hedgehog (*Erinaceus europaeus*)	yes	2	
UK	Sarcoptic Mange	Fox	yes	12	
UK	*Skrjabingylus* sp. Infection	Stoat (*Mustela erminea*)	yes	2	
UK	Squirrel pox	Red Squirrel	yes	8	
UK	Squirrel pox	Red Squirrel	yes	13/58 (22%) seropositive	
UK	Squirrel pox	Red Squirrel (*Sciurus vulgaris*)	yes	38	
UK	Syngamiasis (*Syngamus trachea*) infection	Blackbird, Starling (*Sturnus vulgaris*)	yes	2	

UK	Syngamiasis (*Syngamus trachea*) infection	Rook (Corvus frugilegus)	yes	2	
UK	Toxoplasmosis	Red Squirrel	yes	1	
UK	Toxoplasmosis	Red Squirrel	yes	1	
UK	Trichomoniasis	Buzzard (*Buteo buteo*)	yes	2	
UK	Trichomoniasis	Collared dove	yes	48	
UK	Trichomoniasis	Feral pigeon	yes	18	
UK	Trichomoniasis	Marsh Harrier (*Circus aeruginosus*)	yes	1	
UK	Trichomoniasis	Red Kite (*Milvus milvus*)	yes	1	
UK	Trichomoniasis	Sparrowhawk (*Accipiter nisus*)	yes	2	
UK	Trichomoniasis	Stock dove (*Columba oenas*)	yes	1	
UK	Trichomoniasis	Tawny Owl (*Strix aluco*)	yes	22	
UK	Trichomoniasis	Woodpigeon	yes	317	
UK	Trichomoniasis	Woodpigeon	yes	269	
UK	Trichomoniasis (oesophagitis)	House sparrow (*Passer domesticus*)	yes	Endemic	
UK	Trichomoniasis (oesophagitis)	Bullfinch (*Pyrrhula pyrrhula*)	yes	Endemic	
UK	Trichomoniasis (oesophagitis)	Greenfinch (*Carduelis chloris*)	yes	Endemic	
UK	Trichomoniasis (oesophagitis)	Siskin (Carduelis spinus)	yes	Endemic	
UK	Trichomoniasis (oesophagitis)	Yellowhammer (*Emberiza citrinella*)	yes	Endemic	
UK	Trichomoniasis (oesophagitis)	Dunnock (*Prunella modularis*)	yes	Endemic	
UK	Bovine Tuberculosis	Fallow deer (*Dama dama*)	yes	28	
UK	Bovine Tuberculosis	Red deer	yes	9	
UK	Bovine Tuberculosis	Roe deer (*Capreolus capreolus*)	yes	3	
UK	Bovine Tuberculosis	Badger	yes	55	
UK	*Yersinia enterocolitica* pneumonia	Red Squirrel	yes	1	
UK	*Yersinia enterocolitica* pneumonia	Red Squirrel	yes	1	
UK	Yersiniasis (Yersinia pseudotuberculosis)	Hawfinch (*Coccothraustes coccothraustes*)	yes	2	
UK	Yersiniasis (*Yersinia pseudotuberculosis*)	Goldfinch, Chaffinch	yes	2	
UK	Yersiniasis pseudotuberculosis infection	Brown hare	yes	1	
UK	Anaplasmosis	Field vole (*Microtus agrestis*)	yes	5%	
UK	Squirrel pox	Grey Squirrel (*Sciurus carolinensis*	infection	304/591 (51%) positive	
Ukraine	**No report**				
USA	**Avian pox**	**numerous species**	**endemic**		
USA	Rabies	bats and carnivores	endemic		
USA	Tyzzer´s Disease	Muskrat (*Ondatra zibethicus*)	endemic		
USA	West Nile virus	numerous birds, particularly white pelicans (*Pelecanus erythrorhynchos*)	endemic	4047	
USA	Hantaviruses	wild rodents	endemic		
USA	Large Liver Flukes	*O. virginianus*	endemic		
USA	Meningeal worms of cervides	*O. virginianus*	endemic		
USA	Avian influenza, LPAI	waterfowl, shorebirds	endemic		
USA	Aujeszky´s Disease	Feral swine - *Sus scrofa*	endemic		
USA	Bovine Tuberculosis	*O. virginianus, C. elaphus*	endemic	(~25-30 culture positive per year of ~15,000 exxamined)	
USA	Brucellosis	*Sus scrofa*	endemic		
USA	Leishmaniasis	wild furbearers	endemic		
USA	Leptospirosis	wild furbearers	endemic		
USA	Avian Tuberculosis	birds and mammals	ubiquitous		
USA	Anthrax		yes		
USA	Anaplasmosis		yes		
USA	Avian Cholera	Waterfowl -sporadic	yes		
USA	Avian Vacuolar Myelinopathy	*Haliaeetus leucocephalus*	yes	8	
USA	Avian Vacuolar Myelinopathy	*Fulica americana*	yes	1	
USA	Babesiosis		yes		
USA	Bluetongue	*O. virginianus*	yes		
USA	Bluetongue	*Odocoileus virginianus*	yes		
USA	Botulism	waterfowl Types C & E, gulls	yes		
USA	Brucellosis	*Cervus elaphus, Bison bison*	yes	endemic	
USA	Brucellosis	*Rangifer tarandus*	yes		
USA	Chytridiomycosis	Eastern red spotted newt (*Notophthalmus viridescens*)	yes	VA - 8	
USA	Duck Plague (DVE)	waterfowl	yes	FL-40; VA-18	
USA	Echinococcus granulosus	*Canis lupus*	yes		
USA	Echinococcus multilocularis	wild furbearers	yes		
USA	Epizootic Haemorrhagic Disease	*O. virginianus*	yes		
USA	Fibropapillomatosis in sea turtles	*Chelonia mydas*	yes		
USA	Iridovirus diseases	*Rana clamitrans*	yes	150 in FL	

USA	Lyme borreliosis	*Peromyscus maniculatus*	yes		
USA	Newcastle Disease	*Phalacrocorax auritus*	yes	WI - 39	
USA	Paramyxoviruses (Bat, Canine, Cetacean, Phocine)	canine distemper: procyonids and canids	yes		
USA	Paratuberculosis	*O. virginianus*	yes	few deer	
USA	Salmonellosis (please state species and type)	common tern (*Sterna hirundo*), laughing gull (*Larus atricilla*)	yes	625	
USA	Salmonellosis (please state species and type)	passerine birds	yes		
USA	TSE, CWD	*Alces alces*	yes	2	
USA	TSE, CWD	*O. virginianus*	yes	WV (5 more in 2006), NY - 0	
USA	TSE, CWD	*O. virginianus, O hemionus, C. elaphus*	yes		
USA	Tularemia	*Sylvilagus spp, Castor canadensis, Ondatra zibethicus*	yes		
USA	Bovine tuberculosis	*O. virginianus*	yes	6	
USA	Histomoniasis	*Meleagris gallopova*	endemic		
USA	Paramyxoviruses	waterfowl APV-1	endemic		
USA	Sarcoptic Mange	*Vulpes vulpes, Canis latrans*	endemic		
USA	Trichomoniasis	columbids and raptors	endemic		
USA	Trichomoniasis	columbids and raptors	endemic		
USA	Bovine tuberculosis	*C. elaphus*	endemic Michigan		
USA	Bovine tuberculosis	White-Tailed deer (*Odocoileus virginianus*)	yes		
USA	Tularemia	*Sylvilagus* spp	endemic		
USA	Tularemia	*Castor canadensis*	endemic		
USA	Tularemia	*Ondatra zibethicus*	endemic		
USA	West Nile virus	numerous birds	endemic		
Vietnam	**Avian influenza**	***Egretta garzetta***	**yes**	**Total of 18**	
Vietnam	Avian influenza	*Casmerosius albus*	yes	Total of 18	
Zambia	**No report**				
Zimbabwe	**Avian Influensa H5N2**	**Ostrich**	**yes**	**200**	
Zimbabwe	Feline panleukopenia	African wild cat	yes	single cases	
Zimbabwe	Cysticercosis	Roan antilope	yes	1	
Zimbabwe	Babesiosis	Zebra	yes	1	
Zimbabwe	Babesiosis	Lion	yes	2	
Zimbabwe	Rabies	Reebuck	yes	1	
Zimbabwe	Rabies	Impala	yes	1	
Zimbabwe	Newcastle disease	Ostrich (farmed)	yes	15	
Zimbabwe	Trichinellosis	Lion	yes	1	
Zimbabwe	Papillomatosis in crocodiles **POX** ??	*C. niloticus*	yes	500	
Zimbabwe	Trichinellosis	*C. niloticus* + *Varanus niloticus*	yes	50	

60 countries reported
11 countries did not observ any disease outbreaks in wildlife
34 countries that had reported to OIE in previous years did not send in a report this year