



# Convention on the Conservation of Migratory Species of Wild Animals

Secretariat provided by the United Nations Environment Programme



## 16<sup>TH</sup> MEETING OF THE CMS SCIENTIFIC COUNCIL

Bonn, Germany, 28-30 June, 2010

UNEP/CMS/ScC16/Inf.10

Agenda Item No. 13.3a

### COMPILATION OF (RE-) EMERGING TRANSMISSIBLE DISEASES IN MIGRATORY SPECIES

*(Prepared for the CMS Secretariat by Philipp Zimmermann, DVM, PhD)*

1. COP Resolution 9.8 calls on the CMS Secretariat and the FAO Animal Health Service to co-convene a new task force, the Scientific Task Force on Wildlife Disease, with the aim of identifying diseases that have an impact on both domestic and wildlife species, and that are of greatest concern with regard to food security, economics and sustainable livelihoods.
2. The new task force is also meant to develop responses to emerging and re-emerging diseases in migratory species, taking into account the fact that integration of both wildlife and domestic animal issues is required to understand disease epidemiology properly as well as to address disease transmission, control and prevention.
3. As a basis for the work of the new task force, two tables have been prepared, one on transmissible diseases of viral origin (Annex I) and another on transmissible diseases of bacterial origin (Annex II). These tables summarize the most relevant diseases that can affect wild animals, and include information on species affected, outbreaks, transmission, and treatment and control mechanisms.
4. The sources and criteria used include:
  - The Transmissible Diseases Handbook, 3<sup>rd</sup> Edition, European Association of Zoo and Wildlife Veterinarians
  - The Field Manual on Wildlife Diseases, US Geological Survey
  - Review of selected literature
5. While these tables are not intended to be exhaustive, they do provide basic information about a wide variety of diseases that are known to affect the conservation status of migratory species. Wild animal species as well as livestock may be threatened by these diseases, and many of which hold great zoonotic potential. Numerous factors such as microbiological adaption, environmental change, food production and trade as well as human behavioural factors may favour an emergence or re-emergence of some of these diseases. Therefore the aim must be to detect and contain the spread of these diseases, wherever and whenever they occur.



## Transmissible Diseases of Viral Origin

<u>Disease / Pathogen</u>	<u>Species affected</u>	<u>Distribution / Outbreaks</u>	<u>Transmission / Properties</u>	<u>Treatment / Control Mechanisms</u>	<u>Notification</u>
<b>African Swine Fever</b> ASF-Virus	wild boars, bush pigs, warthogs, American wild pigs domestic swine	enzootic in most countries of Sub-Saharan Africa; Europe: reported in the Iberian Peninsula and in Sardinia	transmission via direct contact, secretions, raw or insufficiently cooked meat in acute form, morbidity and mortality can be high	strict eradication	yes
<b>Aujeszky's Disease or Pseudorabies</b> Suid Herpesvirus 1	suidae, accidental: most mammals, fatal for carnivores, ruminants and young suidae natural host: suidae	worldwide	naso-oral and via the genital tract, also airborne	no treatment, vaccination, don't feed raw pork, avoid contact	
<b>Bluetongue</b> Bluetongue-virus (BTV) Orbivirus	all ruminants affected several wild ungulate species reported in literature: Kudu, Muntjak, Grant's Gazelle, Sable antelope, African buffalo, Ibex, Hartebeest, Addax sensible antibodies reported from Racoons, Oposums, Rhino, Elephants, Wild dogs, Lion, Cheetah, Spotted hyena wide range of domestic and wild ungulates can act as reservoirs domestic sheep, goats	worldwide distribution in temperate and tropical climates	blood transmission, sperm during viraemia, transplacental vector: Midges ( <i>Culicoides spp.</i> ) (seasonal occurrence of the disease in relation to seasonal patterns of vector activity)	insect control, disinfection during outbreaks, vaccination	yes
<b>Bovine Viral Diarrhoea and Border Disease Virus Infections</b> (BVDV, BDV) Pestiviruses	Cervidae, Giraffidae, Antilocapridae, Bovidae, Moschidae, Camelidae, Tragulidae, Suidae, Leporidae infection demonstrated in more than 50 species of free-ranging and captive ungulates Cattle	found in livestock worldwide	secretions, excretions, aborted foetuses, foetal membranes, mechanical, vectors two biotypes distinguished by their effects on tissue culture cells: noncytopathic (ncp) and cytopathic (cp), virus pairs consisting of both types lead to Mucosal disease (BVDV-related affliction)	symptomatic avoid transport/trade of viraemic animals	yes
<b>Canine Distemper</b> CDV Morbillivirus	Canidae, Mustelidae, Procyonidae, Hyaenidae, Ursidae, Viverridae, Felidae domestic carnivores	worldwide distribution among wild and captive carnivores	aerosol, contact with secretions, faeces	inactivated vaccines, serum therapy	

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<b>Cattle Plague (Rinderpest)</b> Morbillivirus	wild ruminants (African buffalo, Eland, Giraffe, Kudus) are highly susceptible Warthogs, Bushpigs as well domestic ruminants (cattle, Water buffaloes, Yaks) are highly susceptible	the Somali Ecosystem in Africa	inhalation, contact with secretions	no primary treatment available supportive, symptomatic Global Rinderpest Eradication Programme (GREP) coordinated by FAO	yes
<b>Classical Swine Fever</b> CSF Pestivirus	wild boars domestic swine	recognised in 36 countries, EU: Guidelines for CSF control	direct contact, secretions, insemination, feeding of raw and insufficiently cooked meat, transplacental	strict eradication serological monitoring, strict importation restrictions, no garbage/meat feeding	yes
<b>Cowpox Virus Infection</b> Orthopox	Macaques, Marmosets, Elephants, Rhinoceroses, Zebra, Okapis, Llamas, Alpacas, Cats Hosts: wild rats, voles and mice	presumed to be widely spread amongst wild rodents across Europe	direct contact, bites	non-human primates: normally self limiting, antibiotics for secondary infection Herbivores: antibiotics Elephants/ Rhinos: Vaccination Eradication of wild Rodents	yes
<b>Ebola / Reston Viruses</b> Ebola Viruses, Filoviridae Ebola-Sudan, E-Zaire, E-Ivory Coast, E-Uganda, E-Reston	Chimpanzee, Gorilla, Baboon, Drill, Mandrill, <i>Cercopithecus spp.</i> Man	Africa Reston Virus probably imported from Africa to Philippines	contact, aerogenously to Man suspected by bushmeat consumption	no treatment quarantine	yes
<b>Endothelio-tropic Elephant Herpesvirus Infection</b> EEHV 1 EEHV 2	Asian E. ( <i>Elephas maximus</i> ) African E. ( <i>Loxodonta africana</i> )	working Elephants in South East Asia and India	unknown	antiviral treatment reduction of stressful situations	

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<b>Foot and Mouth Disease</b> Picornavirus	all artiodactyls belonging to Bovidae, Tragulidae, Cervidae, Antilopidae, Camelidae, Antilocapridae, Capridae, Ovidae, Suidae, Tayassuidae Tapir sp., Elephants, European Hedgehog, Kangaroo African buffaloes in Southern Africa are natural carriers distinct difference of susceptibility between species only ruminants can become carriers Man is affected very sporadically	enzootic in large parts of Asia, South America, Africa and parts of Europe (Free areas: go to www.OIE.org)	aerosol, contact direct and indirect	treatment only by allowance of national authority: hyper-immune serum, symptomatic	any suspicion has to be reported to national veterinary authorities
<b>Goat Plague or Peste des Petits Ruminants (PPR)</b> Morbillivirus	wild small ruminants (Laristan sheep, Dorcas-type gazelles, Gemsbok, Nubian ibex) domestic small ruminants (sheep, goats)	currently present in central and western Africa, Asia, Near and Middle East	Inhalation, contact with secretions contaminated water highly contagious, fast spreading 20-90% mortality	no treatment available	
<b>Gray Patch Disease</b> probably Herpesvirus	Marine turtles, young Green turtles ( <i>Chelonia mydas</i> )	worldwide distribution	unknown	control secondary skin bacterial infections	
<b>Hepatitis A</b> Hepatitis A Virus Picornaviridae	Pongidae ( <i>Pongo pygmaeus</i> , <i>Pan troglodytes</i> , <i>Hylobates lar</i> , <i>Macaca spp.</i> , <i>Nasalis larvatus</i> , <i>Mandrillus sphinx</i> , <i>Ateles spp.</i> , <i>Aotus trivigatus</i> ), Cercopithecidae	highly endemic in Central and Southeast Asia, Africa, Central- and Southern America, less frequently in temperate climates	feco-oral zoonotic potential	immunoglobulin treatment, vaccination	
<b>Hepatitis B</b> Hepatitis B Virus Hepadnaviridae	Pongidae, Hylobatidae, Lagothrix sp., Lemur sp.	worldwide	percutaneous, venerally, perinatal, direct contact	vaccination	
<b>Herpesvirus Infection In Water Turtles</b> Herpesvirus-like Particles	Pacific pond turtles ( <i>Clemmys marmorata</i> ), Painted turtles ( <i>Chrysemis picta</i> ), Map turtles ( <i>Graptemys spp</i> )	North America	unknown		

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<b>Highly Pathogenic Avian Influenza</b> HPAI, Fowl Plague Orthomyxoviruses of influenza A type H5N1	Birds, especially Galliformes, Anseriformes, Struthioformes Man	worldwide 1996 China 1997 Hong Kong 2002 Hong Kong 2003 - 05 Vietnam, Thailand, Indonesia, Cambodia, Laos, Korea, Japan, China, Malaysia April 2005 Qinghai Lake, Central China: first major outbreak in wild birds 2005 - 06 Russia, Kazakhstan, Mongolia, Pakistan, Romania, Croatia, Ukraine, most European countries , Middle East, Africa	directly (aerosol, body fluids, faeces), indirectly (contaminated material of all sorts) in poultry very high morbidity and mortality	currently no treatment allowed vaccination requires special permit quarantine Task Force on Avian Influenza and Wild Birds (CMS/AEWA)	yes
<b>Lung-Eye-Trachea Disease (LETD)</b> Alpha-Herpesvirus	Green turtles	worldwide	faecal-oral, direct contact, contaminated sediments, surfaces, seawater	only secondary infections	
<b>Malignant Catarrhal Fever (MCF)</b> Alcephaline Herpesvirus 1 Ovine Herpesvirus 1 Caprine Herpesvirus 2	Bovidae, Suidae, Cervidae, Giraffidae, Camelidae captive and wild species of Artiodactyla	worldwide	in Wildebeest vertical and horizontal, horizontal predominant in sheep,	no effective treatment	
<b>Monkeypox</b> Monkeypox Virus, Orthopoxvirus	non-human primates, Man reservoir hosts: <i>Cercopithecus ascanis</i> , <i>C. nigriviridis</i> , <i>C. petaurista</i> , <i>Colobus badius</i> ; rodents ( <i>Cricetomys</i> sp.)	African rain forest, human cases in Congo, Zaire, West- and Central Africa; Monkeypox Virus of West African origin is less virulent in cynomolgus monkeys than Monkeypox Virus from the Congo basin	aerogenously, biting, contact, vector: in the USA Prairie dogs ( <i>Cynomys</i> sp.) are vectors in transmission to man	only secondary infections	yes

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<b>Newcastle Disease</b> Avian Paramyxovirus (Newcastle Disease Virus)	Galliformes, Passeriformes, Columbidae Double-crested cormorants ( <i>Phalacrocorax auritus</i> ) White pelicans ( <i>Pelecanus erythrorhynchos</i> ) Gulls ( <i>Larus spp.</i> ) mass mortality of cormorants ( <i>Phalacrocorax spp.</i> ) and terns ( <i>Sterna spp.</i> ) in USA and Canada Psittacines wild and caged birds (especially Anseriformes and Charadriiformes) play major role in international spread	worldwide severe outbreaks in Rock doves (Europe 1980's) double crested cormorants (USA, Canada 1990's)	highly contagious, heat stable, survives well in protected environments non-pathogenic to highly virulent strains (present in most countries) isolates are characterized by virulence in chickens and are categorized into three main pathotypes depending on severity of disease. Lentogenic isolates are of low virulence while viruses of intermediate virulence are termed mesogenic. Highly virulent viruses that cause high mortality in birds are termed neurotropic or viscerotropic velogenic.	a) no treatment b) Import control on live birds and poultry products to reduce risk of introduction c) statutory notification of suspect disease, followed by investigation and stamping out in case of confirmation d) vaccination of poultry flocks, OIE does not recommend vacc. of exotic, non poultry birds e) strict biosecurity Velogenic NDV are List A pathogens that require reporting to the Office of International Epizootics and outbreaks result in strict trade embargoes. Listed as an OIE List A disease; obligatory Notification (EU	EU Obligatory Notification (ICPI 0,7 or greater)
<b>Parvovirus Infection</b> Feline Parvovirus (FPV) Canine Parvovirus (CPV)	Felidae, Canidae, Procyonidae, Mustelidae, Ursidae, Viveridae	worldwide	faecal-oral	interferons, hyperimmunsera	
<b>Poliomyelitis</b> Poliomyelitis Virus Picornaviridae	Pongidae, Colobidae	worldwide	faecal-oral	vaccine	

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<b>Rabies</b> Lyssavirus Rhabdoviridae	all mammals; epidemiologically only Carnivora and Chiroptera important, major reservoir species for terrestrial rabies is the Red fox ( <i>Vulpes vulpes</i> ) Rabies cases in European insectivorous bats peaked in mid 1980's, but decreased steadily through the 1990's Spillover hosts: primates	worldwide, causing 35.000-50.000 human deaths each year, WHO periodically updates the presence/absence of rabies in member countries/territories	biting, occasionally ingestion, inhalation reported	no effective treatment no particular measures have been taken so far for rabies control in European bats	Yes
<b>Rift Valley Fever</b> Phlebovirus Bunyaviridae	wild and domestic ruminants, camelids Buffaloes, Antelopes, Wildebeest rodents: host-candidates Humans are very susceptible	endemic in sub-Saharan Africa outbreaks have also occurred in Egypt, Madagascar and in Saudi Arabia and Yemen	contact vector: haematophagus mosquitoes of several genera	no treatment, vector control large epizootics coincide with periods of heavy rainfall and high vector density	yes
<b>Seal Morbillivirus Infections</b> Phocine Distemper Virus (PDV) Monk Seal Morbillivirus (MSMV) Paramyxoviridae	Harbour seal ( <i>Phoca vitulina</i> ), other phocid species Atlantic walrus ( <i>Odobenus rosmarus</i> ); Monk seals ( <i>Monachus monachus</i> ), interspecies transmission of morbillivirus from Cetaceans to Monk seals also possible	northern Atlantic, including central and northern Europe, the North Sea, subarctic and arctic, North America; Asia (Lake Baikal and Caspian Sea) 1988, 2002 Northern Europe	aerosol, contact with excretions of carriers, including asymptomatic species (harp and potentially grey and hooded seals)	symptomatic	
<b>Simian Immunodeficiency Viruses</b> SIV's	foreign hosts: Asian Macaques zoonotic potential (HIV suggested to origin from SIV)	Africa	contact, venereally, infants, perorally (milk)	no treatment	

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<b>West Nile Virus</b> Flavivirus Arbovirus (Arthropod-borne Viruses) Japanese Encephalitis Antigenic Complex	wild (migratory) birds suspected to be long-distance introductory and amplifying hosts Common kestrel ( <i>Falco tinnunculus</i> ) European White Stork ( <i>Ciconia ciconia</i> ) Glossy Ibis ( <i>Plegadis falcinellus</i> ) American Crow ( <i>Corvus brachyrhynchos</i> ) Blue Jay ( <i>Cyanocitta cristata</i> ) Reptiles, Amphibians Equidae, Rabbits, domestic geese Humans	epizootics of disease in horses: Morocco (1996), Italy (1998), US (1999-2001), France (2000) WNV-Encephalitis in humans: Russia (1999), Canada (1999-2003), Israel (2000), US (1999-2009), amongst others Further infections reported: Africa, Asia, Australia, Central America, Caribbean, Madagascar,	vector: ornithophilous Mosquitoes, various species (especially <i>Culex</i> spp.)	a) Control of zoonotic spread by controlling vector breeding spots (compare to Malaria) b) Vector (Mosquitoe) Control: Insecticides (wise use!!) c) No essation of herbicides, pesticide, other chemical applications, which destroy mosquitoes endemic predators: birds, fish, insects d) Although licensed West Nile Virus (WNV) vaccines exist for horses, there are no specific vaccines or treatments for human WNV disease. e) The combination of mosquito control methods selected for use in a control program depends on the time of year, the type of mosquitoes to be controlled, and the habitat structure. In	

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<b>Yellow fever</b> YF-Virus Flaviviridae Arbovirus	Africa: <i>Colobus badius</i> , <i>Cercopithecus aethiops</i> , <i>C.</i> <i>ascanius schmidtii</i> , <i>C. diana</i> , <i>C.</i> <i>mona</i> , <i>Cercocebus spp.</i> , <i>Papio spp.</i> , <i>Galago spp.</i> , <i>Pan spp.</i> South/ Central America: <i>Alouatta</i> <i>spp.</i> , <i>Aotus trivirgatus</i> , <i>Saguinus</i> <i>spp.</i> , <i>Ateles spp.</i> , <i>Saimiri spp.</i> , <i>Cebus spp.</i> , <i>Cal</i>	originally in Africa between 15 degree North and 10 degree South Americas: Bolivia, Brazil, Colombia, Ecuador, French Guinea, Peru, Venezuela, Trinidad	vector: Mosquitoes ( <i>Aedes</i> <i>spp</i> )	no treatment	subject to official notification of the WHO through the national authorities

## Transmissible Diseases of Bacterial Origin

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<b>Anthrax</b> Bacillus anthracis	Mammals, primarily Ruminants (Bovidae, Camelidae, Cervidae, Elephantidae, Equidae, Hippopotamidae), <i>Pan troglodytes</i> , some avian species Cattle high zoonotic potential	worldwide enzootic in most countries of Africa and Asia, a number of European countries as well as areas of the American continent and Australia	inhalation, ingestion, biting flies, wound infection	antimicrobial therapy Incineration of carcasses, Decomtamination fomites, Vaccination	Anthrax should be noticeable in the whole country;
<b>Avian Botulism</b> Clostridium botulinum	Black-faced Spoonbill ( <i>Platalea minor</i> ) major annual cause of disease in Pelicans domestic poultry	worldwide outbreak in Taiwan (2002-2003) killed > 7% of the world population of Black-faced Spoonbill	persists in form of dormant spores resistant to heating and drying viable for years Type C-toxin (strains widely distributed in wetland sediments and tissues of most wetland inhabitants like insects, mollusks, crustacean and vertebrates) Type E-toxin decomposing carcasses are a main source: Carcass-Maggot-Cycle	a) Prevention is not possible b) Focus research on the impact on populations and ecological causes of outbreaks c) reduce organic inputs into wtlands, eliminate factors that introduce large amounts of decaying matter d) carcass removal e) emphasis on prevention through maintenance/ management of water quality/ problem sites	

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<b>Avian Cholera,</b> <b>Fowl Cholera,</b> <b>Avian Pasteurellosis</b> Pasteurella multocida	Amsterdam Albatross (Diomedea amsterdamensis) Sooty Albatross (Phoebastria fusca) Common Eider Duck (Somateria m. mollissima) Cape Cormorants (Phalacrocorax capensis) Significant cause of mortality in numerous species of water-birds worldwide (Main reservoir) documented in over 100 different wild bird species domestic poultry potential transmission to cattle, swine, goats, sheep	worldwide multiple in USA and Canada Denmark (2001) Antarctica (Hope Bay 2000-2001) amongst others Most common disease among North American Waterfowl Environmental contamination from diseased birds is a primary source of infection thousands of wild water fowl killed annually, considerable effects on avian populations spreading of infection enhanced by dense bird concentrations resulting from habitat limitations	highly infectious, spreads rapidly high concentrations of P. multocida for several weeks in waters where birds die of the disease	a) Early detection b) Carcass collection and incineration c) Habitat management (e.g. Drainage of problem area and creation or enhancement of other habitats) d) Vaccination and postexposure treatment may be used in captive propagation flocks e) Endangered species: Trap and Immunize	
<b>Avian Tuberculosis in Primates</b> Mycobacterium avium, M. intracellulare	primarily Cercopithecidae, rarely Hylobatidae or New World Monkeys	worldwide	primarily perorally, occasionally cutaneously or aerogenously	usually no treatment, euthanasia	
<b>Avian Mycobacteriosis</b> Mycobacterium avium, M. intracellulare, M. genavense	all avian species porcine, bovine and other mammals subclinically infected zoonotic potential particularly immunocompromised individuals particularly M. genavense of great zoonotic concern	worldwide	primarily ingestion, also aerogenously	not recommended	

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<b>Bovine Brucellosis</b> Brucella abortus	wild and domestic ruminants Antilocapridae, Bovidae, Camelidae, Cervidae, Giraffidae, Hippopotamidae, Tragulidae also: Marsupialia, Lagomorpha, Rodentia, Catacea, Carnivora, Pinnipedia, Tubulidentata, Perissodactyla	worldwide, except brucellosis free countries (fulfilling OIE requirements): Canada, Austria, Switzerland, UK, Ireland, Finland, Czechoslovakia, Germany, Sweden, Norway, Poland Romania	vertically or direct contact with discharge, aborted fetuses, placental membranes, vaginal fluids also by ingestion of contaminated food, milk, water, insect bites, artificial insemination	long term antimicrobial therapy vaccination with Brucella abortus strains RB51 etc., according to national brucellosis eradication programs (OIE)	Yes
<b>Chlamydiosis</b> Chlamydia psittaci	Birds, Amphibians, Reptiles, Mammals, Man	worldwide	aerogenous via secretions, excretions, dust of feathers and feces, oral, direct, horizontal, vertical, parasites, carriers!!	antimicrobial therapy electrolytes Germany: treatment is given in a psittacosis decree and accessory carrying out and responsibility notice	yes Psittacosis is registered as an occupational disease according to the occupation disease decree in Germany
<b>Contagious Bovine Pleuropneumonia (CBPP)</b> Mycoplasma mycoides, small colony type (Mmm Sc)	Cattle (Bos spp), Buffalo, Yak, Bison, Reindeer, Sheep, Goat, Wild bovids and camelids are resistant	enzootic in most of Africa; parts of Asia, especially India / China outbreaks in Spain, Portugal and Italy (1990s) eradicated from the US, Australia, most of Europe	close direct contact, aerogenous	no efficient treatment	yes EU directive 82/894
<b>Erysipelas</b> Erysipelothrix insidiosa (rhusiopathiae) Corynebacteriaceae	Cebidae, Cercopithecidae, Prosimiae naturally pigs, mice, birds domestic swine	worldwide	direct or indirect contact the pathogen persists in the environment for long periods and survives in marine conditions Transmission to nonhuman primates has been related to contact to avian species, especially raptors	antimicrobial therapy vaccination	

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<b>Listeriosis</b> Listeria monocytogenes	Pongidae, Cercopithecidae, Cebidae, Prosimiae, Man	worldwide	perorally, percutaneously Listeria monocytogenes has been isolated from healthy domestic animals and from food, especially milk and milk products in newborn monkeys intrauterine, diaplacental transmission	antimicrobial therapy no feeding of raw milk of milk products	
<b>Lyme Disease, Lyme borreliosis</b> Borrelia burgdorferi, B. afzelii, B. garinii	Passeriformes Falconiformes Piciformes act as mechanical vectors great variety of mammalian species including humans	worldwide	spirochete-infected ticks <i>Ixodes</i> spp. ( <i>Ixodes scapularis</i> , <i>Ixodes pacificus</i> , amongst others) commonly infest a wide range of species Birds play role in the geographic expansion of Lyme disease as dispersers of the arthropod vectors along their migration routes, this is considered to be an important mechanism for the establishment of new endemic foci of the disease	a) vector control b) management of host species c) vaccination	
<b>Paratuberculosis or Johne's Disease</b> Mycobacterium avium sp. Paratuberculosis	wild and domestic ruminants Buffalo, White-tailed deer, Red deer, Roe deer, Elk, Bison, Bighorn dheep, Rocky Mountain goat, Aoudad (Barbary sheep), Mouflon sheep, Camel, Mountain goat, Reindeer, Antelopes, Yak, Moose	worldwide more prevalent in temperate and wetter areas, usually occurs in regions with high cattle density	distinctly different from M. avium vertical and horizontal, most important faecal-oral	only supportive treatment	

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<b>Pasteurellosis</b> Pasteurella multocida P. haemolytica Mannheimia haemolytica	Dall's sheep, Bighorn Sheep, Mountain goats, die-offs often following documented contact with domestic animals Saiga antelopes domestic sheep and goats, llamas	worldwide M. haemolytica has the potential to act as a primary pathogen in Bighorn sheep, resulting in all age die-offs in herds throughout western North-America; recovery from die-offs often takes years (low reproductive rates, sick, undersized lambs, poor survival rates etc.) die-offs in Saiga suspected to origin from Pasteurella Infection	direct contact/ aerogenously large and diverse group of related bacteria benign strains commensal in the upper respiratory tract opportunistic pathogens, associated with predisposing factors such as any kind of stress do not persist in the environment no public health risk	vaccination/ treatment are non-viable options for controlling or preventing outbreaks in wild sheep reduction of stress	
<b>Porcine Brucellosis</b> Brucella suis	ferral and domestic swine (B. suis biovars 1,2,3); European brown Hare (B. suis biovar 2) Arctic fox, Wolf, Bear, Reindeer, Moose, Rodents (B. suis 4 and 5) Man	Biovar 1: South-East Asia and Pacific Islands Biovar 2: North-East Europe Biovar 3: North-America and China Biovar 4 / 5: Arctic Region	spread of B. suis and B. abortus infection in similar ways: natural mating or artificial insemination; occasionally arthropods ( <i>Oedemagena tarandi</i> )	no treatment	yes Directives: 92/65/EEC, 64/432/EEC, 97/12/EEC, 90/425/EEC, 89/662/EEC, 1999/466/EEC, 1999/467/EEC
<b>Salmonellosis</b> Salmonella spp (>1800) (S. enteritidis, S. enterica serotype Typhimurium)	Vultures, Crows, and, most importantly, Gulls most significant outbreaks of wild bird Salmonellosis occur in passerines. domestic poultry Man, Prosimiae, Old World Monkeys and Apes, less frequently in New World Monkeys, Reptiles	worldwide	perorally commonly found in the intestine of wild birds bacteria in contaminated food, poultry products feces of animals (wild animals, companion animals, reptiles etc.) Salmonella enteritidis silently infects the ovaries of healthy appearing hens and contaminates eggs before shells are formed.	revision of diet, supportive volumen and electrolyte substitution, eventually Antimicrobial therapy	
<b>Tuberculosis</b> (Cervidae) Myco-bacterium bovis, M. tuberculosis (less commonly)	Cervidae all cloven-hoofed stock (Artiodactylids)	worldwide	primarily aerogenous, also oral	treatment not recommended	

## Transmissible Diseases of Bacterial Origin

<u>Disease / Pathogen</u>	<u>Species affected</u>	<u>Distribution / Outbreaks</u>	<u>Transmission / Properties</u>	<u>Treatment / Control Mechanisms</u>	<u>Notification</u>
<b>Tuberculosis</b> (Primates) M. tuberculosis, M. bovis, M. africanum	all susceptible Pongidae, Cercopithecidae, more rarely Hylobatidae, Cebidae or Prosimiae Man	worldwide	mainly aerogenous, less commonly perorally	euthanasia recommended quarantine and testing	
<b>Yaws</b> Treponema pertenuis	Gorillas Man	humid tropical regions South America, Africa, Asia, Oceania	skin-to-skin contact, trauma, bites, also vectorborne	eradication programme in the 1950's among humans, on rebound today	
<b>Yersiniosis</b> Yersinia pseudo- tuberculosis, Y. enterocolitica	all nonhuman primate genera reservoir hosts are wild and domestic mammals and birds Man	worldwide, especially in moderate climates	contact, perorally (contaminated food, water)	antimicrobial therapy rodent control vaccination of endangered colonies	