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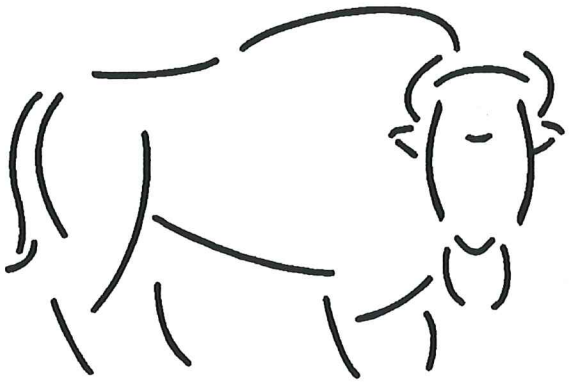
Abstracts



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THE EUROPEAN BISON, (*BISON BONASUS /L.*), A STRONGLY PROTECTED AND HIGHLY ENDANGERED SPECIES

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1. Chronobiology has started that all living organisms present the tendency to prolong their circadian rhythms. This gives impulse to move from the East to the West. But when the organisms are pushed in opposite directions they perish. In prehistoric times the man moved to the West. He pushed down animals to the north-eastern terriries. Large mammals did not tolerate this process. The Giant Irish elk and Cave bear died out rather quickly. The Aurochs died out near Warsaw in 1627 and European bison – in 1919 in Bialowieza Forest.
2. In Poland, before extinction, the European bison lived in two forest complexes. In Kucpiowska Forest they died out in the XVIIIth century. Since that time the only herd lived in Bialowieza Forest under protection. But this population became closed population. No new gen came to it. It was favourable for quick homozygosity. All bison sent to zoos and reserves originated from that closed population.
3. After extinction – the effort for restoring the European bison caused that several aninals were found. All of them originated from Bialowieza herd. Only 1929 first two bison were brought from the Warsaw zoo to the Bialowieza Forest. Next year another 3 bison. They were bred in reserves. First calf was born in 1957. The bison were strictly protected. The reproduction was quite well.
4. In 1952 was done the reintroduction of bison into natural forest environment of the Bialowieza Primeral Forest. After a success in Bialowieza Forest next free-ranging herds were established. This allowed to make many scientific studies.
5. The European bison is well adapted to live in forest environment, but in forest all changes go very slow and it has some kind of sterility. So, the bison is sensitive to any slow changes and has low ability to produce antibodies against any pathological factors.
6. The physiological studies showed very low level of nonspecific immunity in the bison. But low level of immunity enables well reproduction which really is observed.
7. The breeding in closed population over 200 years had to develop homozygosity. The whole world population is now highly inbreded. This can lead to some changes genetically determined. Since 1980 are observed some inflammatory processes in prepuce and penis area. It concerns some 5 – 6 months old males as well as mature bulls. Several teams started to look for the cause of this disease. After a big effort it found really nothing. Over 100 males were eliminated lastly in Poland.
8. Only one way of explanation is that we have a case of specific genetic deviation. So, it is necessary to stress that the European bison is now highly endangered species. High homozygosity, pollution of the environment and low immunity may cause many unknown changes in their health and metabolism. Additionally, elimination of many diseased males quickly will deepen homozygosity – very dangerous process for the future of the species.

SOME BIOCHEMICAL PARAMETERS OF THE BLOOD OF FREE-ROAMING EUROPEAN BISON IN THE BIALOWIEZA FOREST

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The European Bison (*Bison bonasus*) once ranged over most of Poland, but by the 11th and 12th centuries they were found only in the larger forests. At the beginning of the 20th century, bison were present in only two regions – the Bialowieza Primaeval Forest and the Caucasuas mountains. The last free-living bison in Poland was killed by poachers in April 1919.

In an attempt to reintroduce the European Bison back into Bialowieza three were purchased in 1929 from a Swedish zoo and kept in an enclosed area in there. Such succesful captive breeding allowed the bison to be released into the forest as a freeliving herd in 1952. Presently, there are over 600 free-roaming European Bison in Poland, of which 230 are in the Bialowieza Primaeval Forest and the remainder are primarily in the Bieszczady Mountains. The number of bison and their distribution in Poland has allowed some hunting, but the bison are still carefully monitored in their natural enviroment.

The studies were carried out on 35 European bisons of both sexes and various age culled for various reasons including: poor condition, old age, lameness and diseases of the reproductive tract in males. Blood for biochemical tests was collected from the jugular vein, and the carcasses were autopsied and histopathologically examined. An analysis of the relationships between selected biochemical blood parameters (total protein, immunoglobulins, urea, uric acid, alkaline phosphatase) points to the role of urinary tract disorders in males in the pathogenesis of disease of the penis and prepuce. A disease of the genital organs of male bison has been noted in the Bialowieza Primaeval Forest since 1980. These results also suggest that disorders of the urinary tract, which are common in both male and female European Bison. increase their susceptibility to other diseases.

IMPACT OF HUMAN ACTIVITIES ON WELFARE OF WILDLIFE IN EUROPE

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Recent advances in understanding the minds of animals and of their capacity for suffering when harmed, have spurred many endeavours to improve the welfare of animals under human stewardship including companion, farm laboratory and zoo animals.

Although many human activities and human-induced changes to the environment adversely affect the welfare of free-living wild animals, the welfare interests of these animals (that are not under human stewardship) has received relatively little attention. We undertook a survey of situations in which the welfare of wild animals in Europe is compromised by human activities to gain some impression of the scale of the problem[1]. Our method involved consideration, in each case, of the nature of the harm, its duration, and the number of animals affected[2].

The assessment of harm in each case was based on knowledge of the challenge or cause of the harm (eg ingestion of lead shot), knowledge of its effects on health, and on inference of the welfare consequences of these effects, particularly in relation to level of pain and stress (physiological stress, overstress, or distress). In this way, we compared the scale and severity of many challenges to the welfare of wild aninals caused intentionally or unintentionally by humans. Human activities which have severely affected the welfare of very large numbers of free-living wild aninals include: the control of rodents using warfarin-like anticoagulant poisons, dispersing lead shot which is ingested by waterfowl, the keeping of pet cats (*Felis catus*) which injure small mammals and birds, accidental spillage of oils at sea and wounding with guns. Some of these problems result from activities which many judge to be essential and for which there may not be readily available solutions or, as yet, more-humane alternatives. However, other cases are potentially more tractable and measures to alleviate the situation may already be available (eg use of non-lead shot in shot guns). From this study it is clear that the welfare of large numbers of individuals of a wide range of species of wild animals is seriously compromised each year as a result of past or present human actions. The cases which, using our methods of assessment, seem the most important in terms the severity of harm and numbers of animals affected are often not those which receive greatest public attention. This study was part-funded by the Eurogroup for Animal Welfare and the European Commission to whom we are grateful.

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[2] Kirkwood, J.K., Sainsbury, A.W. & Bennett, P.M. (1994) The welfare of free-living wild animals: methods of assessment. Animal Welfare 3, 257 – 273.

HUMAN ACTIVITIES AFFECTING THE HEALTH OF THE MOUNTAIN GORILLAS *(GORILLA GORILLA BERINGEI)*

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The mountain gorilla (*Gorilla gorilla beringei*) is the most endangered of the three subspecies of gorilla. There are thought to be only approximately 320 individuals in the Virunga Volcanoes region on the borders of Rwanda, Zaire and Uganda, and a separate population of 300 in the Bwindi Impenetrable Forest in Uganda. The Mountain Gorilla Veterinary Centre has been monitoring the health of these gorillas for ten years (Foster, 1993).

There are many human activities that have an impact on the health of this endangered species. Daily human contact is made with a number of habituated groups for the purposes of tourism and research. Due to the close genetic relatedness of humans and gorillas there are many anthropozoonotic diseases that can be transmitted. To prevent disease transmission there are strict regulations regarding number of visitors per day, duration of the visit, and proximity to the animals. Despite these regulations, in 1988 there was an outbreak of respiratory disease among three of the habituated groups, suspected to be human measles (Hastings et al, 1991).

Poaching within the parks is also a major concern. Direct gorilla poaching had ceased until 1995 when eight gorillas were killed by poachers probably during attempts to capture infants for sale. Gorillas also become caught in snares set for bushbuck and duiker. These snares constrict around a wrist or ankle and cause ischaemic necrosis of the distal limb, leading to loss of a hand or foot and possibly death. One of our main activities is removal of these snares to prevent such an occurrence. During 1995 five gorillas were immobilised and one was physically restrained for snare removal. Habitat loss due to such activities as illegal grazing, encroaching cultivation, and deforestation, limits the area available for gorillas (Foster, 1992). This not only limits the population size but also forces the remaining animals into smaller possibly unsuitable areas, and increases the population density. This may have a detrimental affect on the health of the gorillas.

The civil war in Rwanda beginning in October, 1990 and culminating with the tragic events of April – July, 1994 has meant that the Virunga Volcanoes region has, and continues to be, the front line of a war zone. Two gorillas have been killed as a direct result of the war. In addition, there is a large amount of military activity within the forest, resulting in increased human-gorilla contact, including contact with potentially infectious human waste (Macfie, 1992). This type of contact is also potentially stressful, leading to immunosuppression and a greater susceptibility to disease such as infection with the nodular worm, *Oesophagostomum stephanostomum*. This parasite is present in virtually all mountain gorillas (Hastings, 1992) and does little harm to otherwise healthy gorillas, but will quickly debilitate an animal with an impaired immune system. This parasite was responsible for the death of 80 % of captive gorillas up to the age of ten years (Cousins, 1972).

REASONABLE OVEREXERTION, A METHOD FOR CAPTURING STEPPE EAGLES (*AQUILA NIPALENSIS*) IN THE WILD. EVALUATION OF PHYSIOLOGICAL STRESS AND EFFORT RECUPERATION.

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The use of a capture-technique based on human induced over-exertion was evaluated on ten steppe eagles (*Aquila nipalensis*). In order to assess the degree of physiological stress and delay of effort recuperation, various blood parameters were monitored at the moment of capture and 1, 24 and 48 hours later. Mean time required to capture an eagle was 4min 46 sec (n = 10, SD = 2'25").

Serum concentrations of creatinine phosphokinase (CPK), which is an indicator of muscle damage and metabolic flux after prolonged and/or strenuous muscular efforts, changed, reaching peak concentrations 24 hours after capture (mean = 1915 IU/l, SD = 1364 IU/l, n = 10).

Only a slight increase in PCV and total protein was observed, indicating moderate extracellular dehydration at the moment of capture. Values of these parameters returned to normal one hour later. Hyperkaliemia at the moment of capture could be caused by a redistribution of potassium from the intracellular to the extracellular fluid *(acidosis)*, linked to dehydration or to a slight hemolysis. Kaliemia was back to normal one hour after capture. Natremia and chloremia did not change.

The flight-induced increase in blood uric acid 16.2 mg/dl (n = 10, SD = 6.5 mg/dl) could be attributed to an increase in purine catabolism. A higher uric acid level should not only enhance water conservation, but may also reduce flight-induced hyperthermia as well as acting as an antioxidant defence against oxidative tissue injury. Uric acid levels returned to normal 24 hours after capture. Basic physiological parameters showed polypnea, tachycardia and hyperthermia as a result of capture. Rectal temperature, respiratory and heart rates had returned to normal physiological values two hours after capture.

Blood gas analyses revealed a decrease in arterial blood pH to 7.1 (n = 7, SD = 0.1), in pCO2 to 11.6 mm Hg (n = 7, SD = 3.1 mmHg), in HCO3 to 5.7 mmol/l (n = 7, SD = 2.3 mmol/l) and a deficit of base excess to -18.9 mmol/l (n = 7, SD = 3.6 mmol/l) at the time of capture. These parameters are diagnostic of a metabolic acidosis. Blood gas values were back to normal 24 hours after capture.

These data indicate that despite using a physiologically stressful capture technique, effort recuperation proved to be efficient within 24 hours.

During 1994 – 1995 and 1995 – 1996 migration seasons a total of 210 steppe eagles (*Aquila nipalensis*) and 27 imperial eagles (*Aquila heliaca*) were captured using this technique. In addition to biometric and banding works, a health assessment check was carried out on all birds. Seven (3.3 %) steppe eagles and 3 (11.1 %) imperial eagles presented evidence of leg injuries. Recurrence of similar lesions as well as macroscopic and radiographic studies of amputation lesions suggest that jaw traps were likely to be responsible of the injuries. Analyses of capture data reveal that eagles were probably accidentally trapped on their breeding grounds. Impact on existing wild populations is highlighted, and protective conservation issues are discussed.

IMPACT OF SOME PESTICIDES ON WILDLIFE HEALTH

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Pesticides are widely used in France for the protection of crops against disease and predators. In spite of heavy efforts made by the firms to limit the environmental impact of their products, the epidemiological surveillance by the SAGIR network reveals an increasing number of cases of poisoning in wildlife. This increase is particularly obvious for poisoning due to the criminal use of pesticides, but it is also noticeable for cases linked to their normal use in agriculture. We will only consider the second type of pesticide use and describe the mortality in wildlife caused by three normal agricultural uses of pesticides during the last four years in France.

The first example of wildlife mortality is that by treatments against voles or coypu with anticoagulant rodenticides like *Chlorophacinone* or *Bromadiolone*. The first mortality event, affecting hare, was detected in 1991 by SAGIR in the East of France. Since this date, many individuals belonging to various species of mammals and birds have been poisoned by these rodenticides. Herbivorous and omnivorous mammals and granivorous birds are preferentially poisoned by *Chlorophacinone*. Carnivorous mammals and birds and waterfowl are rather victims of Bromadiolone. The hypothesis of secondary poisoning of predators by ingestion of rodents killed by the rodenticide is now verified. Due to a reduction of the quantity of rodenticide use in vole destruction campaigns, the number of poisoned mammals decreased in 1995. This is not the case for the birds.

The second accident was caused by *furathiocarb*, a carbamat insecticide used in seed coating on proteagineous peas. This product was commercialised for the first time in France in 1993 and used on 15.000 hectares. As of that year, a few cases of mortality in wild pigeons (about ten individuals) were recorded in the region where the product was used. Although the treated surface was multiplied by four, only one case of mortality was noted in 1994. On the other hand, in 1995, when 150.000 hectares were seeded with treated peas, a high rate of mortality affecting wild pigeons (9 cases involving more than 120 pigeons), but also partridges and mallard ducks was observed in the northern half of France. *Furathiocarb*, which was reputed repulsive and non toxic for the birds in normal conditions of use was identified to be responsible for these deaths. Disturbed by the obvious toxicity of *furathiocarb*, the firm decided to implement a study in collaboration with the laboratory of toxicology of the national veterinary school of Lyons and the Office National de la Chasse to analyse bird mortality in the region sowed with treated peas.

The last example, quite similar to the precedent one, appeared in 1995 when a few grey partridges were found dead in fields seeded with cereals coated with an insecticide belonging to the nitroguanidines family: *imidacloprid*. The first case of mortality was recorded in spring with treated wheat seeds, there were only a few deaths. The second episode, which occurred in October 1995 in fields seeded with treated winter barley, was more serious since the product was suspected to be responsible for the death of more than one hundred birds. Concentrations varying from 15 to 50 ppm were detected in the crop of 10 partridges found dead near treated fields. Here also, tests carried out by the manufacturer had shown that the product was repulsive for birds (quails) and, as a consequence, it was inferred that in spite of a very low LD50 (25 mg/Kg) the risk of poisoning was weak. The great emotion created by these deaths led the firm to carry out new experiments in collaboration with ONC and ENVL to appraise the real level of toxicity of its product for partridges.

These three examples show that pesticides, both the old products and the new ones, have a significant impact on wildlife health. This impact could partly be explained by the type of test and the species used to determine molecule toxicity. They also show that a surveillance network can avoid or limit this noxious impact.

ROLE OF DOMESTIC ANIMALS AND WILDLIFE IN LOUPING-ILL VIRUS TRANSMISSION

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Louping-ill virus (LIV), a tick-borne virus causes encephalomyelitis in a number of species, but in upland Britain, only sheep and red grouse (*Lagopus scoticus*) exhibit a post-infection viraemia sufficient for feeding tick instars to acquire the virus. Mountain hares (*Lepus trimidus*) and red deer (*Cervus elaphus*) may be numerous on some areas, but exhibit only a low level of viraemia after infection. Red grouse are considered to only act occasionally as an amplifier of the virus and thus the persistence of the virus is considered to be largely dependent on sheep. Nevertheless, the vaccination of sheep for many years, has not apparently reduced the prevalence of LIV infection in red grouse and sheep in some areas of Scotland. Alternative hypotheses to explain this viral persistence including amplification of LIV by lambs before vaccination and non-viraemic transmission by co-feeding on wild hosts. Examination of LIV infection rates in lambs revealed a high rate of infection (up to 80 % in four months). However few lambs probably amplified virus as most infections occurred in the presence of maternally acquired antibody. Field studies have revealed that mountain hares can be important hosts for all instars of *Ixodes ricincus* on open moorland. An average of 300 larvae, 100 nymphs and 20 adult ticks per individual have been recorded on mountain hares in peak weeks on a study site in Northern Scotland with larval numbers peaking in May, nymphs in May/June and adults in early August. With these tick burdens, hares are rapidly exposed to LIV, with 72 % of young hares seropositive for the virus by the end of their first summer and 95 % of older hares seropositive. On the same site, red grouse are important host only for the larval and nymphal stages, but also become rapidly infected with approximately 80 % of grouse at 3 months of age and 83 % of older grouse seropositive. With hare densities of 20 – 30 km^2 commonplace in some areas, hares are clearly of potential epidemiological significance.

PATHOLOGIC FINDINGS IN ROE DEER *(Capreolus capreolus)* SUBMITTED TO THE NATIONAL VETERINARY INSTITUTE OF SWEDEN, 1986 – 1996.

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Roe deer (*Capreolus capreolus*) comprises one of the most important big game species in Europe with a population of around one million in Sweden alone. Approximatelly 1 600 full carcasses and parts were submitted to the National Veterinary Insitute of Sweden between January 1986 and March 1996 for diagnostic purposes. During an epidemiologic study, causes of mortality were determined for 993 roe deer full carcasses. Age, sex, body condition, and geographic distribution were considered during the analysis of medical records. The most common conditions included trauma (19 %), winter starvation (17 %), bacterial and parasitic pneumonia (16 %), and gastroenteritis (15 %). This last condition has been associated with a chronic wasting disease of unknown etiology characterized by diarrhea, ulceration of the oral mucosa and abomasum, catarrhal to hemorrhagic enteritis, and occasionally mesenteric lymphadenopathy, hepatitis and hepatomegaly. Although a virus is suspected, the etiology of this chronic diarrhea syndrome remains to be elucidated. Approximatelly 40 % of the deer with the diarrhea syndrome, starvation, and pneumonia, were infected with the lungworms *Varestrongylus capreoli* and *Dictyocaulus noerneri*, being considered an important disease factor. Other less common conditions identified were septicemia (3 %), neoplasia (2 %), and abscesses in brain and other organs (2 %). Fibropapillomas, carcinoma, adenoma, and lymphoma were among the neoplastic processes identified. Bacterial and parasitic diseases including *babesiosis*, *clostridiosis*, *colibacillosis*, *mycobacteriosis*, *paratuberculosis* and *yersiniosis* were diagnosed only sporadically. Cause of death could not be identified in 6 % of the cases. Further research is granted to diagnose causes of mortality in the roe deer population.

CAUSES OF DEATH IN CETACEANS STRANDED ON THE COASTS OF ENGLAND AND WALES

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There has been concern that populations of some species of cetaceans may have declined in the seas around Britain and that these animals may be threatened by factors such as entanglement in fishing nets, changes in food supply, and pollution. In Order to provide information on the nature and scale of current threats to marine mammals, a pilot scheme, was initiated in 1990 to caordinate detailed investigations of both pathology and toxicology of marine mammal strandings around the coasts of England and Wales. This involved collaberation between the Institute of zoology, the National Environment Research Council's Sea Mammal Research Unit, The Natural History Museum, the Ministry of Agriculture, Fisheries and Food's (MAFF) Fisheries Research Laboratory at Burnham-on-Crouch, the MAFF Veterinary Investigation Service and many other organisations and individuals. Post-mortem examinations were carried out on 422 carcases of 12 species of cetaceans that stranded on the coast of England and Wales between August 1990 and September 1995. These comprised 234 harbour porpoises *Phocoena phocoena*, 138 common dolphins *Delphinus delphis*, and 50 individuals of 10 other species of dolphins and whales. A diagnosis of the cause of death was made in 320 (76 %) of these animals. Of the cases in which the cause of death was established, 66 (38 %) of 76 harbour porpoises, 86 (80 %) of 108 common dolphins, and 6 (19 %) of 36 individuals of other species were diagnosed to have been entangled in fishing gear (bycaught). Physical trauma of unknown cause lead to the deaths of a further 33 animals, including 22 harbour porpoises.

Neonatal starvation, pneumonia, and generalised infections accounted for a further 31 % of the diagnosed causes of death in harbour porpoises. Live stranded animals were often found to be diseased but 25 animals of various species appeared to have died as a result of live-standing as they showed no signs of preexisting disease. We conclude that entanglement in fishing gear is a threat to harbour porpoises and common dolphins but lack of knowledge of the proportion of dead animals that strand (and the possible influence of cause of death on this) and of the size and structure of the populations from which the carcases originate, limits assessment of the prevalence of particular diseases or the impact of particular threats at the population level.

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MORBILLIVIRUS INFECTIONS IN AQUATIC MAMMALS: CURRENT SITUATION

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There have been several epizootics of morbillivirus infection in marine mammals since 1987. Retrospective studies have indicated that morbillivirus infection was the cause of an epizootic among bottlenose dolphins (*Tursiops truncatus*) along the eastern seaboard of the United States in 1987 – 88. Morbillivirus epizootics also killed hundreds of Baikal seals (*Phoca siberica*) in Lake Baikal in Siberia in 1987 and approximately 20000 harbour seals (*Phoca vitulina*) and a few hundred grey (*Halichoerus grypus*) seals in northwestern Europe in 1988. Thousands of striped dolphins (*Stenella coeruleoalba*) died in the Mediterranean Sea in 1990 – 1992 as a result of morbillivirus infection. More recently, morbillivirus infection has been established as the cause of death of bottlenose dolphins in the Gulf of Mexico from mid 1993 to mid 1994. Distemper has also been found in a few harbor porpoises (*Phocoena phocoena*) in northwestern Europe and in a single bottlenose dolphin from the Mediterranean Sea.

Serological studies have revealed the presence of morbillivirus infection in a wide range of pinniped and cetacean species in the northern hemisphere, pinnipeds in Antarctica, Florida manatees (*Trichechus manatus latirostris*), walruses (*Odobenus rosmarus rosmarus*) from Canada, and polar bears (*Ursus maritimus*) from Canada and Russia.

Many of the clnicopathologic changes in morbillivirus-infected aquatic mammals are similar to those of distemper in dogs and other terrestrial carnivores. They include pneumonia, encephalitis, enteritis, and depletion of lymphocytes in lymphoid tissues. Many infected mammals develop bacterial, fungal and protozoal infections secondary to morbillivirus-induced immunosuppression. Morbillivirus antigen has been demonstrated in a wide range of epithelial, lymphoid and central nervous system tissues of infected animals.

Diagnosis is based on clinical signs, necropsy and histopathological findings, and demonstration of morbillivirus in tissues by immunoperoxidase, immunofluorescence or virus isolation techniques. In situ hybridization and the reverse transcription-polymerase chain reaction have also been used.

Comparative genomic analysis and investigation of the reactivity patterns to monodonal antibodies indicate that a strain of canine distemper virus caused the morbillivirus epizootic in Lake Baikal seals whereas a newly identified phocine distemper virus was responsible for the European pinniped epizootic. The morbilliviruses that infected European harbor porpoises and striped dolphins, and bottlenose doInhins along the eastem coast of the United Stares and in the Gulf of Mexico, may be strains of the same viral species.

The reasons for the occurrence of recent epizootics of morbilliviral infection among aquatic mammals are unknown. Altered migratory behaviour of marine mammals as a result of emvirenmental changes may have resulted in introduction of previously unknown morbilliviruses into susceptible populations.

HOOF DISEASES OF MOUFFLON

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Hoof lesions have been detected in moufflon for some time, most of them being related to outgrowth of side and sole horn. Cases in which those outgrowths are accompanied by inflammatory alterations of hooves and decomposition of horn substance can be diagnosed with high probability as foot rot. Bacterioides nodosus is considered to be the pathogen causing this disease owing to a specific synergism with Fusobacterium necrophorum. Predisposing factors are of crucial importance to actual outbreak of the infection.

The infectious process is supported by high ground moisture and pre-existence of hoof lesions. Spontaneous healing has been assumed by some authors but, in our experience, is extremely rare. Good results were achieved only after several weeks of intensive treatment. When, following treatment, animals were accommodated in enclosures with specially prepared and conditioned ground, hoof care proved necessary only for rams and in reasonable intervals. The following additional causes of hoof outgrowth are currently discussed:

- Site conditions
- Nutritional deficits
- Genetic disposition
- Impairment of horn production

Our own observations suggest that malposition of joints may be another cause. Hoof outgrowth in moufflon is obviously caused by a complexity of interrelated factors, which calls for further investigations.

DISEASE AND HEALTH PROBLEMS IN BRITISH OTTERS AT A REHABILITATION CENTRE

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The Vincent Wildlife Trust has run an otter rehabilitation centre since 1985 and has cared for 119 otters. 101 of these were juveniles and 18 adults, the largest category (83) is orphaned cubs, 36 animals were injured. 71 males to 48 females were admitted, but a higher percentage of females died. It is argued that males are more likely to have accidents or stray from their mothers, but having got into trouble are more likely to draw attention to themselves and to benefit from care; the more cautious behaviour of females helps to keep them out of trouble, but makes them more difficult to help. Growing experience has helped to identify and rectify problems caused by hand rearing otters. Results show that it is important to get injured or abandoned otters into experienced hands quickly if they are to recover. To date 74 animals have been returned to the wild.

40 otters have died since the centre opened. Orphan cubs have the lowest mortality rate at 25 % and injured adults the worst at 72 %. Total mortality rate is 33.6 %. Trauma is the commonest cause of death with bite injuries from otters outnumbering road traffic accidents. In this sample the most significant cause of death and ill health is other otters. In addition to their role in biting, otters' teeth also cause a number of health problems and the importance of dental examination is emphasised.

Analysis of health problems shows starvation, trauma and complications of both accounting for almost all ill health encountered. Despite concern about disease and effects of environmental pollution in the wild otter population no poisoning and only two cases of disease (*pemfigous foliaceous*) were seen. No tumours or other gross abnormalities were seen at post mortem examination apart from a case of hydroencephaly. Only 1 other genetic abnormality, an albino, was seen. It is clear that any health problem can predispose otters to others, so 56 animals accounted for 239 drug prescriptions, while 37 otters needed no medication at all.

17 otters were involved in RTAs of which 9 died. Road traffic is an increasing killer of otters but animals are much more likely to be killed than injured; 11 Scottish otters were brought in alive after RTAs, of which 6 survived, but in the same period 522 deaths on the road were recorded in Scotland. However road traffic not only affects otters by killing or injuring them, it is known to have orphaned at least 12 of the cubs cared for. 9 cubs were orphaned or injured by direct persecution such as casual cruelty, snaring, shooting and trapping and a further 7 came into care as result other human intervention, not always ill intentioned.

Medication, treatment and methods of delivering them to otters. In the course of caring for 119 otters with a variety of injuries, infections and other health problems we have drawn up a list of suitable and effective drugs and treatments. Because the otters are to be returned to the wild minimal human contact and handling is required, which can present difficulties in delivery of drugs. The most significant cause of death and ill health found in this sample is bites from other otters which almost invariably become infected. For this reason indirect delivery is also favoured by the rehabilitators. Drug formulations which can be given in food are most suitable and uptake can be improved by the use of anabolic steroids or diazapam to increase appetite and calm the patient. Some injectables can be given via the food.The most frequently used drugs are antibiotics and agents to promote wound healing. A list of drugs found to be valuable is given and methods of delivery discussed, including blow pipes, oral administration and topical application using improvised but effective techniques. Safe, smooth anaesthesia which can be administered from a distance and does not require intubation or gas is needed for work in the field. A list of anaesthetics found useful for delivery by blow pipe is given.Hand rearing young otters can bring its own health problems. Ways of modifying diet and feeding regimes to address such problems are discussed as are effective non pharmacuetical measures to deal with sucking body parts of companions to excess.

VIRUS IN FRAGMENTED POPULATIONS OF CARNIVORES: A CONCERN FOR CONSERVATION BIOLOGIE

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Since they are on the top of the food chaine, Carnivores are among the most threatened mammal species because of habitat loss and vanishing preys.They are frequently in competition with man and then directly killed in order to protect livestock. Several populations of wild Felids or Canids can survive in remote favourable habitat where long term self-maintenance is a stochastic event.

In such circumstances non density-dependent mortality like total habitat, destruction, climatic disturbance or introduction of exotic disease can simply eradicate such a remnet population. In this paper we focus on virus-Carnivorus relationship as a potential threat for endangered mammalian predators. Looking mainly at Felid and Canid, but Mustelid as well, we review the numerous virus known to infect wild Carnivores and suggest to classify them as "specialist and generalist" parasites.The range of host specifity, virulence and transmission, survival on abiotic substrate favour maintenance of different viruses in different populations structures and habitats. within spatlally heterogenous host population. general persistence is compatible with local extinction. The paper illustrates that point with analysis of feline viruses maintenance in urban and rural population of free-ranging cats. Dispearance of the virus is due to the suppression of susceptibles either by recovery and immunization or by extirpation of host dying from the infection. Edge effect is a major component of the Canivor/virus balance as some virus can be chance enter a small population of wild susceptible surrounded by a large population of its domestic counterpart (dog rabies in wild dogs or Ethiopean wolf). The demographic consequences of introduction depend on the virulence of the strain for the considered species and on the turnover of the susceptibles, as examplified by the distemper outbreak in Serengeti lions viral diseases and associated mortality in wild Carnivores are on the one hand a selectiv pressur, then one of the major component of the nature balance. On the other hand some of such diseases are shared by companion animals or man, and then can be transmitted to him. Cats are the mostly infected domestic animals in Europe and one of the mostfrequent vector to man. The question of the wildlife reservoir of zoonose needs approbiate studies of the involved species of which the ecology is frequently poorly documented. Finally when the victim of the diseases in some extent threatened by extention, introduction of a virus in a susceptible population could be problematic as was the epizootic of distemper within the last remnent population of Black-footed ferrets. In such circumstances (zoonose or conservation concern) some degree of disease control should be considered. The choice for a target or a strategy involves non intuitiv consideration. The numerus options are discussed.

HEALTH ASSESSMENT OF THE ENDANGERED ARCTIC FOX *(ALOPEX LAGOPUS)* IN SWEDEN.

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The arctic fox (*Alopex lagopus*) is listed as one of the most endangered mammals in Fennoscandia comprising about 80 to 100 individuals. The arctic fox population decreased drastically around the turn of the century, mainly due to hunting, and has not recovered since. Numbers and reproductive success are regulated by prey availability based on microtine rodents. Comprehensive health assessment programs are necessary when dealing with endangered populations. During July 1996, pups from three occupied dens were trapped and sampled in the Nature Reserve of Vindelfjällen, Sweden. Blood specimens collected from the cephalic or jugular veins, and tonsilar swabs, rectal swabs, and fecal samples were collected from 21 pups 5 – 7 weeks of age. Body condition, weight, hind foot length, and sex were recorded. In the laboratory, blood serum and blood smears were evaluated for biochemical values and blood cell counts. Following standard bacteriologic techniques tonsilar and rectal swabs yielded Staphylococcus and a few gram negative organisms including Proteus and Escherichia coli. No Salmonella or other pathogenic bacteria were isolated. Coproparasitoscopic examinations yielded several endoparasite eggs including *Toxascara leonina*, *Uncinaria*, *Isospora*, and *Crenosoma vulpis*. Normal hematologic and blood biochemistry values will be reported. Further studies are necessary to establish normal health values for adult foxes and different seasons to better understand the health status of this species.

DISEASES, PARASITES AND SURVIVAL OF RED FOXES IN NORTHEASTERN SPAIN

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Post-mortem diagnostic evaluations, serologic testing and radio-tracking, among other techniques, were used to investigate the impact of parasites and diseases on the population dynamics of the red fox (*Vulpes vulpes*) in two different habitats in the Ebro Bassin, northeastern Spain. Red fox survival was estimated with the aid of Kaplan-Meier life-tables, based on 358 tooth-cementum analysis.

Canine leishmaniosis (*Leishmania infantum*) is endemic in the red fox in northeastern Spain, and could be reproduced in hamsters injected with spleen tissue of foxes, but none of the investigated canids showed lesions due to the parasite. Prevalence of the trematode *Metorchis albidus*, heartworm (*Dirofilaria immitis*), and *Uncinaria stenocephala*, was higher in the more moist habitat close to the main rivers of the study area. Other helminth parasites, like *Rictularia affinis* and *Trichuris vulpis*, were more common in foxes from the dry land. Other parasite species found include *Angiostrongylus vasorum* and *Spirocerca lupi*. Cestodes of the genus Echinococcus were not detected. Sarcoptic mange is also endemic in the red fox in northern Spain, causing occasionally local outbreaks.

Canine distemper was found to be the most important single disease causing mortality among red foxes in the study area. No death due to canine parvovirosis or canine hepatitis was diagnosed.

Antibodies were found against canine distemper, canine parvovirus, and leishmaniosis.

Only two out of 14 (14 %) mortalities of radio-tagged foxes were caused by hunting. Overall survival of foxes from the irrigated areas was lower ($p = 0.0059$) than survival of populations inhabiting dry areas. Natural mortality may be significant in the population dynamics of red foxes in northeastern Spain.

SEROEPIZOOTIOLOGIC INVESTIGATIONS OF CALICIVIRUS-ANTIBODIES IN FREE-RANGING EUROPEAN FOXES (*VULPES VULPES*) IN MECKLENBURG-VORPOMMERN (GERMANY)

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Rabbit hemorrhagic disease virus (RHDV) belongs to the genus calicivirus and appears naturally to infect rabbits only. RHD has been reported in many European countries and is characterized by hemorrhages located mainly in the lung, and results in degenerative and necrotic lesions in the liver. Due to the role of European fox (*Vulpes vulpes*) as a top-carnivore and its flexibility in habitat use and variable prey, foxes may be regarded as a potential transmitter of infectious agents.

Three hundred and fifty-two serum samples of free-ranging foxes, collected in 1993, were tested for prevalence of RHD antibodies with an enzyme-linked immunosorbent assay (ELISA) kit. In addition, 90 sera with positive or questionable ELISA results were also analysed by the haemagglutination inhibition test (HI). Eighteen serum samples (5.1 %) were positive in the ELISA and 8 of these were also positive in the HI test. These are the first results which indicate the presence of calicivirus infections in European foxes. Based on the specificity of the test and the epidemiology of RHD, the antibodies detected against caliciviruses may be induced by RHDV.

PREVALENCE AND POSSIBLE PATHOGENICITY OF HELICOBACTER-LIKE ORGANISMS IN THE STOMACH OF WILD CARNIVORES

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Several bacterial species of the genus *Helicobacter* have found their ecological niche in the stomach. The most important organism of this genus is *Helicobacter pylori*, a small bacterium that colonizes the gastric mucosa of humans. This organism has been recognized as the most important cause of chronic active gastritis. It has also been found to be involved in the process of peptic ulceration and cancer formation of the gastric mucosa. In animals, especially in dogs and cats, the presence of large spiral bacteria in the gastric mucosa has been known since the end of the nineteenth century. Studies in the last few years have shown that several species of spiral organisms occur in the stomach. By sequencing the bases in their 16S ribosomal RNA molecule it has been found that they all belong to the genus *Helicobacter*.

Recent studies in our institute have shown that Helicobacter-like bacteria are also widely distributed in wild carnivores. Large spiral bacteria ("*Gastrospirillum*"-like) do not only occur in the stomach of domestic dogs and cats, but have also been found to occur in hyenas, in canids such as fox and wolf, and in several feline species such as lynx, serval, puma, cheetah, lion, and exotic small cats. On ther other hand, *Helicobacter pylori*-like organisms are now known to occur in cheetahs, tigers, and lions.

The colonization of the gastric mucosa with organisms of the genus *Helicobacter* can be associated with histological gastric changes. The histopathological finding most frequently found in association with the large spiral bacteria ("*Gastrospirillum*"-like) were proliferations of the mucosa associated lymphoid tissue with formation of focal lymphoid nodules. Additional changes found in lions and tigers infected with *Helicobacter pylori*-like organisms were a superficial lymphoplasmocytic gastritis and, in some cases, focal to diffuse mucosal infiltration with lymphocytes, plasma cells, and neutrophils. Size, severity and topographical distribution of the inflammatory response in association with *Helicobacter spp.* need further examination.

ON THE RELATIONSSHIP OF THE HELMINTH FAUNA OF FREE RANGING AND ZOO-KEPT CARNIVORA IN BERLIN

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The prevalence of helminths of free living carnivora caught in Berlin and its environs is compared with that of zoo and pet animals in the same area. Since 1976 more than 1 800 wild red foxes were examined. Cestodes were the dominating helminth parasites. *Mesocestoides lineatus* reached prevalences up to 70 %. *Mesocestoides litteratus*, *Taenia crassiceps*, *T. hydatigena*, *T. pisiformis* and *T. taeniaeformis* were also common tapeworm species of foxes. Only single findings of *Echinococcus multilocularis* were reported from this area. *Toxocara canis* and *Uncinaria stenocephala* were the nematodes mostly found. Almost every fox was infested by helminths. In many cases several helminth species occurred in the same specimen among them parasites with zoonotic importance. *Atriotaenia incisa* was the dominating cestode species of 34 badgers. The same tapeworm species was also found in 30 of 51 free ranging raccoons as the most frequent helminth. Only scarce results could be documented from stone and pine marten, weasel, ermine, raccoon-dog, and wolf. Domestic dogs were also mainly infested by Mesocestoides and Toxocara, occasionally by Dipylidium. *Dipylidium caninum*, *Taenia taeniaeformis* and *Toxocara mystax* were the dominating helminths of domestic cats especially in feral ones. The results on zoo carnivora are based on coprological examinations, dissections and spontaneously excreted parasites of more than 1 490 animals (*Felidae 18*, *Canidae 11*, *Ursidae 8*, *Mustelidae 7*, *Viverridae 3*, *Hyaenidae 2*, and *Procyonidae 2* species, respectively) investigated since 1970. Almost all carnivorous species were parasitized by helminths. The nematodes dominated whereas trematodes and cestodes were found almost exclusively in animals imported from the wild. Our results indicated that in free living animals heteroxenous helminths were mainly found in those life cycles which are established in the specific ecosystem. Within a short period zoo animals showed a much lower diversity of parasite species. Later homoxenous helminths are the dominating parasites restricted to some few species. Some attention should be payed on the possibility to introduce parasites by newly imported animals and by feeding meat containing developmental stages of helminths. Pet animals have an intermediate position between the two former groups.

SARCOPTES SCABIEI VAR VULPES INFESTATION IN LYNX *(LYNX LYNX)*, PINE MARTEN *(MARTES MARTES)* AND WOLF *(CANIS LUPUS)* IN SWEDEN

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Sarcoptic mange in Swedish wildlife was first observed in modern times in a red fox (*Vulpes vulpes*) in 1972. From 1975 fox mange spread rapidly throughout the country and was 10 years later found in all parts of Sweden except for the islands Gotland and Öland. The mortality caused by mange in the red fox population, was high reaching in local areas up to around 75 %. In 1980 the first case of mange was found in a lynx (*Lynx lynx*). Based on epidemiological observations it was determined that this infestation was caused by *Sarcoptes scabiei* var vulpes. Between 1980 and 1996, sixty lynx were investigated at the National Veterinary Institute (NVI). From these, 28 (47 %) animals were infested with *Sarcoptes scabiei var vulpes*. The major cause of death in infested lynx was emaciation. The first case of fox mange in pine marten (*Martes martes*) was observed in 1984 and up to 1996 the disease was observed in 18 of 46 martens examined at the NVI. Mange has during that period also been observed in a free ranging wolf (*Canis lupus*) and in a wolf that originated from a zoo.

The infestations of *Sarcoptes scabiei* caused a deep dermatitis with varying degrees of inflammatory cell reaction. The epidemiology of mange in lynx, marten and wolf are further discussed.

OUTBREAK OF SARCOPTIC MANGE IN CHAMOIS (*RUPICAPRA PYRENAICA*) IN THE CANTABRIAN MOUNTAINS (NORTH SPAIN)

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Sarcoptic mange is probably the most severe disease affecting Chamois populations. Until 1993, it had only affected the Eastern part of the Alps. In 1993, it is detected for the first time in the Cantabrian Mountains (in Spain). The population of chamois in the Cantabrian Mountains is divided into two separated nuclei: the western one with a population of 500 animals and the eastern one, with 15000 animals. In spring of 1993, a chamois was found with sarcoptic mange in the eastern nucleus. The origin of the disease is unknown, but it is suspected that domestic goats could have transmitted it. In 1994, a second focus appeared, 25 km far from the first one. In 1996, the two focuses joined. Since the beginning of the disease, it is spreading in the population between 5 and 7 km per year. The disease has a marked seasonal trend, animals being clinically affected mainly at the end of winter and beginning of spring. Interaction between ethology, the ruf activity, and condition, explains this seasonality.

Morbidity and mortality were difficult to determine because of the roughness of the landscape and the presence of predators and scavengers such as the spanish wolf (*Canis lupus siunatus*) and the commomvulture (*Gyps fplvus*). The first year, morbidity and mortality were around 1.6%. In 1994, they reached a maximum of 12% and in 1995 20% in some areas. Chamois density did not exert a remarkable influence on the severity of the disease, the same as it has been observed in the chamois of the Eastern Alps.

Other ungulate species, such as one roe deer (*Capreolus capreolus)* and four red deer (*Cervus elaphus*) have been affected with sarcoptic mange in 1995.

It is practically impossible to control the epizooty. Attempts to control it in the chamois in the Alps and in the Spanish ibex in Southern Spain, have never been successful. Killing the affected animals, decreasing densities and physical barreers have never stopped the disease. Treatment of affected animals is also unpracticable.

OCCURRENCE OF PSEUDORABIES VIRUS (AUJESZKY'S DISEASE) INFECTIONS IN EUROPEAN WILD BOAR IN EASTERN GERMANY

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Although many domestic animal species are susceptible to infection by pseudorabies virus (PrV), pigs are considered to represent the main host reservoir. Only limited data exist about natural infection of wildlife. Thus, from an epidemiological point of view, it is important to characterize the susceptibility and reservoir function of wildlife for pseudorabies. Because of its predominant association with domestic pigs, the Eurepeon wild boar (*Sus scrofa*) could act as a reservoir for PrV with a carrier state.

From 1991 – 1994 indigenous Eurepeon wild boar (WB) was serologically and virologically investigated on the occurence of PrV-infections in Estern Germany. Serum samples collected from hunted WB were tested for the presence of antibodies to PrV by a commercially available enzyme-linked immunosorbent assays (ELISA), and by serum neutralization test (SN). Out of 3143 sera tested 281 (8,9 %) were positive in ELISA. Reactivity was confirmed by presence of neutralizing antibodies in 220 sera and by immunoblotting. Analysis of data on age, and sex of the animals as well as time and origin of samples, which was available for 95 % of all samples, showed that seroprevalence did not differ between males and females, but a significant higher seroprevalence was observed in older animals than in younger individuals. Based on epidemiological aualysis we conclude that PrV-infections appear to occur for a number of years in WB populations of the examined region with increasing prevalence. Especially the eastemmost part of the study area appears to be endemically infected with seroprevalences as high as 22 % within the endemic site. Interestingly, pseudorabies had been eradicated in domestic pigs in this area in 1985.

Recently, 4 (four) PrV were isolated from endemic areas. These are the first PrV isolates from wild boar in Germany. Molecular biological analysis using restriction lenght polymorphism (RFLP) showed considerable differences to PrV-strains occuring from domestic animals of the same region. The PrV-isolates were identified by southern blot hybridization in the BamHI restriction pattern as a 5-10/5-12 double fusion strains. The origin of these isolates is unknown because this PrV-type has never been observed in Germany so far. Thus, it appears as if the endemic infection in WB is occuring without involvement of the domestic pig population. Presently, there are no hints for a potential danger for domestic pigs. In the future experimental studies of the virulence of the PrV-isolates and their potential danger for both WB and domestic pigs will be completed.

RELATIONSHIPS BETWEEN MOUNTAIN LIVESTOCK BREEDING AND WILD UNGULATES' HEALTH IN NATIONAL PARK OF VANOISE (FRANCE)

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A large scale investigation was performed from 1994 to 1996 in National Park of Vanoise (France) in order to characterise the extend of grazing pastures and the various modalities of livestock management in this protected area whereas wild ungulates' habitat was defined, according to seasonal patterns.
National Park of Vanoise holds 352 pastoral units, grazed by 38751 sheep, 2410 goats, 5198 milk cattle and 4297 beef-cattle (15360 sheep, 561 goats, 862 milk-cattle and 1434 beef-cattle in its protected central area), while 5200 chamois (*Rupicapra rupicapra*) and 1350 ibexes (*Capra ibex ibex*) are living in the same area. A cartographic analysis (G.I.S. Arc-Info) shows frequent patterns of overlapping of their respective home-ranges.
Sanitary investigations reveal an impact of livestock density on Chamois' parasitic fauna and a recent event of bovine brucellosis (*Brucella abortus biovar 1*) points out the epidemiologic risks of recently emerging modalities of cohabitation between wild ungulates and livestock on grazing pastures.

PATTERNS OF HELMINTH PARASITISM IN WILD LIVING CATS IN SCOTLAND.

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Differences in the prevalence and mean intensity of helminth parasites amongst host populations may result from variations in resistance to infection, differences in hahitat preferences, diet or socal behaviour. The use of helminth parasites as leological markers' for determining differences between morphological groups of wild living cats in Scotland was investigated, in light of the debate over the definition of a wildcat. The prevalence and intensity of infection with the tapeworm *Taenia taenieaformis* did not differ significantly between cats designated as 'wild' and 'feral' types. There was however, a borderline significant relationship between *T. cati* burdens and cat group, with higher intensities of infection in 'wild' type cats. The prevalence of both helminths was high (94 % and 69 % respectively) and there was significant varration in infection intensities related to season and geographical area. Also, prevalencc of infection with *T. cati* was significantly higher in female cats. Cats which harboured large numbers of one worm species were also likely to harbour large numbers of the other. However, a possible relationship with cat condition was only found for *T. taeniaeform is* for which there was a significant negative correlation between an Index of cat condition and intensity of infection amonast 'wild type' cats, but not amongst 'feral type' cats. Variations in worm burdens could not be attributed to differences in cat diet as there was no significant relationship between the presence of any individual prey type and either the presence or intensity of infection with *T. cati* or *T. taeniaeformis*. There was a significant negative correlation between density and biomass of individual worms in infections of *T. taeniaeformis*, suggestive of a density dependent constraint on tape worm growth.

EPIDEMIOLOGICAL ASPECTS OF M. CONJUNCTIVAE IN WLLD AND SMALL DOMESTICATED RUMINANTS IN'THE SWISS ALPS

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Infectious keratoconjunctivitis (IKC) is a common ocular disease in domestic and wild ruminants, As for wild bovidae in the Alps IKC is known in Alpine chamois (*Rupicapra rupicapra nepicapra*) and Alpine ibex (*Capra ibex ibex*). IKC is used to describe a clinical condition which is contagious but apparently not always ascribable to the same agent. In domestic as well as in wild ruminants several bacteria are described to be associated with IKC, but in sheep and goat pathogenicity has been demonstrated for only two micro-organism which have been isolated from the eyes, namely *Chlamydia psittaci* and *Mycoplasma conjunctivae*.
Our objectives were to characterize the epidemiology and identify likely etiological agents in ibex, chamois, and sheep in the Swiss Alps. In the present work prelirninary results of etiological investigations and of describfion of IKC-occurrence in three ruminant species are presented.
Our results indicate that *M. conjunctivae* is the causative agent of IKC in Alpine ibex, chamois and sheep in the Swiss Alps. *M. conjunctivae* was the only pathogen isolated from affected eyes of Alpine ibex in this study and this agent could also he detected in pure cultures in both chamois and sheep. The presence of *M. conjunctivae* in three hosts-species in the same areas leads to the consideration of an interrelationship of IKC in sheep, ibex and chamois.
To elucidate the role of *M. conjunctivae* as the primary pathogenic agent of IKC in ibex and chamois more research is necessary such as experimental infections. Further epidemilogical studies should be carried out in order to investigate the possible transmission of IKC between ibex, chamois and sheep and to assess if in ibex and chamois a boost is required from sheep.

RESPONSE IN REINDEER TOWARDS LOW FLYING AIRCRAFTS

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Rangifer Rangifer is wide spread in northern parts of Scandinavia and Russia. With small differences in genotype in USA as well. The Svalbard arkipelago has a subspecies of the genus.

Our institute was given a project from the Norwegian Airforce, as the airforce wanted to revise their low flying regulations. Throughout the last years several court claims has been received by the airforce from reindeer owners, claiming that low flying over the herds cause damage to the animals in several ways. In lack of former research in this field, the project was accepted as relevant by our institute.

The experiment was carried out at Sõrõya, Finnmark, northern Norway. Sõrõya is an island used for pasture in the summer. A total of seven animals were implanted with hearth-rate transmitters for remote recording of hearth activity. This work was done in April 1994. When the experiment was to be carried out with bypassing aircrafts in August the same year, none of the prosessed animals were activly transmitting signals. Three animals were missing, two were present in the herd, but without active transmitters. The three missing animals were not found on the island despite thorough search. We then desided to instrumentate two additional animals and use them the next day.

Medetomidin and ketamin were used for general anesthesia. Local anesthesia was carried out with lidocain. Intravenous fluid was given through the operation. A heart-rate transmitter was implanted under the skin near the jugular vein on the left side of the neck, near the breast aperture. Cords from the transmitter were fitted, one on the sternum and one 15 cm up on rib nr. 4, left side. The cords were fitted subcutaneously. Two animals had the tranceiver located in the abdomen.

The animals were kept in an enclosure measuring 300 x 500 meters. The hearth-rate signals were recorded analogously as well as the sound from the aircrafts, both recordings in true time. The aeroplanes were the General Dynamics Fighting Falcon F-16 and Lynx 86 helicopter as well as Bell 412. Together with five other not implanted reindeers the animals were exposed to lowflying aircrafts according to a preset procedure. Speed, altitude and flying pattern varied among the testsequencies. Syncronized recordings of sound and hearth-activity were tapered during the overflights, and the animals were visually examined for behavioural responses.

The testsequencies included passages in 200, 500, 1 000, 1 500 and 2 000 feet. Within one sequence, altitudes were combined differently. Timespace between bypassings were differently set in such a way that the animals were given time to calm down before the next passing by.

The reindeers showed moderate reactions to the aircrafts. Flightbehaviour was observed only when a helicopter hovered overhead the animals at 60 – 80 feet. The most common reaction was increased vigilance and a brief startling response. During a majority of over-flights below 2 000 feet, no clear response was detectable.

Conclusions:

During the testsequensies at Sõrõya the reindeers showed limited reactions and fear as response to lowflying aircrafts. The most distinguished reaction was a short disorientation and startling response. The disorientation was measurable by means of heart-rate registrations.

The orientation response was correlated with increased startling response on initial registration of the source of disturbance. The orientation response was seldom followed by flightreaction. In the few flightreactions observed, the distance of flight was short.

Fear- and flightresponse towards lowflying aircrafts are seemingly moderate with small consequences in regard to energy balance. Individual differences in behaviour must, however, be anticipated.The research identified, in accordance with existing literature in the field, no need for revision of the low flying regulations in Norway.

SOME ASPECTS TO REPTILE DISEASES

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The interest in diseases of reptiles is growing up from year to year enormously. A lot of reptile species is belonging now to the endangered animals and the scientists all over the world are beginning to include reptiles in comparative examinations. In this paper we`ll explain at first the characteristic differences which are exhibited by respiratory organs and by the digestive tracts.

The result of examinations of 4000 reptiles from zoos and hobby herpetologes shows that the most common cause of death are the infectious diseases (Virus, Bacteria, Mycoses and Parasites). In nearly 20 % of all necropsied snakes we found an amoebic dysentery as cause of death. The way of infection and the alterations in the infected animals will be described in the paper. Another parasitological problem is the ascariasis in tortoises and snakes. Massive ascarid attack may occur also to lizards. Ectoparasites may be detected under the scales and may cause severe anaemia.

Leucosis in boa constrictor is an example of virus infections. A typical bacterial infection in reptiles is the salmonellosis. It has been quite often recorded from tortoises but may occur to other reptile species as well. Fungal infections were more frequently observed in recent years.

Not-infectious diseases we can find as well. Gouty alterations to serous membranes must be attributed to severe metabolic disorders in the kidneys. Vitamin-D overdosage over an extended period of time can lead to total calcification of the vertebral column.

Egg-binding or egg retention has been a particular problem to reptile breeders and may occur to all reptile species. Further on traumatical alterations, tumor diseases and malformations and other more will be discribed.

PERMANENT CONTROL ON THE PEST RODENTS AT SOFIA ZOOLOGICAL GARDENS

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During two years continuous Observation upon the biolcological parameters of the pest rodent population and its micro-populations units at Sofia Zoological Gardens have been carried out. Monthly deratisation measures in accordance with the specified biological particulars of the rodents have been realised. It was found that the dominant species at Sofia Zoo is the wander rat Rattus norvegicus, which number is very large. The permanent deratisation through 2% "Lanirat" lure, containing 0.25% Bromadiolan (anticoagulant of the second generation) led to strong decrease in the rat number already in the first two months. Six months after the permanently decreasing the number of wander rat, a calamity of the domestic mouse (*Mus musculus*), which till that time was been discriminated species, was followed. The subsequent deratisation through 4% "Lanirat" liquidated their population. The further observation at the zoo shows that irrespective of the permanent deratisation at some sections, certain single rat families remain. They could quickly restore the initial high number of the population if the deratisation has been stopped. That fact necessitates the deratisations at Sofia Zoological Gardens to be an obligatory part of the complex of zooprophilaxis measures. In order to reach a high effectiveness in the rodent control at such facilities it is very important to be well acquainted with the relevant biological species and the specific particulars of its population according to the concrete conditions and to apply in a competent way relatively harmless and attractive for the rodents poison lures.

POSTER

CARDIOVASCULAR MALFORMATION INCLUDING PATENT DUCTUS ARTERIOSUS IN RUMINANTS OF THE VIENNESE ZOO "SCHÖNBRUNN"

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Patent ductus arteriosus is recorded in all domestic mammals. In comparison with other malformations of the cardiovascular system it is one of the more common defects (ROBINSON and MAXIE, 1993). Up to now a hereditary basis of the lesion is confirmed only in the dog (PATTERSON, 1989): Patency of the ductus arteriosus is transmitted by a polygenetic inheritance pattern. The severity of the defect increases as the number of responsible genes increases (ROBINSON and MAXIE, 1993).

The following report documents a series of identical malformations of the great arteries combined with patent ductus arteriosus in captive ruminants in the zoo "Schönbrunn" in Vienna.

In the years 1995 and 1996 two male and two female barbary sheep (*Ammotragus lervia*) and one female Markhor (*Capra falconeri*) died within a few hours up to two days post partum. A further male Nilgai (*Beselaphus tragocamelus*) was euthanatized on the day of birth because of high-grade debility. Two of the barbary sheep did not show any signs of illness before death; one barbary sheep and the Markhor obviously were in weak condition after birth and one animal was transmitted as "stillbirth". Potential fathers of the barbary sheep were the leader of the herd respectively his 3-year-old outbred son. All mothers were daughters of the leader. The new born Markhor descended from a new acquired male and an unrelated female. The Nilgai too was the offspring of non related parents.

Dissection in all six cases revealed malformations of the great arteries near the heart: The main arterial vessel originated from the initial part of the pulmonary trunc, passed over to the Ductus arteriosus and continued to the adjacent Aorta ascendens. Simultaneously the section of the pulmonary trunc following and of the Aorta preceding that abnormal artery were hypoplastic. The degree of the malformation differed from case to case but inevitably resulted in death because of insufficient functional pulmonary circulation. Consequently the lungs of all five carcases were highly ischemic and emphysematous.

Regarding the etiology of the malformation in the barbary sheep the frequent occurence of the defects in addition to the genealogic situation in the herd are suspect of a (poly) genetic determination. The sudden onset of the malformation in the year 1995 coincides with the first potential paternity of a 3-year-old male. Lambs which were born in the years before did not show malformations of the cardiovascular system although many of them were inbred too. A hereditary burden of the young male and his fatherhood in the four cases of malformation is suspected. In the cases of the Markhor and the Nilgai the next few years will clarify whether the malformations were isolated cases or the beginning of analogous problems as in the barbary sheep herd.

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HISTOLOGICAL INVESTIGATIONS OF THE THYROID GLANDS OF MONGOLIAN GAZELLES (*PROCAPRA GUTTUROSA*)

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In May 1995 thyroid glands of 31 Mongolian Gazelles (*Procapra gutturosa*) swere collected for histomorphological investigations on the occasion of a Mongolian-German expedition. Ten animals were acquired from the highlands, 10 from the steppe and 11 from the lowlands. Seven gazelles (4 males, 3 females) were subadults (body weight 19.8 kg). Their relative thyroid weight was on average 9.44% (g thyroid weight per kg body weight). In 24 adult gazelles (17 males, 7 females) the relative thyroid weight was on average 9.03%. During the expedition to the highlands there was sudden frost with heavy snowfall. Numerous gazelles died. Eight of the ten animals included in this investigation were found dead. All the other gazelles were shot.
Macroscopically both thyroids of the Mongolian gazelles were longish-oval in shape with a convex lateral face. The medial face ranged from plain to slightly concave. An isthmus was absent. The inner parathyroid glands were subcapsularly located in the medial face.
The fibroelastic capsule of the gland contained no fat. Trabecular connective tissue separeted the thyroid lobules. Between lateral and medial faces arteriae and venae thyreoideae penetrated deeply into the glandula lobes. In 13 gazelles ultimo-branchial follicles were found in this hilus-like area, which varied significantly in size and structure. Their association with the para-thyroid tissue has been observed in 8 animals. The epithelial lining of the follicles was highly variable, ranging from simple or stratified squamous to cuboidal and columnar forms. The lumen of the follicles contained cells and colloidal material which was PAS-positive. Papillar proliferation of the epithelium into the lumen was found in one adult male gazelle. Such extensive occurrence of ultimo-branchial follicles has been reported in rats and goats only so far.
C-cells were located interfollicularly as single cells or in groups of 3 to 5 cells in the middle or in the upper half of each lobe, especially in the vicinity of the parathyroid gland.
The activity status of the thyroid was assessed on the base of thyroid follicular size, the height of thyreocytes, the size and structure of nuclei, the colloid and blood content. Colloidal storage
forms with big follicles in the periphery of the glands have been observed in more than half of the adult gazelles. Small active follicles were distributed in a nest-like form. Subadult animals developed active glands. All gazelles found dead showed thyroids with extreme perifollicular hyperaemia, a low colloid content and columnar thyreocytes. These alterations are typical signs of a sudden activation.

THE OCCURRENCE OF HYPERTROPHIC PULMONARY OSTEOPATHY (MARIE'S DISEASE) IN CERVIDES

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Hypertrophic Pulmonary Osteopathy, also called Marie's Disease or Acropachy is described in humans and domestic animals like horses, cattle and mainly in dogs. In wildlife some cases are reported in roe deer and brown hare. Between 1976 and 1996 the disease could be diagnosed in 4 roe deer out of 1208 necropsies and 1 red deer out of 145 necropsies at the Research Institute of Wildlife Ecology. Other cervides like fallow deer (n = 119) did not show any typical lesions nor did brown hares (about 2000 necropsies in the corresponding time). Acropachy is characterised by a swelling of the distal parts of the limbs caused by periostal new bone formation observed almost invariably as a secondary manifestation of thoracic disorders. In 2 roe deer showing hypertophic pulmonary osteopathy we could prove mycotic abscesses of more than fistsize in the lungs, in the third roe deer, submitted for necropsy already eviscerated, a severe fibrinous pleuritis was diagnosed. The pathogenesis is still not known exactly, a nervous reflex with afferent fibres originating in the thorax and efferent fibres affecting connective tissue and periosteum is supposed to be the pathogenetic pathway.

MORPHOLOGICAL CHARACTERIZATION OF HELICOBACTER-LIKE ORGANISMS IN THE STOMACH OF CAPTIVE WILD CARNIVORES

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The gastric bacterium ***Helicobacter pylori*** is known as an important human pathogen. Spiral gastric bacteria related to this organism also occur in a variety of domestic and nondomestic animals including wild carnivores such as tiger, lion, puma, wolf, and fox.

By studying the gastric mucosa of several carnivores by means of histopathological, immunohistochemical and electron microscopical methods we found two common types of gastric *Helicobacter*-like organisms (GHLOs). The first one was 0.5 Êm wide and over 6 Êm long and had a variable number (10 to 25) of tight spiral turns. These bacteria mainly found in the lumina of the gastric glands and were distributed over the intire mucosa. In addition, they frequently invaded the cytoplasm of the gastric parietal cells. High densities of these bacteria were found in 3 pumas, but similar organisms were also detected in a serval, in 3 lions and some other carnivores, usually at lower densities. The organisms found in the stomach of a wolf were characterized by the presence of a spiral periplasmic fibril on its surface (*Helicobacter felis*-like).

The second type of GHLOs were short (about 2 – 3 Êm) curved bacteria located in the mucous layer in close proximity to the mucosal epithelial cells, in the lumina of the gastric pits, and in the proximal parts of the gastric glands. Such *Helicobacter pylori*-like organisms were detected by us in 42 % of the tigers and 90 % of the lions examined. The most striking histopathological finding associated with the GHLO colonization was the formation of lymphoid follicles in the mucosa. Additional lymphoplasmacytic and neutrophilic infiltrates in the gastric mucosa were found in a number of tigers and lions infected with *Helicobacter pylori*-like organisms, but none in the other carnivores infected with the large spiral bacteria. From these results it is concluded that gastric bacteria similar or identical to *Helicobacter pylori* may also be an important cause of chronic gastritis in exotic wild carnivores.

DETECTION OF ORTHOPOX VIRUS INFECTION IN NORWEGIAN WILD RODENTS

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Orthopoxviruses, such as vaccinia virus and racoonpox virus, are used as vectors in recombinant vaccines, carrying foreign genes coding for proteins with antigenic nature.

Release of recombinant poxviruses in ecosystems containing naturally occuring related viruses may lead to spontaneous recombinations, and viruses with unknown geno- and phenotypes might occur. Important characteristics like pathogenicity, host range and environmental survival could be changed in an unfavourable manner.

Small wild rodents are believed to be the reservoir for orthopoxviruses in many countries. During the years 1993 – 1995 we have collected small rodents and shrews from different locations and types of ecosystems in Norway. Bloodsamples were collected. DNA was extracted from several organs from these animals and an orthopoxspecific PCR/Southern blot were developed. Othopoxvirus DNA has been detected in Bank vole (*Clethrionomys glareolus*), Northern red-backed vole (*Cl. rutilus*), Grey-sided vole (*Cl. rufocanus*), Common field vole (*Apodemus sylvaticus*) and Common shrew (*Sorex araneus*) from different locations and seasons. The DNA are characterized by PCR with a different set of primers, and most probably originates from cowpox-like viruses. We were not able to cultivate virus from any of the positives. Orthopoxvirus specific antibodies has been detected from the same species by a competition-ELISA assay.

The first norwegian clinical cases of cowpox infections in a 37 year old femle and a cat were observed in 1994. There were also two cases of human cowpox infection in Sweden in 1990. These four virus isolates are being further characterized and compared with the reference strain (*cowpox Brighton*) and vacciniavirus.

DICROCELIASIS IN MOUFLON (*OVIS AMMON MUSIMON, SCHREBER 1782*) IN CATALONIA

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In Catalonia (NE Spain), there are two populations of free-ranging mouflon (*Ovis ammon musimon, Schreber 1782*), one in the North (National Hunting Reserve of Freser-Setcases) in an area of 1200 ha between 2000 and 2800 m of altitude. At present, this population is about 300 animals. The other one, is in the South (National Hunting Reserve of Ports Tortosa- Beseit), in an area of 1000 ha between 600 and 1300 m of altitude. This population was introduced in 1971, and in 10 years reached a maximum of 250 mouflons, but from 1982, began to decrease due to unknown causes, and in 1994 there were only 25 left.

In 1992 we started a study on mouflon diseases, in order to know their health status and stablish a programme of surveillance of diseases in this species. Between 1992 and 1996, 8 mouflons were hunted and 25 were captured alive in the N.H.R. of Freser-Setcases. In the N.H.R. of Ports Tortosa-Beseit, 12 animals were hunted in the same period.

In the mouflons of the N.H.R. of Freser-Setcases, the prevalence of *Dicrocoelium dendriticum* was 3 %, while in the N.H.R. of Ports of Tortosa-Beseit was of 100 %, presenting all animals macroscopic an microscopic hepatic lesions. The parasitation burden in this organ was between 663 and 2500 parasites.

Macroscopically, the liver presented an extensive biliary fibrosis, and appeared indurated, scarred, lumpy, with complete shrunken and sclerotic areas at the margins. The bile ducts stand out as whitish, firm (sometimes mineralized), branching cords, with irregulary stenotic lumina which contained a dirty dark brown fluid with many clumps of flukes.

Histopathologically, the liver changes were those of a cholangiohepatitis with numerous lancet flukes. Bile ducts appeared strongly dilated by the presence of flukes, their eggs, and a mixture of mucinous exudate with desquamated cells, detritus and pus. Mucous glands of the large ducts were remarkably hyperplastic, and the wall thickened due to an inflammatory fibrosis. The inflammatory lesions in individual portal areas extended to join each other, so that entire hepatic acini underwent inflammation and destruction. These foci characterized by a hepatocyte degeneration, and mixed inflammatory infiltrates composed of eosinophils, histiocytes and giant cells.

Even though we can not afirmar con toda certeza, dicrocoeliasis could have contributes to the disparation of mouflon in the N.H.R. of Ports of Tortosa-Beseit.

EFFICACY OF IVOMEC AGAINST HELMINTHS IN RED DEER AVD FALLOW DEER

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Investigations were carried on firm December 1995 to July 1996 on Deer Farm of W. Stefanski Institute of Parasitology P.A.S in Kosewo Göme (Olsztyn District). On the area of 100 ha, 150 red deer *(Cervus elaphus)* arid 150 follow deer (*Dama dama*) in two separated yards were grazing. Before the drug administration, 30 randomly collected faceal samples from red and follow deer were examined quantitatively by flotation and Baermann methods.

In examined animals were found gastro-intestinal nematodes from family *Trichostrongylidae* and from genus Trichocephalus tissue nematodes *Elaphostrongylus cervi* and lung nematodes *Varestrongylus sagittatus* and *Dictiocaulus noemeri*. Specially prepared granulated food which contained 2 kg of Ivomec Prernix (0.6 % of Ivermectine) in 600 kg of granulate, were given to animals. Red deer and fallow deer have gott two doses of 0.3 mg Ivermectine per kg of body weight in two following days. To establish efficacy of treatment, 30 faecal samples from both species of deer were collected and examined on 18, 120 and 200 day after drug administration.

Used treatment showed high effiectiveness. Efficacy against nematodes from *Trichostrongylidae* was 89,3 % in red deer and 95,5 % in fallow deer, and against Trichocephalus 91,2 % nid 100 %, respectively. Efficacy against lung nematodes was also high. In red deer it was 90,3 % against *E. cervi*, 95,3 % against *V. sagittatus* and 99,6 % against *D. noemerie*. Fallow deer were completely free from *D. noemeri.* High effect of dehelminthisation was observed on 120 day after drug administration and some effect were observed even on 200 day.

AN EXAMINATION OF BELGIAN RED FOXES (VULPES VULPES) FOR ANTIBODY TO NEOSPORA CANINUM AND TOXOPLASMA GONDII.

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Toxoplasma gondii and *Neospora caninum* are closely related protozoan parasites. The life cycle of the former is known but with N. caninum, which can cause death in domestic dogs and abortion in cattle, horses, sheep and goats, to date it has been shown only to exist as bradyzoites in tissue cysts and as tachyzoites. To better understand the distribution of *N. caninum* in the environment sera from 118 red foxes (*Vulpes vulpes*) caught in the province of Luxembourg, Belgium and 5 from the outskirts of Brussels (of both sexes and > seven months except for 12 cubs) were examined for evidence of IgG antibody to the two parasites. Sera were examined with an indirect immunofluorescent antibody (IFA) test, in two-fold dilutions which ranged from 1/64 to at least one step past the end titre.

Antibody to *N. caninum*. 21 (17 %) had titres of 1/256 or more (with 4 at 1/512, 2 at 1/1024, 1 at 1/2048, 1 at 1/4096 and 1 at 1/8192). 83 %, including the 12 cubs, were negative. Antibody to *T. gondii*. Most had titres >1/64 with 8 at 1/128, 13 at 1/256, 15 at 1/512, 39 at 1/1024, 25 at 1/2048, 17 at 1/4096 and 4 at 1/8192. In the current study IFAT titres >1/128 were defined as indicating specific seroconversion to either parasite. Thus it is concluded that 98.4 % of the foxes had been exposed to *T. gondii* (1 of 2 with titres of 1/64 was a juvenile) and 17 % (21) to *N. caninum*. Thus many animals were Toxoplasma positive but Neospora negative. Of the 21 animals positive for Neospora the 2 with titres of 1/4096 and 1/8192 had correspondingly lesser Toxoplasma titres (1/1024 and 1/256 respectively), in one case both titres were equal at 1/256 and in all other instances the Toxoplasma titres were the greater of the two.

Discussion. The serological evidence strongly suggests that there is no significant cross-reaction between the two tests. The very great frequency of seroconversion to Toxoplasma indicates the widespread occurrence of the parasite in their food supply and while antibody to Neospora is less common a significant number of animals had encountered the parasite. Titres of 1/1024 to 1/8196 allow the suggestion that these animals may have suffered a recent Neospora infection. While the great majority of the foxes will have become infected with *T. gondii* by ingesting small animals persistently infected with Toxoplasma tissue cysts the source of Neospora must remain speculation as the life cycle of *N. caninum* is not fully understood. If the source was small animals it is not certain whether the host range is more restricted than for Toxoplasma or whether the host range is as broad but the incidence of infection lower than for *T. gondii*. Whether infection could be picked up as a result of contamination of the environment (eg water sources) by *N. caninum* or vertical transmission such as is encountered in dogs is not known but it is clear that N. caninum does infect the wild fox population of Belgium and further research is required to define its extent and its significance.

SEROLOGICAL ANALYSIS IN ALPINE UNGULATES

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Blood samples of 146 wild ungulates were analysed. Alpine ibex, *Capra ibex* (n. 89) and Chamois, *Rupicapra rupicapra rupicapra* (n. 57) were captured in Orco, Savara and Cogne valleys, in the Gran Paradiso National Park (Western italian Alps), from 1989 to1995.

For the tele-sedation was employed a Xylazine and Ketamine mixture (60 mgr of Xylazine and 50 mgr of Ketamine in toto). Serological tests were realized at the Veterinary Laboratory of Savoie.

The presence of 13 diseases, 7 bacterial and 6 viral, were detected: Brucellosis, Q-Fever, Chlamydiosis, Paratubercolosis, Contagious agalaxia, Salmonellosis, CAEV/Visna-Maedi, Pestivirus, IBR, RSV, Para-influenza and Adenovirus.

The Alpine ibex population showed a significant prevalence of Pestivirus infection (10.1 %) and a very low prevalence of Chlamydiosis (5.6 %), Ovine Salmonellosis (5.6 %) and Agalaxia (4.5 %). In this population we have observed one case of infection caused by Brucella sp.. This is the first case of infection described in literature in Alpine ibex. The infected animal come from the high Orco valley, where Brucellosis was considered present in domestic ruminants – cattle and sheep – untill 1995.

Chamois showed a low prevalence of Chlamydiosis (3.5 %) and one case of infection caused by Adenovirus.

NEDICATION, TREA MENT AND METHODS OF DELIVERING THEM TO OTTERS

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In the course of caring for 119 otters with a variety of injuries, infections and other health problems we have drawn up a list of suitable and effective drugs and treatments. Because the otters are to be returned to the wild minimal human contact and handling is reguired, which can present difficulties in delivery of drugs. The most significant cause of death and ill health found in this sample is bites from other otters which almost invariably become infected. For this reason indirect delivery is also favoured by the rehabilitators. Drug formulations which can be given in food are most suitable and uptake can be improved by the use of anabolic steroids or diazapam to increase appetite and calm the patient. Some injectables can be given via the food.

The most frequently used drugs are antibiotics and agents to promote wound healing. A list of drugs found to be valuable is given and methods of delivery discussed, including blow pipes, oral administration and topical application using improvised but effective techniques.

Safe, smooth anaesthesia which can be administered from a distance and does not require intubation or gas is needed for work in the field. A list of anaesthetics found useful for delivery by blow pipe is given.

Hand rearing young otters can bring its own health problems. Ways of modifying diet and feeding regimes to address such problems are discussed as are effective non pharmacuetical measures to deal with sucking body parts of companions to excess.

DIAGNOSIS OF EARLY PREGNANCY AND EMBRYONIC DEATH IN ROE DEER (*CAPREOLUS CAPREOLUS*) BY TRANSRECTAL ULTRASONOGRAPHY

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The roe deer has an unique reproductive physiology exhibiting monoestry and delayed implantation (DI) and is therefore of high biological interest. Normal conception during July/August is followed by a retarded growth phase from September until December. Implantation of the conceptus occurs five months after mating in late December/early January. In this context, previous investigations dealt with postmortem morphological and histological descriptions of ovaries and uterus in roe deer. Ultrasonography because of its diagnostic potential as a non-invasive method is used extensively in reproduction and gynaecology. The aim of the present study was to use the ultrasonography for monitoring early pregnancy and embryonic death in roe deer.

Transrectal ultrasonographical examinations of the genital tract in eight captive roe deer were performed monthly throughout DI and gestation (October – April 1994/95). Additionally, 35 free ranging roe deer were examined once in late January. All animals were immobilised and examined in lateral recumbency using a portable B-mode ultrasound scanning system (Oculus CS 9100, Ecoscan) equipped with 7.5 MHz curved linear array transducer. The small probe (35 x 12.5 x 9 mm) was fitted into a specifically developed adapter (Fa. Schnorrenberg, Berlin) before it was applied transrectally. All examinations were videotaped for documentation and retrospective video-analysis.

The genital organs (vagina, cervix, uterine body, uterine horns and ovaries) were imaged sonographically in all roe deer. Structural changes in the sonomorphology of the uterus (endometrium) and ovaries were followed from mating time until late in gestation. Active ovaries containing corpora lutea and follicles were visualised as spherical structures (12.5 mm x 8.4 mm). Active corpora lutea (2 – 4 per animal) in pregnant and non-pregnant deer appeared sonographically identical during first four month of DI as hypoechoic, spherical structures (4 – 8 mm). In late November during the last month of DI four deer showed changes in the sonographic texture of the endometrium and corpora lutea as first sonographical signs of pregnancy. The endometrium of pregnant does was enlarged and characterised by a hypoechoic echotexture. Corpora lutea in pregnant does appeared more hypoechoic than in non-pregnant does. From January until April, rapid embryonic and foetal development was monitored by the growth of the embryonic yolk sac (1 – 2 mm) into a well-developed foetus with a crown-rump-length of 23 Ò6 cm. 74,3 % of the wild ranging animals investgated in late January were determined to be pregnant. Embryonic death sonographically characterised by endometrial calcifications on the implantation sites, loose embryonic cell masses within the yolk sac and floating yolk membranes was detected in 7,7 % of all single pregnancies and in 11,5 % of all twin pregnancies. 19,2 % of the pregnant does had no intact conceptus but showed signs of embryonic death.

In conclusion transrectal ultrasonography visualises endometrial and ovarian changes in pregnant animals at the end of DI. Ultrasound can also show pregnancy with multiple conceptus concurrent with embryonic death of one or more of these embryos.

PATHOMORPHOLOGICAL AND IMMUNICYTOLOGICAL FINDINGS IN FIV INFECTED NON-DOMESTIC FELIDS

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During the last few years it has become evident that the FIV seroprevalence in some non-domestic felids is much higher than in the domestic cat. However, it is still not clear to what degree FIV may influence the immune system of infected wild cats. As FIV infection may be of potential risk for endangered species, more research should be conducted on transmission and pathogenesis of FIV infection in zoo cats.
When serum samples collected from different feline species kept in several German zoos were tested for FIV by ELISA and Western Blotting, an overall FIV seroprevalence of 48 % was found. All serum samples were negative for FeLV p27 antigen. Female and male animals were equally affected. Post mortem examinations showed rather non-specific pathomorphological alterations similar to those described in domestic cats. They included lymphadenopathy, ulcerative stomatitis, chronic cachexia, nephropathy, gastritis, bacterial infections and in several cases tumors. FIV p24 and transmembrane protein was demonstrated by immunohistology in cryostat sections prepared from fresh-frozen lymphnodes. The histological findings in the lymphatic tissues ranged from normal to depletion of several lymph follicles, increase of plasma cells and decrease of T-cell numbers, deposition of eosinophilic, hyaline material, and finally to total disorganization of the follicle structure. In the REM, a loss of cells in the fDC web was recognized. The lymphocyte "subpopulations" (fCD5, fCD3, fCD4, fCD8) were classified by immunofluorescence and PAP technique.

TRICHINELLOSIS AND TOXOPLASMOSIS IN HUNTER-KILLED FINNISH LYNX (*LYNX LYNX*)

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During the winters 1989/90 to 1994/95, 327 lynx of different ages and both sexes were shot at various locations in Finland. The Carcasses were shipped to the University of Oulu. Diaphragm and semitendinous muscles (12.5 + 12.5 gram) were examined for *Trichinella* larve according to digestion method. From 70 lynx, blood was collected from the heart or thoracic cavity and deep frozen. Following thawing, the blood samples were tested for *Toxoplasma gondii* specific antibodes in a commercial Direct Agglutination Test (Toxo-Screen DA, bioMérieux, Charbonniéres-les-Bains Cedex, France) in dilutions 1:40 and1:4000. In case of positive reaction, a quantitative test was performed, either in dilutions 1:60, 1:80, 1:540, and 11620, or 1:6000, 1:18 000, 1:54000 and 1:162000, depending on the results of primary (screening) test. The age of the animals was determined according to dental cemental annulation, and varied from 1st year juveniles (about 8 to 10 month) up to 14 years. One hundred and thirty-two of 327 lynx (40 %) had trichinellosis. Fifty-one (73 %) of lynx gave positive agglutination test reaction, indicating specific antibodies to *T. gondii*. The titres varied between 1:40 and 1:18000. There were clear geographic differences in the prevalence of trichinellosis, the infection being most common in areas with dense raccoon dog populations in southern Finland. Moreover, male sex (or high body weight) was also associated with trichinellosis. The prevalence increased from kittens to 1- and 2-year-olds, but levelled then.Factors associated with higher proportion of *Toxoplasma* seropositivity were male sex, adult age, and *Trichinella* infection. No geographical difference in seroprevalence of toxoplasmosis could be demonstrated.