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19 Vaccination and Parasite Control in Wild Animals and their General Treatment

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Wild animals are susceptible to a vast number of diseases and parasitic infestations. In the Kruger National Park, for instance, the buffalo, *Syncerus caffer*, has been found to harbour more than 40 different diseases and parasites[34], while more than 25 different types of infection have been encountered in impala, *Aepyceros melampus*[35].

Some of the more important infectious diseases of domestic animals may be responsible for very high mortality amongst wild animals, while some of the less dramatic infections and parasitic diseases may also exert decimating effects[28]. Not only are the birth, growth, and mortality rates affected, but these infections may also render the carcasses of meat-producing herbivores inferior. Furthermore some of these diseases and parasites may present a health hazard to the human consumer and various animal species, including domestic stock. The development of effective measures for the prevention of disease is therefore imperative.

Wild animals which are to be introduced into a game park or farm must be kept under close observation in a suitable quarantine section before their ultimate release. During the observation period all suspicious signs of infection should be investigated.

The various diseases and parasites of wild animals which have been described in Chapter 18, represent an indication of what may be encountered during the preliminary observation period. It should be emphasized that certain infections may be carried in an asymptomatic form for prolonged periods. Infected individuals might subsequently develop clinical infection which may cause significant problems and losses. Blue wildebeest, *Connochaetes taurinus*, have, for instance, been found to carry mites, such as *Sarcoptes scabiei*, without showing any signs of mange prior to being subjected to the stresses of capture and translocation. The highly infectious nature of mange leads to practical problems in the control of outbreaks of diseases of this kind in free roaming populations of wild animals. Tuberculosis, which has already established itself in kudu, *Tragelaphus strepsiceros*, of the Eastern Cape[13], may also cause irreparable damage when introduced into a susceptible population. Special tests are required to exclude the presence of latent infections of this kind.

During the quarantine period, vaccination should be carried out to protect the animals against diseases to which they are known to be susceptible. In addition, parasiticides should be administered to control parasitic infestations.

Vaccination

Immunization of wild animals may contribute to a significant extent to their successful re-establishment on disease infected farms from which they might have disappeared[27, 30, 37]. Diseases of domestic animals which have been found to infect wildlife with fatal consequence include rinderpest[29], anthrax[15], salmonellosis[2] (V. de Vos, *pers. comm.*), tetanus[20], lumpy skin disease[31], heartwater[12] (E. Young and P. A. Basson, *ms.*), bluetongue[29], rabies[13], canine distemper[7,13] and feline infectious panleucopenia or cat flu[7, 29].

Satisfactory techniques of vaccine administration to free roaming wild mammals would seem to present tremendous and almost insurmountable practical difficulties. However, various techniques have been recently described which may permit the vaccination of up to several hundred free living wild animals per day[37]. These include the large scale corralling of game herds for subsequent vaccination and or the use of specially developed disposable vaccination dart syringes.

Animals in captivity may be either vaccinated subsequent to immobilization or after they have been captured in nets or have been driven into a narrow and well-padded crush. Carnivores and primates are frequently restrained in specially designed squeeze cages. These species, and other animals, have also been vaccinated successfully by the use of 1 ml dart syringes. These syringes, which may be fired from a Palmer Cap Chur gas-gun or other appropriate propelling weapon, should be fitted with short, barbless needles. Once the dart syringe has hit the animal and the vaccine injected, it will fall out and may be recovered for subsequent use.

In addition to the above-mentioned techniques, other methods such as the use of vaccination bullets and the administration of vaccines by means of drinking water, food, salt licks, or aerosols, have also been investigated but as yet have not been perfected.

The vaccines used in domestic animals may not necessarily be safe for use in wild animals. In at least one instance the experimental vaccination of wild animals has resulted in propagation of the disease instead of its control[11]. Better results are to be expected with modern vaccines although it may be still advisable to test the safety and immunogenic properties of these prior to their large scale use on wild animals[30].

Various vaccines have already been used on a small scale on captured wild animals. These include the use of lapinised rinderpest virus in buffalo[29], and the administration of anthrax vaccines to blue wildebeest, giraffe, *Giraffa camelopardalis*, eland, *Taurotragus oryx*, topi, *Damaliscus korrigum*[4], buffalo, roan antelope, *Hippotragus equinus*, tsessebe, *Damaliscus lunatus*, bushbuck, *Tragelaphus scriptus* and nyala antelope, *Tragelaphus angasi* (V. de Vos, *pers. comm.*). The Onderstepoort anthrax spore vaccine was used for the immunization of the five last mentioned species.

Giraffe, eland, buffalo, blue wildebeest and topi have also been vaccinated against blackwater and haemorrhagic septicaemia[3]. Elephant, *Loxodonta africana*, have been successfully immunized with the Onderstepoort combined Salmonella typhimurium-dublin vaccine (V. de Vos, *pers. comm.*).

Eland[5] and springbuck, *Antidorcas marsupialis*,[30] have been inoculated with heartwater-infected blood in order to immunize them against this disease. The latter species developed a severe clinical reaction and recovered upon systemic treatment with tetracyclines.

Various species of wildlife, including the cheetah, have been vaccinated against rabies, using the Onderstepoort rabies vaccine.

All the Southern African canine species and hyenas, as well as the aardwolf, *Proteles cristatus*, and a variety of corresponding exotic species of carnivores, have been successfully vaccinated against canine distemper and infectious canine hepatitis by using commercially available vaccines. Similarly, the prophylactic vaccination of lions, *Panthera leo*, leopards, *Panthera pardus*, cheetahs, *Acinonyx jubatus* and all the Southern African

external parasites (ectoparasites) such as mites, ticks, lice, fleas and parasitic flies, may lead to a great deal of irritation and may in some instances even cause clinical disease. In addition, these parasites may transmit infectious agents.

Mange and scab, which are examples of parasitic mite infestations, have been diagnosed in the Kruger National Park in lion, cheetah, buffalo, blue wildebeest, giraffe, impala and steenbuck, *Raphicerus campestris*[29, 34, 35, 36, 38, 39, 40] (E. Young, P. J. Burger and I. J. Whyte, *ms.*). In the buffalo not less than 3 different genera of mites have been associated with clinical infestation[34]. There is adequate evidence that mange may be responsible for mortality in affected wild animals, particularly in wildebeest, cheetahs and young lion cubs.

Parasitic conditions of the integument have been treated successfully in wild animals with highly active insecticides, applied in the form of sprays or washes. In the Pretoria Zoo, for instance, more than 200 animals, representing a vast number of species, have been treated in this manner. The most common infestations encountered were due to ticks, lice and biting flies in most species, mange in wild herbivores and fleas on the wild carnivores. Some of these infestations could have been avoided if all animals were treated before their introduction.

Benzene hexachloride (B.H.C.) and malathion-containing preparations have been used most frequently and with considerable success. B.H.C. preparations, mixed as prescribed by the manufacturers, have been used on a variety of antelopes, wild pig species and various other ungulates, as well as on lions. The enclosures were also sprayed, where necessary, and all precautions taken to avoid intoxication. Apart from its use on lions, B.H.C. should preferably not be used on felines as this group of carnivores is believed to be quite sensitive to intoxication with this parasiticide. Wild carnivores, as well as birds and reptiles, are usually treated with malathion-containing preparations, which are generally considered safer[21, 27, 30, 38]. Although no side-effects had previously been encountered in many cheetahs and other wild carnivores treated with suspensions of the 5% wettable powder of malathion, a few cheetahs recently died after immobilizing them with phencyclidine hydrochloride (Sernylan, Parke-Davis) and bathing them in a 5% dilution of a commercially available emulsified form of malathion. Exceptionally good results had generally been obtained in mange infested lions and cheetahs, treated with malathion but further research is obviously required to establish the safety of the various formulations of this parasiticide, especially when used in conjunction with immobilizing agents.

Cutaneous filariasis in black rhinos deserves special mention as this condition has been found very difficult to cure. The daily superficial application of the following combination of drugs can be recommended: Iodoform 10%, sulfanilamide 10%, B.H.C. (formulation Multibenhex) 10%, zinc oxide 20% and Stockholm tar 50%. About 10% of the zinc oxide may be replaced by copper sulphate for the initial removal of excessive granulation tissue. Lesions usually heal within one week following treatment. Alternatively the lesions may also be treated with the "Onderstepoort Blowfly Remedy" which contains 65% alcohol (96%), 32,35% benzol, 2,5% cresol (98%) and 0,15% sulphuric acid (conc. comm.). Local treatment, however, seems to produce only a temporary cure and the use of systemic parasiticides may produce more durable results[23].

As in the case of the anthelmintics, it should be emphasized that parasiticidal agents available for the control of ectoparasites, should be used with the greatest care to avoid fatal intoxication. It may at this stage still be the safest procedure to first treat one or two animals with a prescribed concentration of a particular preparation before the treatment is extended to more animals of the same species. Until the manufacturers have tested and specifically advocated the use of their parasiticides on specific species of wildlife, one has no alternative but to use the available preparations at one's own risk. This applies to all the preparations mentioned as their use on wildlife cannot yet be guaranteed to be safe under all circumstances.

General treatment

The diagnosis of disease conditions in wild animals may present difficulties especially to the inexperienced clinician and should always be supported by information obtained from specialised examinations where possible. Clinical-pathological tests are especially useful to determine the nature and degree of damage done to various parts of the body as well as to assist the clinician in determining the prognosis and in advising systemic treatment. Haematological studies have already been undertaken on blood specimens from more than 20 different species of wild mammals to determine the range of normal blood values in order to be in a position to evaluate the abnormal[21, 22, 32].

While the veterinarian may be unfamiliar with certain species, such as the elephant, hippo or sealion, his general knowledge of comparative physiology, pharmacology and various other relevant fields of study will enable him to prescribe intelligently for many wild animals species. The best results in the treatment of sick wild animals can only be obtained when the assistance of a veterinarian is sought at the earliest sign of disease and especially before the development of secondary complications. Obviously help should be sought before the complaint has developed beyond the stage of clinical recovery.

Captive wild animals will usually struggle violently against any mechanical restraint or physical force and this may lead to considerable harm. Clinicians who may have to treat wild animals are therefore required to have appropriate knowledge of the various forms of restraint to be applied in the different animal groups. This important aspect of wildlife husbandry is described in great detail by Graham-Jones[1].

Injections may be made subsequent to chemical or mechanical restraint or by means of dart syringes while various tasteless and odourless medicaments, in the form of crushed tablets, powders or solutions may be administered with the animal's food, milk mixture or drinking water. Medicaments inserted into freshly killed rats or chickens are usually taken by sick carnivores while fruit juices may serve as a useful medium for the oral treatment of primates.

Sulfadimidine is a most useful anti-infective agent for the treatment of vague illnesses in most species and it also has the advantage of being quite tasteless. The tablets may be crushed and mixed with food, milk, fruit juices or water, although the drug is very often taken in tablet form by some of the primates.

The principles of therapy are basically the same in wild and domestic animals and the following notes on the treatment of some of the most frequently encountered diseases and ailments of captive mammals are for the benefit of the inexperienced.

Unwillingness to feed (anorexia) is one of the most frequent and troublesome complications of most illnesses of wild animals. Sick animals refusing to eat may be fed on special and appetizing diets. Sick carnivores will, for instance, frequently still take a live or freshly killed animal such as a fowl or pigeon. Greens may be taken by sick wild herbivores which have already refused to take any dry hay. In addition, vinegar, sucrose or glucose, and

yeast, administered by stomach tube, often has a beneficial effect on sick herbivores, while the parenteral administration of vitamin B_{12} and corticosteroids is usually effective in increasing appetite in most species. Corticosteroids should, however, always be used in conjunction with specific anti-infective agents.

Forced feeding or the use of stomach tubes may eventually be necessary but care should always be taken to avoid suffocation. Large aggressive carnivores can frequently be dosed by putting them into a squeeze cage and pushing a thick-walled hosepipe down deep into the pharynx. Once the animal has grasped the rubber pipe between its teeth, tablets or semi-liquid medicaments can be pushed through it by means of a metal or wooden rod, acting as a plunger. Stomach tubes may also be used following chemical immobilization as has been described for the elephant[33].

A perverted or depraved appetite (pica) manifested by a craving for substances not ordinarily considered as food, is most frequently due to some mineral deficiency. Animals showing this abnormal behaviour should receive a more balanced ration (see chapter on nutrition) or else, be put into another enclosure or provided with companionship. Ear and tailbiting in hand-reared animals are best avoided by the separation of the animals during and shortly after feeding times.

The effective digestion of crude fibre in ruminants is very much dependent on the adaptation of the micro-organisms in the rumen to a particular diet. Any change in diet should therefore be made gradually and wild animals, newly introduced from the veld, may be assisted in their physiological adaptation to the sudden change of diet by the artificial provision of adapted organisms. This can be done by the administration, through a stomach tube, of some rumen-fluid obtained from another animal already adapted to the particular diet. When rumen-fluid for this purpose cannot be obtained in any other way, a few litres of a 0.9% saline solution may be infused through a stomach tube into the rumen of a healthy immobilized ruminant and then subsequently be withdrawn. The fluid which is recovered may then be strained and used.

Gastro-enteritis, a very common complaint, can be best prevented in newly captured young wild animals by the oral administration of antibiotics or sulphonamides, with protectants such as kaolin or pectin. The gut-active sulphonamide, phthalylsulphathiazole (Thalazole, May & Baker) has been found most useful while "Terramycin Animal Formula" soluble powder has also produced good results[25, 26, 28, 30, 33].

Diarrhoea in young antelopes is best treated by the elimination of the cause and the administration of Thalazole, kaolin and lime water with their milk. Advanced cases should receive systemic antibiotics, such as a tetracycline and may, in addition, also be given A.C.T.H. and corticosteroids[28].

Baby elephants suffering from gastro-enteritis may become extremely dehydrated within one or two days if not treated and they will then usually succumb. They are often infested with intestinal nematodes and the administration of the following combination of drugs by stomach tube, invariably produces very satisfactory results: Thalazole 10 gm, kaolin 500 gm, glucose 300 gm, lime water (sat. calc. hydrox. sol.) 600 ml and thiabendazole 50 mg/kg. As part of prophylaxis, about 50-60 gm kaolin may be added to the ration as soon as the faeces become too soft. It should, however, be borne in mind that baby elephants are very prone to constipation and that the use of excessive anti-diarrhoeals may contribute to its occurrence.

Salmonellosis has been diagnosed in young elephants (V. de Vos, *pers. comm.*) and prophylactic vaccination may therefore be advisable. A very young hippopotamus, *Hippopotamus amphibius*, which developed very suspicious signs of salmonellosis, reacted very favourably, as did the affected young elephants, to oral treatment with furazolidone (Neftin, S.K.F.)[25].

With the exception of young, unweaned animals, antibiotics, sulphonamides and other anti-infective agents must not be administered orally to ruminants or other herbivores as this may give rise to serious digestive disorders when the micro-organisms, responsible for digestion, are destroyed. This problem may possibly be overcome in wild ruminants if the administration of the anti-infective agents can be preceded by the oral administration of a chemical agent which will close the reticular groove. It is, however, probably advisable to resort to an alternative treatment which may include the administration of kaolin, tannic acid and lime water or carron oil. Black rhinos suffering from severe diarrhoea have reacted very favourably to the administration of kaolin (500 gm), tannic acid (30 gm), calcium hydroxide (5-10 gm) and Thibenzole (50 mg/kg) through the meal ration. Furthermore, some ruminants will take diluted lime water which may be provided to treat cases which have accidentally been given too much grain. Chlorodyne, for the relief of colic, is also sometimes taken with the food.

The treatment of gastro-enteric infections in carnivores and primates does not differ basically from that suggested for young wild herbivores. Suitable anti-infective agents and demulcents may be easily administered by means of the carnivore's meat or milk ration or, in the case of primates, with milk, fruit juices, fruit salad or some other palatable food.

Obstipation, a less common complication in wild animals, may be treated by the use of mild laxatives, such as Metasilia (Abbott Labs) (which contains 80% liquid petrolatum) in the case of primates and carnivores, or with molasses which may be included in the diet of wild herbivores. The administration of purgatives should, however, generally be avoided as they may give rise to superpurgation. Enemas are often a useful alternative. In primates, glycerine suppositories may be used in mild cases of constipation while more extreme cases may require the employment of enemas, using a mild soap-water solution. In baby elephants 200 ml glycerine, followed by 400 ml of liquid paraffin and water, has been found to be adequate while excellent results have also been obtained with the use of much smaller volumes of the same fluids in other species[33].

Wound treatment will depend on the nature and location of the injury. The basic lines of treatment should, however, make provision for the prevention of infection by wound debridement and the local and possibly also systemic use of anti-bacterial agents. Healing may also be facilitated by the suturing of uncomplicated wounds, careful bandaging and splinting where necessary, and also by rest. Effective sedation or tranquillization is frequently a very important pre-requisite for the successful treatment of wild animals to prevent self mutilation and to ensure uneventful recovery.

Superficial wounds may be treated effectively by merely spraying them from some distance with a suitable disinfectant. Deeper or more complicated wounds may require the immobilization of the animal prior to treatment.

A variety of medicaments have been used with equally good results. The superficial application of Tr. chloromycetin, acriflavine in glycerine (1 : 1 000) and certain commercially available wound oils and greases has usually been found adequate. Stockholm tar is most useful for the treatment of wounds on the larger pachyderms, i.e. elephant, rhino and hippo[27].

The development of abscesses may be retarded by systemic treatment with antibiotics or sulphonamides but, depending on their locality, abscesses may first be left to mature before they are drained, curetted and plugged with gauze which has been soaked in an antiseptic such as an acriflavine-glycerine emulsion. The systemic administration of broad spectrum antibiotics will prevent further spread of infection.

Slow-developing swellings on the maxilla or mandible should always be viewed with suspicion as this may be indicative of actinomycosis, a condition which can seldom be cured unless vigorously treated at its onset. Furthermore, it may also be very difficult to get rid of the infection from the enclosures.

Navel-cord infection is more frequently encountered in young wild animals than is generally realised and is often reponsible for mortalities in untreated animals. It is, therefore, advisable to disinfect the umbilicus of newly-born animals with Tr. iodii or Tr. choloromycetin and to administer systemic antibiotics, to prevent ascending infection.

Trauma caused by projectile syringes or mechanical restraint procedures may result in systemic infection and this may be best prevented or treated by the use of systemic broad spectrum anti-bacterial drugs of which the tetracyclines have proved to be of exceptional value.

Prophylaxis remains the greatest single factor in maintaining a healthy group of animals while the frequent evaluation of their health status by a veterinarian and the timely employment of treatment of sick individuals will further contribute to sucessful management.

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