CONTROL OF DISEASE IN DOGS IN THE CANADIAN NORTH*

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IN RECENT YEARS, modern means of transport have lessened man's dependence on the dog in arctic and sub-arctic regions, and it is fair to assume that this trend will continue. Nevertheless, the dog will continue to fulfill an important role in the economy and social pattern of northern communities. The loss of dogs through disease can bring much hardship.

This discussion of diseases in dogs in northern regions is limited to the most serious conditions. First, there are those diseases which exist in an enzootic form or may occur in epizootic form and cause the death of a large number of dogs in a short time. There are also those diseases which ought to be eradicated or prevented because of their impact on the animal's performance. The latter category refers more specifically to parasitic infestations and malnutrition.

In a consideration of control of disease in dogs in northern regions one must take into account particular conditions and circumstances which favour the occurrence and spread of diseases among the canine species, as well as the role of wildlife species as reservoirs of diseases communicable to the dog.

PARASITISM, MALNUTRITION

Parasitic infestations are prevalent in dogs in northern areas. Probably no dogs are free of intestinal parasites of one kind or another. Several years ago Cameron *et al.* showed the wide distribution of roundworms, tapeworms, and flukes in the dog in northern regions (2). Sporadic examination of dogs confirmed this.

Hookworms and ascarids are most prevalent. It is of interest to note that hookworms are uncommon in the Arctic fox, at least in the Eastern Arctic, where almost universally this species is host to ascarids. The common occurrence of faecal-borne infestations is understandable if one considers the unsanitary conditions under which dogs are kept when not working.

Tapeworms and flukes are also common, and their occurrence is related to feeding practices. Thus fish-fed dogs are often the hosts of fish tapeworms (*Diphyllobothrium* spp.) and of the Canadian liver fluke *Metorchis conjunctus*. Fish tapeworms are widely distributed, from the Arctic to the southern part of Canada and from Labrador to the British Columbia coast, while *Metorchis conjunctus* seems to be confined roughly to an area extending from the Laurentian Mountains to the northern part of Saskatchewan and from the U.S.-Canada border as far north as Moosonee on Hudson's Bay (3). The latter species is not

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a problem in the more northerly regions. However, it is an important parasite of dogs in northern Manitoba (1, 6).

The larval stage of many species of tapeworms of dogs develops in mammalian hosts. When dogs eat or are fed contaminated carcasses or contaminated portions thereof, the life cycle of these parasites is brought to completion. A few years ago Miller showed the practice of feeding dogs the contaminated viscera of herbivores harbouring the larval stage of *Echinococcus granulosus* to be an important factor in the epidemiology of hydatid disease in humans in Western Canada and part of the Northwest Territories (5).

Malnutrition is a problem and no effort should be spared to promote the idea of proper feeding all year around. However, this sometimes presents difficulties, with shortage of food not being the least.

Generally speaking, it can be said that with the exception of dogs in a few Government-operated camps, practically no dogs in the Northwest Territories and the Arctic are treated for intestinal parasites. The periodic treatment of the dogs can be beneficial only if, in addition to the treatment, adequate feeding and sanitation are instituted. The implementation of such a program would mean departure from long established practices in the care and feeding of dogs in northern areas. It is clearly a matter of education and the only avenue to the solution of the problem of parasitic infestations and malnutrition.

Viral Diseases

Distemper, infectious canine hepatitis and rabies are responsible for the death of many dogs each year in the Canadian North. Rabies is particularly important because of its human implications.

In 1947, Plummer established the existence of rabies in dogs and wildlife in the District of Keewatin, the Eastern Arctic and the Western Arctic. Since then the disease has been diagnosed on several occasions in dogs and wild animals from various areas in the Northwest Territories and the Arctic (7, 8). Health of Animals Branch statistics show that during the period 1948–49 to 1963–64 the disease was confirmed in 94 cases: 49 dogs, 39 foxes, five wolves, and one caribou. A greater number of cases would undoubtedly have been diagnosed if all suspected material had been submitted for examination.

It is obvious that rabies is enzootic throughout the Canadian North and that foxes and other wildlife species are reservoirs of infection. It is likely that the spread of rabies is related to the density of wild animal populations and that it is more prevalent at times of high population density (9). There are, however, many unknowns in the epizootiology of rabies in wild animals and it is difficult to explain its maintenance in animal populations in arctic and sub-arctic regions. Tierkel reports that a survey of the rabies virus in small wild rodents trapped in high enzootic fox rabies areas in New York and Georgia in 1958 revealed no evidence of infection, confirming previous reports that these species do not serve as reservoirs of the disease in the wild (12). Rausch also pointed out in the same year that there was no information to suggest that microtine rodents have any importance in the origin of outbreaks in foxes in the Arctic (10). There is evidence that subclinical infection occurs in wildlife vectors in nature, positive serum

antibody titers having been found in foxes trapped in areas with a recent history of fox rabies, in contrast to completely negative antibody results in animals taken from known rabies-free areas (12). However, in no instance have salivary glands been found infected without concurrent infection of the central nervous system, indicating that foxes are not capable of transmitting the disease as asymptomatic carriers.

For several years, prior to 1947, there had been numerous reports from various areas in the Northwest Territories and Arctic Quebec of "disease" outbreaks in dogs and wild animals. Plummer's investigations suggested that pathogens other than the virus of rabies were involved in these outbreaks. This was also the opinion of Savage and Isa (11). It is now known that distemper and infectious canine hepatitis have been involved in outbreaks in recent years, as they probably were in the past.

Both distemper and infectious canine hepatitis also occur in a number of wildlife species which perpetuate them in nature. In the fox, the virus of infectious canine hepatitis produces an encephalitis. This does not occur in the dog. It is probable that dogs may be exposed to the viruses of both distemper and infectious canine hepatitis and contract both diseases concurrently. Dogs thus affected would show a more severe clinical picture with a higher mortality rate than that observed in single infections. This was demonstrated experimentally by Gillepsie *et al.* (4). It is probable that in terms of dog lives and of the economy of northern areas, distemper and infectious canine hepatitis pose a greater threat than rabies.

It has been reported that infectious canine hepatitis was responsible for the death of dogs in northern Manitoba in late 1959 and early 1960 (6). In March–April 1961, there was a serious disease outbreak in dogs in the Great Whale River area in northeast Quebec. Though the cause of the outbreak was not definitely established, it was epizootiologically and clinically evident that distemper and infectious canine hepatitis were involved. It was feared that the outbreak would spread to the neighbouring Belcher Islands in Hudson's Bay where at that time there were no signs of infectious disease in the canine population. The Great Whale River outbreak occurred about break-up time when traffic between the islands and the mainland was at a minimum. Before it was resumed to any extent, the dogs on Belcher Islands, regardless of their age, were inoculated with vaccines against both distemper and infectious canine hepatitis, and no losses due to disease were registered there after traffic between both localities was resumed that spring. Similarly, there is reason to believe that distemper and infectious canine hepatitis were involved in a serious outbreak at Pangnirtung on Baffin Island, late in 1961, resulting in the death of several hundred dogs.

The most serious outbreaks and the greatest losses occur when people and their dogs gather in settlements, as is the case at certain times of the year. Under these conditions rabies outbreaks can be initiated by rabid wildlife, particularly foxes, invading the settlements and attacking dogs. Under these same conditions distemper and infectious canine hepatitis spread easily. These diseases also occur at other times and outside the settlements. It is expected that, as a result, survivors would possess a certain degree of resistance to further infection. Yet losses are sometimes high in outbreaks occurring in the settlements. This could be explained by the fact that the degree of resistance conferred by previous

exposure to the viruses is not sufficient to withstand the challenge under conditions such as those prevailing in the settlements when great numbers of animals are brought together. A logical explanation would be that many dogs have not been exposed to these diseases before they are brought into the settlements. However, it is doubtful that this is the case as dogs of all ages are affected; considering the endemicity of both diseases in certain northern areas it is also doubtful that many dogs would have escaped exposure. Another possible explanation is that different virus strains are introduced with dogs coming into the settlements. Stress may also be a factor in triggering such outbreaks.

Prophylaxis Through Vaccination

In 1955–56, the Health of Animals Branch, in collaboration with the Royal Canadian Mounted Police, initiated an anti-rabies vaccination programme with dogs in a few areas in the Mackenzie District in the Northwest Territories and the Yukon Territory. Since then this programme has been extended to other areas in the Canadian North, including Arctic Quebec. However, the number of dogs inoculated each year falls short of the estimated canine population there.

Considering the endemicity of rabies, distemper, and infectious canine hepatitis in many areas in the Canadian North, the vaccination of as many dogs as possible whenever possible is highly desirable. However, the formulation of a vaccination programme and its implementation present difficulties. For instance, vaccination clinics must be held when the greatest number of owners and their teams are in the settlements. In the circumstances, it is not possible, except in a few cases, to have the dogs on vaccination schedules, as is done in southern communities. Difficulties of a logistic nature must also be reckoned with.

A vaccination program against rabies, distemper, and infectious canine hepatitis was initiated in 1963 in Arctic Quebec where in recent years there had been several serious outbreaks. In the autumn of 1963 and winter and spring of 1964, some 3,500 dogs of all ages gathered in settlements were given a dose of rabies vaccine (LEP chick-embryo origin) and a dose of canine distemper-infectious canine hepatitis vaccine (modified live virus, tissue culture origin). The vaccines were administered as a single injection. The results have been gratifying. In a very few instances death followed the administration of the vaccines. However, it was reported that these dogs were already showing signs of "disease" when the vaccines were administered, contrary to instructions not to inoculate such dogs. Otherwise, no outbreaks or losses attributable to infectious diseases have been reported in localities where dogs have been inoculated. When dogs have not been inoculated a number of deaths have been recorded.

Other Prophylactic Measures

Vaccination is only part of the control programme. Other measures advocated include the tying of all full-grown animals and the confinement of all pups, as well as the destruction of all stray and unused dogs. In some parts of the Canadian North there are police ordinances dealing with the disposal of stray dogs. The establishment of a "buffer zone" by continual trapping and shooting of

foxes around the settlements is another possible measure, though it may not prove too effective in view of the mobility of foxes, stray dogs and trapping and hunting parties.

It is evident that the successful implementation of a control program depends to a great extent on the support and collaboration of the dogs' owners. It is largely a matter of mass education. Therefore, in conjunction with this year's programme in Arctic Quebec and Baffin Island it is planned to launch, through the offices of local administrators, collaborating with school teachers, nurses, missionaries, police officers and others, an intensive publicity campaign explaining the programme and stressing the significance of uncontrolled dogs and the importance of sanitation.

Summary

Parasitic infestations are prevalent in dogs in the Canadian North. Poor sanitation facilitates the occurrence of faecal-borne helminthiasis, while the occurrence of other helminthiasis is often related to feeding practices. Malnutrition is also a problem. Adequate feeding and sanitation practices would certainly improve the general health picture of the animals.

More important is the problem of infectious diseases such as rabies, distemper and infectious canine hepatitis. These three diseases are endemic in many areas in northern regions where disastrous epizooties often occur and where wildlife species are important vectors. The authors discuss a control programme initiated in 1963 in Arctic Quebec.

Résumé

Dans les régions septentrionales canadiennes, les chiens sont souvent infestés de parasites. Le manque d'hygiène favorise l'invasion des helminthes d'origine fécale et les méthodes d'alimentation sont souvent à l'origine des helminthiases d'autre nature. La sous-alimentation cause aussi des problèmes. Une alimentation rationnelle et une bonne hygiène contribueraient puissamment à améliorer la santé des animaux.

Les maladies infectieuses, telles la rage, la Maladie de Carré et l'hépatite infectieuse, présentent un problème encore plus aigü. Dans plusieurs régions du Nord, ces trois affections existent à l'etat endémique, et des épidémies désastreuses se développent qui originent chez des espèces sauvages jouant le rôle de réservoirs infectieux. Les auteurs évaluent une méthode de contrôle qu'on a instaurée, en 1963, dans les territoires arctiques du Québec.

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BOOK REVIEW

The A.T.A. Manual of Laboratory Animal Practice and Techniques. Edited by Douglas J. Short and Dorothy P. Woodnott. Crosby Lockwood and Son Limited, London. 1963. 350 pages. Price 45*s*.

This manual is intended primarily for the laboratory animal technician and generally it admirably fulfills this requirement. There is, however, some unnecessary repetition. For example, in the chapter dealing with routine care of laboratory animals there is considerable discussion on disease of the various species. This material could have been included in the chapter that follows and is devoted to common diseases of laboratory animals. Similarly in the latter chapter parasitic diseases are considered from several aspects and they are again discussed in detail in the chapter on pests of the animal house.

The chapter on disease of laboratory animals is perhaps too detailed for the animal technician. This chapter would be more suitable and useful if it were styled after the chapter on techniques for infected animals and dealt more with general disease recognition rather than with specific disease entities. The technician should recognize disease symptoms in animals and should be encouraged to report abnormalities to the veterinarian in charge. He should not, however, be expected to diagnose and treat disease.

An outstanding feature of the manual is in the extensive information supplied in tabular form and which heretofore was not available in any single publication. The generous use of concise informative tables particularly in those chapters concerned with sterilization and disinfection, transport of laboratory animals, parasites, reproduction, breeding and others make this manual a gold mine of information on the many technicalities inherent in the field of laboratory animal technology. *H. C. Grice.*