Wildlife Disease Research and Economic Development

Proceedings of a workshop held in Kabete, Kenya, 8 and 9 September 1980

Editors: Lars Karstad, Barry Nestel, and Michael Graham
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/IDRC publication/, /wild animals/, /research/, /animal diseases/, /disease transmission/, /livestock/, /Kenya/ — /epidemiology/, /parasitic diseases/, /infectious diseases/, /viruses/, /immunization/, /disease control/, /meat/, /food contamination/, /ruminants/, /animal production/, /environmental effects/, /list of participants/.

UDC: 591.2

Microfiche edition available
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Contents

Foreword 5
Participants 7
Opening address
S. Chema 11

The role of wildlife disease research in livestock development
Lars Karstad and Barry Nestel 13

The role of wildlife in the epidemiology of foot-and-mouth disease in Kenya
E.C. Anderson 16

Queries about rinderpest in African wild animals
A. Provost 19

Epidemiology and control of bovine malignant catarrhal fever
E.Z. Mushi, F.R. Rurangirwa, and L. Karstad 21

The possible role of wildlife as maintenance hosts for some African insect-borne
virus diseases
F.G. Davies 24

The possible role of wildlife in the natural history of rabies in Kenya
F.G. Davies 28

Attempted isolation of Cytocoetes ondiri from wild ruminants in areas where bovine
petechial fever is endemic
F.G. Davies 30

The importance of wildlife in the epidemiology of theileriosis
J.G. Grootenhuis and A.S. Young 33

Potential application of research on African trypanosomiases in wildlife and prelim-
inary studies on animals exposed to tsetse infected with Trypanosoma congo-
lense
Max Murray, J.G. Grootenhuis, G.W.O. Akol, D.L. Emery, S.Z. Shapiro,
S.K. Moloo, Faiqa Dar, D.L. Bovell, and J. Paris 40

The role of wild ruminants in the epidemiology of nematodiasis in Kenya
E.W. Allonby 46

Helminths in wild ruminants in Central Africa: impact on domestic ruminants
M. Graber 48

The role of jackals in the transmission of Echinococcus granulosus in the Turkana
District of Kenya
Calum N.L. Macpherson and Lars Karstad 53

The public health significance of cysticercosis in African game animals
P. Stevenson, A. Jones, and L.F. Khalil 57
The value of research findings to the research director
    S. Chema  62
The role of wildlife disease research in livestock production
    L.J. Howard  64
Wildlife ranching in perspective
    David Hopcraft  68
What ecologists think veterinarians should do
    Harvey Croze  72
Discussion Conclusions  76
The Role of Wildlife Disease Research in Livestock Development

Lars Karstad and Barry Nestel

This workshop is somewhat unusual in that we are going to talk about fairly sophisticated technology in the context of its developmental role. Thus, we will focus not on blood counts or serological titres but on the relationship of certain major epizootic and zoonotic diseases to livestock development and human welfare and to the natural resources of the country. Perhaps we could clarify this a little by explaining how the Canadian Government became interested in supporting wildlife disease research.

The Pioneer Ranch Development Scheme in the Masai area was begun by the World Bank and the Swedish Government (SIDA) in the late 1960s. The scheme was designed to establish rational utilization of rangelands by controlling grazing and by improving disease control and access to water. The scheme was complex because it had to take into consideration the interrelationship between domestic stock and the abundant natural fauna as any substantial increase in domestic animal numbers would automatically lead to an encroachment on land used predominantly by game.

The preservation of the wildlife population is important because it is a considerable tourist attraction and a source of a large part of Kenya's foreign exchange earnings. Any major disturbance in the balance of the relationship between domestic and wild animals could endanger the growth of the livestock and/or the tourist industries.

The experiences gained in the Masai ranching scheme and the need to develop Kenya's large and latent livestock industry encouraged a consortium of donor agencies to offer the Kenya Government support for a second stage of ranch development in the mid 1970s. This consortium comprised the World Bank and a number of national development agencies, including the Canadian International Development Agency (CIDA).

Part of the CIDA funding was allocated to the Kenya Rangeland Ecological Monitoring Unit (KREMU), which was designed to provide information on the degree of competition for grazing and water between domesticated and wild animals. This knowledge would facilitate the establishment of sound strategies for formulating appropriate stocking rates on new ranches and for determining the need for, and location of, new watering points. In addition, the Canadian Government responded to a request from Kenya for support for strengthening wildlife disease research. This request was based upon the common susceptibility of domestic stock and wildlife to certain diseases. Wildlife can act as hosts to some bacterial, viral, and protozoal diseases that can be transmitted to domestic livestock. The transmission of these diseases is, in many cases, enhanced by the large ectoparasite population found in Africa. In some areas, cattle may be absent because of the presence of diseases which are harboured by wildlife and which may cause high mortality in exposed cattle. However, the literature on this subject is often confusing and controversial and much of the work was done some years ago before many of the current techniques in immunology and serology had been properly developed. In view of the importance of both cattle and wildlife to the economy of Kenya, it is important to verify as many of the uncertainties as possible in order to optimize the development of both industries.

The Wildlife Diseases Section of the Veterinary Research Laboratories at Kabete, Kenya, has made considerable progress toward such clarification. The section has been particularly fortunate in that it has not had to work in isolation but has been able to collaborate with a large number of national and international agencies working in the veterinary and wildlife fields in Kenya. Our partners in this work include members of the staff of the Veterinary Research Laboratories; the International Laboratory for Research on Animal Diseases (ILRAD); the Veterinary Department of the Kenya Agricultural Research Institute (KARI); the Food and Agriculture

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Organization of the United Nations; the World Health Organization; the University of Nairobi; the University of Guelph; the University of Utrecht; the University of Leiden; the University of Alberta; the Commonwealth Institute of Helminthology; and the many farmers, ranchers, and landowners in Kenya on whose land we have worked, notably David Hopcroft, Gilfred Powys, and the Galana Game and Ranching Company.

The research work of the Wildlife Diseases Section and its collaborators has concentrated on two specific objectives: to survey naturally occurring wildlife populations for the causative agents of certain specific diseases and to test the pathogenicity and transmissibility of these diseases in experimental animals (both domestic and wild).

As examples, several of the approximately 30 wild ruminant species found in Kenya have been examined for trypanosomiasis and of these the giraffe and the buffalo have been shown to be potentially important carriers (Karstad et al. 1978). Buffalo are the only wild animals found so far to carry Theileria pathogenic to cattle but Theileria species have been found in other wild ruminants although their significance is not fully understood (Grootenhuis 1979). The wildebeest has long been known to carry malignant catarrhal fever (Plowright et al. 1960) and bushbuck to be associated with bovine pestechnial fever (Snodgrass et al. 1975). The buffalo is also the only wild ruminant commonly infected with foot-and-mouth disease although virus from carrier buffalo is not readily transmitted to cattle (Anderson et al. 1979).

As an example of a disease believed to have been imported into Africa with domestic livestock, rinderpest took a very heavy toll of native wild ruminants in the early 1900s. Contrary to expectations, it does not seem to have become established in the wildlife, at least not as the virulent disease seen earlier (Scott 1970).

A study of intestinal parasites of sheep showed that although Thomson's gazelle could carry certain species transmissible to sheep, the gazelle did not appear to be an important source of infection for sheep. This is significant because sheep and gazelle often graze together (Preston et al. 1979).

At risk of oversimplification, we can divide the diseases of wildlife and domestic animals into four broad categories:

1. Diseases of domestic animals not known to be naturally transmissible to wildlife. Examples of such diseases are the contagious bovine and caprine pleuroneumonias, bovine babesiosis (red water), and Nairobi sheep disease. In this workshop we do not need to concern ourselves further with diseases in this category.

2. Diseases of domestic animals, initially exotic to Africa, that have invaded the indigenous fauna. Rinderpest is a prime example.

3. "African diseases," in other words, infections and parasites occurring primarily in indigenous wild animals but also involving introduced domestic animals. This is the largest and most important category for studies of wildlife–domestic animal disease interrelationships. Good examples are African swine fever (Plowright et al. 1969) and African horse sickness (Davies and Otieno 1977), which have reservoirs in wild pigs and zebras, respectively; other examples are canine ehrlichiosis, with its reservoir in jackals (Price and Karstad 1980); trypanosomiasis transmitted by tsetse flies; and malignant catarrhal fever carried by wildebeest. Category 3 diseases have had a long time to evolve a good host-parasite relationship in their wild animal hosts. Characteristically, the wild animals suffer little, if at all; yet they serve as carriers and reservoirs of infections that cause serious diseases in domestic animals.

4. Infections and parasites of African wildlife which do not involve domestic animals. Examples are a Theliera found in impala (Grootenhuis et al. 1975) and the Taenia spp. tapeworms of certain wild carnivores which are not transmissible to cattle (Gathuma 1973). The infective agents in this category generally have evolved a temperate or amenable relationship with their wild animal hosts, and because they do not cause disease in our domestic animals we will not consider them further.

Although we have been engaged in research on the disease interrelationships between livestock and wildlife for several years and have also made some observations on the role of wild animals in the epidemiology of several human diseases, much remains to be learned. For example, in collaboration with Mas Bakal of the University of Leiden, we have found a high prevalence (about 80%) of antibodies to Toxoplasma gondii in the serum of many species of wild mammals in Kenya (Mas Bakal et al. 1980). What does this mean? Further research is required. Leishmaniasis and tick typhus are examples of human diseases that probably have wildlife reservoirs. Research is indicated. Anaplasmosis is a tick-borne disease of livestock. Many species of wild ruminants have Anaplasma-like bodies in their red blood cells (Lohr and Meyer 1973). Are they Anaplasma marginale bodies or are these other Anaplasma species that are not pathogenic to cattle? One could cite many other questions that demand research.

On the experimental side the project has established captive breeding herds of eland, buffalo, waterbuck, bushbuck, wildebeest, and oryx. Since the immunological status of captured animals is not always easy to determine, these animals are being bred.
in captivity and the offspring used for experiments to study pathogenicity and transmissibility of the diseases.

Some of the research on these and other subjects and on certain important zoonotic diseases, such as rabies, echinococcosis, and cysticercosis, are presented in later papers. These contributions report the scientific findings and relate their significance in livestock development and wildlife management. Most but not all of the studies to be described have been carried out in Kenya. There are also papers that look at research as a whole and examine how it relates to different development goals.

In general, the risks of disease transmission between wild and domestic animals have been overestimated and overstressed. Our research has turned up more negative than positive information about such transmission. This has been good for wildlife conservation. We can often tell the livestock producer that the risks of a certain disease, say East Coast Fever, spreading from eland or waterbuck to his cattle are negligible and that the wild animals should be allowed to remain. Such findings and recommendations have removed the early apprehension of wildlife conservationists about our work and have brought the views of wildlife managers and veterinarians into more general agreement, at least as regards diseases. The stage is now set for farmers and ranchers to be given financial incentives to allow game animals to share their lands with their livestock, thereby ensuring the continued existence of large numbers of plains game animals in the face of intensified production of livestock and crops. Wildlife can begin to “pay their way” as a resource that is as valuable to the individual landowner as it is to the Government and at the same time can be cherished and protected.


