Disease surveillance in mixed livestock and game areas around Lake Mburo National Park in Uganda

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Lake Mburo National Park is surrounded by cattle ranches. Wild animals are common within the ranches with impala *Aepyceros melampus* and zebra *Equus burchelli* being the most numerous. The population sizes of impala ($t = 0.4584$) and zebra ($t = 0.714$) at the study sites on the ranches and inside the national park were not significantly different ($p > 0.05$). The predominant cattle breed is the Ankole Sanga breed. The attitude of the ranchers towards mixed game and livestock ranching was favourable provided transmission of diseases from wild animals to their livestock was controlled and the ban on consumptive utilisation of wildlife be lifted. Tick-borne diseases and brucellosis were identified as the major diseases requiring immediate attention in the area. Theileriosis, especially East Coast Fever (ECF) is a predominant tick-borne disease in the area. Ankole cattle were shown to have evolved endemic stability to tick-borne diseases. Livestock pose a risk of transmitting brucellosis to wild animals with a prevalence of 30.8% in cattle and an even higher rate in goats. Blackquarter was shown to be endemic in the area, affecting cattle, impala and eland *Taurotragus oryx*. Closely related wild ruminants could act as a source of helminth infection to domestic ruminants.

**Keywords:** disease, game, livestock

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Introduction

Lake Mburo National Park is a small park (260 km²) located in the Lake Mburo area in Mbarara district, Western Uganda. This park is surrounded by cattle ranches that form a part of Ankole Ranching Scheme (ARS). This area has a semi-arid climate (700–800 mm of rainfall per annum) (Monday 1992). The original vegetation of this area was *Acacia-Themeda* woodlands (Pratt, Greenway & Gwyne 1966), but on the ranches the rangeland is now dominated by *Acacia hokii* and *Cymbopogon nardus* (blue lemon grass) (Muhuku 1993). This resulted from overgrazing and frequent burning. The park contains a number of game including impala *Aepyceros melampus*, zebra *Equus burchelli*, warthog *Phacochoerus aethiopicus*, eland *Taurotragus oryx*, hippopotamus *Hippopotamus amphibius*, buffalo *Syncerus caffer* and topi *Damaliscus lunatus jimela*. Historically wild animals in this area have been living together with pastoralist herds for over four centuries (Karugire 1971).

The park is faced with two major problems namely incursions of pastoralist herds into the park during the dry periods in search of water and pasture, and numerous wild animals living on the neighbouring ranches. The latter problem is brought about by the small size of the park that is unable to accommodate the ever-increasing population of wild animals, and lack of a buffer zone around the park. In order to overcome this problem there is a need to involve ranchers in wild-life management where game and livestock are combined. When a preliminary study was done to evaluate the feasibility of such a programme in this area, results indicated that it was possible, provided the risk of disease transmission between livestock and game is minimised. It was against this background that this study was initiated.

The study was conducted from August 1993 to December 1995. The study consisted of a preliminary study and a detailed disease study lasting for four months and 24 months respectively. A preliminary study involved a questionnaire and monthly visits to ranches. During the field survey, the ranchers and veterinarians in the area gave information on which diseases were important in the area. They reported tick burdens, tick-borne diseases, trypanosomiasis, Contagious Bovine Pleuro Pneumonia (CBPP), abortions, helminthiasis, blackquarter and tuberculosis as being the major disease problems. A detailed study was therefore done to verify the above claims.

Field assistants, some of them veterinary officers, were recruited to monitor the disease situation on the ranches. Ranchers were encouraged to keep health records with the aid of specially designed cards. Postmortems on dead animals on the ranches and in the national park were done and appropriate tissue samples especially liver, lymph node, spleen and lungs, depending on the suspected disease, were submitted in 10% formal-saline or in glycerine to the Faculty of Veterinary Medicine, Makerere University, Kampala, Uganda, for laboratory analysis. Clinical diagnosis and treatment of sick livestock was done. Blood, faecal, lymph node and other specimens according to the suspected disease condition were taken from both livestock and wild animals for analysis. Blood was analysed for haemoparasites. Faecal samples were analysed for helminths. Faecal samples were subjected to floatation, sedimentation, bearman and culture tests as described by Anon. (1971). The following tests for brucellosis were done by Staack (1994): Rose Bengal Plate Test, Milk Ring Test and Serum Agglutination Test, were done in cattle, goats, wild animals and man. Tuberculosis testing on cattle was done using the comparative intradermal tuberculin method.

The population dynamics of ticks, helminth infective lar-
The idea of mixed game and livestock ranching was favourably supported ($z = 2.772; p < 0.01$) by the ranchers provided transmission of diseases between livestock and wild animals could be controlled. It was found that the major disease problems in the area were brucellosis, tuberculosis, blackquarter, tick burdens and tick-borne diseases especially East Coast Fever (ECF), mange and helminthiasis. The sero-prevalence of brucellosis was 30.8% in cattle and almost in all goats. There was evidence of the presence of Brucella abortus in impala and buffalo using Rose Bengal Plate Test. A number of human cases with clinical signs of brucellosis namely swollen joints, swollen male genitals, rheumatic body pains and abortions were reported during this study. Evidence of exposure of some human cases to B. abortus was shown using the Serum Agglutination Test. It has been known for some time that domestic livestock are the source of this disease for wild animals (De Vos & Van Niekerk 1969; Condy & Vickers' 1974; Pastoret, Thrity, Broacher, Schwers, Thomas & Dubuios 1988). There is therefore a need to implement an effective brucellosis monitoring and control programme so as to protect wild animals in this area. If this disease gets established in wildlife populations it will become much more difficult to maintain numbers and population growth of these animals in future.

There was a prevalence of 8% of tuberculosis (TB) reactors to the comparative intradermal tuberculin test in Ankole cattle. This was lower than the 42% prevalence quoted by Guilbridge, Rollison, McNaulity, Alley & Wells (1963). Since livestock and wild animals have been living together in this area for centuries (Karugire 1971) sharing the same pastures and water sources, this disease may have become established in the wild animal population. It has been reported that domestic animals transmit TB to wild animals whenever they are in close contact (Woodford 1972; Bengis & Erasmus 1988; Pastoret et al. 1988). Owing to the public health significance of this disease, if game is to be cropped in future, proper meat inspection must be instituted. A long term research programme is needed to establish the prevalence of this disease in wild animals.

This study showed that blackquarter occurs both in cattle and wild animals. The causative agent Clostridium chauvoei was isolated from cattle, eland and impala found dying. This disease seems to be endemic in this area (Anon. 1987). Therefore vaccination against blackquarter is indicated.

Trypanosomiasis was shown not to be a limitation to mixed game and livestock ranching in this area. Wild animals are known to be reservoirs of trypanosomes for livestock and man (Wells & Lumsden 1971). Trypanosomiasis is absent in this area because in the 1950s an effective tsetse control programme was instituted, which involved spraying, bush clearing and indiscriminate killing of wild animals. As a result of the movement of pastoralist herds into the neighbouring districts, this disease may be re-introduced to the area. Monitoring the disease in this area is therefore desirable.

The major constraints to mixed game and livestock ranching in many parts of Africa are ticks and tick-borne diseases. This area is no exception, with all the ranchers blaming wild animals as the source of this problem. The major tick and tick-borne disease are Rhipicephalus appendiculatus and ECF respectively. The other tick-borne diseases found in the area are anaplasmosis and babesiosis. Rhipicephalus evertsi, Amblyoma variegatum, Amblyoma lepidum and Ornithodoros moubata are also other tick species existing in the area. About 6.7 USD is required per head of cattle for controlling ticks and treating tick-borne diseases. This is a great economic loss to the ranchers. Therefore there is a need for ranchers to utilise wild animals beneficially on their ranches so that the cost of tick control is diminished. It was shown that 30% of Ankole cattle calves died as a result of untreated ECF but no mortalities were seen owing to ECF in sub-adult and adult Ankole cattle. According to Norval, Perry & Young (1992), this indicated that the Ankole breed had developed endemic stability to tick-borne diseases and therefore it could be a useful cattle breed in mixed game and livestock ranching. Ranch-
ing of this breed combined with strategic dipping during periods of high adult tick activity could significantly reduce the costs of tick control.

The economic impact of helminthiasis on mixed game and livestock ranches is not well known. In this area, it was found that helminthic control was limited to livestock. This can become a problem in closely related ruminants where some helminths of genera Haemonchus, Trichostrongylus, Strongyloides, Bunostomum and Oesophagostomum were found to infect both groups. In such a situation, wild animals like impala, topi and waterbuck can act as reservoirs of infection for livestock. Some helminths were found to be specific for small ruminants, for example, Ocaido, Siefert & Aruo (in press) reported that Muellerius capillaris was infecting only impala and goats in the area. They observed that almost all impala (93.7%) examined on necropsy had verminous pneumonia owing to this lungworm. This indicated that there was cross-infection of this helminth between impala and goats. Most of the helminths of zebra namely: Sateria equi, Oxyuris equi, Trichonema species, Habronema species, Strongylus species, Parasarcis equorum and Anoplocephala perfoliata were found to be equine specific. In this respect, zebra are advantageous for this phenomenon of mixed and livestock grazing in this area, in that most infective larvae of equine-specific helminths will end up in accidental hosts where they cannot develop or reproduce. Similarly, as zebra are bulky grazers, most infective larvae of helminths of ruminants will end up in them. This fact was ably elucidated in this study, in that there were less infective larvae ($t = 2.224; p < 0.05$) in mixed game and livestock grazing areas (923 ± 747 / kg of pasture) than pure livestock areas (5146 ± 2886 / kg of pasture). Infective larvae are found in pasture in high concentrations during the early months of the rainy season. Strategic helminth control measures should be developed for the area based on this finding. Methods of providing anthelmintics to grazers, most infective larvae of helminths of ruminants will end up in them. This fact was ably elucidated in this study, in that there were less infective larvae ($t = 2.224; p < 0.05$) in mixed game and livestock grazing areas (923 ± 747 / kg of pasture) than pure livestock areas (5146 ± 2886 / kg of pasture). Infective larvae are found in pasture in high concentrations during the early months of the rainy season. Strategic helminth control measures should be developed for the area based on this finding. Methods of providing anthelmintics to wild animals in the form of mineral licks should be examined.

Provided measures are put in place to control diseases and support from government is given, mixed game and livestock ranching could become economically feasible in this semi-arid rangeland with impala, zebra, Ankole cattle and local goats as key species.

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