Serosurvey for canine distemper virus exposure in dogs in communal lands in Zimbabwe

P J Kelly, G. Musuka, G Nic Eoghain, J B U Tebje-Kelly and S Carter

ABSTRACT
Sera from 173 apparently healthy, unvaccinated dogs from 4 widely separated communal lands in Zimbabwe were tested by ELISA for antibodies against canine distemper virus. Overall, 82% were positive with high prevalences found in each communal land. The highest seroprevalence was in dogs between 1 and 2 years of age (91%; 49/54). These results show dogs in the communal lands of Zimbabwe are commonly exposed to canine distemper virus and that a substantial number survive infection. The role that the virus might play in the high mortality rate of the dog population on communal land warrants further investigation.

Key words: communal lands, distemper, serosurvey.


INTRODUCTION
Most dogs in Zimbabwe live on the communal lands, rural areas where traditional subsistence agro-pastoralism is practiced. They play an important role in communal land life, protecting households against intruders and deterring wildlife species from raiding crops and preying on livestock. The mortality rate in communal land dogs is very high (72% within the 1st year of life) and life expectancy is low (1.1 years). Although canine distemper virus (CDV) is known to be an important cause of morbidity and mortality in dogs worldwide, there is only limited information on infections in rural dogs in southern Africa. As part of a study of infectious diseases of dogs in the communal lands of Zimbabwe, a previously described ELISA was used to determine the prevalence of antibodies against CDV in dogs in 4 widely separated communal lands in Zimbabwe. The findings are recorded in this report.

MATERIALS AND METHODS
Sera
Test sera were obtained from apparently healthy dogs (≥20 weeks of age) during rabies vaccination campaign in central (Chinamora (~17.5833S, 31.2500E)), southeast (Chiredzi (~21.0000S, 31.5000E)) and Bikita (~20.66667S, 31.6000E)) and northern (Matusadona (~17.0833S, 28.2500E)) Zimbabwe. The age, sex and vaccination history of the dogs were recorded and sera stored at −20 °C until ELISA’s were performed. Negative control sera were obtained from 8 crossbred puppies, 20 weeks of age. These unvaccinated dogs had been reared in a household with no history of canine distemper and the pups had shown no clinical signs of infection. As positive controls, we used sera from 12 dogs that presented to the Veterinary Teaching Hospital of the University of Zimbabwe with clinical and histological evidence of canine distemper virus infection.

ELISA for canine antibodies to CDV
ELISAs were performed as described previously. Briefly, antigens were prepared from a CDV vaccine (Intervet, Cambridge, UK) by salination to 330 mM and precipitation with polyethylene glycol 6000 (7%) at 4 °C. Viral proteins were obtained by disruption with freezing and thawing and stripping of the surface proteins with Nonidet P40 (Sigma, Poole, Dorset, UK) (non-ionic detergent). Microtitre ELISA plates were coated with CDV proteins at 10 µg/ml and canine sera (test samples) were added, diluted 1:100 and incubated at 37 °C for 1 hour. Bound antibodies were detected, after washing, with alkaline phosphatase-conjugated rabbit anti-dog IgG (1:1000) (Sigma, Poole, Dorset, UK) followed by the substrate, p-nitrophenyl phosphate (Sigma 104).

RESULTS
Sera
Sera from 173 dogs in the 4 communal lands were tested for CDV antibodies by ELISA (Table 1). Twenty-four dogs were excluded from the study because they had previously been vaccinated with CDV. Almost a third of the dogs sampled (114/173; 66%) were 2 years old or younger; most dogs were male (100/173; 58%). Only 7 animals in the study were neutered, all females.

ELISA
Dogs were regarded as having been exposed to CDV if their OD values were greater than the mean OD values of the negative controls plus 2 standard deviations. None of the sera from the negative control dogs had OD values above this level while all positive control sera had OD values at least 30% above the value (results not shown).

Overall, there was a high prevalence of dogs with evidence of previous exposure to CDV (142/173; 82%) (Table 2). Seroprevalences in the dogs from the communal lands studied were 74% (Chinamora), 81% (Bikita), 83% (Matusadona) and 89% (Chiredzi). Although not statistically significant, the highest seroprevalence was in dogs 1 to 2 years of age.

DISCUSSION
The age and sex distributions of the dogs we studied were similar to those...
previously reported in communal lands in Zimbabwe. Of particular note were the low percentages of neutered bitches and dogs vaccinated against CDV (12 %; 24/197).

The CDV is a morbillivirus that occurs worldwide and is an important cause of morbidity and mortality in dogs. Clinical signs occur in up to 50 % of infected dogs and commonly include listlessness, anorexia, fever and respiratory, gastrointestinal and neurological signs. Mortality rates are high in dogs that develop clinical signs. Dogs that develop subclinical infections or recover from infections. As CDV is very labile and droplets from animals with acute infections. As CDV is readily transmitted to susceptible hosts in aerosols and droplets from animals with acute infections. CDV plays an important and droplets from animals with acute infections. As CDV is readily transmitted to susceptible hosts in aerosols and droplets from animals with acute infections. CDV plays an important role of CDV in these high mortality rates. Further studies are warranted to investigate the role of CDV in the rapid turnover of communal land dogs, the implications for in-contact wild carnivores and the most appropriate methods to prevent and control infections.

ACKNOWLEDGEMENTS

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REFERENCES


### Table 1: Numbers (percentages) of dogs in various age categories from 4 communal lands in Zimbabwe.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>≤1 yr</th>
<th>&gt;1, ≤2 yrs</th>
<th>&gt;2, ≤3 yrs</th>
<th>&gt;3, ≤4 yrs</th>
<th>&gt;4 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bikita</td>
<td>42 (24)</td>
<td>14 (33)</td>
<td>17 (41)</td>
<td>4 (10)</td>
<td>5 (12)</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Chinamora</td>
<td>38 (22)</td>
<td>16 (42)</td>
<td>5 (13)</td>
<td>9 (24)</td>
<td>5 (13)</td>
<td>3 (8)</td>
</tr>
<tr>
<td>Chiredzi</td>
<td>52 (30)</td>
<td>15 (29)</td>
<td>21 (40)</td>
<td>9 (17)</td>
<td>3 (5)</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Matusadona</td>
<td>41 (23)</td>
<td>15 (37)</td>
<td>11 (27)</td>
<td>11 (27)</td>
<td>3 (7)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Total</td>
<td>173</td>
<td>60 (35)</td>
<td>54 (31)</td>
<td>33 (19)</td>
<td>16 (9)</td>
<td>10 (6)</td>
</tr>
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</table>

### Table 2: Ages and percentages (numbers) of dogs found positive by ELISA for antibodies reactive with canine distemper virus.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>≤1 yr</th>
<th>&gt;1, ≤2 yrs</th>
<th>&gt;2, ≤3 yrs</th>
<th>&gt;3, ≤4 yrs</th>
<th>&gt;4 yrs</th>
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<tbody>
<tr>
<td>Bikita</td>
<td>42</td>
<td>93 (13/14)</td>
<td>77 (13/17)</td>
<td>75 (3/4)</td>
<td>80 (4/5)</td>
<td>50 (1/2)</td>
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<tr>
<td>Chinamora</td>
<td>38</td>
<td>50 (8/16)</td>
<td>100 (5/5)</td>
<td>100 (9/9)</td>
<td>60 (3/5)</td>
<td>100 (3/3)</td>
</tr>
<tr>
<td>Chiredzi</td>
<td>52</td>
<td>80 (12/15)</td>
<td>100 (21/21)</td>
<td>78 (7/9)</td>
<td>100 (3/3)</td>
<td>75 (3/4)</td>
</tr>
<tr>
<td>Matusadona</td>
<td>41</td>
<td>80 (12/15)</td>
<td>91 (10/11)</td>
<td>82 (9/11)</td>
<td>67 (2/2)</td>
<td>100 (1/1)</td>
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<tr>
<td>Total</td>
<td>173</td>
<td>75 (45/60)</td>
<td>91 (48/54)</td>
<td>85 (29/33)</td>
<td>75 (12/16)</td>
<td>80 (8/10)</td>
</tr>
</tbody>
</table>

In summary, our study has shown that dogs in the communal lands of Zimbabwe are commonly exposed to CDV and that a substantial number survive infection. Further studies are warranted to investigate the role of CDV in the rapid turnover of communal land dogs, the implications for in-contact wild carnivores and the most appropriate methods to prevent and control infections.
Serological survey of canine distemper virus infection using enzyme-linked immunosorbent assay. *Journal of Veterinary Medical Science* 57: 761–763


20. von Messling V, Harder T C, Moenning V 1999 Rapid and sensitive detection of immunoglobulin M (IgM) and IgG antibodies against canine distemper virus by a new recombinant nucleocapsid protein-based enzyme-linked immunosorbent assay. *Journal of Clinical Microbiology* 37: 1049–1056

