

findings of the first. The significant role of colostrum in calfhood immunity to *C. ruminantium* infection is discussed in relation to the epidemiology and control of heartwater.

M. I. Meltzer, B. D. Perry and P. L. Donachie (1996) Mortality percentages related to heartwater and the economic impact of heartwater disease on large-scale commercial farms in Zimbabwe. *Preventive Veterinary Medicine* 26: 187–199.

A postal questionnaire asking for data concerning heartwater deaths was sent to all large-scale commercial farmers in Zimbabwe's lowveld, where heartwater is endemic. One hundred and fifty returns (24% return rate) provided usable data, with 85 farms (57% of sample) reporting heartwater deaths in 1990/91. The median heartwater mortality percentage for calves (0–12 months) was 2.3%. This was statistically significantly different (Wilcoxon signed rank test, $P < 0.005$) from the median mortality percentage of 0.6% for cattle 13 months and older. Heartwater accounted for 51% of all mortalities on farms reporting heartwater deaths. There were no meaningful correlations between farm or herd size and heartwater mortality percentages. A plot of the farms reporting heartwater deaths found that the heartwater endemic area in 1991 is essentially unchanged from 1979. Inspection of the geographic distribution of farms reporting heartwater showed no obvious patterns, and distances from communal land farms were not significantly correlated to heartwater mortality percentages. An economic model found the annual financial impact of heartwater on large-scale commercial farms in Zimbabwe to be some Z\$19.4 million (1991 prices). The upper bound, that allowed for inflation since 1991, was Z\$33.4 million. The lower bound estimate was Z\$8.1 million (Z\$3 = US\$1, 1991 rates). Eighty-nine per cent of these costs can be attributed to the cost of dipping. Since it has been shown experimentally that the carrier state of heartwater may not affect the productivity of cattle, intensive dipping may not be the best means of controlling heartwater.

J. A. Lawrence, F. L. Musisi, M. W. Mfitilodze, K. Tjornehoj, A. P. Whiteland, P. T. Kafuwa and K. E. Chamambala (1996) Integrated tick and tick-borne disease control trials in crossbred dairy cattle in Malawi. *Tropical Animal Health and Production* 28: 280–288.

Crossbred dairy heifers on a farm in an East Coast fever (ECF) endemic area in Malawi were immunized against *Theileria parva*, *Anaplasma* spp., *Babesia bigemina*, *Babesia bovis* and *Cowdria ruminantium*. They were treated at infrequent intervals with chlorfenvinphos to limit infestation with adult ticks, without providing complete tick control. In one trial, which tested a threshold dipping regimen, 20 heifers were dipped only once in 6 months to control a flush of *Boophilus microplus*. Unimmunized controls showed serological evidence of exposure to *T. parva* and *B. bigemina*, and one died of ECF, but there were no incidents of tick-

borne disease in the immunized group. In a second trial, which tested a strategic dipping regimen, 107 animals were dipped 9 times over a 6 month period. Despite heavy challenge by *B. bovis* and moderate challenge by *B. bigemina* and *Anaplasma* spp., demonstrated serologically, there was only a single clinical case of babesiosis. The observations provide encouragement for the introduction of integrated tick and tick-borne disease control programmes in improved cattle in ECF endemic areas.

C. M. Foggin and R. D. Taylor (1996) Management and utilization of the African buffalo in Zimbabwe. *Proceedings of a Symposium on the African Buffalo as a Game Ranch Animal, Onderstepoort, 26 October 1996*: 144.

Some 48 000 buffalo presently occur over 80 000 km² in Zimbabwe following a 30% reduction in numbers over the last 10 years due to a succession of below rainfall seasons. Most buffalo (71%) are on Parks & Wild Life Land, 25% occur on Communal Land, about 1% are on Forest Land and the remaining 3% of buffalo are now on Private Land. Food-and-Mouth Disease (FMD) in buffalo and cattle is reviewed before discussing disease control zones and the successful establishment of FMD-free and FMD-infected buffalo herds on private land. The production of FMD- and *Theileria*-free buffalo in Zimbabwe is now possible following the identification of non-carriers. Buffalo are managed for conservation and economic objectives, the latter relying primarily on wildlife tourism, especially sport hunting to which buffalo contribute 13% of the annual national trophy fees. About US\$7 000 is charged for a 7–10 day buffalo hunt which takes place mostly in Parks & Wild Life Land and Communal Land, with revenues in the latter earned through the CAMPFIRE programme. Sport hunting quotas for buffalo males over the past 10 years average 925 annually and appear biologically sustainable. While presently limited, the number of buffalo likely to be taken in this way on private land can be expected to increase. A re-assessment of veterinary management, which reflects innovative and adaptive approaches to the growing importance of wildlife production, is discussed. Such management nevertheless remains compatible with beef export requirements and normal standards of disease control.

N. D. Kock (1996) Myocardial Purkinje degeneration and necrosis with fibrosis in free-ranging black rhinoceroses (*Diceros bicornis*) in Zimbabwe. *Journal of Wildlife Diseases* 32: 367–369.

Degeneration and necrosis of Purkinje fibers with fibrosis around Purkinje fibers were found in the hearts of three adult black rhinoceroses (*Diceros bicornis*) in Zimbabwe in 1989 and 1990, among 38 animals examined from 1988 to 1994. Causes of death were not apparently related to these changes, nor was there evidence of heart failure. The etiology of these changes is unknown.