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# A Serosurvey of the Prevalence of Enzootic Bovine Leukosis in the Mafikeng Area of the North West Province of South Africa

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**KEYWORDS** Enzootic Bovine Leukosis (EBL). Bovine Leukaemia Virus. Seroprevalence. ELISA. Low Awareness Level.

**ABSTRACT** The objectives of this study were to determine the seroprevalence of enzootic bovine leukosis (EBL) and some possible factors influencing its occurrence in the Mafikeng area of the North West Province using the enzyme-linked immunosorbent assay (ELISA) method. Three hundred and forty blood samples were collected from cattle aged 6-72 months. Structured interviews as well as clinical examinations were used to gather supplementary data. The overall seroprevalence was 12.6 percent while area prevalence ranged between 6 and 51 percent. Eighty percent of the studied areas tested positive to EBL, revealing the extent to which farmers could be losing out to the disease. Oral interviews revealed a paltry 20 percent awareness level among the farmers. Awareness campaigns and more seroprevalence surveys are obligatory if the actual extent of the disease and its effects are to be revealed.

## INTRODUCTION

Enzootic bovine leukosis (EBL) is an economically important disease of adult cattle that causes losses owing to decreased production, premature culling, reduced slaughter rate, abortions, treatment costs, and the restricted trade of cattle, semen, ova, and milk products from affected regions, as well as mortality (Acaite et al. 1999; Nuotio et al. 2003). It is caused by the bovine leukemia virus (BLV) which is an exogenous C-type *Oncoviridae* of the family Retroviridae (Radostits et al. 2005). The virus causes a systemic infection which infects lymphocytes leading to tumour development in the lymph nodes (Uysal et al. 1998). EBL has a worldwide distribution and prevalence varies between countries (Acaite et al. 2007; Radostits et al. 2005). In Africa, BVL infection has been confirmed in Botswana, Egypt, Namibia, Zambia, Tanzania and Zimbabwe among other countries (Kaura and Hubschle 1994; Meas et al. 2004; Mushi et al. 1990; Schoepf et al. 1997; Schwartz and Levy 1994; Zaghawa et al. 2002). In South Africa, EBL has been reported in Kwazulu-Natal, Mpumalanga, Limpopo, Free State, Eastern Cape and Gauteng provinces (Moola et al. 1983; Morris et al. 1996; DAFF 2008). However there is no data available on the prevalence of the disease in the North West Province despite the huge economic implications of the disease as well as the huge climatic and geographic differences among South Africa's provinces. The aim of this study was therefore to investigate the seroprevalence of EBL in some areas of the North West Province.

## METHODOLOGY

### Study Areas and Data Collection

Blood was randomly collected from nine herds of cattle above the age of six months in five locations around Mafikeng (25° 52'S and 25° 38'E). Mafikeng is 1278m above sea level, and has a semi-arid environment with Savanna type vegetation and summer annual rainfall of 540 mm. It has one long dry season (winter) extending from May to October and a relatively short wet season (summer) extending from November to February.The sampled areas included Ramatlabama, Mogosane, Molelwane, Top Village and Rooigrond (Table 1). The selected herds included one dairy herd (Friesian) and the other herds comprising of Brahmans, Bonsmaras and mixed breeds.

### Sample Collection and Preparation and Analysis

Blood samples were collected from jugular and coccydeal veins using serology tubes. The samples were kept cool overnight to allow clotting and the

**Table 1: Information regarding sampled areas, herds, and age of animals in months.**

| *Areas herds* | *Number herds of per area* | *No. of animals sampled* | *Age range in months* |
|---|---|---|---|
| Rooigrond | 1 | 85 | 12-48 |
| Molelwane | 2 | 72 | 12-60 |
| Mogosane | 2 | 49 | 6-72 |
| Top village | 2 | 34 | 6-48 |
| Ramatlabama | 2 | 100 | 6-60 |
| Total | 9 | 340 | |

tubes centrifuged at 2500rpm for 10 minutes. Serum was then transferred to storage tubes and preserved at -20°C until analysed. The samples were analysed using the enzyme-linked immunosorbent assay (ELISA) method using a Bovine Leukemia Virus antibody test kit (USDA Product code 5505.20).

### Background Information and Clinical Examinations

Oral interviews using structured questions, and clinical examinations were conducted in order to gather background information and ascertain the health status of the animals.

## RESULTS

A total of 340 cattle aged between 6 and 72 months were sampled from nine herds around Mafikeng. The overall seroprevalence was 12.6 percent, covering 80 percent of the sampled areas (Table 2). Herd prevalence ranged from 0 to 51 percent with Mogosane recording the highest prevalence. Clinical examinations showed only one bovine from Ramatlabama and 2 from Mogoshane with varying degrees of lymphadenopathy. Thirty-three percent of the farmers revealed that they had at times found enlarged lymph nodes on animals slaughtered for own consumption and only 2 herd owners had prior knowledge of EBL. Also, 50 percent of the farmers felt that veterinary fees were often times expensive such that they would only consult for emergencies like downer or dystocia cases. One farmer from Mogosane had two cases of confirmed EBL in 2004 that led to the subsequent culling of his animals. The farmer was one of those who had prior knowledge of the disease.

## DISCUSSION

To the best of our knowledge, this is the first study on the seroprevalence of EBL in North West Province. In this study only cattle aged 6-72 months were sampled since EBL is a disease of adult animals (D'angelino et al. 1998). The ELISA method used in this study has high sensitivity and specificity of 98 and 100 percent respectively, thus providing a reliable and adequate method of testing. It is regarded as a better testing tool when compared to other methods like the agar-gel immunodiffusion (AGID) test (Schoepf et al. 1997). The 12.6 percent seropositivity in this study represents prior natural exposure to the virus since the animals had not been vaccinated against EBL. This prevalence falls with in the reported range of 3.6 percent-17.8 percent for other provinces in South Africa (Moola, 1983; Morris et al. 1996). This prevalence is however dwarfed by the 36 percent reported in Tanzania where the ELISA method was also used (Schoepf et al. 1997). Lower seropositive levels have been reported in various other countries and ranged between 1.5 and 7.8 percent in Nigeria, Sudan and Botswana (Adu and Olson 1981; Mushi et al. 1990; Osheik et al. 1988). However the low levels in these countries have been attributed to the low sensitivity of the AGID test used in the respective studies (Schoepf et al. 1997). The various country figures confirm the wide distribution of the virus.

**Table 2: Prevalence of EBL around Mafikeng in the North-West province.**

| *Areas* | *Age range in months* | *No. tested* | *No serpo-posi-tive* | *% sero-posi-tive* |
|---|---|---|---|---|
| Rooigrond | 12-48 | 85 | 0 | 0 |
| Molelwane | 12-60 | 72 | 9 | 12.5 |
| Mogosane | 12-72 | 49 | 25 | 51 |
| Top village | 6-48 | 34 | 3 | 8.8 |
| Ramatlabama | 12-60 | 100 | 6 | 6 |
| Total | | 340 | 43 | 12.6 |

Between 2001 and 2007, South Africa encountered four outbreaks of EBL in the districts of Inkwanca (Eastern-Cape), Pietmaritzburg (KwaZulu-Natal), Kopanong (Free State) and Lephalale (Limpopo Province) (DAFF 2008). In the studied areas, only 2 cases of EBL have been confirmed since 2004. This finding suggests either a low diagnostic level or high incidence of asymptomatic carriers (Radostits et al. 2005). The fee related low veterinary consultation levels revealed in this study may also have been responsible for a possible under reporting. The low levels of awareness about the disease revealed in this study will more likely result in higher infection rates as some farm routines are

also modes of transmission for EBL (Johnson and Kaneene 1992; Nuotio et al. 2003; Acaite et al. 2007). The prevalence of the infection calls for efforts to investigate possible losses related to decreased production, premature culling, reduced slaughter rate, abortions and treatment costs (Acaite et al. 1999; Nuotio et al. 2003).

## CONCLUSION

Results have revealed a seroprevalence of EBL and points to a possible under reporting of the disease. There is a need to raise farmers' awareness of the infection in order to help curtail its spread. More studies are needed in order to determine the extent of the infection as well as possible economic losses associated with the infection.

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