

ESTIMATION OF RISK OF EAST COAST FEVER (ECF) ON SMALLHOLDER DAIRY FARMS TARGETED FOR IMMUNISATION IN KENYA.

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Four methods were applied to estimate the risk posed by ECF in a smallholder dairy farming region of Kiambu district, Kenya. This region was targeted for widespread immunisation using the infection and treatment method. Using data from an immunisation trial covering 289 cattle and a one year post immunisation monitoring, the risk of ECF was estimated through quantification of the disease risk as a farmer's perceived constraint, epidemiological estimation of risk rates and annualised risk of infection and simulation of the financial impact of immunisation at farm level. Scenarios with and without immunisation were compared. In all cases, immunisation reduced the risk of ECF.

INTRODUCTION

ECF is a major constraint to the development of the dairy industry in Kenya. Immunisation against ECF (Radley et al., 1975) is being implemented on smallholder dairy farms. It is therefore imperative to quantify the risk posed by the disease before and after the immunisation trials for economic and social impact analysis. While longitudinal studies are best suited for this, such detailed studies are constrained by lack of resources including time, capital and personnel.

DATA COLLECTION AND ANALYSIS

Data from a cross-sectional survey were used to estimate the risk of ECF in two divisions of Kiambu district in central Kenya before and after immunisation of 289 cattle on 132 smallholder farms. Four approaches were applied :

- i) Quantification of ECF as a livestock production constraint against other farm level constraints.
Using a structured questionnaire, farmers were asked to rank three of the main livestock production constraints on their farms.
- ii) Estimation of ECF risk rate from retrospective farm data.
Cases of ECF diagnosed on the farms were recorded and the ECF risk rate was estimated by : Total number of ECF cases diagnosed in the last one year / Average cattle population on the trial farms. After immunisation, the trial animals were monitored for one year and the risk rate for this period was computed.
- iii) Estimation of an annualised risk of ECF (R_Y) from serological data using the equation :
$$R_Y = 1 - (1 - R_x)^{1/2X}$$

Where : R_x = Proportion of calves of age X having a positive titre (≥ 160) on the indirect fluorescent antibody test (Burrige and Kimber, 1972).
- iv) Calculation of Coefficient of Variation (CV) of the expected Net Present Value (NPV) as generated by a simple model developed to simulate the farm livestock financial outlay (Muraguri, 1994). In all cases, scenarios with and without immunisation were compared.

RESULTS AND CONCLUSION

3.2% of the farmers in the 'immunised' farms and 12.4% of the farmers in the 'non-immunised' farms specifically identified ECF as the main constraint on their farms. ECF risk rate estimated from retrospective farm data was 6.4% and 28.2% on 'immunised' and 'non-immunised' farms, respectively. From serological data, the annualised risk of ECF was 5.9% and 41% in 'immunised' and 'non-immunised' farms, respectively. For a ten year period, the CV of NPV was always significantly ($p < 0.05$) lower with immunisation than without. Therefore, immunisation reduced the risk of ECF in all the evaluation methods tested.

BIBLIOGRAPHY

- Burrige M.J. and Kimber C.D., 1972. The indirect fluorescent antibody test for experimental East Coast fever (*Theileria parva* infection of cattle) : Evaluation of a cell culture schizont antigen. Research in Veterinary Science 13, 451-455.
- Muraguri G.R., 1994. Financial analysis of the control of East Coast fever by immunisation in small scale farms in Kenya. MSc. Thesis, University of Reading, UK. pp 47-55.
- Radley D.E., Brown C.G.D., Cunningham M.P., Kimber C.D., Musisi F.L., Payne R.C., Purnell R.E., Stagg D.A. and Young A.S., 1975. East Coast fever. 3 : Chemoprophylactic immunisation of cattle using oxytetracycline and a combination of *Theileria* strains. Veterinary Parasitology 1, 51-60.

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