



## Exploring farmer preferences for contagious bovine pleuropneumonia vaccination: A case study of Narok District of Kenya



Salome W. Kairu-Wanyoike<sup>a,b,\*</sup>, Simeon Kaitibie<sup>b,2</sup>, Nick M. Taylor<sup>a</sup>, George K. Gitau<sup>c</sup>, Claire Heffernan<sup>a</sup>, Christian Schnier<sup>d,3</sup>, Henry Kiara<sup>b</sup>, Evans Taracha<sup>b,4</sup>, Declan McKeever<sup>d,5</sup>

<sup>a</sup> University of Reading, Whiteknights, P.O. Box 217, Reading, Berkshire RG6 6AH, United Kingdom

<sup>b</sup> International Livestock Research Institute, P.O. Box 30709, 00100 Nairobi, Kenya

<sup>c</sup> Faculty of Veterinary Medicine, University of Nairobi, P.O. Box 29053-00625, Nairobi, Kenya

<sup>d</sup> Moredun Research Institute, Pentlands Science Park, Bush Loan, Penicuik, Midlothian, EH26 0PZ, Scotland, United Kingdom

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### ABSTRACT

Contagious bovine pleuropneumonia (CBPP) is an economically important disease in most of sub-Saharan Africa. A conjoint analysis and ordered probit regression models were used to measure the preferences of farmers for CBPP vaccine and vaccination attributes. This was with regard to inclusion or not of an indicator in the vaccine, vaccine safety, vaccine stability as well as frequency of vaccination, vaccine administration and the nature of vaccination. The analysis was carried out in 190 households in Narok District of Kenya between October and December 2006 using structured questionnaires, 16 attribute profiles and a five-point Likert scale. The factors affecting attribute valuation were shown through a two-way location interaction model. The study also demonstrated the relative importance (RI) of attributes and the compensation value of attribute levels. The attribute coefficient estimates showed that farmers prefer a vaccine that has an indicator, is 100% safe and is administered by the government ( $p < 0.0001$ ). The preferences for the vaccine attributes were consistent with expectations. Preferences for stability, frequency of vaccination and nature of vaccination differed amongst farmers ( $p > 0.05$ ). While inclusion of an indicator in the vaccine was the most important attribute (RI = 43.6%), price was the least important (RI = 0.5%). Of the 22 household factors considered, 15 affected attribute valuation. The compensation values for a change from non inclusion to inclusion of an indicator, 95–100% safety, 2 h to greater than 2 h stability and from compulsory to elective vaccination were positive while those for a change from annual to biannual vaccination and from government to private administration were negative. The study concluded that the farmers in Narok District had preferences for specific vaccine and vaccination attributes. These preferences were conditioned by various household characteristics and disease risk factors. On average the farmers

\* Corresponding author at: P.O. Box 319-00605 Uthiru, Nairobi, Kenya. Tel.: +254 0722 568 510.

E-mail address: [swwanyoike@yahoo.com](mailto:swwanyoike@yahoo.com) (S.W. Kairu-Wanyoike).

<sup>1</sup> Current address: Ministry of Livestock Development, Veterinary Department, P.O. Kangemi, 00625 Nairobi, Kenya.

<sup>2</sup> Current address: College of Business and Economics, Qatar University, P.O. Box 2713, Doha, Qatar.

<sup>3</sup> Current address: Health Protection Scotland, Clifton House, 1–7 Clifton Place, Glasgow G3 7LN, United Kingdom.

<sup>4</sup> Current address: Institute of Primate Research, P.O. Box 24481, National Museums of Kenya, Karen, Nairobi, Kenya.

<sup>5</sup> Current address: The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Hertfordshire AL9 7TA, United Kingdom.

would need to be compensated or persuaded to accept biannual and private vaccination against CBPP. There is need for consideration of farmer preferences for vaccine attribute levels during vaccine formulations and farmer preferences for vaccination attribute levels when designing delivery of vaccines.

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## 1. Introduction

Contagious bovine pleuropneumonia (CBPP) is an important disease in most of sub-Saharan Africa (OAU-IBAR, 1999; Tambi et al., 2006). This is due to its contagiousness and trans-boundary nature of spread as well as negative effects on food security, investment and trade (Geering et al., 1999). The importance of the disease is demonstrated also by the fact that, through participatory methods involving proportional piling, simple ranking and pair-wise ranking, it has been ranked among the top five most important diseases. The criteria for ranking were ease of transmission within the herd, persistence in the herd and the high economic losses that result from the high mortality levels it causes (Mariner et al., 2006b; Wanyoike, 1999, 2009). Indeed 24 out of 47 sub-Saharan countries reported the disease between 2003 and 2007 (AU/IBAR, 2003–2007). Also by 2005, nearly 24.4 million people in 19 African countries were at risk of food insecurity, reduced investment and reduced trade caused by CBPP as the disease was already reported in these countries (Thomson, 2005).

Vaccination is the most practical method of choice for CBPP control in endemic zones in Africa (Tulasne et al., 1996). It is also the most commonly practiced method of CBPP control in most sub-Saharan African countries (Thomson, 2005). Modelling studies by Mariner et al. (2006b) have demonstrated that a control strategy combining vaccination and treatment with antimicrobials is of higher value in terms of reducing disease persistence through reduction of the infectious period and total mortality than a strategy involving vaccination alone. However, enough field studies on the use of antimicrobials in CBPP control are yet to be carried out in order to fully advise on in vivo dosages to be used in antimicrobial treatment against CBPP (FAO, 2007) and the consequences of antimicrobial treatment particularly with regard to development of carriers. The OIE recommended T<sub>144</sub> vaccine strain when administered as part of a well managed vaccination campaign is highly effective in bringing CBPP under control (Bamhare, 2001). However, both the distribution and prevalence of CBPP have increased in tropical Africa in spite of vaccinations (FAO, 2004). Mass vaccination as an eradication strategy is fraught with constraints related to production, distribution and administration of vaccines (Thomson, 2005). CBPP vaccinations throughout most of the African region have been observed to be irregular (skipping some years) and of low annual coverage (not vaccinating  $\geq 80\%$  of the target population) due to low availability of funds and logistical problems (Kebkibah, 2004). Kenya recorded an annual vaccination coverage of between 20% and 60% of the target population from 1989 to 2007 (Wanyoike, 1999, 2009).

Several suggestions have been made to improve vaccination coverage and effectiveness. Occurrence of adverse post-vaccination reactions has contributed to owner reluctance to use existing vaccines in certain areas suggesting a safer vaccine is needed (Thiaucourt et al., 2003). As the development of new vaccines is still a long way off, suggestions have been made to improve the stability of the vaccine and include an indicator in the vaccine for end user assessment of viability (March, 2004).

For effective vaccination, there should be information about consumer behaviour that underpins the decisions made by modellers and policy makers (McLeod and Rushton, 2007; Heffernan et al., 2008). Modelling studies by Mariner et al. (2006a,b) have suggested policy change towards private and elective vaccination. However, implementing or changing some of the policies as suggested without seeking the preferences of farmers may lead to resistance to vaccination and continued low vaccination coverage. Vaccine formulations should also take into account the preferences of farmers with respect to vaccine characteristics. There may also exist segmentation of farmers with respect to vaccine and vaccination preferences which may include farmer socio-economic and other characteristics. This segmentation may influence vaccine formulation and vaccination policy (Ngugi, 2002).

No study so far has attempted to establish consumer preferences with respect to CBPP vaccine and vaccination attributes. In this paper, these preferences and the factors conditioning them are determined. Suggestions are made regarding policy change and or formulation and implementation with regard to vaccine formulation and delivery (vaccination). The study was part of a wider study which explored the epidemiology and socio-economics of CBPP and its control by vaccination in Kenya (Wanyoike, 2009). The results of the preferences study were also used to compute willingness to pay (WTP) for vaccination (Kairu-Wanyoike et al., submitted).

## 2. Materials and methods

### 2.1. Selection of the study area

At the time of the study, there were four CBPP zones in Kenya: the clean zone, the surveillance zone, the buffer zone and the infected zone (Fig. 1). The Mara and Loita divisions of Narok District in the infected zone (Figs. 1 and 2) were chosen as the study sites firstly because the incidence of reported cases of CBPP in Kenya was highest here (GOK, 2000–2006). Secondly, farmers from the divisions had a good knowledge of the disease and its control (Wanyoike, 1999; Catley and Mariner, 2001; Catley, 2005). CBPP has been present in Narok District since prior to the beginning of the 20th Century (Wanyoike, 1999; Kariuki, 1971; Hodgson, 1999). The two study divisions are in the

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