

Original Research Article

Livestock keepers' perception on East Coast fever-immunization (ECFiM) in Kajiado Central, Kenya.

Abstract

The study was carried out in Kajiado County to gain information on livestock keepers' perception on East coast Fever disease and its vaccines utilization. East Coast fever (ECF) is a major constraint to livestock production, ranking among those of high economic importance. The high input cost in ECF management, control and treatment steered the development of the East Coast Fever Immunization vaccines (ECFiM) as envisaged to be effective and economical. The main aim of the study was to realize livestock keeper's perception on the East Coast Fever Immunization vaccines (ECFiM). The data was collected using a survey of 88 households, fifteen focus groups with livestock keepers, key informant interviews and a workshop. Frequency counts and percentages were used to analyse data. Type of livestock kept by the community and their preference; cattle 37.5%, sheep 28%. Prioritized livestock diseases: ECF 42.5%, FMD 25%. Sources of ECFiM-vaccines information were ranked as Kenya Agricultural Livestock Research Organization (KALRO) employees 26.25% and veterinarians 16.25%. The importance the ECFiM was ranked as reduced mortality 38.75% and reduced tick control 25%.

Main factors constraining the adoption of ECFiM vaccine as given by the respondents were two that [isare](#), inadequate technology 31.25% and finances 21.25%. Agriculture being a devolved function, the County government should formulate policies that enhance working relationship between (KALRO) so that they can train the farmers on the use of ECFiM vaccine. There is need for the County government to link the farmers with financial institutions where they could have access to loans to purchase the vaccine.

Keywords: East coast fever, immunization, livestock keepers' perception and Kajiado Central

Introduction

East Coast fever (ECF) disease is caused by the protozoan parasite *Theileria parva*, transmitted by brown ear tick (*Rhipicephalus appendiculatus*) that is a major constraint in cattle production in Kenya and other African countries (Mukhebi *et al.*, 1992). The mortality rate caused by ECF can reach 100% in herds of exotic cattle introduced in an endemic area, and in indigenous animals the rate can be as high as 30% (Anon, 1990). Animals that recover from ECF show substantial losses in milk yield and live weight gain (Young *et al.*, 1990; Rumberia, 1992).

ECF is mainly controlled by intensive application of acaricide chemicals. However, there are several drawbacks of this approach. These include high costs, resistance to the acaricides by ticks, increased environmental pollution (Mbogo *et al.*, 1996), and lack of appropriate infrastructure such as dips in most of this region. In Kenya, although therapeutic drugs such as buparvaquone (Butalex[®], Mallinckrodt Veterinary, UK) are currently available, they are not affordable by most resource-poor small-scale farmers. ECF immunization 'Infection and Treatment Method' (ITM), leads to lifelong immunity to the disease and offers the most reliable control of ECF. Mukhebi *et al.*, (1989), working on a beef cattle farm in coastal Kenya showed that cattle immunized against ECF had lower case mortalities, higher weight gains and greater marginal rates of returns. In Zambia, Pegram *et al.*, (1996) working on beef

cattle showed that on farms where theileriosis was a serious problem, immunization coupled with a strategic dipping programme was economically very attractive. Immunized cattle required ~~6~~^{six} strategic dipping per year to reduce the effects of ticks, representing an 85% reduction in acaricide use. In view of existence of other tick-borne diseases like babesiosis and “anaplasmosis, tick control programme of dipping has to continue albeit at a lower interval. The current delivery system of the vaccine is based on KALRO staff training to private and public veterinarians who are left to offer the services at a cost to the farmers. The adaptation of the “infection-and-treatment method (ITM)” of immunizing cattle against ECF, is still very low. The reasons for this are yet to be elucidated. In view of this it was. In view of this it was found prudent to study livestock keepers’ perception on the status and performance of ECFiM in Kajiado County.

Materials methods

Study area

The study was carried out in Kajiado Central sub county in Kajiado County which has a human population of 102,978 (GoK, 2009). The Sub County has five wards: Ildamat, Dalalekutuku, Porko, Matapato North and Matapato South. The Sub-County is classified as arid and semi-arid, characterized by low rainfall less “than 500mm per year and high temperatures ranging from 24⁰c to 37⁰c. The in-consisted rainfall makes pastoralism the only suitable economic activity. Most of the vegetations are perennial grasses, shrubs and thorn trees.

Data Collection methods

The quantitative data was collected through a semi-structured questionnaire administered to 88 households randomly selected from five wards. The data was collected from two different households, 80 ECF vaccinated households to determine the effects of ECF- vaccination and 8 none ECF vaccinated households for determining the net effect of the ECF vaccination. Qualitative data were collected through workshops and key informant interviews with livestock stakeholders to gain information on the constraints encountered by livestock keepers and animal health service providers, above their perception to ECF immunization and dissemination constraints.

Data analysis

Data obtained from focal group discussions were sorted out and interpreted in relation to the research general objective, to enable the researcher to provide overall interpretation of the findings showing how thematic areas and issues relate to one another. On the other hand, quantitative data derived from the household interviews were edited, coded and analyzed using the Statistical Package for Social Sciences (SPSS) software version 20 spread sheets. Descriptive statistics which included frequencies and cross-tabulations were generated and used to characterize pastoralists’ perception on ECFiM uptake and other animal health constraints.

Comment [HS1]: Provide recent population. It does not give the latest impression of the situation.

Results and discussion

Livestock production

The priority of livestock kept in the area is shown in table 1. ~~Cattle, goats and sheep were the~~ Cattle, goats and sheep were the preferred livestock species. This could be attributed to the prevailing climatic conditions for the sheep and goats` browsing natural shrubs and cattle for provision of milk.

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Table 1: Priority livestock species kept and reasons for preference by the Maasai community

Livestock species	Frequency (f) (n=88)	Percentage	Ranking reasons for preference			
			1	2	3	4
Cattle	33	38	Milk (16)	Income(11)	Meat (4)	Skin (2)
Goats	25	28	Income (13)	Security (8)	Drought resilience (3)	Milk (1)
Sheep	23	26	Drought resilience (14)	Security (6)	Skin (3)	
Donkey	5	6	Transport(3)	Income(2)		
Chicken	2	2	Income (2)			

Livestock production is the main source of livelihood in Kajiado Central. Sahiwal cattle breed is dominant and is preferred due to its dual purpose traits of milk and beef production and adaptability to the dry climatic conditions. Due to losses of many animals occasioned by frequent drought conditions and inadequate feed resources, there is a gradual shift to use of improved breeds in milk production. However, use of improved vaccines, forages and skills in fodder conservation are still limited. The capacity building of livestock stakeholders is therefore needed.

Priority livestock diseases as perceived by livestock keepers.

The pastoral community prioritized livestock diseases based on impact on morbidity, mortality and loss of incomes in Kajiado central as shown in table 2. Important diseases affecting the Cattle were East coast fever, Foot and Mouth, Heart water, Pneumonia and Anthrax. Capacity building through ECFiM vaccine awareness is needed as East coast fever is a priority threat, to mostly improved breeds.

Table 2: Important livestock diseases as perceived by livestock keepers

Diseases	Frequency	Percentage
East coast fever (ECF)	34	42.5
Foot and Mouth Disease (FMD)	20	25
Heart water	11	13.75
Pneumonia (Contagious Bovine pleuropneumonia- CBPP)	9	11.25
Anthrax	6	7.5
	n=80	100

Sources of ECF vaccine information as perceived by Pastoral Community

Livestock keepers ranked sources of information on ECFiM vaccine as shown in table 3. KALRO employees whether television shows or in the field disseminate the information.

Table3: Sources of ECF vaccine information as perceived by Maasai Community.

Sources	Frequency	Percentage
KALRO Employees	24	32.50
Veterinary officers	13	16.25
Non-Governmental Organization	11	13.75
Community Animal health workers	10	12.5
Agricultural Shows of Kenya (ASK)	8	10
Neighbours	6	7.5
News media (TV, Radio)	5	6.25
	n=80	100

Evidences of ECFiM preferences by livestock keepers

Livestock keepers supported earlier research done on the following merits of using ECFiM vaccines on herds: Immunization against ECF resulted lower case mortalities, reduced tick control through strategic dipping programme thus reducing the use of acaricides. Due to the existence of other tick-borne diseases like *babesiosis* and *anaplasmosis*, tick control programme has to continue albeit at a lower interval, greater marginal rates of returns in terms of labour and acaricides cost and higher weight gains.

Table4: Importance of ECFiM as perceived by livestock keepers.

Importance of ECFiM	Frequency	Percentage
Reduced mortality	31	38.75
Reduced tick control (cost)	20	25
Higher weight gains	12	15
No adverse reproduction	9	11.25
Higher marginal rate of return	8	10
	n=80	100

ECFiM adoption constraints perceived by animal health service providers

Technical know-how (technology): Animal health service providers expressed that the technology was intricate, as this was a prerequisite to manage the vaccine. Livestock keepers cannot buy it from the counter. A significant number of animal health service providers cannot afford to buy and maintain liquid nitrogen containers, due to which condition they are unable to offer the vaccine. The vaccine stockiest need to be trained by KALRO for operationalization.

Input capital: Veterinarians need capital to start with adaptation of this technology. They lack initial capital for purchasing ECFiM vaccine and training. Animal health service providers could have pooled resources but poor livestock keepers are not ready to make upfront payment. They need free services as they receive from the Non-Government

162 Organizations (NGOs). County government, bank loans providers and KALRO need to create
163 awareness on the service payment requirements.

164 **Service payment:** The monetary conditions in the County have negated ECFiM adoption.
165 Livestock keepers' needs education from KALRO and County on the issue of value of money
166 for services as livestock keeping is a private business

167 **Awareness:** Most of the livestock keepers are not aware of ECFiM-vaccine. Those aware are
168 not facilitated to inform others. The Animal health service providers and stockiest assume
169 that livestock keepers would demand the vaccine without its promotion. Kenya Agricultural
170 Research Organization and NGOs are needed to increase the promotion and awareness
171 creation programmes.

172 **Packaging:** Livestock keepers rely more on service providers for this information which is
173 often 'compartmentalized', because it is given by different service providers dealing with
174 different commodities and the information is not always accurate because it is influenced by
175 the desire to sell the service. ECFiM technology is irrationally packaged, whereas the demand
176 for 3-5 animals may not be met since the straw contains 20 doses of the vaccine for twenty
177 animals. Packaging of ECFiM vaccine in small doses may enhance adoption by the livestock
178 owners with 3-4 dairy animals.

179 **Transportation:** Due to vastness of Kajiado County with many remote areas transportation
180 of the vaccine is very costly. Lack of transport, poor road network for Animal health service
181 providers limits the dissemination of the vaccine. The farmers were of the view that County
182 Government should assist in providing transport and storage services. These constraints were
183 ranked according to their weight by livestock keepers (table 5).

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186 **Table 5: Constraints to ECFiM adoption as perceived by animal health service**
187 **providers**

Constraints	Frequency	Percentage
Technical know-how	25	31
Financial	16	21
Services payment	14	17
Unawareness	12	14
Packaging	7	9
Poor infrastructure	6	8
	n=80	100

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189 **Livestock keeper's perception on accessibility, affordability and acceptability of ECFiM**
190 **vaccines**

191

192 **Accessibility:** Access to ECFiM vaccine for livestock production is constrained by
193 inadequate extension staff, insufficient funding, lack of facilities, weak stakeholder linkages
194 and poor infrastructure- road network, water and power. They resolved that animal health
195 assistant due to proximity should be more empowered to handle ECFiM followed by Agro
196 vets for vaccine storage.

197 **Accessibility of inputs and service providers to livestock owners**

198 All the livestock owners resolved that KALRO should assist them in training Animal health
199 assistants on ECFiM techniques and agro vets storage.

Affordability: The affordability parameter assessed the ability of households to pay for the vaccines. This survey realized that the Maasai have no problem with ideal costs of inputs is beneficial.

Acceptability: The livestock keepers interviewed felt that the technology if properly used. They welcomed immunization but were critical due to unavailability of ECFiM vaccine. This high level of interest in ECFiM vaccine was related to the fact that farmers recognized ECF as a major constraint to cattle production.

Discussion

Drugs such as buparvaquone (Butalex[®], Mallinckrodt Veterinary, UK) are currently available, they are not affordable by most resource-poor small-scale livestock keepers. ECF immunization 'Infection and Treatment Method' (ITM), leads to lifelong immunity to the disease and offers the most reliable control of ECF. Mukhebi *et al.*, (1989), that cattle immunized against ECF had lower case mortalities, higher weight gains and greater marginal rates of returns as supported Kajiado county benefits of immunization. In Zambia, Pegram *et al.*, (1996) showed that on farms where theileriosis was a serious problem, immunization coupled with a strategic dipping programme was economically very attractive. Immunized cattle required 6 strategic dipping per year to reduce the effects of ticks, representing an 85% reduction in acaricide use. In view of existence of other tick-borne diseases like babesiosis and "anaplasmosis, tick control programme of dipping has to continue albeit as supported Maasai Cattle keepers.

Conclusions

Cattle, sheep and goats are the most preferred livestock species, cattle for milk and sheep and goats owing to the climatic conditions. These species are accustomed to browsing on shrubs. Priority cattle diseases were East Cost Fever, Foot and Mouth Disease, Heart water, CBPP and Anthrax. Sources of Ecf-vaccines information included: KALRO– employees, private veterinarians, NGOs, CAHW, ASK and media. The benefit of Ecf-Vaccines included: reduced mortality, reduced tick control costs, increased weight gains and high marginal returns. The constraints in adaptation of ECFiM included technical know-how, financial, services payment, unawareness, high number of doses per pack and poor infrastructure.

Recommendations

Agriculture being a devolved function, the County government should formulate policies that enhance working relationship with Kenya Agricultural Livestock Research Organization (KALRO) as it is the main source and the trainer in ECFiM delivery and dissemination. County government should provide soft term loans to stakeholders in ECFiM delivery. KALRO should come up with tick control strategy to be followed after immunization, in order to reduce acaricides effects on the input costs, build-up of resistance and environmental pollution. ~~County government should provide soft term loans to stakeholders in ECFiM delivery for easier availability and affordability. KALRO should come up with tick control regime to be followed after immunization, in order to reduce acaricides effects on the input costs, build up of resistance and environmental pollution.~~ County government should formulate polices that government veterinary extension and Community Animal health

Comment [HS2]: The main aim of the study was to realize livestock keeper's perception on the East Coast Fever Immunization vaccines (ECFiM).

Above is the main objective of the article. However, I don't see how this paper has achieved the stated objective well. The author must bring in more discussions based on highlighted

Comment [HS3]: The main aim of the study was to realize livestock keeper's perception on the East Coast Fever Immunization vaccines (ECFiM).

As mentioned above.

Comment [HS4]: The main aim of the study was to realize livestock keeper's perception on the East Coast Fever Immunization vaccines (ECFiM).

Important aspects that required further clearer elaborations to make more sensible for policy-makers.

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Comment [HS5]: Repeated sentences.

Workers after training to be used to encourage the utilization of ECFiM technology through service provision business at livestock keeper's costs.

Reference

- Anon, (1990). Assessing the impact of better control of livestock diseases in Africa. *ILRAD Reports, January* (1990).
- GoK. Government of Kenya (2009) Human population census report. Ministry of planning and vision (2030)
- Kothari CR (2008). Research Methodology, Methods and Techniques. 2 Revised International New Delhi: New Age Publishers.
- Mbogo, S.K. (1996). NARP I Project completion report on the support to research into the field application of East Coast fever immunization and epidemiology of related tick-borne diseases in cattle. Page 9.
- Mukhebi *et al.*, (1989). Financial Analysis of East Coast Fever control strategies on beef production under farm conditions. *Veterinary Record*, 125, p456-459.
- Mukhebi *et al* (1992). Economic impact of Theileriosis and its control in Africa in: Norval R.A., Perry B.D., Young A.S. (Eds). *The Epid. Of Theileriosis in Africa* Academic Press, pp. 378-403.
- Pegram *et al.*, (1996). Effects of immunisation against *Theileria parva* on beef cattle productivity and economics of control options. *Tropical Animal health and Production*, 28: 99-111.
- Rumberia, R.M. (1992). The effect of theileriosis on the reproductive function of Boran/Friesian cross heifers. PhD thesis, University of Edinburgh, 288 pages.
- Statistical Package for Social Sciences (SPSS) software version 20 spread sheets.
- Young, A.S., *et al.*, (1990). Evaluation of infection and treatment methods in immunization of improved cattle against theileriosis in an endemic area of Kenya.

Comment [HS6]: Old references. Must update the literature search.