

# Factors influencing choice of veterinary service provider by pastoralist in Kenya

Joshua Orungo Onono · Barbara Wieland · Jonathan Rushton

Accepted: 11 February 2013 / Published online: 19 February 2013  
© Springer Science+Business Media Dordrecht 2013

**Abstract** This study analyzed the determinants for choice of animal health providers in a semiarid pastoral area with an aim of identifying specific attributes that could be targeted for intervention to enhance pastoralist access to quality veterinary services. The data were collected through administration of semi-structured questionnaires to 350 randomly selected household heads in different locations in Narok County of Kenya. Most of these respondents had no formal education (66.9 %), and most households were headed by men (88.9 %). The men were in control of sales (84.2 %), purchases (83.7 %), and treatment of sick cattle (70.3 %), while women were responsible for milking (83.8 %). Animal health services were delivered by drug stockists (87.76 %) and government veterinarians (12.24 %). The time spent while seeking animal health services and transport cost were specific attributes with impact on the probability of choice for service providers. Although distance covered to the preferred service provider was a significant attribute, it was inversely related to the probability of choice. The other factors including herd sizes, age and sex of household head, cost incurred per visit, level of education of household head, and the number of visits did not have

significant impact on choices. These findings support commercialization of veterinary services in marginalized areas where the delivery of essential animal health services such as disease control programs are often viewed as a public good. In order to enhance delivery of veterinary services in these areas, it is proposed that public and private means are investigated to support qualified veterinarians and to strengthen the activities of untrained personnel operating drug outlets.

**Keywords** Pastoralism · Animal health services · Livestock policy · Kenya

## Introduction

The pastoralist communities living within east Africa have been described to be faced with more challenges in their way of life due to population growth; loss of grazing land to crop agriculture, ranching, game parks, and rapid urban growth; increased commoditization of the livestock economy; and dislocations brought about by drought and famine (Elliot 2001). In addition, these pastoralists face challenges on access to affordable and reliable veterinary services (Leyland and Catley 2002; Okwiri et al. 2002).

The delivery of animal health services in marginalized areas have been hampered by several challenges including lack of resources by government and the low incentives for setting up private practices (Leonard 2004; Ngeiywa and Masake 2009). Following the introduction of structural adjustment program by the World Bank, which proposed privatization of veterinary services, the growth of private veterinary delivery system was not uniform across different livestock systems (Oruko et al. 2000). In the smallholder production system where there was ready market for livestock and livestock products and where farmers were considerably wealthier

---

J. O. Onono (✉) · J. Rushton  
Veterinary Epidemiology and Public Health Group,  
Department of Veterinary Clinical Sciences,  
Royal Veterinary College, Hawkshead Lane,  
AL97TA, Hatfield, UK  
e-mail: jonono@rvc.ac.uk

J. O. Onono  
Department of Public Health, Pharmacology and Toxicology,  
College of Agriculture and Veterinary Sciences,  
University of Nairobi, P.O. Box 29053-00625, Nairobi, Kenya

B. Wieland  
Swiss Agency for Development and Cooperation (SDC),  
Sukhbaatar District,  
Ulaanbaatar, Mongolia

and had knowledge on good husbandry practices, the growth and establishment of private delivery system had fewer challenges (FARM-Africa 2003; Leonard 2004). On the other hand, under the arid and semiarid areas, where the government veterinary services had never been properly organized, the growth of private veterinary delivery system faced several constraints including lack of opportunities for diversification of veterinary services and poor cash flows, and therefore, few practitioners established veterinary practices in this areas (Okwiri et al. 2002; Young et al. 2003). In these pastoral areas, the idea of community-based animal health-care workers (CBAHWs) who were facilitated by the non-governmental organizations emerged to fill the gap left by this inadequate veterinary service delivery (Leyland and Catley 2002; Mugunieri et al. 2002; Okwiri et al. 2002).

A review of several studies that assessed the impact of these CBAHWs within these marginalized areas have shown that pastoralists who rely on CBAHWs for animal health services realized a high level of production from their livestock as compared to those who did not obtain these services (Leyland and Catley 2002). However, to date, the economic sustainability of CBAHWs still remains unknown; besides, policy on delivery of animal health care still has not incorporated their role despite the idea gaining momentum in the arid and semiarid areas within Kenya (Mugunieri et al. 2004). On the other hand, veterinary drugs are available in stockist shops also referred to as “the Duka model,” and pastoralists and other farmers have got access to this for treatment of their sick animals. In some areas, these drugs are also sold to pastoralists and farmers through illegal market channels (Mugunieri et al. 2002). The livestock farmers in these areas rely on drug manufactures inserts, drug leaflets, and advice from private paraveterinary professionals for information on how to administer these veterinary products, but misuse of these drugs is rampant (Okwiri et al. 2002; Machila et al. 2007; Ngeiywa and Masake 2009; Maingi and Njoroge 2010). The use of ethno-veterinary products for treatment of sick animals is also common under these extensive cattle systems (Ole-Miaron 2003). According to this author, the Maasai herbalists have a strong knowledge on ethnomedical products that are used for treatment of most prevalent animal and human diseases.

While the provision of veterinary services had been privatized in Kenya and other countries within sub-Saharan Africa, the growth of private veterinary delivery system in marginal areas still faces constraints, while factors that can be targeted for interventions to improve the quality of services are not well documented. The aim of this study was to identify some specific attributes that could be targeted for intervention to enhance access to quality animal health services by pastoralists. The results from this study would be useful for policy formulation on delivery of animal health

services in semiarid pastoral areas of Kenya and other similar production systems.

## Materials and methods

### Study area

The study was conducted in Narok County, Kenya, an area of about 15,000 km<sup>2</sup> that lies between 0°50' and 2°05' S and 35°58' and 36°00' E and is inhabited by the Maasai community. It receives between 500 and 1,800 mm of rainfall per annum, and temperature ranges between 5 and 28 °C (ALRMP 2007).

### Selection of study locations

Location was used as the sampling unit for this study. This is an administrative area that falls within a division and a district in that sequence. These locations were randomly selected from a list obtained from the government office. Nine out of 17 locations in Osupuko and Mau East divisions were selected for this study. The two divisions were initially purposively selected because they had high number of cattle both in Narok South and North districts, respectively, based on advice from the local veterinary officers. The selected locations included Enoosupukia; Suswa; Keekonyokie; Ntulele; Ongata Naado; Naroosura; and Elangata Enterit, Enkutoto, and Ntuka.

### Household data collection

A pretested semi-structured questionnaire was administered to pastoral household heads by enumerators who were recruited from these locations and trained by the first author. These enumerators were identified with the assistance from local veterinary officers and government administrators. They were either secondary school leavers or college graduates with training in general agriculture or animal health. In Narok South district where no college graduates were found, veterinary scouts who work closely with the local veterinary officer were recruited. These veterinary scouts acted as early warning system by reporting outbreak of livestock diseases to government officers, besides helping in vaccination campaigns. The veterinary scouts recruited for this study had secondary education. They had also obtained basic training on identification of different diseases by the local veterinary officer. The questionnaires were administered through systematic transect walks made within the locations while passing every second homestead (manyattas) following a sampled homestead. In case a household declined to participate, the next household in the order was interviewed instead. A minimum of 30 questionnaires were administered

per study location, but in densely populated locations, Keekonyokie, Ongata Naado, and Ntulele, more questionnaires were administered. A total of 350 household heads were interviewed during this study. The data sought included the following: sex of respondent, sex of household head, age of respondent, level of education for household head, cattle herd sizes, who were the preferred veterinary service provider to the household, what was the estimated distance in kilometers covered by household members while seeking veterinary services from the nearest provider, what was the estimated time in hours spent while seeking veterinary services, how many times in a month did the household visit the preferred service provider, how much money did the household spend as transport cost to the preferred provider, and how much money did the pastoralist spend during their last visit to the preferred service provider.

#### Data management and analysis

The data collected were entered into a database developed in Microsoft Access. Quantitative data were exported and analyzed in a statistical package “IBM® SPSS® version 20.” This was performed for the cost incurred on transport, time spent while seeking providers, distance covered, and amount of money spent by pastoralists' per visit to health-care provider. Other household factors were also analyzed as follows: sex of household head, sex of respondent, level of education of household head, and cattle herd structure and sizes. A Cox proportional hazard regression model was used to evaluate the determinants of choice for veterinary service providers, and significance level was set at 5 %. The choice for a drug stockist was coded=1, and government veterinarian, coded=0; the base outcome for the regression analysis was the provision of veterinary services by the drug stockists. The choices for service providers were fitted as dependent variables, while other factors including the cost per visit to the provider, sex of household head, sex of respondent, level of education of household head, location, cost of transport, the distance covered, cattle herd sizes, and the time spent were all fitted as explanatory variables. The cost incurred on veterinary services per visit, cost incurred on transport, distance covered, and herd sizes were transformed to logarithm base 10 values before the analysis.

## Results

#### Description of household member's roles on cattle husbandry

Of the total respondents, 14.55 % were female, while 85.5 % were of male gender. The female-headed households constituted 11.21 % of the total respondents, while male-

headed households were 88.97 %. Most of the respondents had no formal education (66.47 %), while the others had varied level of education: primary (18.95 %), secondary (10.79 %), and college (3.79 %). The men were responsible for the purchase of cattle (83.7 %), sale of cattle (84.2 %), and treatment of sick cattle (70.33 %), while women were responsible for milking (83.8 %). Herding of cattle was the responsibility of hired workers (54.01 %), men (14.54 %), and sons (13.35 %). The average age for all respondents was  $42.33 \pm 13.05$  years with an average age for men being  $41.67 \pm 13.41$  and  $44.69 \pm 11.04$  years for women.

#### Description of determinants for choice of veterinary service providers

Most pastoralists obtained veterinary services from drug stockists (87.76 %), while only 12.24 % were seeking government services. The average distance covered while seeking services from the drug stockists and government veterinarians was 10.93 and 12.56 km, respectively. The average number of visits that pastoralists made to drug stockists and government veterinarians per month was 5.54 and 3.19 times, respectively, while the average cost incurred on transport to the drug stockists and the government veterinarians was US\$4.7 and 7.4, respectively. The cost incurred on veterinary services per visit to the drug stockists and government veterinarians was US\$15.33 and 31.88, respectively; however, this observed difference was not statistically significant. The results in Table 1 summarize the values of determinants for choice of animal health service provider as reported by pastoralists.

The factors that significantly influenced the choice of animal health service providers in this pastoral area included the distance ( $p$  value<0.01), time spent while seeking service providers ( $p$  value=0.017), and cost incurred on transport ( $p$  value=0.003). The other household factors including sex of household head, sex of respondent, cost incurred on veterinary services per visit, age of respondent, cattle herd sizes, the number of visits made per month to the provider, and the level of education of household head did not significantly influence the probability of choice. The cost incurred on transport was 19.73 times more likely to be a determinant for choice of a drug stockist as compared to the government veterinarian, while time spent while seeking the service provider was 1.53 times more likely to be a determinant for choice of a drug stockist as compared to the government veterinarian. Conversely, the distance covered was 0.04 times more likely to be a determinant for choice of a drug stockist as compared to the government veterinarian. Table 2 summarizes the risk ratios, chi-square values, and 95 % confidence limits of risk ratio for factors that were determinants for choice of animal health service provider.

**Table 1** Average measures for factors influencing access to veterinary services provision to pastoralists

Factors	Mean	Median	SD	Minimum	Maximum
Distance to veterinarian (km)	12.56	7.5	11.51	0.4	35
Distance to drug stockist (km)	10.93	8	9.41	0.3	46
Time to veterinarian (h)	2.30	2	1.43	0.25	5
Time to drug stockist (h)	1.54	1	1.25	0.083	8
Visits to veterinarian	3.19	2.5	2.03	1	8
Visits to drug stockist	5.54	3	7.69	1	30
Transport cost to veterinarian (\$)	7.4	6.25	6.1	0.63	25
Transport cost to drug stockist (\$)	4.7	2.5	4.34	0.63	25
Cost on veterinarian (\$)	31.88	18.75	30.8	1.25	100
Cost on drug stockist (\$)	15.33	6.25	22.88	0.38	125
Herd size <sup>a</sup>	97.15	65	94.18	7	435
Herd size <sup>b</sup>	91.41	49	134.6	2	1,281

Exchange rate=US \$ 1=KES 80

SD standard deviation, km kilometer, \$ US \$

<sup>a</sup>Herd sizes in veterinarian treated herds<sup>b</sup>Herd sizes in drug stockists attended herds

## Discussion

Most household heads who were approached during the study granted an opportunity for interview, and none expressed any reason for nonparticipation. There was a lot of enthusiasm among the interviewees on sharing the information and their experiences with the enumerators. Most respondents were middle-aged people with experience on cattle husbandry, but other members of the community who were heading households were also interviewed. The women-headed households were not common; however, widows and other elderly women were interviewed as they too carried out roles played by household heads. In male-headed households, women often preferred that men respond to questions, and a few of these were revisited when men were away at the time of visit.

The men were in control of livestock resources as shown by their involvement in most activities that entailed income and expenditure such as sales, purchases, and treatment of sick cattle. The women, on the other hand, had adequate

access to milk produced from cattle, and this could probably be due to their role in preparing food for the household. This women's role can be viewed as an opportunity for educating them on value addition to the milk produced from cattle for purposes of marketing in order to empower them economically, besides the opportunities for training on hygienic milk handling that will also have an impact on health status of the household members and other people who currently are consuming raw milk that exposes them to zoonoses such as brucellosis which is prevalent under this extensive production system (Muriuki et al. 1994; Kangethe et al. 2007).

The drug stockists dominated delivery of animal health services under this pastoral area over the government veterinarians. A few veterinary scouts operating closely with local veterinarian were also present; however, they were not fully engaged in animal health service delivery. Their main role was to report outbreak of diseases to the local veterinarian and occasionally assist during vaccination campaigns.

This present study have identified time spent while seeking veterinary services, the cost incurred on transport, and

**Table 2** Chi-square values, risk ratios, and their confidence intervals for determinants of choice for veterinary service providers by pastoralist

Factors	Chi-square	Risk ratio	95 % lower bound	95 % upper bound
Time spent	5.69	1.53*	1.08	2.16
Transport cost	8.61	19.73**	2.69	144.7
Distance covered	22.64	0.04**	0.01	0.14
Herd size	0.50	1.41	0.55	3.62
Cost of service	0.04	1.13	0.58	7.4
Number of visit	0.53	1.04	0.94	1.14
Age of respondent	0.10	1.01	0.97	1.05
No education	2.77	–	–	–
Primary education	1.11	1.66	0.65	4.28
Secondary education	2.34	2.28	0.79	6.52

\* $p < 0.05$ ; \*\* $p < 0.01$

the long distances that pastoralists travel as the main factors influencing choice of animal health service provider and hence acting as constraints to access for veterinary services in pastoral areas. Other challenges that were previously documented to affect animal health service delivery in pastoral areas include lack of adequate credit facilities to set up private practices, poor cash flow, sale of veterinary products through black market, and long distances that pastoralists and animal health-care providers have to travel to either access or deliver animal health services (Okwiri et al. 2002; Leonard 2004; Ngeiywa and Masake 2009).

Even though, from this study, the distance covered was not as likely to influence the choice of a drug stockist, it was previously described as a factor that determined choice of a service provider in other production systems in Kenya and Nepal (Irungu et al. 2006; Dirga and Shrestha 2012). The estimated distance to health-care providers that was used for this analysis was based on the opinion of pastoralists and not the actual distance as measured between their homestead to the nearest veterinary service provider and, therefore, may have some degree of bias. However, the average cost incurred on transport could be argued to be positively correlated to the distance traveled. This relationship may support previous finding that distance is a significant choice factor since transport cost was the main choice-specific attribute that was identified to affect the choice probability for a drug stockist. In a previous study, distance that animal health-care providers must travel under pastoral areas before they can break even was hypothesized to be prohibitive for the development of an efficient animal health-care delivery system (Ngeiywa and Masake 2009). Several authors have also described it as the main cause of high transaction costs borne by producers and health-care providers in the delivery of veterinary services in marginalized areas (Ahuja et al. 2003; Ahuja 2004; Leonard 2004). Similarly, another study had postulated that time spent while seeking animal health services and the distance covered could be used to estimate the opportunity cost associated with the provision of animal health-care services in pastoral areas (Heffernan 2001). The findings from our study support this hypothesis, since time spent while seeking the veterinary services and the cost of transport were the main determinants for choice of animal health service providers.

Although the age of respondent and level of education of household head were previously reported to be inversely related to the choice probability for a service provider in two studies conducted in Kenya and Nepal (Irungu et al. 2006; Dirga and Shrestha 2012), they had no significant impact on choices in the present study. These could be due to differences in the production systems. The present study covered Maasai pastoral area, while these two studies were conducted with sedentary cattle keepers. Other factors

including sex of respondent and sex of household head were also not significant choice attributes.

The cost incurred on veterinary services per visit by pastoralists did not differ significantly between the main service providers. This was previously reported in India, where it was observed that the poor did not have adequate access to government veterinary services and that they paid market level fees for animal health services despite the government running a subsidized veterinary delivery system (Ahuja et al. 2003). This has also been documented for many countries within sub-Saharan Africa (Leonard 2004). The belief that poor communities cannot afford veterinary services offered by the private actors and that they are only better served through subsidized government veterinary services, therefore, have no merit. These subsidized services would also tend to benefit the rich who have power and influence and can conveniently use their position to get services as opposed to the poor members of the community as was demonstrated in Orissa in India (Ahuja et al. 2003).

From our findings, it would be advisable for government veterinary administration to subcontract some disease control activities including tick control, vaccinations, and other essential services to the private practitioners, while they retain the overall role of supervision, quality control, and legislation. This will ultimately enhance access to quality veterinary services to the poor pastoralist's community since most government veterinary departments, as currently organized and funded, lack the ability to deliver services. However, the private sector service providers would be able to operate effectively as they are driven by the desire to make profits; the pastoralist would be willing to pay for better quality veterinary services, while the government veterinary department will be acting to monitor and regulate the quality of services and would only intervene when there is an obvious sign of market failure through enhanced legislation and arbitration.

Most of the drug stockists had no formal training in animal health. This is an observation that had been made in previous studies conducted under the arid and semiarid pastoral areas in Kenya (Mugunieri et al. 2002; Okwiri et al. 2002; Bett et al. 2004). Additionally, they operated illegally without relevant government approvals (Mugunieri et al. 2004). Furthermore, relying on these drug stockists or CBAHWs for the delivery of veterinary services raises questions on the appropriateness of advice that pastoralists get on handling and administration of veterinary drugs. Nonetheless, their businesses seemed to grow as they are responsive to the needs of pastoralists, in addition to their willingness to accept low pay for animal health services provided. These drug stockists can be incorporated in the early identification and reporting of outbreak of diseases in their areas of operation as was described for the CBAHWs model (Admassu 2002; Leyland and Catley 2002; Okwiri et

al. 2002). This would strengthen disease surveillance and monitoring within the pastoral areas. The effectiveness of these drug stockists can be enhanced if they work under supervision of a professional veterinarian, while opportunities for training should be provided as was suggested for CBAHWs (Admassu 2002). Although CBAHWs who are supported by non-governmental organizations were not common within this study area, their benefits to community have been described, and these include provision of quality drugs, offering advice on use of veterinary drugs, provision of advice on the control of both endo- and ectoparasites, and quick response to outbreak of notifiable diseases, besides their knowledge of prevalent livestock diseases in their area of operations (Mugunieri et al. 2004; Ngeiywa and Masake 2009). This is in addition to increased production potential from pastoral herds that rely on services offered by these CBAHWs (Leyland and Catley 2002).

### Conclusion and recommendation

This study has identified the cost incurred on transport, time spent while seeking services, and the distance covered as the specific attributes that influences the choice of animal health service provider under this pastoral area. Additionally, the cost of veterinary services did not differ significantly between the animal health service providers. The study shows market failure in the delivery of veterinary services and potential suboptimal use of animal health technologies. In order to enhance the delivery of quality animal health services in marginalized areas, it is proposed that public and private means are investigated to support qualified veterinarians with the aim of commercializing disease control activities offered as public good such as vaccination and also to strengthen the current activities of untrained personnel operating drug outlets.

**Acknowledgments** The first author acknowledges the financial support from the Commonwealth Scholarship Commission, UK. The veterinary officer in Narok County Dr. Omori, his assistants Mr. Japheth Kilonzo and Mr. Joseph Kotonto for their assistance during fieldwork, and the Maasai community for their active participation and willingness to share information are also acknowledged.

**Conflict of interest** The authors declare that they have no conflict of interest.

### References

- Admassu, B. 2002. Community-based animal health service delivery: the benefits of veterinary professional participation and opportunities of CAH service delivery. In: Harmonizing community-based animal health service delivery in the Somali National Regional State, Ethiopia Jijiga, Ethiopia.
- Ahuja, V., 2004. The economic rationale of public and private sector roles in the provision of animal health services, in: Veterinary institutions in the developing world: current status and future needs. *Revue Scientifique et technique* 23, (1), 33–45
- Ahuja, V., Morrenhof, J. and Sen, A., 2003. The delivery of veterinary services to poor communities: the case of rural Orissa, India. *Revue Scientifique et technique* 22, (3), 931–948
- ALRMP, 2007 Office of the President: Arid Lands Resource Management Project July 2006–June 2007, Narok district: Republic of Kenya
- Bett, B., Machila, N., Gathura, P. B., McDermott, J. J. and Eisler, M. C., 2004. Characterisation of shops selling veterinary medicines in a tsetse-infested area of Kenya. *Preventive Veterinary Medicine* 63, 29–38
- Dirga, K. L. and Shrestha, S., 2012. Determinants of farmer's choice for veterinary service providers in Nepal Mountains. *Tropical Animal Health and Production* 44, 1163–1168
- Elliot, F., 2001. East African Pastoralism in Transition: Maasai, Boran, and Rendille Cases. *African Studies Review* 44, (3), 1–25
- FARM-Africa, Ed. 2003. Delivering affordable and quality animal health services to Kenya's rural poor: FARM-Africa's Experiences, FARM-Africa Meru & Tharaka-Nithi Dairy Goat and Animal Healthcare Project, FARM-Africa.
- Heffernan, C., 2001. Consumer preferences and the uptake of animal healthcare by the poor: A case study from Kenya. *Journal of International Development* 13, 847–861
- Irungu, P., Omiti, J. M. and Mugunieri, L. G., 2006. Determinants of farmers' preference for alternative animal health service providers in Kenya: a proportional hazard application. *Agricultural Economics* 35, (1), 11–17
- Kangethe, E. K., Arimi, S. M., Omore, A. O., McDermott, J. J., Nduhiu, J. G., Macharia, J. K. and Githua, A., 2007. Testing for antibodies to *Brucella abortus* in milk from consumers and market agents using Milk Ring Test and Enzyme Immunoassay. *The Kenya Veterinarian* 31, 18–21
- Leonard, K. D., 2004. Tools for the new institutional economics for reforming the delivery of veterinary services. In: Veterinary institutions in the developing world: current status and future needs *Revue Scientifique et technique* 23, (1), 47–57
- Leyland, T. and Catley, A., 2002 Community-based animal health delivery systems: improving the quality of veterinary service delivery. *World Veterinary Congress: Tunis, September 2002*
- Machila, N., Emongor, R., Alexandra, P. S., Welburn, C. S., McDermott, J., Maudlin, I. and Eisler, C. M., 2007. A community education intervention to improve bovine trypanosomiasis knowledge and appropriate use of trypanocidal drugs on smallholder farms in Kenya. *Agricultural Systems* 94, 261–272
- Maingi, N. and Njoroge, G. K., 2010. Constraints on production, disease perceptions and ticks and helminths control practices on dairy cattle farms in Nyandarua District, Kenya. *Livestock Research for Rural Development* Volume 22, Article #138. Retrieved March 12, 2012, from <http://www.lrrd.org/lrrd2022/2018/main22138.htm>
- Mugunieri, G. L., Omiti, J. M. and Irungu, P., 2002 Animal Health Service Delivery Systems in Kenya's Marginal Areas under Market Liberalization: A Case for Community-Based Animal Health Workers, International Food Policy Research Institute.
- Mugunieri, G. L., Irungu, P. and Omiti, J. M., 2004. Performance of community-based animal health workers in the delivery of livestock health services. *Tropical Animal Health and Production* 36, (6), 523–535
- Muriuki, S. M. K., Arimi, S. M. and McDermott, J. J., 1994. Brucellosis as a cause of human illness in Narok district, Kenya. *The Kenya Veterinarian* 18, (2), 537–539
- Ngeiywa, K. J. and Masake, R. A., 2009 The Status of Community Animal Health in Kenya: OSRO RAF 801 EC; Technical Report; vedaman consultants.

- Okwiri, F. O., Kajume, J. K. and Odondi, R. K., 2002. An assessment of the economic viability of private animal health service delivery in pastoral areas in Kenya: summary of findings. *The Kenya veterinarian* 25, 24–27
- Ole-Miaron, J. O., 2003. The Maasai ethnodagnostic skill of livestock diseases: a lead to traditional bioprospecting. *Journal of Ethnopharmacology* 84, (1), 79–83
- Oruko, O. L., Upton, M. and Mcleod, A., 2000. Restructuring of animal health services in Kenya: Constraints, prospects and options. *Development policy review* 18, 123–138
- Young, J., Kajume, J. and Wanyama, J., 2003 *Animal Health Care in Kenya: The Road to Community-based Animal Health Service Delivery*, Overseas Development Institute 111 Westminster Bridge Road London SE1 7JD UK. Working Paper 214.