

Full Length Research Paper

The status of livestock technologies and services in the Southern Maasai rangelands of Kenya

Simon P. W. Omondi*, John A. Kidali, Irene Ogali, John M. Mugambi and Jacob Letoire

National Veterinary Research Centre, Kenya Agricultural Research Institute, Kenya.

Received 10 December, 2012; Accepted 25 March, 2014

This study was carried out in Mashuru district, Kajiado County in the Southern Maasai rangelands of Kenya to assess the status of livestock technologies and services. Data was collected using a survey of 380 households, participatory stakeholder workshops, five focus groups with pastoralists, and key informant interviews. Analysis was done using frequency counts, percentages and chi square test. The findings of this study revealed that access to livestock technologies and services was hampered by institutional (77%), technological (12%), environmental (9%) and economic (2%) factors. Inadequate government staff, long distances to service providers and weak institutional linkages were the most common problems encountered by 27, 20 and 17% of pastoralists respectively. Technologies perceived to be important included: Availability of water and water harvesting technologies (52%); pastures (28%); vaccines and drugs (8%); dual purpose breeding stock for milk and meat production adapted to dry climatic conditions (4%); market infrastructure and information (4%); management skills (3%), and small equipment (1%). In view of problems encountered in accessing livestock services, Maasai pastoralists preferred the establishment of one-stop-shop centres stocked with priority inputs and technologies ($P < 0.05$). The willingness of pastoralists (65%) to pay for this service should attract public-private partnerships to support livestock productivity in rangelands.

Key words: Livestock technologies and services, pastoralists, Maasai rangelands, multi-institutional linkages.

INTRODUCTION

There is great potential for improvement of livestock productivity in Arid and Semi-Arid Lands (ASALS) in Sub Saharan Africa and Kenya in particular, yet this potential has not been fully realized (Adugna and Aster, 2007), mainly due to divergent research, extension and other development approaches, which are largely uncoordinated (Omoro et al., 2009) as well as constraints associated with inadequate feed resources, disease

control strategies and poor infrastructure (Mgheeni et al., 1992).

Following liberalization policies of 1990s in which most African governments reduced involvement in provision of free livestock services (Den Haan and Bekure, 1991), the delivery of livestock services in Sub Saharan Africa, including Kenya, has seriously declined over the last two decades (Tambi and Maina, 1994). Consequently, the

*Corresponding author: E-mail: spwomondi@yahoo.com. Tel: +254 717 444 923.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](#)

majority of pastoralists now rely more on drug manufacturers and other service providers for information which is often compartmentalized because it is given by different service providers dealing with different commodities. Given that most of Kenya's red meat is produced in ASALS, access to productivity enhancing technologies is of utmost importance. This study sought to make an assessment of the status of livestock technologies and services on the premise that supporting livestock keepers in pastoral areas to access necessary inputs and services has the potential to improve productivity and commercialization of livestock in the rangelands.

MATERIALS AND METHODS

Study area

Mashuru district lies at longitude 36.70° E and 37.50° E and latitude 1.50° S and 2.20° S. It occupies an area of 2192.6 km² with a population of 41 655 persons consisting of 20974 males and 20681 females, grouped into 8810 households with a population density of 17 inhabitants/ km² (District statistics report, 2010). The occupants of the district are predominantly Maasai pastoralists keeping cattle, goats, and sheep, under extensive and ranching production systems. It is a semi arid region in Agro ecological IV to VI characterized by low rainfall of less than 500 mm per annum and temperatures ranging from 24 to 37°C (Jaetzold et al., 2006). The low and often unreliable rainfall makes pastoralism the only suitable economic activity. The most dominant vegetation consist mainly of perennial grasses, shrubs and thorn trees.

Sample size, study variables and data collection methods

All pastoralists in the district (N = 8810) formed the population from which a sample size was determined using the formula by Kothari (2008): $n = N / 1 + N (e^2)$, where n is the required sample size, N = estimated study population and e = marginal error set at 5%. Quantitative and qualitative data were collected through a survey of 380 households, stakeholder workshops, five focus group discussions, ten key informant interviews and transect observations. The data collected included: livestock species kept by pastoralists and preferences, common diseases, important inputs and services, service provision by public and private sector, constraints related to access to inputs, preferred interventions and willingness to pay for services. Quantitative data was collected using a structured questionnaire administered to 380 households randomly selected from ten locations in the district (Kothari, 2008). Qualitative data was gathered through workshops, focus group discussions and interviews with community leaders and ministry of livestock staff purposively selected to provide a deeper understanding of the status of livestock technologies and services (Kumar, 1993; Mariner, and Paskin 2000; Kruger, 2002).

Data analysis

Data was entered in Statistical Package for Social scientists version 19 to produce frequency counts and percentages of various livestock technologies and services, while chi square test was used to analyse intervention options and willingness to pay (Kothari, 2008; Mugenda and Mugenda, 2003).

RESULTS

Livestock production

Table 1 shows the results of common livestock species kept. Cattle were the most important source of income, milk, meat as well as for payment of dowry. Goats and sheep were the next important species for income and meat, while donkeys were kept mainly for transport of water and firewood, mainly by women. Chicken were ranked last because they are regarded by most pastoralists as an enterprise for women and children.

Priority diseases

Priority diseases to livestock production as identified from focus group discussions and interviews and ranked through household survey are listed in the Table 2. Foot and Mouth Disease (FMD) and Contagious Caprine Pleuropneumonia (CCPP) were ranked as most important in cattle and goats respectively. Pastoralists associated their occurrence with introduction of new animals into the herd due to purchases, movements or interaction at watering points. Black quarter and Newcastle were priority diseases in sheep and local chicken respectively. Endemic diseases were mentioned as East Coast Fever in cattle and Foot rot in goats and sheep.

Inputs and services

Input and services perceived to be important are listed and ranked in Table 3. Among the pastoralists surveyed in the district, 52% (N = 198), 28% (N = 105), 8%, (N = 31) and 4% (N =17) mentioned water, pasture, vaccines and drugs, and availability of breeding stock / forage germplasm respectively as the most important livestock inputs.

Public versus private service providers

A comparison of the benefits from public vs. private service providers as perceived by pastoralists is shown in Table 4. The nearest service provider was the livestock owner himself who were perceived to be cheap and accessible, though not efficient. All the pastoralists buy drugs from agrovets and treat their own animals. Public service providers such as the extension department were neither accessible nor available when required though perceived to be efficient and gives advice.

Problems in accessing inputs and services

Problems encountered by pastoralists while accessing

Table 1. Livestock species kept in order of importance and preferences as perceived by pastoralists.

Livestock species	Frequency (f) (N=380)	Percentage	Ranking reasons for preference				
			1	2	3	4	5
Cattle	270	71.1	Income (136)	Milk (57)	Meat (38)	Dowry (25)	Hides(14)
Goats	51	13.4	Income (30)	Meat (9)	Milk (7)	Skin (5)	
Sheep	34	8.9	Income (20)	Meat (9)	Skin (5)		
Donkey	13	3.4	Transport (11)	Income(2)			
Chicken	12	3.2	Meat(8)	Income (4)			

Table 2. Important diseases to pastoralists.

Livestock species	Priority diseases in terms of impact on mortality, morbidity and loss of income								
	1	N	%	2	N	%	3	N	%
Cattle	FMD	236	62.2	Anthrax	103	27	ECF	41	10.8
Goats	CCPP	216	56.9	Black anthrax	89	23.5	Foot rot	75	19.6
Sheep	Black quarter	232	61	Foot rot	133	35	Enterotoximea	15	4
Chicken	New castle	253	66.7	Fowl pox	127	33.3			

FMD: Foot and Mouth Disease; ECF: East Coast Fever; CCPP: Contagious Caprine Pleuropneumonia; N: Number of respondents.

Table 3. Inputs and services perceived to be important by pastoralists.

Input / service	Frequency	Percentage
Water	198	52
Pasture	105	28
Vaccines and drugs	31	8
Germplasm: Breeding stock, forage species	17	4
Market information	14	4
Capacity building	10	3
Small equipment : spray pumps, syringes, buddizo	5	1
	N=380	100%

Table 4. Merits of public versus private sector service providers as perceived by pastoralists.

Merits	Public sector		Private sector		
	Government agencies	CAHW	NGO	Agro-vet shops	Self
Cheap	1	1	1	0	1
On time	0	1	0	0	1
Efficient	1	0	0	0	0
Available	0	1	0	1	1
Near to pastoralist	0	1	0	0	1
Gives advice	1	1	1	0	0
Accessibility	0	1	0	1	1
Better known	0	1	0	0	1
Quick to respond	0	1	0	0	1
Sub-total points	3	8	2	2	7
Total points	3			19	

1 = Yes; 0 = No; CAHW: Community Animal Health Workers; NGO: Non Governmental Organizations; Source: Stakeholder workshops and focus groups

Table 5. Problems encountered by pastoralists in accessing inputs / services.

Factor	Problem	Frequency	Percentage by factor	Percentage by problem
Institutional	Inadequate Government livestock service providers	102	27	77
	Long distance to livestock input service providers	77	20	
	Weak institutional linkages	65	17	
	Lack of feedback from previous projects	20	5	
	Government and donor funded project priorities contrast with community interests	10	3	
Technological	Inadequate infrastructure – roads, power, water	22	5	12
	Unavailability of cold chain for vaccine portability	25	7	
	Poor packaging: mismatch between quantity demanded and quantity sold	19	5	
Economic	High cost of drugs	7	2	2
Environmental	Recurrent drought	33	9	9
		N = 380	100%	100%

Table 6. Suggested interventions to address constraints to livestock technologies and services.

Intervention	Frequency	Percentage	Willingness to pay	
			Yes	No
Establish a one-stop-shop resource centre for inputs	247	65	160 (64.8%)	87 (35.2%)
Capacity building of pastoralists	79	21	61 (77.2%)	18 (22.8%)
Improve market facilities and development of livestock markets	38	10	4 (10.5)	34 (89.5)
Improve infrastructure especially roads and water	8	2	2 (25%)	6 (75%)
Employ and deploy more extension staff in ASALS	8	2	2 (25%)	6 (75%)
		N= 380	100	

livestock services are shown in Table 5. Institutional factors mainly inadequate government services, long distances to input providers and weak institutional linkages were identified as the common problems encountered by 27, 20 and 17% respectively of the pastoralists surveyed. Other pressing problems were identified as recurrent drought (9%), unavailability of cold chain for vaccine storage (7%) as well as inadequate infrastructure (5%) particularly roads, water and power. Government and donor priority contrasting with community interests was mentioned by 5% of the pastoralists.

Interventions

Interventions suggested by pastoralists to address constraints to accessing livestock technologies and services are shown in Table 6. Out of the 380 households surveyed, 247 prefer the establishment of a one-stop-

shop-resource centre for inputs within the community, while 79 and 38 households respectively suggested capacity building of pastoralists and improvement of livestock marketing and facilities. On willingness to pay for inputs and services, 65% of respondents showed willingness to pay for a resource centre, while 21 and 10% would pay for capacity building and market facilities respectively. Only 2% of the households were willing to pay for employment of extension staff and construction key infrastructure such as roads.

DISCUSSION

Livestock production

The findings of this study showed that cattle are the most important livestock species kept mainly for income, milk, meat and dowry, while goats and sheep are kept for income, meat and skins. These results agree with those

found by Adugna and Aster (2007) in the pastoral production system of Southern Ethiopia. The sahiwal breed is dominant and is preferred due to its dual purpose traits of milk and beef production and adaptability to the dry climatic conditions. Contrary to popular opinion held by outsiders that the Maasai kept livestock for prestige and numbers, we did not find this mentioned as one of the objectives in all focus group discussions and survey throughout the district. These results agree with those obtained by Cossins (1985) in the Sahel region, who argued that pastoralists are not attached to unproductive animals as outsiders believe. Rather, it is the result of the environment and the multiple objectives for keeping livestock which determines the number of animals a family can keep.

Livestock diseases

Priority diseases as perceived by pastoralists in terms of morbidity, mortality and loss of incomes were: Foot and Mouth Disease (FMD) and Anthrax in cattle; Contagious Caprine Pleuropneumonia (CCPP) in goats; Black Quarter in sheep and New castle disease in chicken. Most of these diseases are transboundary animal diseases (TADs) caused by interaction of infected and healthy animals during extensive movements, communal watering or newly purchased animals in the herd. TADs have been known to be priority diseases in pastoral areas (Perry et al., 2005). However, there is little success in control strategies as the public veterinary service appears in these areas only when there is an epidemic. These diseases have far reaching economic and social consequences at household, community and national levels and hence control cannot be left to the private sector or pastoralists as a result of reduced state funding (Perry et al., 2005). Integration of pastoralists in management of these diseases is of utmost importance.

Inputs and services

Water, pasture, drugs and vaccines, breeding stock were ranked as most important inputs and limiting constraints to livestock production as perceived by 52, 28, 8 and 4% of the pastoralists respectively. Access to drugs and vaccines is particularly a challenge since service providers are found only in large towns. This result is consistent with the ministry of livestock reports which observe that there is low input use owing to poor distribution of input suppliers and challenges associated with infrastructure (GOK, 2008)

Public vs. private service providers

The findings of this study show that the Maasai

pastoralists are mainly served by the private sector. This is because they are readily available and accessible. Though the public sector is not visible on the ground, they are perceived to be more competent and have better facilities compared to private sector. However, Mugunieri et al. (2004) compared productivity of livestock herds among farmers who utilized the services of community-based animal health workers and veterinarians and found that they were not significantly different. Hence there is need for linkages with private sector for efficient and effective delivery of services.

Factors influencing access to inputs and intervention strategy

The main factors influencing access to inputs and services identified by pastoralists and other stakeholders in the area are predominantly institutional (77%) rather than technological (12%). These included inadequate government extension staff long distances to service providers, weak institutional linkages and inadequate infrastructure. Priority interventions suggested addressing the problem of inputs and technology availability and accessibility were establishment of a one-stop-shop for inputs, capacity building of pastoralists improvement of market facilities, and road and water infrastructures. The majority of pastoralists (65%) expressed willingness to pay for the inputs centre and capacity building ($p < 0.05$). However they were not willing to pay for improvement of roads and water since they perceived them as public services, even though these were important infrastructure in rangelands. This finding on pastoralists preferred intervention concurs with Omiti and Irungu (2002) who observed that most interventions in the Kenyan pastoral areas have been intermittent and sporadic in nature, often in response to crises such as drought and famine.

Conclusion

The findings of this study indicate that access to livestock technologies and services in Mashuru district in the Southern rangelands of Kenya are hampered by institutional rather than technological factors, and need to be strengthened through effective extension, stakeholder linkages and improved infrastructure. In view of problems encountered in accessing livestock inputs and technologies, pastoralists prefer the establishment of one-stop-shop centres stocked with priority inputs and key information pertaining to livestock production, health and markets. The willingness of the majority of pastoralists to pay for this service should attract public-private partnerships to support livestock productivity in rangelands. Towards this endeavor is the implementation of appropriate models for the provision of livestock services that take into account local contexts in many

areas especially where service markets have not worked.

ACKNOWLEDGEMENTS

This study was made possible through the cooperation and collaboration of pastoralists, the provincial administration particularly the support from Chiefs, District livestock production and veterinary staff, livestock traders, market councils and NGOs, especially the World Vision in Mashuru district, Kajiado county. Funding for this study was made possible through KARI-KAPAP project. This paper is submitted for publication with permission from Director, Kenya Agricultural Research Institute.

Abbreviations: **ASALS**, Arid and semi arid lands; **FMD**, Foot and mouth disease; **CCPP**, Contagious Caprine Pleuropneumonia; **CAHW**, Community Animal Health Worker; **NGO**, Non Governmental Organization.

Conflict of Interests

The authors have not declared any conflict of interests

REFERENCES

- Aduugna T, Aster A (2007). Livestock production in pastoral and agro pastoral production System of Southern Ethiopia. *Liv. Res. Rural dev.* 19(12).
- Cossins NJ (1985). The productivity and potential of pastoral systems. *ILCA Bulletin*, 21 15. Available at http://pdf.usaid.gov/pdf_docs/PNAAV247.pdf. Accessed July 2012.
- Den Haan C, Bekure C (1991). Animal health services in Sub-Saharan Africa: initial experiences with new approaches. International Livestock Centre for Africa: Nairobi, Government of Kenya, 2008. Strategic Plan. Nairobi: Ministry of Livestock development.
- Jaetzold R, Schmidt H, Hornet ZB, Shisanya CA (2006). Farm management handbook of Kenya. Natural conditions and farm information, P 11/C, 2nd edn. Nairobi: Ministry of agriculture.
- Kothari CR (2008). Research Methodology, Methods and Techniques. 2 Revised International New Delhi: New Age Publishers.
- Kruger RA (2002). Designing Focus group interviews. University of Minnesota.
- Kumar K (1993). An overview of Rapid Rural Methods in development settings. In: D'Mello JPF, Davendra C (Eds.). *Rapid Appraisal Methods*. Wallingford: CAB International, pp. 8-25.
- Mgheni M, Mukhebi AW, Setshwaelo R, Tsiresi R, Nyathi P, Osuji P, Kategile JA (1992). Synthesis of constraints to livestock research and development recommendations. In: *Future of livestock industries in East, Southern Africa. Proceedings of a workshop held in Kaduna, Zimbabwe, 20-23 July 1992*, Eds. Kategile JA, Mubi S, pp. 219-223.
- FAO Corporate Document Repository. Available at: <http://www.fao.org/wairdocs/ILRI>. Accessed October 2012.
- Mariner JC, Paskin R (2000). Manual on Participatory Epidemiology. Methods for collection of action-oriented epidemiological intelligence. *FAO Animal Health Manual*. Food and Agriculture Organization of the United Nations.
- Mugenda MO, Mugenda GA (2003). *Research Methods: Quantitative and Qualitative Approaches*. Revised 2003. Nairobi: African Centre for Technology Studies Press.
- Mugunieri LG, Irungu P, Omiti JM (2004). Performance of community-based animal health workers in the delivery of livestock health services. *Trop. Anim. Health Prod.* 36:523-535.
- Omiti J, Irungu P (2002). Institutional and Policy issues relevant to pastoral development in Kenya. Discussion 2002. Institute of Policy Analysis and Research. P. 031.
- Omire A, Kurwijila L, Grace D (2009). Improving livelihoods in East Africa through livestock research and extension: reflections on changes from the 1950s to the early twenty first century. *Trop. Anim. Health Prod.* 41:1051-1059.
- Perry B, Randolph T, Omire A, Perera O, Vatta A (2005). Improving the health of livestock kept by the resource poor in developing countries. In: Owen E, Kitanyi A, Jayasuriya N, Smith T (eds) *Livestock and wealth creation: improving the husbandry of animals kept by resource-poor people in developing countries*. Nottingham University Press: Nottingham, UK. pp. 233-262.
- Tambi NE, Maina WO (2004). *Delivery of Livestock services. Some experiences from Sub Saharan Africa*. African Union Inter African Bureau for Animal Resources.