

Evaluating options for securing camel breeding stock in production systems vulnerable to climate variability in Northern Kenya



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Introduction cont...

- Descriptions of grasslands according to land use;
- Rangelands (NRC 1994) and vegetation that supports grazing systems (McNaughton 1993, 1985).
- Grassland type; shrubland type.
- Grasslands provide rangelands for livestock including camel.
- The rangelands provides forage for domestic livestock.
- In turn supporting human livelihoods with meat, milk and blood.

Introduction

- Forage is good and services provided by the grassland ecosystem.
- Arid and semi-arid grazing systems are highly vulnerable to climate change and socio-economic factors (Thornton *et al.*, 2006).
- Pastoralists forced to abandon their traditional way of life.
- Camels (*Camelus dromedarius*) are primary livelihood assets in ASALs kept under adverse climatic conditions.
- Source of tangible and intangible returns (Guliye et al., 2007).

Introduction cont...

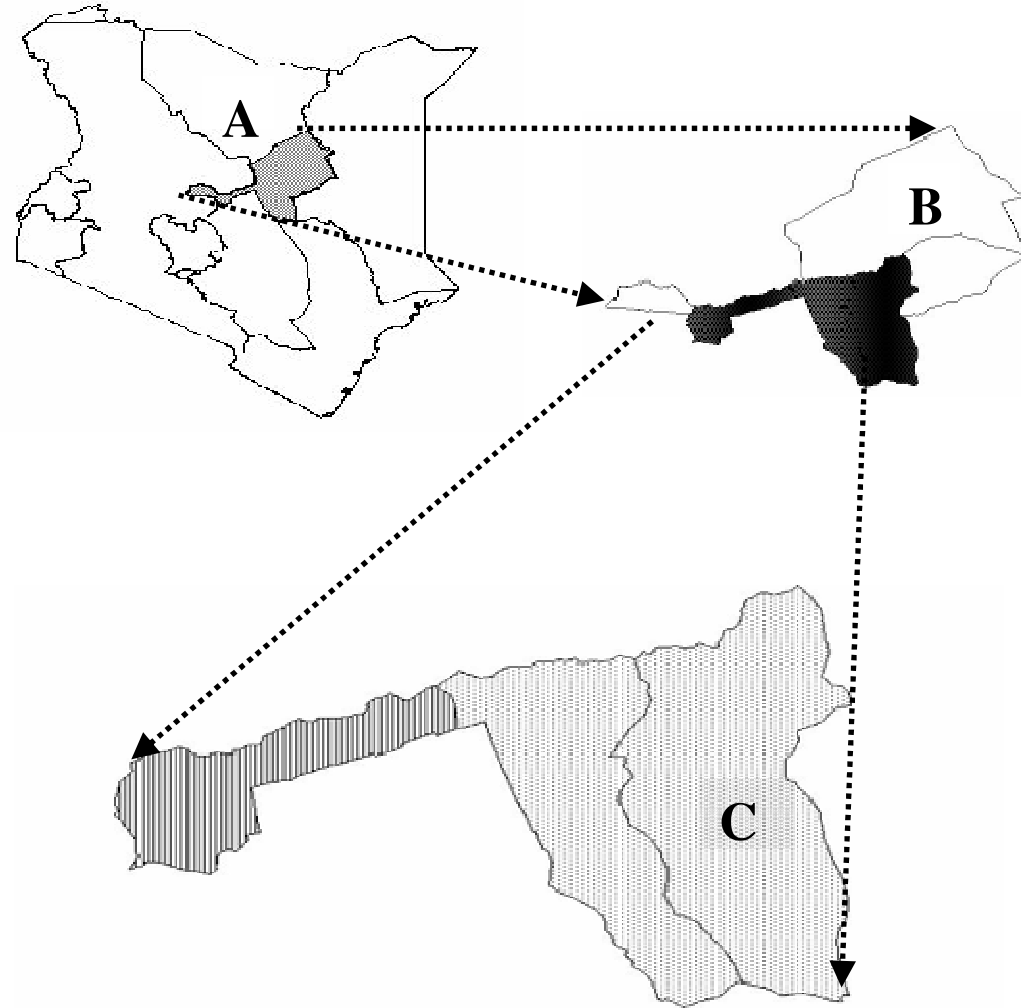
- Sedentarization process- peri-urban camel production has emerged from traditionally pastoral system (Bebe *et al.*, 2007; Seré *et al.*, 2008).
- Creating niche market of camel milk.
- Pastoral camel herds are highly mobile while peri-urban herds mobility is restricted.
- With increasing demand for camel milk there is greater need for improved survival of breeding stock.

Introduction cont...

- Loss of breeding stock is a major productivity constraint in pastoral systems.
- The loss of female calves up to weaning is as high as 20 to 30 % (Kaufmann, 2000;2003).
- Securing survival of breeding stock implies increased profitability for pastoral households.
- To evaluate factors influencing survival of camel breeding stock to first calving.

Materials and methods

- Study conducted in Isiolo district.



Study sites
Postoral system - Garbatulla division
Peri-urban system - Isiolo central division
Pasoral system - Kinna division

A – Kenya
B – Isiolo district
C – Study sites

Sampling techniques and procedures

Multistage sampling

- 1st stage; two strata selected
- 2nd stage; simple random sampling used to select camel herds ([pop..ppt](#)).
- 3rd stage; breeding females sampled in the herd(\geq first parity).
- Primary data collected– progeny history techniques and structured questionnaire.
- 729 cases of loss in pastoral and 1271 cases in peri-urban ([sample size.ppt](#)).

- Tobit model used analyzed with SPSS and STATA softwares

$$y_i^* = \beta x_i + u_i$$

y_i^* is a latent variable which cannot be observed.

$$u_i \sim IN(0, \delta^2)$$

$$Y = \beta_i X_i + \beta_j X_j + \beta_k X_k + \varepsilon$$

Y - proportional loss

X_i - a vector of production systems,

X_j - a vector of herd and herd owner characteristics,

X_k - a vector of support services

ε - error term

Results

Estimated marginal values for factors influencing survival of breeding stock to first calving

Variables	Maximum likelihood Coefficient	Robust Standard Error	Z	P> z
System (0,1)	0.0857	.0254	3.37	0.000 ***
Educ (years)	-0.0039	.0109	-0.36	0.719
Train (0,1)	-0.0104	.0088	-1.18	0.237
veterinary (access)	-0.0551	.0173	-3.18	0.001 **
labour (0,1)	0.1059	.0237	4.47	0.000***
Security (scale)	-.0627	.0168	-3.73	0.000 ***
_cons	.5387	.0412	13.08	0.000

Log likelihood = -1218.1793, Number of observations = 1877,
LR chi2(6) = 113.39, Prob > chi2 = 0.000 ***, Pseudo R² = 0.2024

Results cont....

- Tobit regression statistically significant (p value < 0.01).
- The loss of breeding stock were 8.57% higher in peri-urban than pastoral system.
- Increasing frequency of treating camel herds against diseases reduces loss by 5.5%.
- Hired form of labour for herding increases loss by 10.59%.
- Enhancing security situations through theft/rustling reduces loss by 6.27%

Discussion

- Peri-urban herds are restricted to grazing near settled areas;
- Over utilization of forage and feed resources and water sources.
- Modifications such as urbanization and fragmentation could lead to land degradation in the peri-urban system.
- Sedentarization process decreases mobility of pastoralists and grazing reserves (Seré *et al.*, 2008).
- Inadequate quantity and quality year round feeding resources (Noor,2007).

Positive effects of mobility

- Optimal utilization of the existing natural resources, by taking advantage of;
- temporal and spatial variations in the distribution and quantity of rainfall and forage, and best nutritional status of the forage.
- An effective way of risk management by evading drought conditions and actual or potential disease or pest outbreaks, which usually depend on climatic conditions.
- Avoids over exploitation of the natural resources by reducing concentration of livestock in one area, thus leading to conservation of the biodiversity.

Discussions cont..

- Land use changes in the peri-urban system- have transformed land cover to farmlands, grazing lands, human settlements and urban centers at the expense of natural vegetation/rangelands.
- These changes are associated with deforestation, biodiversity loss and land degradation.
- As native vegetation is lost, indigenous plant and animal biodiversity and plant cover are lost.
- Pastoralism maintains native plant and animal species (Maitima *et al.*, 2009).

Discussion cont...

- More loss are experienced for herds that do not have access to veterinary services.
- Diseases affect the survival of breeding stock generating additional costs.
- The settlement of pastoralists leads to increased disease pressure.
- Unsecured camel herds loose more breeding stock (rustling/theft) forcing pastoralists make unfavorable decisions.

Discussions cont...

- Increased potential for conflict.
- Due to sedentarization, traditional institutions for conflict weakened (Shem et al., 2005)
- Indigenous knowledge of livestock husbandry is eroding for pastoralists as markets drives them to sedentarization.
- Management practices (herd health and feeding strategies) resulting from restricted mobility and grazing systems).

Conclusion

- Insufficient breeding stock to support peri-urban camel milk system.
- Limited forage resources (quantity and quality) supporting peri-urban camel population.
- Indigenous knowledge.

Further research

- Natural resource use implications of peri-urban camel milk production in arid northern Kenya to;
- Focus on sustainability of water, forage, mineral licks, soil, ecosystem services with the question;
- what extent does peri-urban camel system sustain natural resources?



Thank you

