THE OCCURENCE OF TICKS AND TICK BORNE PARASITES OF CATTLE IN LAIKIPIA COUNTY, KENYA

Msc in Veterinary Applied Parasitology
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Background

- In Kenya, livestock production is a major economic and social activity for the communities of the ASALS.

- Over 60 percent of the national herd of cattle is held by pastoralists and it produces 10 percent of the domestic product (GDP) and 50 percent of agricultural GDP.

- **Constraints**: livestock diseases, particularly endemic diseases transmitted by vectors such as ticks and tsetse flies, (Rushton *et al*. 2002), lack of pasture during drought and conflicts with wildlife.

- **Drought** is the greatest cause of livestock mortality.

Background cont'd

- Laikipia district experienced droughts in the years 1983-84, 1986, 1991-92, 1994 ,2000 and 2009.

- Large concentrations of livestock were reported around the remaining watering points and certain locations including the Mt. Kenya forest.

- Movement of animals into the mountains was viewed as a solution to provision of grazing pastures and water, unfortunately this did not prevent many cattle from dying from cold and disease, (Lind and Letai, 2011).

- These naive pastoral herds usually migrate from areas of low ECF endemicity to high ECF endemicity during drought and it is suspected that this is the major cause of the massive deaths along the migration route and in Mt. Kenya forest.

Objectives

1. **General objective :**To determine the occurrence of ticks and tick-borne parasites (TBPs) of cattle in Laikipia county.

2. **Specific objectives**

- To identify and characterize ticks found on cattle in Laikipia county.

- To determine the occurrence and intensity of the ticks.

- To determine the association between TBPs in hosts and ticks found in the county.

- To determine the association between ticks and TBPs in low endemic areas (lowlands of Laikipia) and high endemic areas (Mt. Kenya forest).

Justification

- During drought, pastoralists in group ranches of Laikipia North District move their livestock into the Mt Kenya Forest Reserve.

- In these arid areas they encounter lower incidences of East Coast Fever (ECF).

- When the animals migrate through the highlands to the Mt. Kenya forest for grazing, losses of up to 90% of the cattle are experienced.

- The main cause of this mortality is suspected to be ECF because animals move from **low ECF endemic** areas through **higher ECF endemic** areas.

- It is important to confirm the cause of deaths in cattle migrating from lowlands of Laikipia to Mt. Kenya forest.
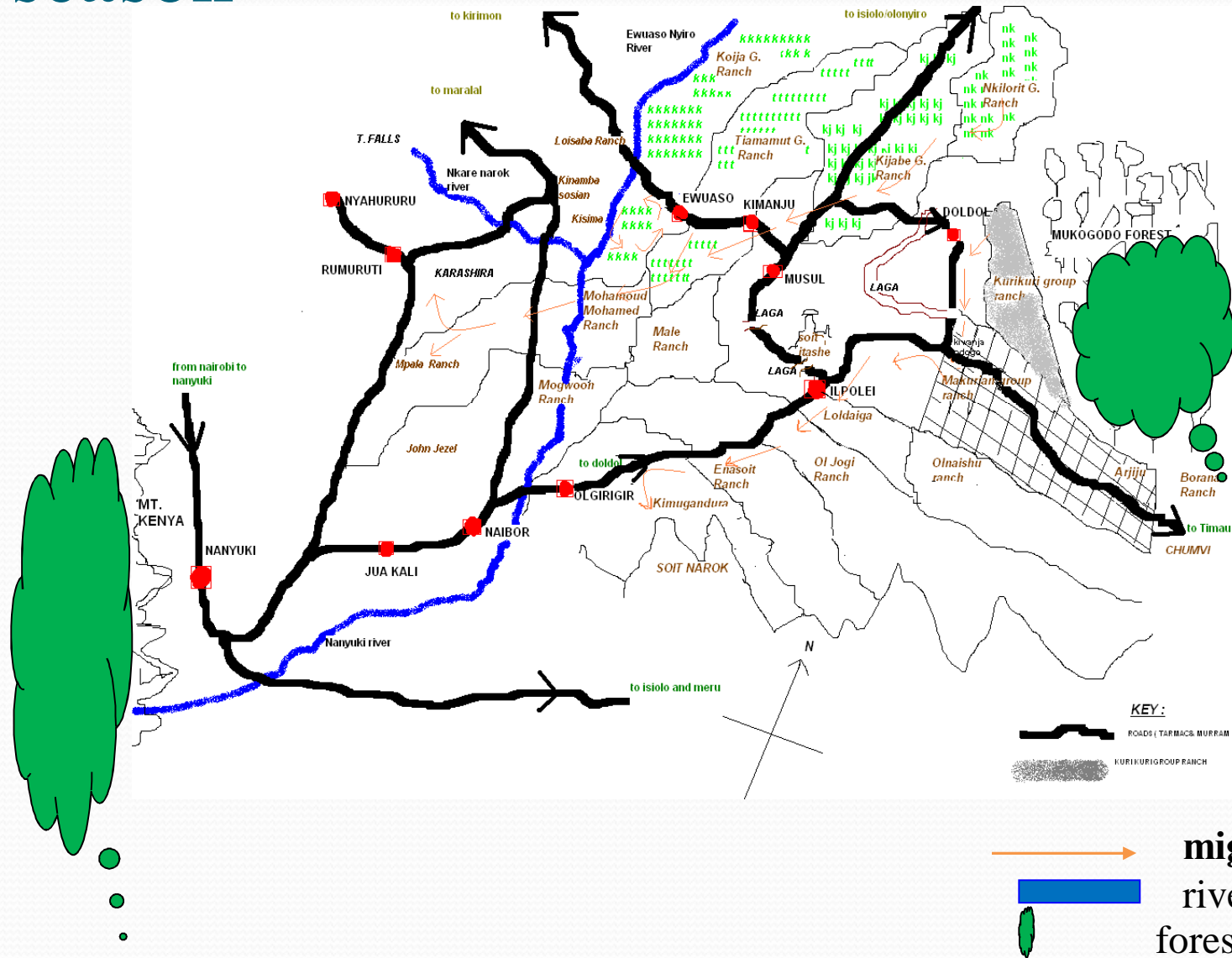
Fig 1: Study area- Laikipia County, Kenya

(Source: Letai, 2011)

Fig 2: Map of Laikipia County
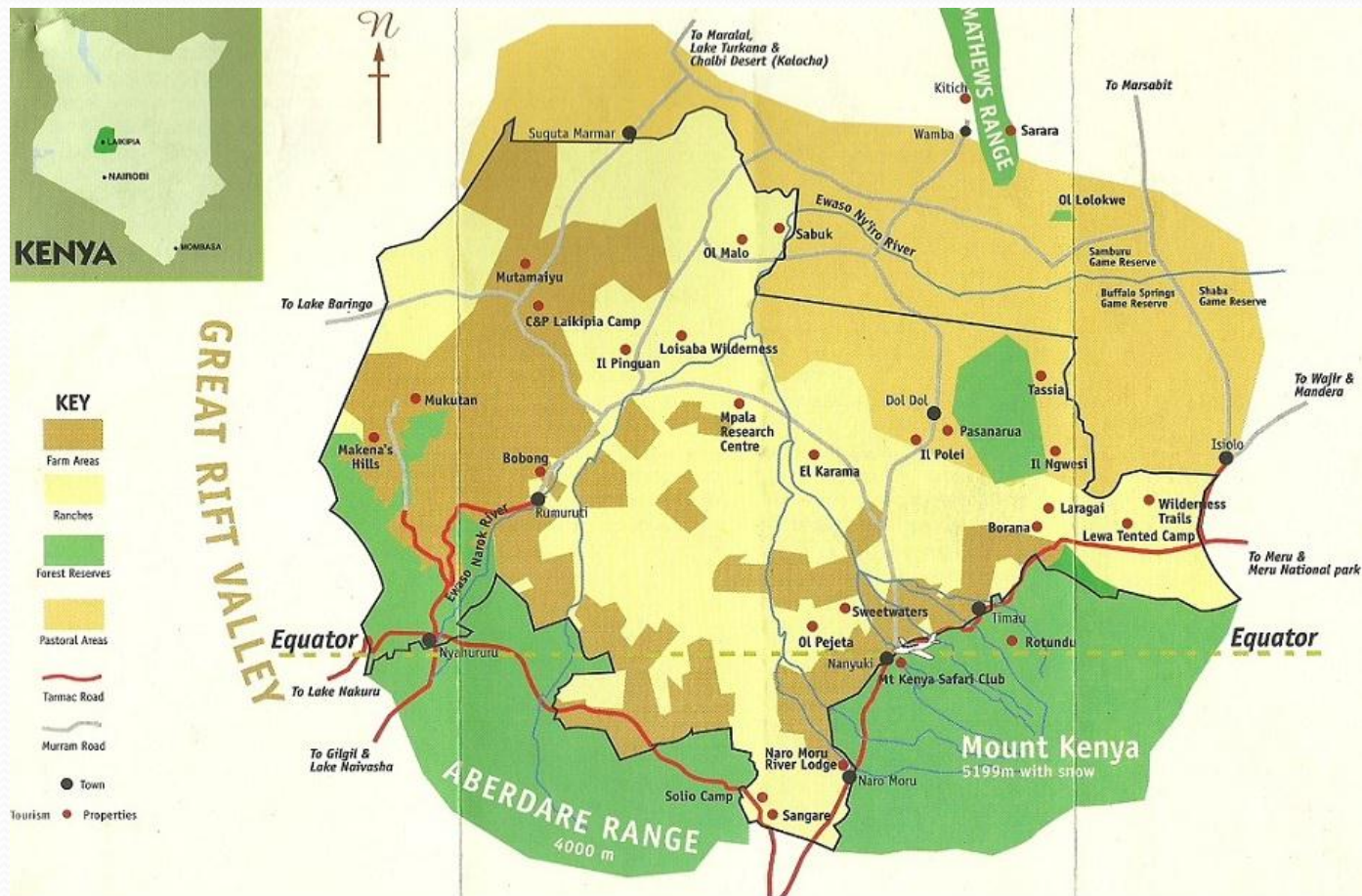
(Source: Expert Africa, 2012)

Fig 3: Cattle migration routes during dry season

(Source: Dr. Turasha G. K ,VETAID, 2012)

Plate 1: Vegetation in Laikipia county during rainy season

Open grassland dominated by *Acacia brevispica* thickets and other *Acacia* sp. and shrubs

(Source: By the author, 2012)

Plate 2: Vegetation in Laikipia County during the dry season

Dominant grass types : Cynodon sp., *Permisetum* sp., *Digitaria* sp. and *Sporobolus* sp

(Source: By the author, 2012)

Study design

Cross-sectional design will be used.

It is purposive that will involve:

1.a) 6 pastoral community group ranches will be purposely selected: Kuri kuri, Makurian, Koija, Nkirolit, Tiemamut and Kijabe

   b) Jikaze area in Timau - Migratory corridor from lowlands to Mt. Kenya forest

   c) Katinka areas - Grazing area in Mt. Kenya forest reserve

2. Sentinel sampling (sampling as animals migrate)

Study cattle: Determination of cattle sample size

- Sample population > 10,000 is considered an infinite population. To determine the sample size, the formula for (Martin *et al*. 1987) will be used.

$$n= \{Z_{\alpha/2}\}^2 \text{ x p q}$$ where,   Z= Z-value

                                           p= population

$$n= \frac{(1.96)^2 \text{x p q}}{L^2}$$ q= 1-p

                                           L=precision

$$n= \frac{1.96^2 \text{ x } (0.5 \text{x} 0.5)}{(0.05)^2}$$

       =384

A sample size of **400 animals** will used in the study.

Distribution of Study animals

The **400** sample size will be distributed as follows:

- 40 cattle from each of the six pastoral community group ranches (Kuri kuri, Makurian, Koija, Nkiloriti, Tiemamut and Kijabe)

- 100 cattle from the migratory corridor in Timau

- 60 cattle from grazing area along Mt. Kenya forest.

Determination of sample size for ticks

- Since tick infectivity is unknown, the formula for (Martin *et al*. 1987) will be used and an estimated sample size of 400 ticks will be dissected as follows:
- Ranches=200, migratory corridor=100 and forest= 100

Data collection

- Sampling for ticks
- Blood and lymph collection from cattle
- PRA: participatory methods
- Administration of semi structured questionnaires

Ticks sampling

a) Collection of ticks from the hosts

- 6 sites on the host animal to be sampled include: one ear, one side of the neck, one leg (including the foot), whole tail including the tail brush, whole upper perineum and one half of lower perineum).

- Put in Boardmanøsolution (17% ethanol, 3% diethyl ether, 80% water) for 24 hours to kill them and prevent their legs from curling up.

- Long-term preservative (80% alcohol+ 15% water + 5% glycerol + 1% chloroform will be added to prevent color fading).

b) Sampling of ticks from vegetation (using the drag-towel technique)

3 main points/Ranch.

- Watering points
- Night pens or night bomas
- Grazing areas

  Drag-towel technique: dragging of 1m squared cloth across vegetation for 5-10m (approximately 30 seconds of walking) and repeated 5 times after picking the ticks.

- Tick density over the land surface will be determined using the following formula:

$$\text{Tick density} = \frac{\text{Total number of ticks}}{\text{Total area dragged (m}^2)}$$

Laboratory identification of ticks

˝Tick identification and enumeration will be done using a stereo microscope as described by (Horak *et al*., 2002) and (Walker *et al*., 2000; 2003) .

Smear preparation and examination for tick-borne parasites

˝Blood and lymph node smears from 400 adult cattle will be examined for haemoparasites as described by (Nemi, 1986).
˝A sample size of 400 ticks will be dissected to extract salivary glands, stained using Feulgen technique as described by (Buscher and Tangu, 1986) examined for tick borne parasites.

c) Climatic data

- Data on rainfall and temperature will be obtained from Meteorological station situated in Nanyuki town about 100 km from the sampling sites.

d) Data analysis

- Raw data will be entered into Microsoft excel which will be entered into descriptive statistics.
- Statistical analysis will be done using Instat® statistical software

Work plan

	Timeline in months										
ACTIVITY	May2013	June	July	August	Sept	Oct	Nov	Dec2013	Jan 2014	Feb	March
Proposal writing	■	■	■	■							
PRA study				■	■	■					
Sample collection					■	■	■	■	■		
Sample analysis						■	■	■	■	■	
Data analysis					■	■	■	■	■	■	
Thesis preparation				■	■	■	■	■	■	■	■

Budget

	Particulars	Cost (Kenyan Shillings)
1	Field work: transport and subsistence	250,000
2	Equipments : stereo-microscope	350,000
3	Stationery and internet services	45,000
4	Laboratory supplies: Reagents, bottles	100,000
5	Data analysis and thesis preparation	70,000
6	5% contingencies	20,000
	Total	835,000

THANK YOU!

Plate 3: (Source: By the author, 2012)