

**RISK FACTORS AND  
SOCIO-ECONOMIC EFFECTS  
ASSOCIATED WITH SPREAD OF  
*PESTE DES PETITS RUMINANTS* IN  
TURKANA DISTRICT, KENYA**

A proposal submitted in fulfillment of the Degree of  
Doctor of philosophy of University of Nairobi.  
(Applied Microbiology-Virology option)

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## Supervisors

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## Support

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# Introduction

- Peste des petit ruminants (PPR) is a highly contagious, infectious and often fatal viral disease of sheep, goats and wild small ruminants.
- The disease is found in Africa and Asia .
- In Eastern Africa region the disease has been described in Sudan, Ethiopia, Eritrea, Somalia, Uganda, Kenya and Tanzania.
- There were reports suspecting PPR in Kenya in 1992.
- The disease was confirmed in Kenya in 2007 .
- Causes major losses ; a key constraint to small ruminants production.

# Introduction contn'

- Naïve populations morbidity rates up to 100% and mortality rates as high as 90%.
- Disease spread is associated with contacts between infected and clean flocks. Factors influencing contacts between infected and clean flocks in Kenya are not clearly studied.
- 62.5% of global small stock is at risk; in Kenya 14.4 million small stock at risk of infection
- economic losses caused by the disease are high; annual estimated loses in India are US\$ 39 million while in Kenya stand at US\$ 13 million.

# Introduction contn'

- 90% of livestock in Turkana is small stock and contribute heavily to their livelihoods. PPR outbreaks in Turkana devastated these livelihoods.
- Ranked among the top ten diseases of small ruminants.
- Control of the disease is through quarantine, movement control and vaccination.
- This study assesses the risk factors influencing the spread of PPR in Turkana district of Kenya; determine herd immunity and socio-economic impact of the disease; and evaluate current control strategies,

# Literature review; PPR disease

- Known as goat plague and stomatitis-pneumoenteritis syndrome.
- First described in 1942 in Cote d' Ivoire, West Africa
- Caused by Peste des petit ruminants virus (PPRV)
- found in sub Saharan Africa, Middle East south Asia, former Russian republics and China.
- In the Eastern Africa region the disease has been described in Sudan, Ethiopia, Eritrea Somalia , Uganda, Kenya and Tanzania.
- Caused by PPRV which is classified as the fourth member of genus Morbillivirus.
- PPRV has only one serotype. Has isolates grouped into four distinct lineages. Lineage 1 and 2 are found exclusively in West Africa, lineage 3 is found in Eastern Africa while Lineage 4 is found in south Asia, Middle East and China and recently in Morocco.

# PPR epidemiology

- PPR is transmitted by contacts between infected animals in febrile stage and susceptible animals .
- The discharges from nose, mouth, eyes as well as diarrhea contain large amounts of virus.
- There no carrier status for PPRV.
- PPR is mainly a disease of small ruminant mainly sheep and goats.
- Camel, cattle and pigs are known to undergo subclinical infection.

# PPR epidemiology

- Disease has been reported in captive wildlife and antibodies found in wild living small antelopes.
- There are differences in the epidemiologic pattern of the disease in different ecological systems and geographical areas
- In Sahel region small ruminants seroprevalence is high and thus the disease is muted or subclinical



# PPR epidemiology.

- In the humid regions of West Africa disease has dramatic outcomes with high morbidity and mortality
- Epidemics in West Africa have been associated with changes in climatic seasons, the corresponding seasonal animal husbandry patterns and livelihood activities among the settled and pastoralist Communities .
- The disease is not well investigated in Kenya and there has been no link made on the disease pattern in relation to social, cultural, economic and climatic factors that could impact on disease pattern

# Clinical signs

**Clinical presentation of PPR can be peracute, acute and chronic.**

**Inflamed (reddened) eye membranes**

**The serous ocular-nasal discharges become mucopurulent dries causing matting together of the eyelids, obstruction of the nose and difficulty in breathing.**



# Clinical signs

**The hindquarters soiled with soft/watery faeces.**



**Mouth lesions early pale, grey areas of dead cells on the gums**



# Pathology

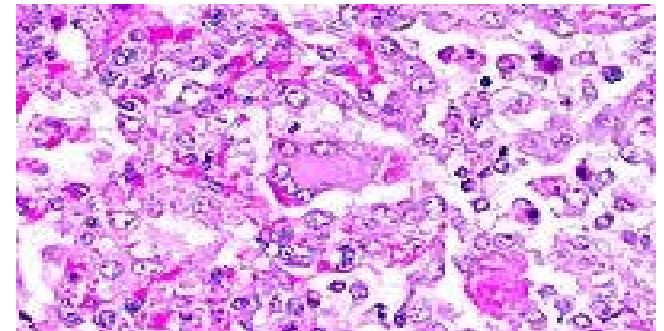
The "zebra striping" in the large intestine



Primary bronchopneumonia



multinucleate giant syncytial cells



# PPR diagnosis, immunity and control

- Diagnosis of PPR may be performed through virus isolation, detection of viral antigens, nucleic acid sequencing and detection of specific antibody in the serum.
- Recovered animals and vaccinated animals develop lifelong immunity.
- Restriction of importation, quarantine, slaughter and disposal of carcasses and contact fomites and decontamination
- PPRV homologous vaccine is ongoing however PPR recombinant marker vaccines useful in sero-monitoring are in development.

# Socio-economic impacts of the disease

- PPR disease destroys livelihoods of pastoral communities i.e. lose of food, earning, social relationships and prestige.
- Economic loses are high but there is scanty data.
- Disease control is expensive considering the reproductive cycle of small stock.
- However vaccination shown to be beneficial in disease control.

# Study Objectives

- To assess the risk factors and socio-economic effects associated with the spread *PPR* in Turkana District, Kenya
  - To determine the risk factors influencing the patterns of *PPR* spread in Turkana district,
  - To determine the level of herd immunity within the flocks,
  - To determine the socio economic impact of the disease.
  - To document and evaluate current control strategies in Kenya.



# Justification of the study

- There are very limited studies investigating the disease patterns in Kenya thus there is need to understand the factors that made the disease outbreak emerge in Turkana, Kenya.
- PPR is an economically important disease to the rural communities.
- inform rehabilitation of affected communities
- inform the policy development in regard to control, prevention and eventual eradication of the disease.



# Materials and Methods

- Study area is six Divisions of Turkana District purposively selected based on initial reports of PPR outbreaks and they lie along the international frontier. Loima, Orropoi, Kakuma, Lokichogio, Kaalich, and Kibish.
- Study design : Participatory Epidemiology FGD, SSI with service providers, cross-sectional sero-prevalence survey, and desk study.
- Sampling unit will be *Adakar*
- Sample size for FGD is 60 *Adakars* selected.
- Sample size for sero-prevalence is 384 per species.

# Data Collection

- Secondary data on PPR disease (Desk study)
- Key informant interviews at institutional level
  - Semi structured interviews with service providers, livestock sector policy makers, and research institutions
- Participatory epidemiology (PE) . Focused group discussion with livestock owners.
  - Qualitative and semi-quantitative data will be collected using participatory epidemiology techniques
- Sero-prevalence survey in sheep and goats.

# *Data collection*

- Assess the risk factors influencing the spread and of PPR in Turkana, Kenya.
  - PE, and key informant interviews
- Determine herd immunity.
  - Sero-prevalence
- Determine the socio economic impacts of the disease .
  - PE, and key informant interviews
- Evaluate current control strategies
  - Desk studies and key informant interviews

# *Data entry and analysis*

- Data will be entered in Ms-excel and cleaned.
- The data will later exported to statistical package for descriptive and analytical statistics.
- Analysis of the data will be done including modeling PPR disease transmission patterns.



# Budget

Activity items				
	Unit	Time (months)	Unit cost	Total Costs
PPR literature review, proposal writing				
Secondary data collection	1		7,000	7,000
PE questionnaires preparation	1		3,000	3,000
Pre-testing the PE questionnaires.	1	2	5,000	10,000
Administration of PE exercises.	5	4	20,000	400,000
Sero Survey data collection	5	4	20,000	400,000
Key informant interviews at policy level.	1	3	10,000	30,000
Laboratory analysis	1	3	20,000	60,000
Thesis write up	1		20,000	20,000
<b>Total</b>				<b>930,000</b>

**Thank you**

