Phylogeography of foot-and-mouth disease virus in Tanzania

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Introduction Position of Country

- Tanzania lies between 6° South and 35° East latitude and longitude respectively.
- Covers an area of 945,000 km^2. and two thirds of the country land resource is rangelands.
- Tanzania borders with Kenya, Uganda, Mozambique , DRC, Rwanda, Burundi, Zambia, Malawi and Indian Ocean.
- The restrictions of livestock and wildlife movement between borders is limited.

Introduction–Climate

- The climate is seasonal, unimodal (Dec.–April) and bimodal (Oct.–Dec. and March–June)
- Rainfall varies widely across and between regions.
- Temp. variation (daily average) is from 25 to 31°C in dry months (Dec.–March) and 15 to 25 °C in wet months (April – July)

Introduction–The Disease

- FMDV, is classified within the Aphthovirus genus as a member of the Picornaviridae family.
- Foot and mouth disease (FMD) is the most contagious disease of mammals.
- Typical cases of FMD are characterised by a vesicular condition of the feet, buccal mucosa and, in females, the mammary glands.

Introduction–The Disease

- In Tanzania, FMD is the first most important viral TAD (MLDF, 2006).
- FMD is endemic in Tanzania since it was first documented in 1927.
- The first virus isolation and typing was done in 1954 (WRLF).
- Four common serotypes isolated and identified in Tanzania include Type A, O, SAT 1and SAT 2.

Objectives

- To use genetic data to determine the distribution of FMDV lineages in Tanzania.
- To find the possible sources FMDV causing outbreaks in Tanzania.

Sample collection and preservations

- 361epithelial tissues, probangs and sera samples from field all over Tanzania(2008-2012).
- Samples were collected from clinical animals.
- Suspended in transport media (PBS and Glycerol).
- Samples homogenized in PBS pH 7.2

Molecular screening/serotyping

- Extraction done using QIAamp® Viral RNA Mini Kit (50)
- Samples were tested using the Real time RT-PCR (Shaw *et., al* 2007)
- FMDV positive samples were typed (A,O C, SAT2) by one step RT-PCR using serotype specific primers (Knowles et al.,2005, 2009)

Results for Real Time PCR

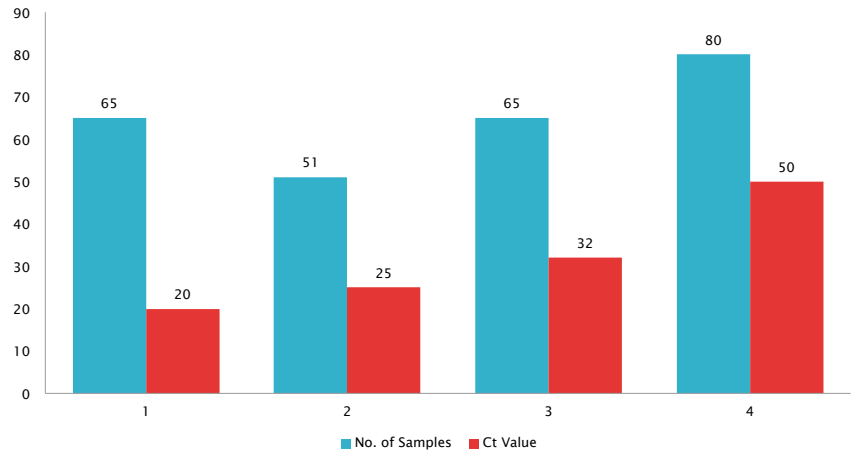
Real Time PCR Results interpretation

- Samples with the Ct value <32 were considered as **POSITIVE.**
- Samples with **NO Ct** value were considered as NEGATIVE.
- Samples with the Ct value ≤32-<50 were considered as **Inconclusive.**

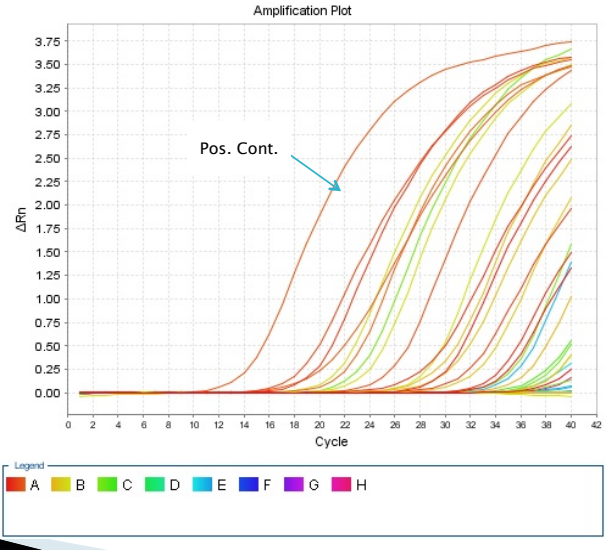
Results Real Time PCR

- Samples screened were 361
- Positive samples were **181** < 32 as below,
  - Samples with **Ct value <20 were 65**
  - Samples with **Ct value 21-25 were 51**
  - Samples with **Ct value 25-32 were 65**
- Samples with Ct value ≤32-<50 were 80
- Negative samples were 100 with no Ct

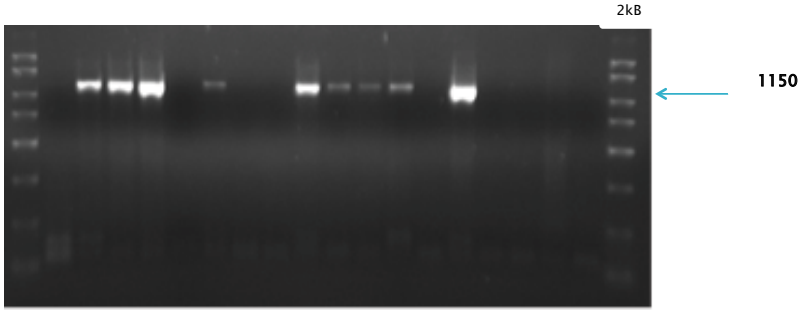
Results Real Time PCR



Results Real Time PCR

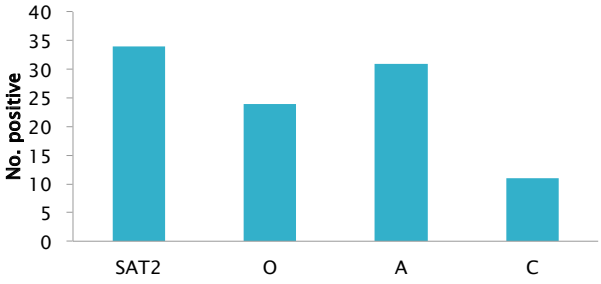


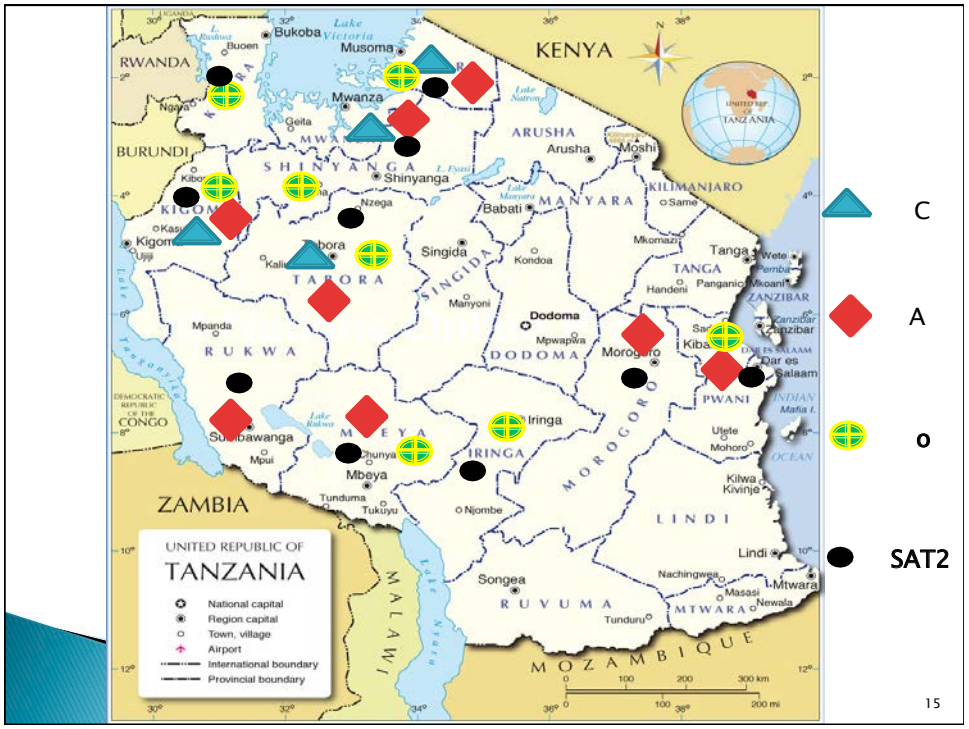
Results Serotyping for O



Results Serotyping

98 Samples were typed using serotype specific primers for O (24), A (32), SAT2 (34) and C?? (11)





Discussion

- The results indicates that the 3 predominant serotypes are still exist (A, O and SAT2).
- Serotype SAT2 scored highest followed by A, O and C???? (11samples).
- Most of outbreaks occurred in the Southern High land, Western part of Tanzania, Eastern and North west.
- No any outbreak reported in greater part of the Central Tanzania to date.

Discussion

- Observation of multiple infections in one samples
- Climate has an effect on the recent outbreaks.
- Movement of animals to better grazing areas
- Wildlife/Livestock interface

Future Work

- Typing serotypes SAT1 and SAT3
- Sequencing and phylogenetic analysis of the VP1Sequences
- To check the sensitivity and Specificity of Antigen Vs. Serotyping methods.
- To complete the phylogeography study.
- Start the assay for qRT-PCR for serotype specific.

ACKNOWLEDGEMENT