Risk factors for the contamination of the African Stable Fly with the Foot-and-Mouth Disease Virus

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INTRODUCTION:

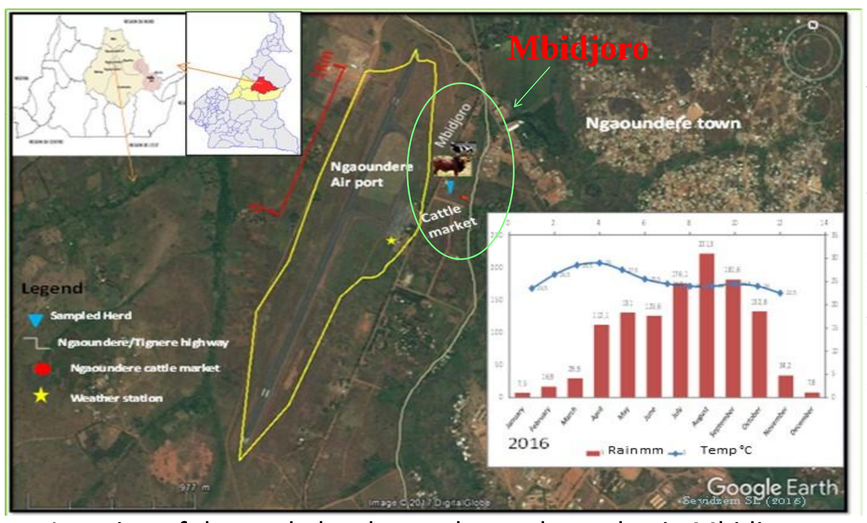
Foot & Mouth Disease (FMD) is the **most contagious viral disease** in mammals and has a great potential for causing severe economic losses in susceptible animals. The role of the **African stable fly (*Stomoxys niger niger*)** in transmission is unkown.

The disease affects cloven-hoofed animals:

Tongue | Foot | Mouth

OBJECTIVES:

- Identify and determine the abundance of *Stomoxys* spp.
- Screen legs and mouth parts of *S. niger niger* for FMDV.



Ngaoundéré:

The Adamaoua plateau is the center of lifestock-production in Cameroon. Cattle and meat are transported by train or road to the Southern regions of Central Africa (Cameroon, Gabon), where cattle cannot be kept because of trypanosomiases.

FMD is epidemic in the whole cattle-breeding area.

Location of the study-herd near the cattle market in Mbidjoro

Figure 1: Net catches (DSC)

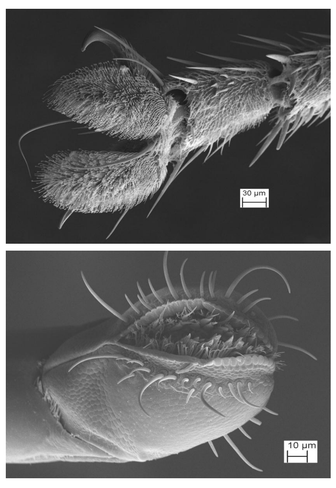


Figure 2: SEM of proboscis and tarsus

Leg:

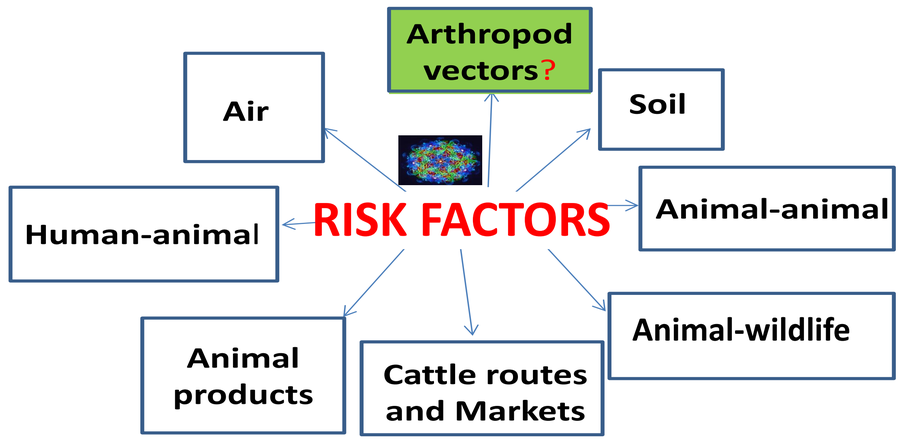
Virus particles (size 0,03 µm) presumably attach to the hairs of the pulvilus, when the fly lands on infected body parts.

Proboscis

The labium forms the proboscis and the labellae are transformed into a penetrating organ, which quickly pierces the skin during the bloodmeal. There is less contact with the cattle than by the tarsi. (photos M. Meinert)

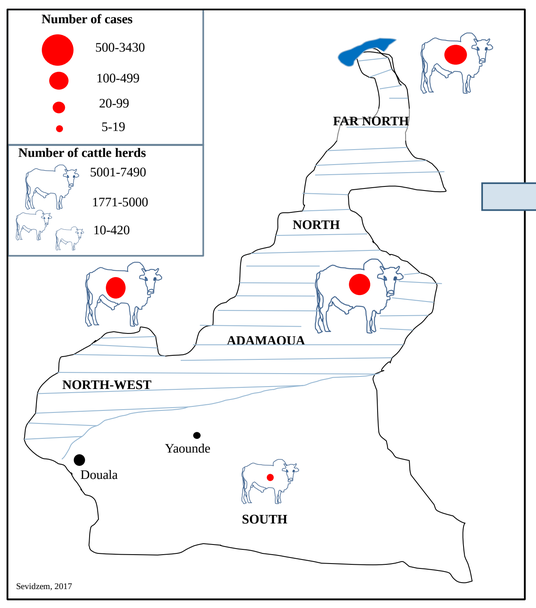
MATERIALS AND METHODS:

- Stomoxes were caught using the **Vavoua trap[1]** and **net catches** (Fig. 1).
- Anatomical parts of African stable flies included: **legs and proboscis**.
- Animal samples collected were **blood** and **Vesicular Epithelial Tissues** (VET).
- Parts of 101 *S. niger niger* from all collection methods *i.e.* Direct skin Catch (DSC) from groups 1 and 2, Vavoua as well as VET of **clinically sick cattle (group 1;** N=5) were analysed with RT-PCR.
- Sera of **clinically unapparent cattle (group 2;** N=5) were analysed using NS-ELISA.

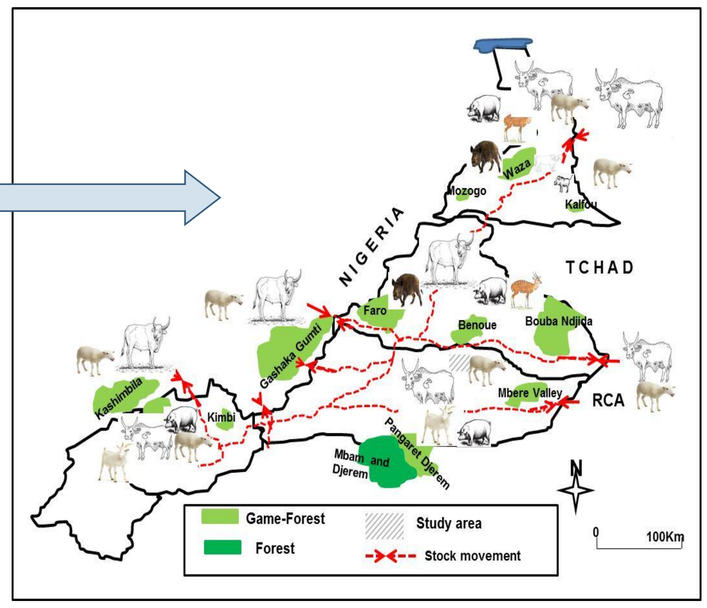


7 mm

Stomoxys niger niger
(photo Acapovi, 2005)



FMDV distribution/cattle density in Cameroon
Data source: SPCFC (2015)[2]



Stock movements and FMDV transmission risk in a stock/wildlife interface in Cameroon

RESULTS:

- *Stomoxys niger niger* was the most abundant stomoxine fly (Fig. 2) and its over-all contamination rate was 40.3% (M = 21.7%, F = 49.0 %).
- The molecular prevalence of FMDV in clinically sick cattle was 100% .
- The seroprevalence of antibodies against FMDV in clinically inapparent cattle was 60%.

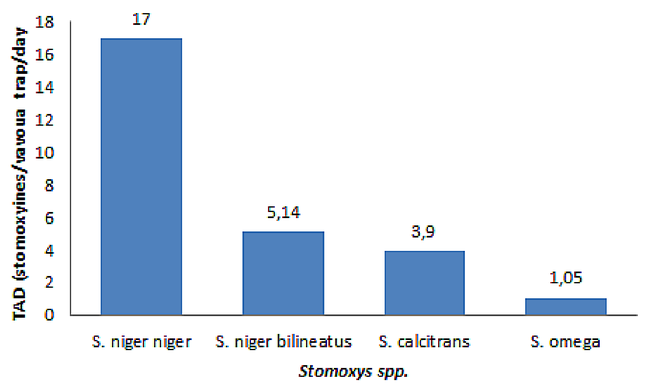


Figure 2: Trap Apparent Density (TAD) of *Stomoxys* spp.: *S. n. niger* was the most common species.

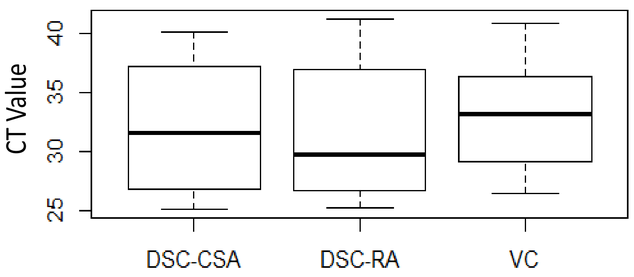


Figure 3: *S. n. niger* flies from Vavoua catches (VC) had lower virus loads (highest Ct values) than catches on animals (DSC). There, flies collected on Clinically Sick Animals (CSA) were more contaminated than healthy ones (RA).

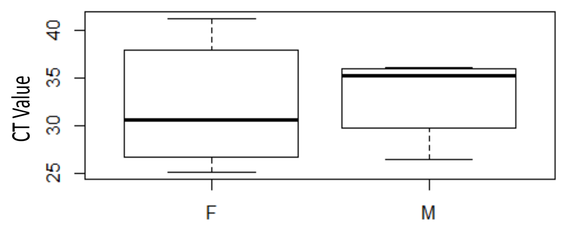


Figure 4: Female flies (F) had higher virus loads than males (M) as indicated by a low cycle threshold value (Ct).

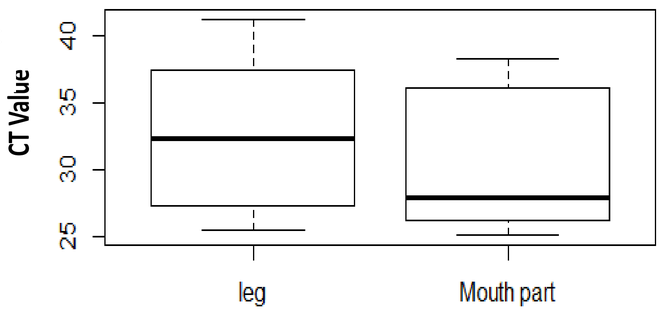


Figure 5: Mouth parts had higher virus loads as compared to legs.

CONCLUSIONS:

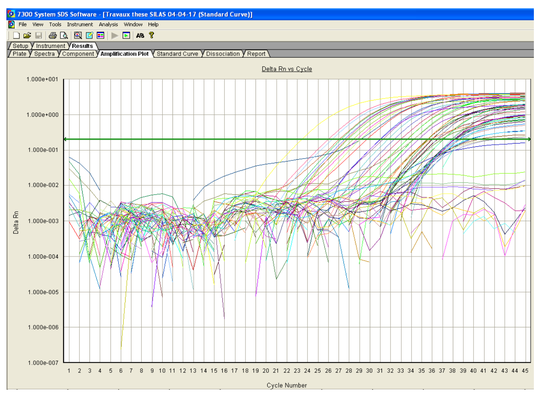
- **Stomoxyines may spread the FMDV through contaminative transmission**
- **Flies must be considered in FMD control**

Lesion on the foot of a 1 year old male Zebu with lameness and a *Stomoxys* spp. biting an open sore

Blood collection on the field

Vavoua trap for fly capture

Virology Unit of LANAVET



RT-PCR Ct values of fly-parts screened for FMDV

REFERENCES

(1) Laveissière C, Grébaut P (1990). The trapping of tsetse flies (Diptera: Glossinidae). Improvement of a model: the Vavoua trap. Trop Med Parasitol . 41(2):185-92.

(2) Strategic Plan for the Control of Foot and Mouth Disease in Cameroon (SPCFC) (2015). Support towards improving the control of transboundary animal diseases of trade livestock. Cameroon, FAO, OMC. MTF/CMR/034/STF. Pages 7-21

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