

## ATSAF - CGIAR++ Junior Scientists Program Final Report

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International Agricultural Research Center: International Livestock Research Institute (ILRI)

Country: Kenya / Tanzania

Supervisor at IARC: Dr. Nils Teufel

Start and end date of stay at IARC: -

Start and end date of remotely supervised project: 15 Jul 2022 - 30 Apr 2022

**Title: East Coast Fever Vaccination Campaign in Tanzania: Assessing supply chain characteristics which lead to vaccination success** 

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Report for ATSAF Junior Scientist Programme By Simon Minz

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After I attended a module entitled *"Livestock-based sustainable land use"* where Prof. Eva Schlecht was the course coordinator and main lecturer at Witzenhausen campus (University of Kassel, Faculty of Organic Agricultural Sciences) my curiosity grew if there is the possibility to write a master's thesis in this field. I study the MSc programme *"Sustainable Economics"* at the University of Kassel which is very multifaceted. Having read books about tropical diseases<sup>1</sup> and the economic impacts of diseases on livestock and livelihoods, the decision was clear. Prof. Schlecht, who agreed to supervise my MSc thesis, told me about the Junior Scientists programme. We contacted Dr. Nils Teufel at ILRI Nairobi, and he suggested that I should work on a data set dealing with the East Coast Fever vaccination campaign in Tanzania and determine supply chain characteristics which lead to vaccination success.

After some email exchange with Dr. Teufel, I applied to the Junior Scientists programme and am very thankful to have received ATSAFs support - it allowed me to buy a new laptop for conducting the statistical analysis required in the context of the MSc thesis. Unfortunately, due to the Corona pandemic and enormous international travel restrictions, I was not able to visit Kenya and Tanzania, even though I received yellow fever and rabies vaccination in the context of travel preparations.

Luckily, we live in a modern era where a lot of collaborative work can be done remotely. But remote work doesn't replace physical meetings. This was and is a challenge. But now restrictions are eased and traveling becomes easier, so I hope to be able to visit the Tropentag conference in Prague and present some of my findings. Africa is still on my bucket list.

From ILRI Nairobi I received a lot of support. Among the rewarding issues were their monthly fellowship meetings where students and researchers presented and discussed their projects. My ILRI supervisor Dr. Teufel was always giving feedback on my work progress and was

<sup>&</sup>lt;sup>1</sup> Grüntzig and Mehlhorn (2006)



coaching my data exploration and in particular statistical analyses when it came to use of R software.

During the fellowship period I also got the opportunity to attend an online R-Software workshop which was very useful for implementing laborious calculations such as the distances from farmers' locations to the health care providers' locations. This calculation is called H*aversine* which is the distance on a globe-shaped object. The R code for this specific calculation will be provided in my thesis, so that others can use it for their calculations as well. Besides R software, the main tools I used for analysing the data were Excel and JMP. From my perspective JMP is great for building regression models.

One of the challenging parts was that the dataset I received is very large and it took some time to select the variables related to my specific research questions. They often needed to be converted into other units to make them comparable with findings from literature. Wherever possible, the variables were related to a *'tropical livestock unit'* or *TLU*. Another major work was to normalize the data and make it fit for the models.

## A brief background on East Coast Fever:

East Coast Fever is a critical cattle disease transmitted by ticks of the species *Rhipicephalus appendiculatus.* The disease causes major economic loss for farmers and reduces production capability of their animals. Until now only a live vaccine is available (Infection and Treatment Method, ITM), that has been developed by ILRI and KARLO. If the vaccine is used, it provides a life-long immunity. The study area is Tanzania. The map here shows the locations of farmers (yellow dots) and healthcare service providers (red dots).





The following Research Questions were formulated:

- 1. Which reasons do farmers have to pay for vaccination?
- 2. Are there differences between purely private service providers *versus* semi-private providers and governmental health care providers?

For a successful adoption of the *East Coast Fever Vaccine* (further referred to as ITM), it is important to know the characteristics of those farmers who use the vaccine in their cattle herd. It is assumed that certain factors like the area of cultivated land, the amount of milk sold as well as other characteristics of a farmer's household contribute to the adoption of the vaccine. The method applied on the data was a least square multivariate regression analysis and descriptive analysis with frequency tables and bar charts. From the regression analysis, the results point to a correlation between the amount of money a farmer pays for the vaccine and the size of cultivated land, as well as the amount of milk sold per TLU. The results of the descriptive data analysis indicated that education plays a big role in the adoption of the vaccine, as illustrated in the following graph.



There are also differences in other characteristics of farmers who use ITM and those who do not use ITM. The ITM users gain less from livestock produce sales compared to non\_ITM



users; in contrast, the ITM\_users have higher revenues from crop sales, a higher overall farm income, off-farm income and total income as is shown in the following graph.



When it comes to the characteristics of the animal service providers, aspects which may contribute to their successful administration of ITM on farm are a *pay later option* for the farmer as a form of credit; access to credit is one of the factors constraining the use of animal (health) services mentioned in the literature. The distances that need to be covered to reach the farmer and the organisation of the animal health care business are other important factors. For the analysis, the healthcare providers were divided into three groups: 1. Private business only, 2. Purely governmental, and 3. Governmental with own business on the side. From the graph below it appears that among farmers who do not use ITM, the government only group of service providers is located farthest away from the serviced farms. Among farmers using ITM, the government service providers also have the highest travel distance. It could be speculated that this group of service providers is obligated to travel further, while private service providers do not accept clients beyond a certain travel distance, because they have the lowest travel distances. The mixed group (3) travels a medium range which may be due to the obligation to follow government orders but try to keep own travel expenses at a minimum.

## Arbeitsgemeinschaft Tropische und Subtropische Agrarforschung (ATSAF) e.V.



Council for Tropical and Subtropical Agricultural Research



Vaccinators: farmers using ITM; Non\_vaccinators: farmers not using ITM.

At present, the analysis of the data and compilation of the MSc thesis is still ongoing, but it is envisaged to wrap up by the end of August.

I can encourage other fellow students to apply for the Junior Scientist Programme as this offers exiting multidisciplinary topics to work on which contribute to new insights at personal as well as scientific level and hopefully to an improvement of farmers' livelihoods in the studied regions.

I'd like to thank you ATSAF e.V for this great support of my master's thesis. Simon Minz

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