



Tropentag, September 20-22, 2017, Bonn

“Future Agriculture:
Socio-ecological transitions and bio-cultural shifts”

Ebola Foresight: The Role of Livestock and Wildlife Species in the Biology of Filoviruses

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Abstract

The Ebola virus disease (EVD) epidemic in West Africa (2013–2016) has been the largest known EVD outbreak in history. More than 28.000 confirmed cases of EVD and more than 11.000 deaths have been reported in the three most severely affected countries Sierra Leone, Guinea and Liberia. The unprecedented dimension of the epidemic caused disastrous economic and humanitarian consequences for the local population.

Human-to-human transmission has been the predominant route of transmission responsible for the rapid spread of the virus. However, the zoonotic origin of EVD outbreaks has been known for a long time and contact of humans to infected wildlife and their infectious body fluids, such as blood or excretions, is thought to facilitate the initial spillover into the human population. Fruit bats have been postulated to be the wildlife reservoir for Ebola virus. With regard to other animal species, there is a lack of knowledge concerning their susceptibility and potential role as intermediate hosts for Ebola viruses.

In the “Ebola Foresight” project, a project in close collaboration between the Friedrich-Loeffler-Institut (FLI), the Institut Pasteur in Guinea, the Sierra Leone Agricultural Research Institute, and the Njala University in Sierra Leone, we aim to study the role of livestock, domestic animals and wildlife as potential hosts in filovirus infection. Funded by the German Federal Ministry of Food and Agriculture, the project furthermore aims to build capacities in the African partner laboratories by training of local PhD students and laboratory staff. Diagnostic tools such as serological assays and novel sequencing techniques will be implemented in the African laboratories and will enable rapid specific responses to future outbreaks of zoonotic diseases. In addition, these techniques are leveraged to provide first answers to the scientific questions of the project. Complemented are these studies in the affected countries by laboratory studies at the FLI. In the long term, the project will enable the African partners to establish successful research projects, as well as to provide insight into the role of livestock and wildlife species in the biology of Filoviruses.

Keywords: Capacity building, diagnostic assays, Ebola virus, filoviruses, livestock, West Africa, wildlife