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**Application for funding to support a workshop focussing on “Advances in Research toward the Global Control of FMD”**

**Organized by the GFRA in Hanoi, Vietnam**

**October 2015**

“Understanding Disease Ecology, Transmission and Vaccine Matching toward FMD Control”

**Background**

Foot-and-mouth disease (FMD) is one of the most important livestock diseases in the world due to its high infection rate, ease of spread, and its impact on farmers as a result of regulations with respect to livestock movement and trade. An outbreak of FMD has a devastating effect on a country’s food security and impacts directly on the national and international trade of animals. Consequently, the confirmatory diagnosis of FMD and its effective control through prophylactic, quarantine or slaughter-out procedures are of paramount importance. FMD is widely distributed in the developing world, particularly in Africa, South America and Asia. These are regions that support 70 percent of the world’s poorest communities who cannot afford the additional burden FMD has on the already limited food supply. FMD is an important economic burden to developing countries and emergent economies since disease occurrence limits animal production but also depresses the value of livestock and limits access to international markets. In addition, endemic FMD pools continue to pose a significant risk to livestock industries of FMD free countries.

Ongoing collaborative epidemiological studies between GFRA partners in Australia, the United States and Vietnam have highlighted the importance of FMD in the region and the need for improving basic knowledge on disease epidemiology and viral ecology. This knowledge is necessary in order to devise effective control programs with vaccine antigens that are relevant to circulating viral strains. The existing collaborative arrangements with Vietnam’s Department of Animal Health both in Hanoi and in Ho-Chi-Min City provide an excellent platform for future collaborative work and GFRA partnerships.

Chemically inactivated FMD vaccines are utilised to control FMD in endemic countries or countries at risk. Although FMD vaccines are widely available and have been used with success to control the disease in certain areas, current vaccines have their limitations. In SEA, vaccines may be of variable quality, contain inappropriate antigen concentrations or formulations or are stored under inadequate temperature conditions. Therefore, vaccines are not as effective in the field as determined in animal experiments. An in depth understanding of transmission is of paramount importance in order to a) to predict the risk of FMD spread, b) devise effective prevention of these risk factors and c) effectively control of the disease. In many developing countries, vaccination will continue to be an essential component for the progressive control of FMD. Where the epidemiology is better understood, maximising the effective application of current vaccines to create immune pools in areas where it is known animals are moved frequently into other countries, to decrease the risk of transmission will be the key in FMD control in the future. However, before coordinated control programs are established elsewhere in South East Asia there needs to be a better understanding to the disease ecology and epidemiology (ie long term maintenance and circulation pattern of the disease agent and transmission from its reservoirs). Thus research supporting the understanding of disease ecology, epidemiology and transmission patterns will have a positive impact on the control of the disease.

The main threat FMD poses to FMD-free areas, located mostly in the developed world, relates to the immediate, devastating consequences an outbreak or suspected outbreak has on the region and country as a whole. As a result of the enforcement of restriction on the movement of animals during an outbreak, the national and international trade of livestock and animal products are impeded, translating into severe economical losses. Moreover, large numbers of animals are often lost through slaughtering of all affected or contact animals as part of a disease control approach or through vaccination and possible re-emergence of disease into FMD-free areas.

FMD is endemic in most of Africa and Asia, and some countries in Latin America. In these areas, the impact of the disease is not only associated with the loss of trading opportunities, but also with the productivity of the animals, since FMD results in a decline in milk production, may induce abortion in pregnant livestock, death in young animals and a loss of traction power. These losses, whilst not often dramatic in an endemic setting, are insidious and costly. They undermine other attempts aimed to increase productivity and in the subsistence farming setting, they are a major factor in maintaining livestock keepers in the poverty trap. Even where vaccination is routinely practised, it is expensive and often ineffective. In terms of the protective requirement of a FMD vaccine, vaccination needs to be repeated frequently and vaccines must afford protection against current circulating FMDV strains. In many developing country settings this is not achievable.

The FMD ecology remains poorly understood and the disease dynamics in terms of reservoirs and factors favouring transmission remain largely unexplored. For example, despite the fact that Asian buffalo have been shown to be susceptible to FMDV infection and capable of harbouring the FMD virus asymptomatically for long periods of time (i.e. they are carriers), their role in long term maintenance of the virus is still undetermined.

In the previous GFRA workshop that was held in Arusha, Tanzania during October 2013, we focused on the role of African buffalo (*Syncerus caffer*) in the transmission of FMDV between wildlife and livestock in an endemic setting to assist with effective control measures and strategies. In this workshop, we want to focus on the role of Asian buffalo in the epidemiology of FMD in South East Asia with the same aim. In addition, this will contribute in the design of better and targeted vaccines for affected region. FMD transmission and the risk factors involved in transmission is a focus point of this workshop. With this topic, we aim to exchange and distribute the latest research findings between research partners to facilitate a greater understanding of the mechanisms involved in the transmission of FMD in endemic settings. The workshop will also address the gaps in our knowledge and new research focus areas regarding transmission and the factors increasing the risk of transmission.

**Purpose of the Workshop**

The purpose of this workshop is to bring together experts in the field of disease ecology, epidemiology and transmission with specific focus on the transmission of FMD. We envisage that approximately 70 participants may be interested in attending a two-day symposium to discuss the latest information disease transmission, epidemiology, vaccinology and viral ecology. The attendees would be expected to actively participate in the meeting by bringing knowledge of the most up-to-date research and the latest technology in order to dissect the selected topics or reviews of the literature. On the third day we intend to have a “table top” exercise to foster interaction between disease control authorities and policy makers from South East Asia and research scientists. This table top exercise will be closely coordinated with the regional FMD control program (SEA-FMD) in order to maximize the communication and data sharing among the different players generating relevant information about FMD and also communicating the main gaps in knowledge that need to be filled with ongoing and future research. We believe it would be valuable for these two groups to interact and identify how to enhance our knowledge of FMD control, for example, understanding the relationship between current vaccine antigens used and viral strains circulating in the region or exploring the economic impact of FMD and the successes and shortcomings of current control strategies. We would like to attract leading research scientists and representatives from major sectors involved in disease control including government agencies, food producing and pharmaceutical companies to the debate. Through this meeting we plan to identify improvements that can be made in the short and long terms and strategies to fill important knowledge gaps. The identified gaps will provide guidelines to current and future research in the region.

**Outputs of the workshop**

FMD epidemiology, transmission, viral ecology and vaccine matching will be discussed and a report will be produced to provide detail on progress, but also identify gaps in our knowledge about disease ecology and epidemiology with implications to disease control programs. In addition, the GFRA will make use of the opportunities to identify research needs within South East Asia and to establish collaborations and partnerships and to identify potential funding sources to address these needs.

**The major output of this meeting will be to identify priority areas of research on FMD ecology, epidemiology and vaccine matching related to control programs in South East Asia**

**AGENDA**

**Themes**

* + Role of Asian buffalo in FMD ecology, implications to disease modelling
	+ Vaccines: quality control, post-vaccine monitoring, improvement in vaccines, vaccine matching, challenges
	+ New developments and application of diagnostic tools
	+ Socio-economic impact of FMD

Day 1: Theme: Epidemiology, Transmission of FMD Ecology

Invited State of the Art lectures:

* Addressing FMDV global diversity with new developments and applications of diagnostic tools : Dr. Don King
* Understanding the role of Asian buffalo in FMD endemic cycle: Dr. Luis Rodriquez
* Assessing the role of African buffalo in FMD transmission Dr. Anna Jolles

Open session

Day 2: Theme: Vaccines, immunological responses and FMD pathogenesis

 Invited State of the Art Lectures

* + - * The current state of knowledge on passive and adaptive responses during FMDV infection: Dr. Bryan Charleston
			* Optimizing and harmonizing challenge methods to evaluate FMD vaccines in cattle and swine: Dr. Jonathan Arzt

Open session

Day 3 Theme: Research Gaps For The Control Of FMD

* + - * Assessing socio-economic impact of FMD in endemic settings: Prof Jonathan Rushton
			* Assessing FMD control strategies: role of disease modeling: Dr. Dan Haydon/Mark Bronsvoort/Eve Miguel/Andres Perez

Table top exercise – Policy Meets Research Towards FMD Control

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