



## THE NEED FOR THE APPLICATION AND AVAILABILITY OF EFFICIENT VACCINES IN DIFFERENT ANIMAL SPECIES

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Foot and mouth disease (FMD) has been successfully controlled and eradicated in large parts of the world using conventional disease control measures including the vaccination of domestic animals. Potent vaccines have also been the mainstay in controlling outbreaks in non-endemic regions. Several characteristics of FMD complicate the control of the disease when using vaccines. Not only do 7 serotypes occur with little cross-protection between the serotypes, but genetic and antigenic variants occur within serotypes. In addition, FMD virus can infect over 70 cloven hoofed species, most of these free living wild animals.

Where wildlife plays a role in the dissemination of the disease, vaccination of domestic animals creates an immune buffer between the wildlife and domestic species and in some reported cases it resulted also in the disappearance of the disease from wildlife. Sub-Saharan Africa is the only region which harbours the known long term maintenance host of the SAT type FMD viruses, viz. the African buffalo (*Syncerus caffer*) that can infect both susceptible domestic animals and wildlife. Eradication of FMD in the sub-continent is therefore not possible, unless the buffalo are all eradicated, an option that is unacceptable. The only other option is vaccination to control the disease. Vaccination of free living wild animals is fraught with difficulties. Virtually no data are available on the efficacy of the current inactivated vaccines and different adjuvants in various species. Added to this, it is difficult to determine which animals have been vaccinated during campaigns and young animals with maternal antibodies should not be covered. The current DIVA tests have not been validated for wildlife and a lack of sufficient well defined sera makes this untenable in the near future.

The role of small domestic animals such as sheep and goats as well as pigs in the epidemiology of the disease, is different in various parts of the world. In southern Africa and in most parts of South America, small stock and pigs have not been vaccinated for many years, even in the event of control of major outbreaks. Vaccination of cattle alone is the standard disease control policy for the application of vaccines in domestic stock based on the assumption that these species – especially sheep and goats - do not play a significant role in the spread of the disease or as sentinel animals to detect clinical disease. However, such an assumption do not hold true for all circumstances or under all epidemiological conditions. In high risk areas or areas where an endemic state of the disease exists and the source of infection is unknown or uncertain, vaccination of small stock should be considered to reduce the likelihood of cross-species contamination. Pigs for example excrete large amounts of virus and vaccines that could reduce the virus load in the environment could be useful during outbreaks.

In domestic animals the current vaccines are not optimal and the requirements for emergency use are different from that of routine use in endemic situations, or for rapid protection and reduction of viral excretion. The only option would be the development of improved, novel vaccines that need only one application without the need of several injections. Self-replicating and self disseminating vaccines could alleviate these problems. However, since wildlife hosts occur mainly in developing countries, there is little incentive for commercial entities to become involved and funding is limited. To reach the goal of worldwide control of FMD, it would be imperative to control the disease at source, and it would be prudent to focus research efforts on the improvement of vaccines.