About the FMD Bulletin for Southern Africa.

This is a product of the newly established OIE Collaborating Centre for Training in Integrated Livestock and Wildlife Heath and Management, Onderstepoort, and is to be distributed electronically approximately four times a year. The Collaborating Centre was recognised by the International Committee of the OIE (World Organisation for Animal Health) in May 2009. It is based at the Onderstepoort complex (near Pretoria, South Africa) and has five collaborating partners:

- ARC-Onderstepoort Veterinary Institute (ARC-OVI);
- Institute of Tropical Medicine, Antwerp - Belgium (ITM);
- University of Pretoria (Centre for Veterinary Wildlife Studies; Department of Animal and Wildlife Sciences; Department of Agricultural Economics, Extension and Rural Development);
- National Institute for Communicable Diseases (NICD), South Africa;
- Department of Agriculture, Forestry & Fisheries (DAFF), South Africa.

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The Bulletin intends to assemble, integrate and disseminate field and laboratory information related to the occurrence, impact and management of foot and mouth disease (FMD) in southern Africa in a non-technical format. This will include ‘news’ and summaries of research findings. In due course, this service will be extended to other animal and zoonotic (infections transmissible from animals to people) diseases. Such information, it is hoped, will be beneficial to a diversity of people — not only students and specialists in animal diseases — concerned with rural development; more particularly those involved with livestock production and wildlife management. FMD is crucial in this context because some of the viruses that cause the disease are maintained by wildlife (and are therefore difficult to manage) while, at the same time, FMD presents a significant impediment to regional and international trade in animals and animal products. The disease therefore directly impacts on bio-diversity conservation and commercialisation of livestock production in extensive systems. Both matters are vital for balanced rural development in the southern African Region.

Each edition of the Bulletin will be distributed by e-mail, free of charge, to recipients in southern African countries as well as further afield who have been carefully selected (but who may at any time choose to have their names removed from the distribution list). The Bulletin will also, in future, be published on the Collaborating Centre’s website once the website has been developed. Relevant comments and questions from readers will be used as a basis for future discussion.

This 1st edition of the Bulletin is devoted to the issue of FMD vaccine and the efficacy of vaccination programmes that are applied widely — at considerable cost — in many southern African countries. The second edition will deal with FMD outbreaks that have occurred with increasing frequency over the last few years in southern Africa. If you have any comments on this first edition please send them to us (see below for the address).
Theme for this edition: Observations on issues related to the recent performance of vaccination programmes against FMD in the SADC Region.

Background: Since 2003/4 the number of FMD outbreaks that have occurred in the SADC Region has increased in frequency and — in some cases — outbreaks have persisted for longer periods of time than was the case in the past [up to 24 months]. The reason(s) for this situation is probably complex and multifactoral (this will be the theme for the next edition of the FMD Bulletin). However, a common assertion has been that the currently available vaccine against SAT serotypes of FMD in the SADC Region has performed poorly and is a reason for the present situation. This issue was investigated over the last 18 months by the EU-funded SADC FMD Project which operated within the Food Agriculture & Natural Resources (FANR) Directorate of the SADC Secretariat [April 2007-November 2009]. This section of the Bulletin summarises some of the findings obtained during that investigation.

Conclusion based on recent investigations

The SADC Region faces a fundamental dilemma in the context of FMD vaccine because of (1) the diversity of topotypes (differences between viruses within a serotype with specific geographic distribution) and (2) the technically difficult, expensive and time consuming process required to adapt SAT field viruses to large-scale vaccine production. The result is that there is doubt about how well current vaccine strains ‘match’ the diversity of SAT variants present in the field in the SADC Region. This relates particularly to SAT2. Although there is evidence for inadequate vaccine performance in the SADC Region in the past, there is equally good evidence for recent improvement in the performance of available vaccine. Consequently there is no sound basis on which to assert that currently available vaccine is not compliant with local or international standards. However, it is also clear that the dynamics of antibody responses to vaccination do not accord with standard assumptions on vaccine performance. Based on information gathered during this investigation, it is likely that bi-annual (6-monthly) vaccination programmes that are presently the norm in the SADC Region are ineffective in the generation of adequate levels of herd immunity. Furthermore, poor vaccine application in the field has certainly been at least as important as vaccine quality and strain matching in inadequate performance of vaccination programmes in southern Africa.

The importance of two initial inoculations of vaccine for achieving sound primary vaccine-induced immunity

Results of trials conducted by the SADC FMD Project in collaboration with the veterinary authorities of Malawi and Namibia and with the assistance of the Botswana Vaccine Institute have emphasised the importance of immunologically naive cattle (calves & older cattle vaccinated for the first time) being vaccinated twice at an interval of 2-8 weeks in order to achieve effective primary immune responses. This is in any case the manufacturer’s recommendation. The results of the Malawian trial are an illustration of this fact (the Namibian trial provided essentially identical results).

For this reason, simply vaccinating as many animals as possible every 6 months in high-risk areas — the current common practise in southern Africa — will almost certainly induce less than optimal levels of herd immunity.
How rapidly do vaccine-induced antibody levels decline?

Experimental work conducted in the containment facility of the ARC-Onderstepoort Veterinary Institute (South Africa) in the last few years has shown that although good antibody responses are achieved by vaccinating naive cattle twice 3-4 weeks apart, the rate at which these antibody levels decline seems to be more rapid than previously assumed. This is shown in the accompanying graph where naive cattle were vaccinated twice 3 weeks apart and then challenged with live virus 45 days later. If this is an accurate reflection of what occurs in the field, it shows another reason why 6-monthly vaccination schedules are unlikely to be adequate in protecting cattle populations from FMD.

What would be an adequate vaccination schedule for FMD prevention in the SADC Region?

With our present understanding it is difficult to recommend a vaccination schedule that will induce both effective levels of herd immunity and, at the same time, be cost-effective. For that reason more extensive field trials which will address this issue are in the planning stage. In the meantime all that can be recommended is that vaccination programmes be designed in consultation with the vaccine manufacturer. In addition, two other actions are vital:

1. Field application of vaccine needs to be reviewed to ensure that vaccine storage, transport and administration to animals in the field is optimised because, as already indicated, vaccine handling and administration is as vital as ensuring the efficacy of the vaccine for effectively protecting cattle populations. There is no doubt that most prophylactic programmes against FMD in the SADC Region require improvement.

2. Post-vaccination monitoring (PVM) based on serological assessment of the levels of herd immunity generated by vaccination programmes needs to be an integral part of any vaccination programme. Failure to conduct PVM is tantamount to ‘flying blind’ but that is what happens in many cases. It is furthermore essential that serological monitoring occurs with test antigens that are homologous with strains of virus incorporated into the vaccine used in the location in question. In the past this important rule was not uniformly carried out, resulting in situations where much effort and expense provided little useful data on which to assess the performance of vaccination programmes.

These issues will be addressed in greater detail in forthcoming editions of this Bulletin.

Comment/discussion:

If you have questions and/or comments on this edition of the FMD Bulletin please send them in less than 500 words to foot.and.mouth.bulletin@gmail.com. If of wide enough appeal these may be discussed in future editions.