Progress in controlling Foot and Mouth Disease in the Greater Mekong Subregion of Southeast Asia

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Progress in controlling Foot and Mouth Disease in the Greater Mekong Subregion of Southeast Asia

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Introduction

Improving cattle and buffalo (large ruminant) production is increasingly being recognised as a pathway to alleviate rural poverty and improve food security in the Greater Mekong Subregion (GMS) and particularly in Cambodia and Laos where the majority of large ruminants and pigs are kept by smallholder farmers (Windsor, 2011; Young et al, 2013a). However there are many constraints to improving the livelihoods of smallholders through better livestock productivity, particularly Transboundary animal diseases (TADs) that cause losses in household income and compromise trade. Foot-and-mouth disease (FMD) is the most important of the TADs globally and is of particular importance in the GMS as it compromises the rapidly developing regional markets for large ruminant products. FMD is caused by infection with one of the 7 serotypes FMD virus (FMDV: O, A, C, Asia 1, SAT1, 2 & 3) although there is a continuing expansion of genotypes within these serogroups. The Global FAO-OIE Strategy for Control of FMD recognises 7 regional virus pools of FMD, each dominated by usually one or more serogroups and genotypes. The GMS is in Pool 1 of the 7 regional virus pools (Fukase, 2012).

Recently, the GMS experienced a major epidemic of FMD that emerged in 2009 and peaked in 2010-11. Although this epidemic was extremely widespread, dominated by O strains, the impacts of outbreaks remain largely unknown, due mainly to widespread disease under-reporting, leading to paucity of information to enable accurate epidemiological assessments and socioeconomic studies. However, several recently published studies from Lao PDR and Cambodia were conducted and are continuing and these are important as we are now witnessing a currently emerging epidemic of A strains. This paper will outline the recent FMD situation in the GMS and particularly in Cambodia and Laos, in the context of progress in the ongoing South East Asian FMD (SEAFMD) and now South East Asian and China (SEACFMD) campaign that is coordinating the efforts of the individual countries in the GMS to achieve regional FMD control (and eventual eradication) of Pool 1 FMDV (OIE, 2011).

FMD in the GMS

FMD in the GMS has received particular attention as it consists of several countries that are well advanced on the 5 stages of the Progressive Control Pathway (PCP) for Eradication of FMD, yet contains several that are at the beginning of these stages (e.g. Laos and Cambodia). There have been increasing efforts to assist the region in obtaining improved FMD status, partly inspired by eradication of the disease from Indonesia and the Philippines, and directed through the SEAFMD and now SEACFMD programs. However international donor contributions to FMD control in developing countries have often been piecemeal, partly because of widespread misconception that FMD is a disease of trade and of interest mainly to developed countries, with limited impacts on smallholder farmers and the economies of developing countries, resulting in FMD being considered a lower order priority to some GMS countries, less-deserving of attention than a lethal disease such as Haemorrhagic Septicaemia (HS) (Kawasaki et al, 2013).

In the GMS, the temporal nature of FMD epidemics has tended to display a ‘wax and wane’ epizootic pattern where there is generally a 4-7 year period between the peaks of outbreaks. For example, the peak in outbreaks recorded in 2006, was followed by the next peak in 2011 when the most recent major epidemic emerged in 2009-10, peaking in 2011 and continuing through 2012, with extension well beyond the GMS region, involving China, South Korea and Japan. This indicated major failures in international biosecurity occurred in the GMS and beyond. Further, this temporal pattern is likely to not only represent the shifting balance between the susceptible and infected or immune populations, but reflects the dynamics of shifting serogroups and genotypes in the population. This is an issue of particular importance for matching vaccines to current outbreaks, requiring consistent international support and demand for regular submission of FMDV isolates to enable disease control strategies to

remain effective. However extension of the 2010-11 epidemic to northern Asia did mean that increased resources were eventually made available to the GMS countries, including excess vaccine stocks from South Korea and Japan provided to Laos.

FMD in Cambodia and Lao PDR

Mounting effective control for TADs in some GMS countries and Cambodia in particular is problematic, as was identified in the Review of the Performance, Vision and Provision of Veterinary Services (PVS) report (Weaver et al, 2007). This report stated that 'the operation of the national program for epidemiology and surveillance is severely limited by the very low level of outbreak investigations, few diagnostic submissions, little information on endemic disease, no routine disease monitoring and reporting and the general absence of survey data'. Further, the PVS identified that 'the extensive VAHW network provides most of the ability to detect emergency disease outbreaks; the sensitivity of detection of emerging disease problems is poor, in part as there is no collection of baseline data. Reports are submitted to the OIE but are based on limited information on the actual animal health situation'. The PVS report included the recommendation that 'increasing information on the animal health situation in Cambodia by increasing outbreak investigations with greater use of laboratory confirmation of clinical diagnoses, and conducting surveys to assess the endemic disease situation' and that there should be 'planning for emergency disease incidents and the running of simulation exercises'. Some progress has been made to address these issues but there is much more to be done.

Recently, the knowledge of TADs in the GMS has rapidly expanded through the coordinated efforts of the OIE-led SEACFMD program and a range of in-country projects, particularly those in Cambodia and Laos that were supported by the Australian Centre for International Agricultural Research (ACIAR). This included projects AH/2005-086 'Best practice health and husbandry of cattle, Cambodia', AH/2006-159 'Best practice health and husbandry of cattle, Lao PDR', and AH/2006-025 'Understanding livestock movement and risk of spread of transboundary animal diseases'. This research confirmed that increasing farmer knowledge of large ruminant health and husbandry techniques led to improved health and productivity, in-turn leading to improved rural smallholder livelihoods (Young et al, 2013a,b) and that animal movement and trading routes were dynamic but did inform TAD disease risk (Kerr et al, 2013). These studies occurred at a time when a major epidemic of FMD developed in the GMS and beyond, associated with a consistently increasing demand for red meat in the rapidly developing economies of southern and eastern Asia that led to declines in the national large ruminant herds between 2009 and 2011 (Suon et al, 2013).

The 2010-12 FMD epizootic in the GMS did mean that 'simulation exercises' were made redundant by the occurrence of numerous actual disease outbreaks. However, weaknesses in animal surveillance and response capacity were exposed, with reputedly high levels of under-reporting, particularly in Cambodia (Shankar et al, 2012; Vergne et al, 2012). A two-source capture-recapture analysis for estimating the true number of villages experiencing clinical FMD in 2009 was conducted in Svay Rieng province in Cambodia (Vergne et al. 2012), evaluating the reporting rate to provincial authorities at a disturbing rate of 0.05 (CI 95% 0.03-0.13). Despite inadequate surveillance, under-reporting of cases, inabilities to confidently confirm the diagnosis of FMD and differentiate it from HS and other diseases in the field, strategic direction of policy is required to allocate appropriate resources for TAD control and eradication. This means that projects on TADs that try to fill the gaps resulting from inadequate surveillance, are highly relevant to future FMD management in the GMS.

Fortunately, recent studies that have improved knowledge of FMD transmission risks in Laos and Cambodia, associated with movement of animals and infection 'nodes' and 'hotspots' for FMD (Nampanya et al, 2013; Kerr et al, 2013a), plus financial impact studies, is providing direction for improved surveillance and disease control interventions. TADs and especially FMD and HS were recently confirmed as causing significant financial impacts on smallholder in Cambodia (Kawasaki et al, 2012; Young et al, 2015) and Laos (Nampanya et al, 2015) and more broadly in the GMS. Inclusion of HS in TAD/FMD control programs is important as they can be clinically confused by farmers as FMD, thus compromising surveillance efficiency, and are also important causes of economic loss and trade concerns. Using financial impact surveys in affected villages, trader surveys and modelling in both Laos and Cambodia, the costs of FMD in 2011 may have exceeded $100,00million in both countries, representing in the vicinity of 10% of the farm gate value of

large ruminant livestock in each country (Young et al, 2015; Nampanya et al, 2015). However, further work is required to address many of the gaps in knowledge, attitudes and practices (KAP) of the broad stakeholder community involved in livestock production in the GMS that have led to the biosecurity breakdowns that have permitted rapid spread of emerging FMD serotypes (Nampanya et al, 2012).

In determining the socioeconomic impacts on large ruminant smallholders in Laos of FMD in Laos during the 2011–12 outbreaks, data on gender, household financial status and farmer husbandry practices were examined. A mix of participatory tools and survey questionnaires at the village and household level, respectively, were conducted, involving individual farmer interviews and group meetings with village elders to establish criteria for classification of household financial status as being 'poor, medium or well off' according to rice sufficiency, assets and household incomes. FMD-attributable financial losses were determined by inclusion of losses due to: mortality, morbidity and costs of treatments. The estimated mean financial losses due to FMD were USD 436 in the 'poor' and USD 949 in the 'well off' household categories, being 128% and 49% of income from the sale of large ruminants, respectively. Variation in financial losses reflected differences in morbidity, farmer husbandry practices including frequency of observation of animals and thus recognition of FMD and choice of treatments. Of concern were adverse financial impacts of treatment especially where antibiotics were used; delays in reporting of FMD cases after observation of signs (mean of 2 days); admission that 10% of farmers had sold FMD-affected livestock; and that 22% of respondents claimed their large ruminants were cared for by females (Nampanya et al, 2015).

These findings confirm that FMD has the most severe financial impact on poorer households and that females have a significant role in large ruminant production in Laos. It is recommended that livestock extension activities promote the benefits of prevention rather than treatment for FMD and encourage participation of women in biosecurity and disease risk management interventions, including rapid reporting and regulatory compliance, particularly with animal movement controls and other biosecurity practices that reduce the negative impacts of FMD on regional food security and poverty reduction in rural communities.

Progress in the SEACFMD campaign

FMD control involves considerable cultural change in GMS countries, and the SEACFMD campaign recognises that significant international effort will be required to achieve the ambitious aims of SEACFMD Roadmap by 2020, and FMD eradication will take many years to achieve. The SEACFMD campaign must confront many issues involved in meeting its aims of regional FMD eradication in the GMS, resulting in adoption of a progressive phased approach involving:

- Phase 1 (1997-2001) involved 'setting-up' the campaign, developing political and scientific networks, and delivering basic training (e.g. diagnostics).
- Phase 2, the 'consolidation phase', involved upgrading technical skills, introducing public awareness programs, and harmonizing approaches to FMD control in member countries.
- Phase 3 (2006-2010), the 'development phase', sought to improve coordination and partnership efforts, increase high level consultations with governments and industries, and consolidate national control programs and direction.
- Phase 4 (2011-2015) is currently expanding the scope and coverage on the campaign with a focus on identifying and managing 'hotspots' and 'critical points' along the livestock movement pathways, progressing socio-economic studies, and initiating major FMD eradication projects in Northern Laos PDR and Central Myanmar.
- Phase 5 (2016-20) has been proposed to seek to: ensure long term sustainable FMD prevention and control with a focus on a risk based approaches; harmonization of SEACFMD with the OIE/FAO Global Progressive Control Pathway for FMD control and supporting OIE formal recognition processes; pursue long term institutional and funding capacities of countries to secure continuation of the Program; and strengthen veterinary services. Subject to funding, major vaccination programs will be carried out in least developed Member Countries.

Given that SEACFMD added other functions such as capacity building in countries and One Health work, particularly on rabies, the OIE RCU in Bangkok recently became a formal Sub Regional

Representation for South East Asia (SRR SEA) through its work (e.g. vaccine banks). The SRR SEA is the largest OIE international representation, with 12 international staff fully funded by external donors. Significant achievements include: the development on laboratory and epidemiological networks; a better trained and knowledgeable workforce in member countries including improved diagnostic capacities; the recognition of two FMD Reference Laboratories, one in Thailand and one in China; an improved understanding of the epidemiology of the various subtypes of the disease as well as livestock movement patterns, informing control strategies; and the development of national FMD control plans with close collaboration between countries with a willingness to share information and experiences. Countries and zones free of FMD have remained free and in FMD endemic countries, zones have been identified for particular attention.

The RCU has been funded mainly from Australia with some support provided in the early days from France, Japan, Switzerland and New Zealand. The Government of Thailand through the Department of Livestock Development, hosts the OIE SRR SEA. Phase 4 of the SEACFMD was subsumed under the STANDZ program with two new elements, capacity building for Veterinary Services, and One Health. The former component along with an EU funded program, the Highly Pathogenic and Emerging Diseases Program, as well as a USAID funded IDENTIFY program,was able to provide significant support to SEACFMD for vaccine banks, evaluation of veterinary services, and support for legislation, education, and enhanced laboratory systems. Japan, the Republic of Korea, New Zealand and China have and continue to provide support for the SEACFMD Campaign with strengthened collaborative arrangements with organisations such as FAO, ACIAR, FAVA and Australian and South East Asian Universities.

The SEACFMD Program is well recognized throughout the world and has served as a model for regional and sub- regional cooperation and coordination of other major TADs such as the influenzas. However, there are a number of real or potential constraints that need to be overcome if the SEACFMD is to be fully successful, including the ongoing need to ensure full political commitment and funding for disease control activities. Poorer countries will continue to need donor support for FMD controls such as vaccination, but also support for education and institutional capacity building. Decentralised authority in some countries can result in difficulties unless there is agreement by central and local governments on priorities, plus a need to engage the support of the livestock industries including smallholder farmers and villagers. An independent Mid Term Review of STANDZ conducted in 2014. It recommended that Australia and OIE should continue their support of the OIE SRR SEA and there is no need to change the major directions of the Program, including the SEACFMD, although several recommendations for improvements were offered.

Conclusion

FMD is endemic in a majority of the countries of South-East Asia, with considerable hurdles to be overcome to achieve control and eventual eradication of the disease. Continuing support from international donors is needed and essential to progress the aims of the SEACFMD program, although the South-East Asian countries are also required to contribute considerable resources and political support into FMD control. Capacity-building is critical to continue this progress, with mechanisms developed to enable the veterinary services of GMS countries to use these capacities effectively, requiring monitoring and evaluation of disease control activities to identify areas for improvement. Interestingly, the 2010-12 epidemic coincided with the emergence of Serotype O (topotype Mya98), whereas the current 2014-15 emerging epidemic, involves mainly Serotype A, particularly in Cambodia. This situation demands high levels of surveillance and reporting with regular submission of samples to ensure correct vaccine matching, particularly where monovalent vaccines are used (e.g. in Cambodia in mid-2014, available vaccine were mainly O Manisa strains, whereas most outbreaks at that time were A serotypes). Sustainability of support for initiatives that are working effectively is essential, such as the current FMD vaccination in northern Laos. As some countries are more advanced than others in their status on the PCP, countries gaining FMD freedom will increase the pressure on neighbouring countries to improve their programs, plus provide examples of success and potentially additional support for other countries in the region to advance their FMD eradication efforts.

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