

Report on the implementation of Foot and mouth disease (FMD) vaccination programmes in SEACFMD member countries



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The preparation of the survey questionnaire, analysis and writing of this report was done primarily by the OIE Sub-Regional Representation for South-East Asia (OIE SRR-SEA) Transboundary Animal Diseases team: Karma Rinzin, Laure Weber-Vintzel, Bolortuya Purevsuren and Ashish Sutar.

Ronello Abila, OIE Sub-Regional Representative for South-East Asia, closely supervised the preparation of the questionnaire and the report.

The participants of the 24th SEACFMD National Coordinators meeting on 30 July 2021 participated in plenary discussion via the presentation software Mentimeter to seek additional information on the access to quality FMD vaccines.

Executive Summary

Developing and implementing a national foot and mouth disease (FMD) vaccination strategy is one of the key pillars of the 2021–2025 Roadmap of the South-East Asia and China Foot and Mouth Disease (SEACFMD) Campaign. In preparation for the 24th SEACFMD National Coordinators Meeting, held on 29 and 30 July 2021, the World Organisation for Animal Health (OIE) Sub-Regional Representation for South-East Asia (SRR-SEA) conducted a survey to gather up-to-date information from member countries regarding the use of vaccines and the vaccination programmes implemented in the region; in addition, the survey aimed to help identify the gaps and priority actions for the SEACFMD Roadmap.

The questionnaire was shared with and completed by all 12 SEACFMD member countries. As part of the survey, the member countries also submitted an annual vaccination report providing quantitative information on FMD vaccination. The preliminary findings of the survey were presented during the 24th SEACFMD National Coordinators Meeting. Additional information regarding access to quality FMD vaccines was sought during the plenary discussion via the presentation software Mentimeter. In addition, a descriptive analysis was conducted using the information received from the eight FMD-endemic countries that had implemented FMD vaccination in the past three years, and four FMD free countries.

All eight FMD-endemic SEACFMD countries use FMD vaccination as a control strategy. The various approaches to vaccination are based on a given country's stage in the Progressive Control Pathway for FMD, as well as local situations and objectives. For example, these approaches can include the vaccination of target animal populations, zones or high-risk areas (six countries); ring vaccination around outbreaks (six countries); blanket vaccination (five countries); and barrier vaccination (four countries). Seven countries followed an integrated approach (combining different strategies) to implement their respective vaccination programmes.

All countries use inactivated FMD vaccines. Depending on the circulating field virus strain, the eight FMD-endemic SEACFMD countries use either trivalent (A, O, Asia-1 serotypes), bivalent (A and O serotypes) or monovalent (O serotype) vaccines. While all eight countries vaccinate cattle, buffaloes and pigs, the vaccination of small ruminants (sheep and goats) was also implemented in six countries. Five of the countries provide an initial dose at the age of three to four months. A second dose is provided one month after the first dose in four countries, two months later in one country, and as early as two weeks later by one country. The vaccination of animals at six-monthly intervals was practiced in six countries, as recommended.

Seven countries reported that their respective authorities allocated specific budgets to purchase FMD vaccines. All eight countries confirmed the availability of budgets to cover FMD vaccination field operations, including travel allowance and gasoline for the vaccination teams. All countries reported that commercial farms are required to conduct regular FMD vaccinations; in six of the eight countries, these farms cover the costs of the FMD vaccines. Basic cold chain facilities are available in seven countries. Refrigerated vans are available in three countries, while two countries reported that they hire a refrigerated van during the vaccination campaign.

In seven countries, FMD vaccination is carried out by government (public sector) veterinarians and veterinary paraprofessionals, with the support of private veterinarians and veterinary paraprofessionals and Community Animal Health Workers; while in one country, FMD vaccination is carried out solely by private veterinarians and veterinary paraprofessionals. All countries reported that their vaccinators are trained by government veterinary officers from state and provincial veterinary agencies and laboratories.

Five countries have general legislation on animal health and disease control that covers FMD vaccination, while the remaining three countries have specific legislation on FMD to support their vaccination programmes. There is a formal vaccine registration process in six countries, of which five have an emergency registration process. There is also a formal process for the procurement of FMD vaccines in five countries.

The European Commission for the Control of Foot-and-Mouth Disease pre-qualification procedures against foot and mouth disease and similar transboundary animal diseases are an excellent example of the independent peer review process for FMD vaccine qualification in the regional market. These pre-qualification procedures ensure that the vaccines supplied meet minimal internationally accepted criteria for quality, safety and efficacy; however, the process needs to be further explored and better understood by SEACFMD member countries. The registration process which is currently under preparation for the Association of Southeast Asian Nations (ASEAN) has stringent procedures to register veterinary vaccines. These include the submission of the relevant registration documents, evaluation of the documents, and testing by an accredited ASEAN vaccine testing laboratory. This system will facilitate the availability and accessibility of quality vaccines for member countries.

All eight countries reported that they conduct post-vaccination monitoring following the FMD vaccination programme, which includes serological surveillance to assess population immunity; estimated vaccination coverage; investigation of outbreaks in vaccinated populations; and monitoring the number of outbreaks in the vaccinated and non-vaccinated areas. Four countries reported FMD outbreaks in a vaccinated herd. Of these, three countries reported that the virus strain/type involved in FMD outbreak was similar to the vaccine strain/type.

All four FMD-free countries have FMD contingency plans in place, in compliance with Chapter 4.19. on official control programmes for listed and emerging diseases of the OIE *Terrestrial Animal Health Code*. Two countries have provisions for emergency vaccination in their FMD contingency plans. Although the other two countries do not have this type of provision in their contingency plans, it would be considered in case of an FMD incursion. For all countries, compliance with OIE standards is a prerequisite for vaccines to be purchased or used in the case of an emergency.

This study on the implementation of FMD vaccination programmes in SEACFMD countries provides valuable insights regarding the status of FMD vaccination, including the strategies and programmes adopted by SEACFMD member countries. This study also yields useful information for understanding the main challenges faced by member countries in accessing high-quality FMD vaccines, as well as some recommendations to address these challenges. The findings of the current study will contribute to strengthening vaccination programmes in the sub-region, prioritising regional activities to support member countries, harmonising approaches on FMD vaccination, and strengthening coordination among SEACFMD member countries and partners.

1. Introduction

In alignment with the [Global Foot and Mouth Disease Control Strategy](#), the South-East Asia and China Foot and Mouth Disease (SEACFMD) Campaign utilises the [Progressive Control Pathway for Foot-and-Mouth Disease](#) (PCP-FMD) tool, which is closely linked to the World Organisation for Animal Health (OIE) procedures for the endorsement of official foot and mouth disease (FMD) control programmes and for the official recognition of FMD freedom. Of the twelve SEACFMD member countries, four countries are officially recognised as FMD-free (Brunei, Indonesia, Philippines and Singapore). In addition, Sabah and Sarawak, the eastern part of Malaysia on Borneo Island, has been recognised as an FMD-free zone without vaccination since 2003. The remaining seven countries are at different PCP-FMD stages: three countries have an official FMD control programme endorsed by the OIE (People's Republic of China, Mongolia and Thailand); one country is in PCP Stage 3 (Vietnam), two are in PCP Stage 2 (Laos and Myanmar), and one is in PCP Stage 1 (Cambodia). Peninsular Malaysia is also in PCP Stage 3.

Vaccination is an important component of FMD prevention and control programmes that seeks to reduce the impact of FMD and to reduce the circulation of the causative virus in order to establish and maintain disease freedom. While the decision to use vaccination is each country's responsibility, recommendations and guidance on when and how to use vaccination are widely available. In particular, countries have access to the following technical resources: [Chapter 4.18](#). on vaccination of the OIE *Terrestrial Animal Health Code (Terrestrial Code)*; [Section 2.3](#). on veterinary vaccines of the OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Terrestrial Manual)*; and the [FAO/OIE Guidelines on foot and mouth disease vaccination and post-vaccination monitoring](#).

Infected countries in the SEACFMD subregion have traditionally vaccinated against FMD for different purposes: as emergency vaccination to limit the spread of ongoing outbreaks; as a prophylactic to protect higher value animals, herds or production systems; to limit the impact of FMD; to pilot a vaccination strategy in certain areas (e.g. risk-based vaccination); or to establish and maintain FMD-controlled zones or FMD-free zones with vaccination. Some FMD-free countries in the subregion have included vaccination as a response, containment and control strategy in case of a re-incursion of FMD.

The implementation of vaccination among the SEACFMD member countries is highly variable depending on a country's PCP-FMD stage, range of susceptible animal species and husbandry systems, and purpose of FMD vaccination. Developing and implementing a vaccination strategy is one of the key pillars of the 2021–2025 SEACFMD Roadmap. In preparation for the [24th SEACFMD National Coordinators Meeting](#), held on 29 and 30 July 2021, the World Organisation for Animal Health (OIE) Sub-Regional Representation for South-East Asia (SRR-SEA) conducted a survey to gather up-to-date information from SEACFMD member countries regarding the use of vaccines and the vaccination programmes implemented in the region; in addition, the survey aimed to help identify the gaps and priority actions for the SEACFMD Roadmap. The survey responses from FMD-endemic and FMD-free countries can be found in Annexes 1 and 2, respectively.

While the preliminary findings of the survey on the implementation of FMD vaccination by 12 SEACFMD member countries were presented during the 24th SEACFMD National Coordinators Meeting, this report presents a detailed analysis of the survey responses, as well as an overview of the annual vaccination reports and plenary discussions from the meeting.

The objectives of this study were:

- to map the current FMD vaccination situation and strategies followed by SEACFMD member countries;

- to identify potential challenges in vaccine procurement (legislation, procurement process);
- to identify technical challenges (quality check of the vaccines, implementation of the vaccination programme, vaccine matching etc.);
- to identify potential success stories, in particular (but not limited to) the establishment of public-private partnerships;
- to obtain a rough estimation of FMD vaccine needs at regional level.

2. Methodology

2.1 Survey questionnaire

The questionnaire, developed by the OIE SRR-SEA, included both closed- and open-ended questions covering various items related to the implementation of FMD vaccination by SEACFMD member countries, such as vaccination strategies; vaccine types used; post-vaccination monitoring; existing legal instruments for procurement and registration of vaccines; and challenges faced during the implementation of FMD vaccination in the field (see Annex 3). Some questions were targeted to different country groups depending on their respective FMD situations.

The finalised questionnaire was incorporated into a Microsoft Form (MS Form), a link to which was shared with the SEACFMD member countries. The questionnaire was completed virtually by the SEACFMD National Coordinators or their Representatives from all 12 SEACFMD member countries.

2.2 Annual Foot and Mouth Disease Vaccination Report form

As part of the survey to understand the status of FMD vaccination by the SEACFMD member countries, the Annual FMD Vaccination Report form was shared via email three weeks before the National Coordinators Meeting to gather quantitative information on FMD vaccination; this included the number of animals vaccinated out of a total population of FMD-susceptible animals in the targeted areas (sub-district, district and province) and the number of vaccine doses and types of FMD vaccines procured or produced in 2020.

Seven FMD-endemic countries submitted the Annual FMD Vaccination Report form; of these, one country did not submit quantitative information regarding FMD vaccination.

2.3 Virtual plenary discussion

During the 24th SEACFMD National Coordinators meeting, a plenary discussion was held to seek additional information from countries regarding their access to quality FMD vaccines; this discussion was facilitated via the presentation software Mentimeter. Six questions focused on the key challenges in accessing high-quality FMD vaccines, the factors that influence access to quality vaccines, the measures undertaken and the support expected from the OIE in order to improve access to quality vaccines.

2.4 Data analysis and reporting

During the analysis, a distinction was made between the eight FMD-infected countries/zones (Cambodia, People's Republic of China, Laos, Peninsular Malaysia, Mongolia, Myanmar, Thailand and Vietnam) that

have conducted vaccination in the past three years (see sections 3.1 to 3.6) and the four FMD-free countries (Brunei, Indonesia, Philippines and Singapore) (see section 3.7).

For confidentiality reasons, this report presents data that has been aggregated at the regional level.

The summary of the plenary discussion during the 24th National Coordinators Meeting is reported in Section 3.8.

3. Results and findings

3.1 Foot and mouth disease vaccination programme

3.1.1 Purpose of vaccination

The main purpose of FMD vaccination for the eight FMD-endemic countries is presented in Figure 1:

- seven countries reported that FMD vaccination is being implemented to limit the spread of ongoing outbreaks;
- six countries are vaccinating to limit the impact of FMD;
- six countries seek to establish FMD-free zones with vaccination;
- five countries aim to protect higher-value animals or herd and production systems; and
- one country is implementing a pilot vaccination strategy in certain areas.

3.1.2 Vaccination strategy

Seven countries followed an integrated vaccination approach (Figure 1); of these, six countries implemented a combination of three strategies and one country reported a combination of targeted vaccination with a blanket vaccination strategy. Only one country reported using a single strategy, that is, a targeted vaccination strategy.

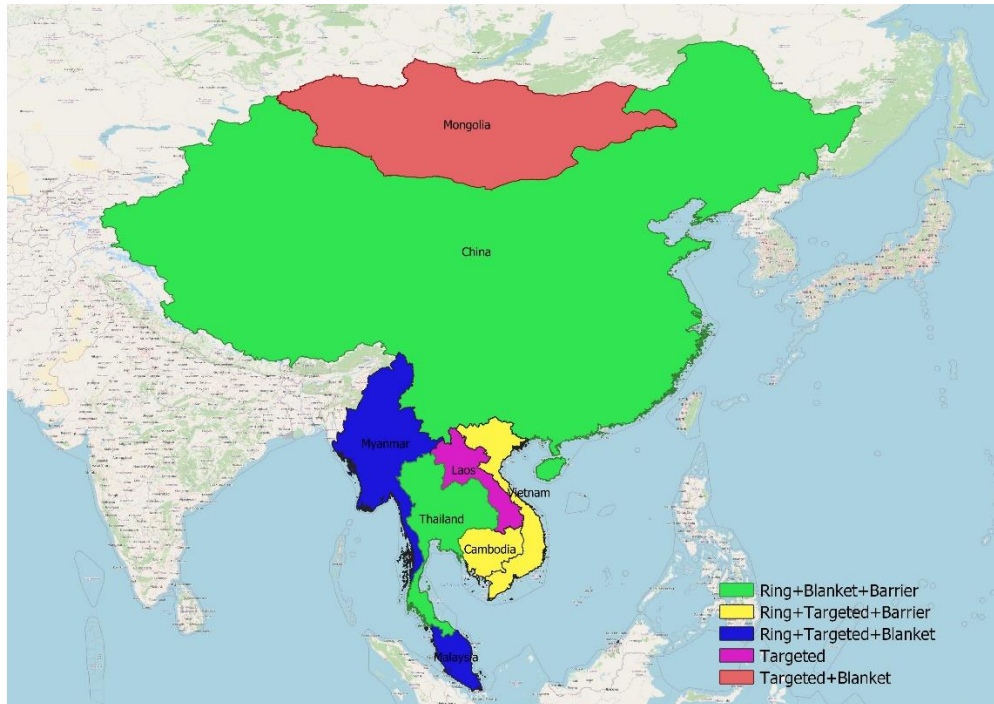


Figure 1. Map of vaccination strategies implemented by eight foot and mouth disease endemic countries

3.1.3 Animals vaccinated

Species vaccinated

Six countries vaccinate cattle, buffaloes, small ruminants (sheep and goats), and pigs against FMD, while two countries reported that they vaccinate only cattle, buffaloes and pigs.

3.1.4 Vaccination schedule

Age of primary vaccination

Five countries vaccinate animals at the age of 3 to 4 months, while the other three countries reported providing primary vaccinations at the age of 1.5 months, 1 year and as per the recommendations of the vaccine manufacturer, respectively.

Booster vaccination

Five countries conduct booster vaccination systematically, one country implements it most of the time, and two countries rarely carry out booster vaccination.

Four of the five countries that systematically implement booster vaccination reported providing the second shot (booster) after one month; while the remaining country reported carrying out the booster after six months. Booster vaccination in the other three countries was carried out after two months by one country, after one year by one country, and as early as two weeks after the first dose by one country.

Vaccination schedule

The FMD vaccination schedule differs among countries. Seven countries implement FMD vaccination every six months, while one country carries out FMD vaccination once a year. In the countries implementing biannual vaccination, most vaccination is undertaken in the months of January, April or May, and in June, September, October or November, depending on various factors such as the targeted area, vaccine stock and commercial farm plans (Figure 2).

Months	Malaysia	Vietnam	Mongolia	Thailand	China	Laos	Cambodia	Myanmar
January							Depends on vaccine availability	variable, depends on targeted area
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

Figure 2. Vaccination schedule in eight foot and mouth disease endemic countries

3.2 Vaccines used in member countries

Vaccine type: All countries reported using only killed vaccine.

Valency: Four countries used only trivalent vaccines, while the remaining four countries used a combination of monovalent, bivalent and trivalent vaccines (Figure 3).

None of the countries reported combining FMD vaccination with vaccination for other diseases.

Vaccine compliance with OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (OIE Terrestrial Manual): Six countries replied that they systematically control the quality of the FMD vaccines and that they only use vaccines that comply with OIE standards. The other two countries reported that the vaccines used are based on the specifications given by the producer, but are not controlled by an independent third party.

Budget: Seven countries reported that a budget was being allocated by their respective governments to purchase FMD vaccines. The detail of vaccines procured/produced in 2020 by eight FMD-endemic countries is presented in Table I.

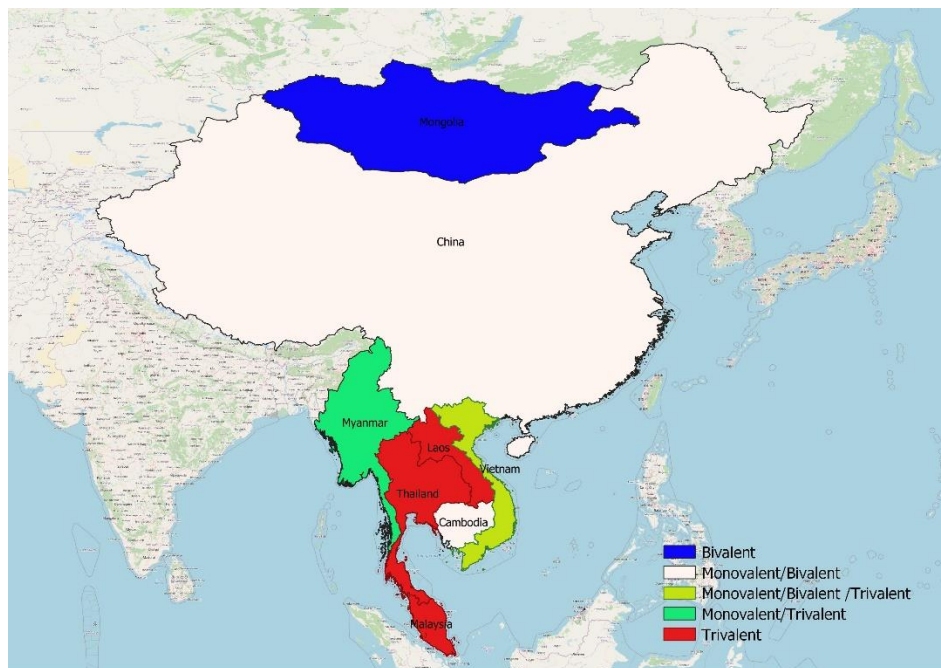


Figure 3. Map of different vaccine valency types used by eight foot and mouth disease endemic countries

Table I. Detail of foot and mouth disease vaccines procured/produced in 2020 (Source: Annual Foot and Mouth Disease Vaccination Reports submitted by countries)

Name of country	Number of doses	Types and valency	Registered vaccine	Manufacturer/ country
Cambodia	100,000	Trivalent (O, A, Asia1)	-	Vietnam and India
China (People's Republic of)	1,361,773,234	Bivalent (O, A)	Foot and mouth disease (FMD) type O inactivated vaccine; FMD type O synthetic peptide vaccine; FMD type A inactivated vaccine; FMD type O-A bivalent inactivated vaccine; FMD type O-A bivalent synthetic peptide vaccine	China (People's Republic of)
Laos	1,500	Bivalent (O, A)	-	China (People's Republic of)
Malaysia	300,000 (Ruminants) +	Trivalent A,O, Asia1)	Aftovaxpur (Ruminants) + Aftopor (Pigs)	Boehringer Ingelheim, United Kingdom (UK)

	185,750 (pigs)			
Myanmar	421,700 13,080	Trivalent (A, O, Asia1) Monovalent (O)	Meril FMD vaccine, Indian Immunologicals Ltd, India	Boehringer Ingelheim, UK Indian Immunologicals Ltd, India
Thailand	14,793,080	Bivalent (O, A) Trivalent (O, A, Asia1)	-	Department of Livestock Development, Thailand
Vietnam	2,916,532	Monovalent (O) Bivalent (O, A)	Avac-V6 FMD Emulsion, Aftovax trivalent O, A & ASIA1; Aftovax/Aftopor mono O, Aftovax Bivalent O&A; Aftogen OLEO, Bioaftogen, Inactivated, Type O (O/Mya98/XJ/2010+O/GX/09-7)	Boehringer Ingelheim Biogenesis Bago

3.3 Public-private partnerships for foot and mouth disease vaccination

3.3.1 Government-supported foot and mouth disease vaccination programme

Five countries reported that the government budget allocation for FMD vaccination ranged from US\$ 100,000 to US\$ 3 million.

All countries reported the availability of a budget for FMD vaccination field operations, including travel allowance and gasoline for the vaccinators.

Seven countries reported that the cost of FMD vaccination is borne by the central government, while one country did not report the source of funding.

3.3.2 Private sector-initiated foot and mouth disease vaccination programme

All countries reported that commercial farms are required to conduct regular FMD vaccinations.

In seven countries, livestock traders are obliged to vaccinate their animals before shipment.

Six countries charge commercial farmers for the FMD vaccine.

In five countries, commercial farms are required to submit FMD vaccination reports to the Veterinary Services.

3.4 Available logistics for foot and mouth disease vaccination

Vaccination is carried out by government (public sector) veterinarians and veterinary paraprofessionals in seven countries; of these, vaccination is assisted by the private veterinary sector and Community Animal Health Workers in three countries, while vaccination is supported by Community Animal Health Workers in two countries (Figure 4). One country reported that FMD vaccination is carried out solely by private veterinarians and veterinary paraprofessionals.

All eight countries reported that vaccinators are trained by government veterinary officers from state and provincial veterinary agencies and laboratories.

Basic cold chain facilities are available in seven countries. Refrigerated vans are available to the Veterinary Services for vaccine transport in two countries. Two other countries reported that they hire a refrigerated van from private companies when required for vaccine transportation.

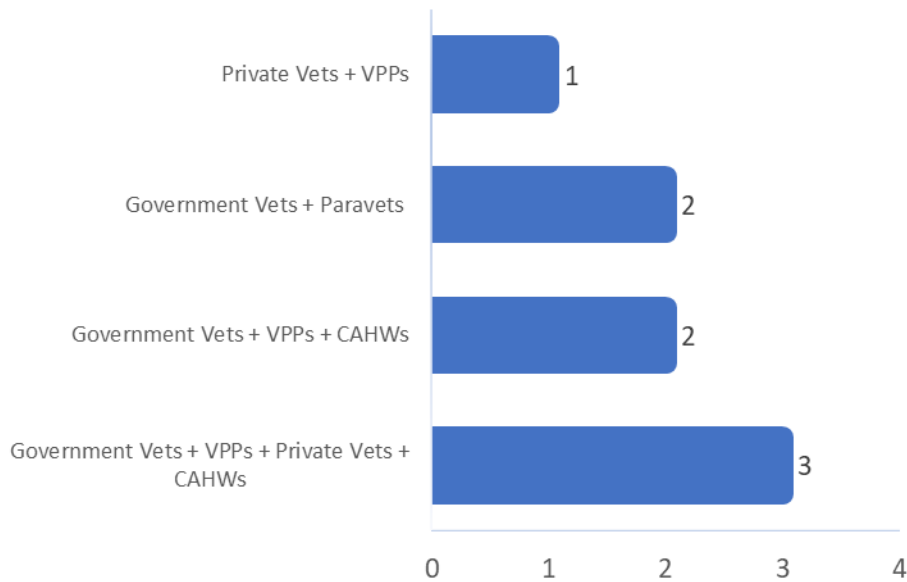


Figure 4. Composition of vaccination team in eight foot and mouth disease endemic countries

CAHWs: Community Animal Health Workers; VPPs: veterinary paraprofessionals.

3.5 Enabling environment

3.5.1 Legislation for foot and mouth disease control and vaccination

Legislation for FMD control is in place and regulated by various laws, regulations and directives in SEACFMD member countries, as listed below:

- Cambodia: Government plan
- China (People’s Republic of): Law of the People’s Republic of China on Animal Epidemic Prevention; Regulation on Emergency Response to the Major Animal Diseases; National Compulsory Vaccination Program for Animal Diseases; Contingency Plan on FMD Prevention and Control; Prevention and Control Technical Specification for Foot and Mouth Disease
- Laos: Livestock and Veterinary Law and FMD Risk-based Strategy Plan
- Malaysia: Law of Malaysia, Animal Act 1953 (Act 647), FMD Strategic Plan 2018-2023, Malaysia’s Veterinary Protocol (PVM) for FMD and FMD Guidelines (Sampling and Laboratory Testing)
- Mongolia: FMD Control Program, FMD Strategy, FMD Guidelines
- Myanmar: Animal Health and Livestock Development Law (13/2020) and its directives
- Thailand: Department of Livestock Development proclamations under Animal Epidemics Act B.E.2558 (2015)
- Vietnam: Circular No. 07/2016/TT-BNNPTNT dated 31 May 2016 of the Ministry of Agriculture and Rural Development.

Seven of the countries that were surveyed reported that their legislative environment supports Veterinary Services in terms of FMD vaccination.

One country reported that the legislative environment would need to be adjusted in order to support the implementation of FMD vaccination. This country highlighted that the main aspect to be changed in terms of legislative tools is 'mandatory vaccination'.

3.5.2 Vaccine registration

A formal vaccine registration process exists in six countries. There is no veterinary drug registration system in the remaining two countries.

In the six countries with a formal registration process, the registration and quality control of FMD vaccines are regulated under the framework of a General Livestock Health Law (the name of the law varies among the countries).

The duration of the registration procedures depends on the documents submitted by the vaccine producers or distributors. It takes about three months to one year to fully complete the registration procedures.

There is an emergency registration process to register FMD vaccines in five of the six countries that have formal vaccine registration process.

3.5.3 Vaccine procurement

Five countries have a formal procurement process to acquire FMD vaccines. The other three countries reported that they have not yet established a formal system to procure FMD vaccines.

The state and local Veterinary Services are mainly responsible for the procurement of FMD vaccines.

The main criteria to register FMD vaccines at country level are the following:

- Technical specifications and requirements including.
 - o FMD vaccine manufacturer, type, expiry date, shipment condition.
 - o safety, sterility, purity, efficacy, and potency.
 - o bidding and contracting conditions, taxation, and budget ceiling.

In terms of timeframe, the procurement process can take from two weeks to nine months. However, only one of the five countries with formal procurement procedures reported having a mechanism to rapidly purchase vaccines in an emergency situation.

3.6 Post-vaccination monitoring

All eight FMD-endemic countries reported that they conduct post-vaccination monitoring (PVM) as part of their respective FMD vaccination programmes. The most common PVM activities implemented by member countries are serological surveillance to assess population immunity; estimation of vaccination coverage; investigation of outbreaks in vaccinated populations; and monitoring of the number of outbreaks in vaccinated and non-vaccinated areas (Figure 5).

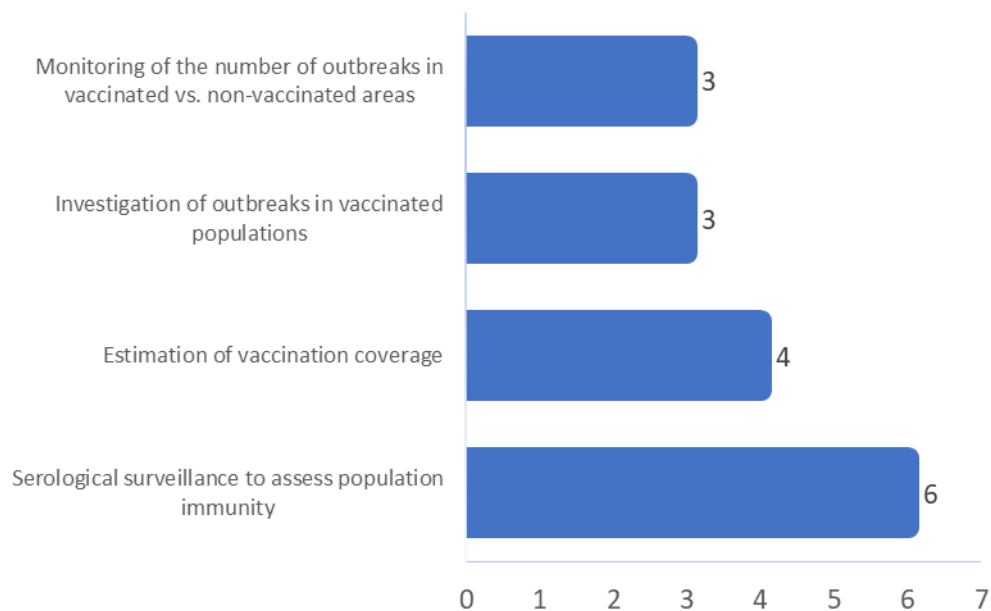


Figure 5. Status of post-vaccination monitoring activities implemented by eight foot and mouth disease endemic countries

In 2020, the coverage of FMD vaccination in the targeted population in six countries is varies widely depending on the country: cattle (2% to 93%); buffalo (4% to 93%); pigs (2% to 19%); sheep/goats (4% to 99%). Vaccination coverage ranges from very low in countries that are at a lower PCP-FMD stage to high coverage in countries at a higher FMD-PCP stage. For instance, FMD vaccination coverage in cattle for FMD-PCP Stages 1 and 2 is from 2% to 6%; for FMD-PCP Stage 3, coverage ranges from 44% to 62%; and for PCP Stage 4, coverage is 93%.

Five countries are satisfied with their existing FMD vaccination coverage. The three countries that reported not being satisfied with existing coverage provided the following suggestions for improvement:

- increase budget allocation from central and local government
- improve legislation, zoning approach, and movement control
- promote public-private partnerships.

Four countries reported FMD outbreaks in a vaccinated herd. Of these, two countries reported that the virus strains/types that were involved in the FMD outbreak were similar to the vaccine types/strain.

3.7 Countries free of foot and mouth disease

Four SEACFMD countries are FMD-free without vaccination. In addition, Sabah and Sarawak (eastern part of Malaysia on Borneo Island) has been recognised as an FMD-free zone without vaccination since 2003.

All four FMD-free countries have an FMD contingency plan in place.

Two countries have a provision for emergency vaccination in their FMD contingency plan. Although the other two countries do not have such a provision in their respective contingency plans, it will be considered if there is an FMD incursion.

For all FMD-free countries, compliance with OIE standards is a prerequisite for vaccines to be purchased and used in an emergency. In addition, Malaysia only uses vaccines that are in compliance with OIE standards.

None of the FMD-free countries have considered stockpiling FMD vaccines. However, two countries have identified a company that is in compliance with OIE standards and from which they would source FMD vaccines in the event of an FMD incursion.

3.8 Outcomes of the plenary discussion

Of the 86 participants who attended the 24th SEACFMD National Coordinators meeting, 21 country participants responded to the questionnaire via the Mentimeter platform. Half of the respondents (50%) reported facing difficulties in accessing high-quality FMD vaccines.

When ranking the factors that support access to quality vaccines, the cost of FMD vaccines was mentioned most often, followed by the availability of funding, the existence of a fair tendering or procurement process, and competitive access to several vaccines.

Other challenges in gaining access to quality vaccines include the following:

- availability of different types of vaccines with varying quality
- monopoly of some vaccine manufacturers
- lack of empirical data from the commercial manufacturer.
- lack of cold chain facilities in some countries.
- poor awareness of decision makers on the importance of vaccination and quality of vaccines
- variable regulations and/or lack of standard operating procedures for registration and procurement of vaccines
- limited human resource capacity (e.g. to evaluate the quality of vaccines).

Some of the measures implemented by SEACFMD member countries to improve access to good quality FMD vaccines are as follows:

- understand the circulating FMD virus strains in neighbouring countries and the risk of introduction into their own countries
- improve communication with different stakeholders such as industry groups, animal health staff and farmers
- implement PVM activities
- conduct field trials to measure antibody titres in vaccinated animals
- explore options to obtain additional funding for vaccine procurement and implementing vaccination in the field.

In addition, SEACFMD member countries provided a series of recommendations to the OIE, with the aim of prioritising its support to member countries (Figure 6).

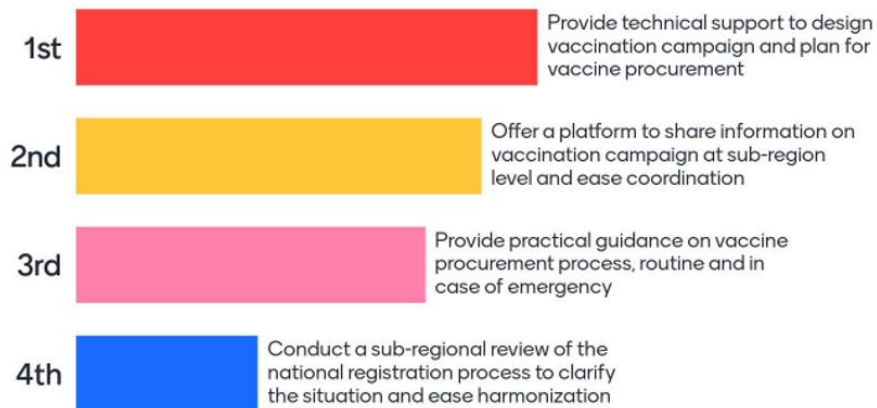


Figure 6. Prioritised recommendations to the World Organisation for Animal Health to support member countries' access to good quality foot and mouth disease vaccines

4. Discussion and conclusions

4.1 Discussion

Vaccination strategy and vaccine types used

Vaccination is an important component of FMD prevention and control programmes. It seeks to protect against clinical signs of disease, reduce the likelihood of infection if exposed, reduce viral shedding if animals are infected, reduce the number of FMD clinical outbreaks, and reduce the impact of FMD. As such, vaccination is one of the most important tools to combat FMD and is used in all eight of the FMD-endemic SEACFMD countries/zones. As outlined in previous sections, various approaches to vaccination strategies have been used by FMD-endemic countries depending on the country's PCP-FMD stage, range of susceptible animal species and husbandry systems, and purpose of FMD vaccination.

All countries use inactivated (killed) FMD vaccines. The great antigenic diversity of FMD virus means that different vaccine strains are required for different field virus strains. The [analysis of the data](#) of past few years (since 2019) on circulating strains/lineage of FMD virus indicated that O/SEA/Mya-98, O/ME-SA/Ind-2001, O/ME-SA/Pan Asia, O/Cathay, and A/Asia/Sea-97 were prevalent in the region. Depending on the circulating field virus strain, the eight FMD-endemic SEACFMD countries use either trivalent (A, O, Asia-1), bivalent (A and O serotype) or monovalent (O serotype) vaccines. Although Asia-1 was not reported in SEACFMD member countries for the past few years (since its last detection in Rakhine state of Myanmar in 2017), four countries still use trivalent vaccines (A, O, Asia-1).

There is a lack of homogeneity in the vaccination strategies and vaccines that are used among the FMD-endemic countries. There is scope to better harmonise the strategies and vaccine types used in the countries sharing a border or in countries confronted with the circulation of similar virus strains in their respective countries; such harmonisation could be addressed via bilateral/trilateral discussions.

Implementation of foot and mouth disease vaccination in the field

While all countries reported vaccinating cattle, buffalo and pigs, the vaccination of small ruminants (sheep and goat) is not practiced in two countries. Since the number of small ruminants, in particular goats, is increasing dramatically in these two countries, FMD vaccination of the small ruminant population should be

considered; while FMD can be clinically inapparent in small ruminant populations, they can still harbour significant amounts of virus, thus playing a major role in the spread of FMD.

Member countries provided primary vaccination to the animals at varying ages. As maternally derived antibodies can interfere with vaccination in livestock populations that are routinely vaccinated, the primary vaccination should be carried out at the age of two months for pigs and four months in cattle.

A key challenge in the use of FMD vaccines in endemic settings is the relatively short duration of immunity. While the presence of antibodies and some protection can be demonstrated as early as four to six days following vaccination, peak immunity is achieved around 21 days after the first vaccination. Based on the *FAO/OIE Guidelines on foot and mouth disease vaccination and post-vaccination monitoring*, a two-dose primary course consisting of a second vaccination at least three to four weeks after the first dose greatly strengthens the immune response, thus leading to stronger and antigenically broader protection and longer immunity. This is called booster vaccination. Although this is carried out after one month by four countries and after two months by one country, it should be noted that one country reported implementing booster vaccination only two weeks after the first dose. One country reported carrying out booster vaccination after six months and another indicated that this was undertaken after one year; however, in these cases, there was most likely a misunderstanding between the concepts of booster vaccination and follow-up vaccination. As such, these countries do not apply booster vaccination, but rather a biannual/annual revaccination.

The duration of vaccination-induced immunity depends on the potency of the vaccines and the number of doses received by the animals, but it is usually a maximum of six months. Therefore, the vaccination of animals at six-month intervals after a booster vaccination is recommended by most vaccine manufacturers. This is practiced by six countries and should be continued over time to ensure the required immunity in the vaccinated animal populations.

In light of the above, the OIE should consider providing technical capacity building in order to increase awareness on the immunisation mechanisms and vaccination protocols (age of primo-vaccination, booster vaccination, and six-monthly revaccination).

Availability of funding, logistics and workforce

Most countries reported that their respective authorities allocate funding to purchase FMD vaccines and implement FMD vaccination. All eight countries reported that commercial farms are required to conduct regular FMD vaccination; of these, commercial farms pay for FMD vaccines in six countries. In order to sustain FMD vaccination programmes, commercial farms and livestock industry groups should be encouraged to bear the cost of vaccination.

Attention should be paid to maintaining the cold chain, from the production of the vaccines up to their administration to animals, as the quality of FMD vaccines can be degraded due to inappropriate storage or a gap in the cold chain. Veterinary Services in the SEACFMD countries that do not have refrigerated vans should either procure them or hire them from private companies when required to transport vaccines.

In seven countries, FMD vaccination is carried out by government veterinarians and veterinary paraprofessionals with the support of private veterinarians and veterinary paraprofessionals, as well as Community Animal Health Workers. In one country, FMD vaccination is carried out solely by private veterinarians and veterinary paraprofessionals. These results highlight the role and contributions of veterinary paraprofessionals and private veterinarians in the implementation of vaccination campaigns, in addition to government veterinarians. The contributions of veterinary paraprofessionals and private veterinarians can be further strengthened by enhancing their skills in line with the recommendations of the [OIE Performance of Veterinary Services \(PVS\) Pathway](#). In addition, developing or strengthening public-

private partnerships may be relevant to improving the implementation of FMD vaccination campaigns; the [OIE PPP Handbook: Guidelines for public-private partnerships in the veterinary domain](#) provide some tips on how to develop or strengthen partnerships with the private sector, such as cattle owners, dairy or beef associations, private veterinarians and veterinary paraprofessionals.

All countries reported that their vaccinators are trained by government veterinary officers from state and provincial veterinary agencies and laboratories. Training of the vaccination teams should include vaccine administration, animal handling, record keeping, biosecurity and communication with farmers. The Veterinary Services and the vaccination teams should refer to [SEACFMD Manual 3: Foot and mouth disease vaccination and post vaccination-monitoring](#), which provides information on FMD vaccines, details of the OIE vaccine bank and how this can be utilised by SEACFMD member countries, together with information on relevant vaccination strategies and factors to consider when planning a vaccination campaign.

Legislation and regulations related to foot and mouth disease vaccination

Seven countries reported that their legislative environment supports Veterinary Services in terms of FMD vaccination. Five countries have generic legislation on animal health and disease control, which covers FMD vaccination, while three countries have FMD-specific legislation to support vaccination programmes. The legislation should support timely access to high-quality FMD vaccines, which may include streamlined formal registration and procurement of FMD vaccines. There is a formal vaccine registration process in six countries, of which five have an emergency registration process. In addition, five countries have a formal procurement process to obtain FMD vaccines. The existing legislation and regulations on FMD vaccination in SEACFMD member countries should be assessed, and revised where necessary, in order to enhance FMD vaccination through the timely access to high-quality FMD vaccines.

The [European Commission for the Control of Foot-and-Mouth Disease \(EuFMD\) pre-qualification procedures](#) against foot and mouth and similar transboundary (FAST) diseases would be an excellent example of an independent peer review process for FMD vaccine qualification in the regional market that could be adapted to the subregion. The pre-qualification procedures ensure that the vaccines supplied meet minimal internationally accepted criteria for quality, safety and efficacy; however, the process needs to be explored and better understood by member countries.

The [Association of Southeast Asian Nations \(ASEAN\) vaccine registration procedures](#) that are currently under preparation have stringent processes to register veterinary vaccines. These include the submission of the relevant registration document, evaluation of the document, and testing by the accredited ASEAN vaccine testing laboratory. This system will facilitate the availability and accessibility of quality vaccines, which will benefit member countries in the long term. The implementation of these procedures and ASEAN's regional registration of FMD vaccines should be encouraged.

Post-vaccination monitoring

Although FMD vaccination can be effective, it is a complex process and a variety of problems can lead to sub-optimal protection. Therefore, it is essential that a vaccination campaign is monitored to review the success of vaccine delivery, the level of induced immunity, and their impact on disease and infection. All eight countries reported that they conduct PVM after the FMD vaccination programme, which includes serological surveillance to assess population immunity; estimation of vaccination coverage; investigation of outbreaks in vaccinated populations; and monitoring the number of outbreaks in the vaccinated and non-vaccinated areas.

Four countries reported FMD outbreaks in a vaccinated herd. There could be number of reasons for the vaccination failure in such cases; these include the performance of vaccine itself and the way in which the vaccine is used. In order to understand the cause of vaccination failures, any report of an outbreak in a vaccinated herd should be investigated systematically following the *FAO/OIE Guidelines on foot and mouth disease vaccination and post-vaccination monitoring*. This is an area where the OIE and its expert network could provide technical support.

State of play for emergency vaccination in countries free of foot and mouth disease

Four SEACFMD member countries are FMD-free without vaccination. The capacity to respond rapidly and effectively to animal health emergencies, such as the occurrence of a listed disease not present in the country or zone (e.g. FMD), depends on the level of preparedness. All four FMD-free countries have an emergency preparedness plan for FMD; of these, two countries have a provision for emergency vaccination and have identified the vaccine manufacturer and vaccines to be used in an emergency. Although the other two countries do not have a provision for emergency vaccination in their preparedness plans, this would be considered during an actual FMD incursion. The two countries that have not yet identified the vaccine manufacturer and vaccine to be used in the event of an emergency should do so as soon as possible to ensure that they will have a vaccine fully compliant with Section 2.3. on veterinary vaccines and [Chapter 3.1.8.](#) on the requirements for FMD vaccines of the OIE *Terrestrial Manual*.

Limitations

The findings of this study are based on the questionnaire responses and the Annual FMD Vaccination Report submitted by SEACFMD member countries. Only six countries were included in the analysis of vaccination coverage, as quantitative data on FMD vaccination from two countries was not provided. This report did not attempt to obtain additional information which was not provided or questions that were left unanswered by member countries. The discussion and conclusion section highlights the key findings of the study and reference is made only to the existing tools and resources available within the OIE, Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs), and other partners, as well as experts' presentations during the second session of the 24th SEACFMD National Coordinators Meeting on 30 July 2021.

4.2 Conclusions

This study on the implementation of FMD vaccination programmes in SEACFMD countries yields valuable insights on the status of FMD vaccination, including the strategies and programmes adopted by SEACFMD member countries. The study provides a better understanding of the main challenges faced by member countries in accessing high-quality FMD vaccines, as well as recommendations to address these challenges. The findings of the current study will contribute to strengthening member countries' vaccination programmes, prioritising regional activities to support member countries, harmonising approaches on FMD vaccination, and strengthening coordination among SEACFMD member countries and partners. The key findings of this study will be used as a baseline indicator to measure progress under Output 1.3 'Robust vaccination strategy developed, including access to quality vaccines and vaccination data management and analysis' of the SEACFMD Roadmap 2021–2025. Thus, progress will be measured by comparing the baseline with the targets set to be achieved by the end of the sixth phase of the SEACFMD campaign.

The main recommendations of this study – addressed to member countries and the OIE to enhance FMD vaccination and access to high-quality FMD vaccines – are provided below.

Recommendations to SEACFMD member countries

- Follow a vaccination protocol based on scientific evidence, such as:
 - a two-dose primary course consisting of a first dose at the age of three to four months and a second vaccination at least three to four weeks after the first dose
 - vaccination of animals at six monthly intervals.
- Develop or strengthen partnerships with the private sector, such as cattle owners, dairy/beef associations, private veterinarians and veterinary paraprofessionals to implement FMD vaccination following the OIE PPP Handbook: Guidelines for public-private partnerships in the veterinary domain.
- Monitor the vaccination campaign to review the success of vaccine delivery, the level of induced immunity, and their impact on disease and infection. This should also include the systematic investigation of any report of an outbreak in a vaccinated herd following the FAO/OIE Guidelines *on foot and mouth disease vaccination and post-vaccination monitoring*.
- Use vaccines that are in compliance with OIE standards (for those countries in PCP-FMD Stage 3 and above) and vaccine types that are based on circulating FMD virus strains.
- Procure vaccines from qualified FMD vaccine manufacturers based on EuFMD pre-qualification criteria for foot and mouth disease and similar transboundary diseases.
- All FMD-free countries should identify a vaccine that is in compliance with OIE standards along with a detailed vaccination plan to be implemented during an FMD incursion.

Recommendations to the OIE

The following recommendations are based on member countries' questionnaire responses and the Mentimeter discussion during the 24th SEACFMD National Coordinators meeting.

- Exchange information on a regular basis regarding the FMD situation and virus strains circulating in the region and in neighbouring countries.
- Coordinate and support the referral of FMD samples to the OIE Reference Laboratories, including logistics and transportation.
- Establish a regional FMD Vaccine Bank and develop a mechanism to access vaccines from the regional Vaccine Bank.
- Support OIE Members in the production of FMD vaccines that are in compliance with OIE standards.
- Recommend vaccines that are in compliance with OIE standards and/or qualified FMD vaccine manufacturers based on EuFMD pre-qualification criteria in order to facilitate the procurement of high-quality FMD vaccines.
- Support PVM activities including their design and testing methods, such as liquid-phase blocking enzyme-linked immunosorbent assays (LPBE) and virus neutralisation tests (VNT).
- Support vaccine matching analysis, that is, selection of vaccine types that match field strains.
- Provide guidelines to FMD-free countries on how to access high-quality FMD vaccines for emergency vaccinations in case of an FMD re-incursion.
- Provide technical assistance and specific guidelines/template on how to conduct an in-country risk assessment and develop a risk-based vaccination strategy as part of a contingency plan (including vaccination decision tree).

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Annex 1: Outcome of the questionnaire response by foot and mouth disease endemic countries

Cambodia

FMD is endemic in Cambodia and has been recorded in all states and regions of the country. Although FMD vaccination is the main strategy implemented to prevent and control FMD, only about 5% of the total number of susceptible animals were vaccinated against FMD.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks
- To protect higher value animals, herds or production systems
- Limit the impact of FMD
- Pilot a vaccination strategy in certain areas.

Vaccination strategy

The following strategies are employed when implementing FMD vaccination:

- barrier vaccination (vaccination in an area along the border of an infected country or zone to prevent the spread of infection into or from a neighbouring country or zone)
- ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)
- targeted vaccination (vaccination of a subpopulation of susceptible animals).

Animals vaccinated

- Cattle, buffalo and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination: 1 year of age
- Booster vaccination: usually conducted one year after the first vaccination
- Time of vaccination: depends on availability of vaccine
- Frequency of FMD vaccination: once a year.

VACCINES USED IN THE COUNTRY

- Vaccine types: killed vaccine
- Valency: trivalent vaccine
- Combination with another vaccine: not combined, only FMD vaccine used separately
- Compliance with OIE *Terrestrial Manual*: partially – some of the vaccines used are compliant, some are not yet compliant
- Source of FMD vaccines: India and Vietnam
- Quantity procured/produced: 100,000 doses
- Number of animals vaccinated: 274,236 heads (cattle: 169,993; buffalo: 16,053; and pigs: 88,190).

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to buy FMD vaccines, though the amount is uncertain
- The central government covers 100% of vaccine costs
- There is a budget available for field operations of FMD vaccination
- The government does not charge farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations
- Commercial farms are not required to submit a FMD vaccination report to the government
- Livestock traders are not required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination
- The legislative environment supports Veterinary Services in terms of FMD vaccination.

Vaccine registration

- There is no formal vaccine registration process in Cambodia.

Vaccine procurement

- There is no formal procurement process to acquire FMD vaccines
- The General Directorate for Animal Health and Production (GDAHP) is responsible for the procurement of FMD vaccines.

POST-VACCINATION MONITORING

- GDAHP Cambodia carries out post-vaccination monitoring activities, which include the following:
 - o investigation of outbreaks in vaccinated populations
 - o estimation of the vaccination coverage (proportion of the target population to which vaccine was administered during a specified timeframe)
 - o serological surveillance to assess the population immunity (proportion of the target population effectively immunised).
- Vaccination coverage in the vaccinated herd is low (cattle: 6.0%; buffalo: 3.7%; and pigs: 7.8%)
- Not satisfied with existing vaccination coverage. Facilitate availability of vaccine to increase vaccination coverage.
- There are reports of FMD outbreaks in the vaccinated herd
- The virus involved in FMD outbreaks was not typed.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by government veterinarians and veterinary paraprofessionals; private veterinarians and veterinary paraprofessionals; and Community Animal Health Workers
- Vaccination teams are trained by the government veterinary officers
- Basic cold chain and refrigerated vans are available for vaccine transport.

People's Republic of China

The official FMD control programme of the People's Republic of China was endorsed by the OIE. Vaccination is one of the main strategies implemented for prevention and control of FMD, with an ultimate aim to achieve an FMD-free zone with vaccination.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks
- To protect higher value animals, herds or production systems
- Limit the impact of FMD
- Establish FMD-free zones with vaccination.

Vaccination strategy:

The following strategies are followed while implementing FMD vaccination:

- barrier vaccination (vaccination in an area along the border of an infected country or zone to prevent the spread of infection into or from a neighbouring country or zone)
- ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)
- blanket vaccination (vaccination of all susceptible animals in a delineated area surrounding the location where an outbreak has occurred).

Animals vaccinated

- Cattle, buffalo, sheep, goats and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination:
 - o calf: 3 to 4 months
 - o lamb: 4 months
 - o piglet: 28 to 35 days (backyard) or 50 to 70 days (commercial farm)
- Booster vaccination – in general, the following timeframe is used:
 - o cattle: the second vaccination is performed 1 month after the first immunisation, followed by vaccination every 4 months
 - o sheep and goats: the second vaccination is performed 1 month after the first immunisation, followed by vaccination every 6 months
 - o fattening pig: the second vaccination is performed 1 month after the first immunisation;
 - o breeding boars and sows: immunized 3 or 4 times per year
- Time of vaccination:
 - o commercial farms: develop their own programmed vaccination procedures
 - o backyard farms: vaccination is carried out in spring and autumn
- Frequency of FMD vaccination:
 - o cattle: vaccination every 4 months
 - o sheep and goats: vaccination every 6 months
 - o pigs: immunised 3 or 4 times per year.

VACCINES USED IN THE COUNTRY

- Vaccine types: killed vaccine
- Valency: Monovalent and bivalent vaccine
- Combination with another vaccine: not combined, only FMD vaccine used separately
- Compliance with OIE *Terrestrial Manual*: quality control is systematic and only vaccines that comply with OIE standards are used
- Source of FMD vaccines: vaccine manufacturers in China (People's Republic of)
- Quantity procured/produced:
 - o government: 1,361,773,234 doses
 - o private sector: 1,702,697,956 doses
- Number of animals vaccinated: 11,663,800 heads
 - o cattle: 9,336,840
 - o buffalo: 1,656,064
 - o sheep/goats: 671,896.

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to purchase FMD vaccines: US\$ 2 million
- The cost of vaccines is borne between central and local government on a pro rata basis, as follows:
 - o Eastern region – 4:6
 - o Central region – 6:4
 - o Western region – 8:2
- There is a budget available for field operations of FMD vaccination
- The government does not charge farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations
- Commercial farms are not required to submit FMD vaccination reports to the government
- Livestock traders are required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination. This includes the following: Law of the People's Republic of China on animal epidemic prevention; Regulation on Emergency Response to Major Animal Disease; National Compulsory Vaccination Program for Animal Diseases; Contingency Plan on FMD Prevention and Control; Prevention and Control Technical Specification for Foot and Mouth Disease
- The legislative environment supports Veterinary Services in terms of FMD vaccination.

Vaccine registration

- There is a formal vaccine registration process in People’s Republic of China which is governed by the Regulations on Administration of Veterinary Drugs
- The Animal Husbandry and Veterinary Bureau of the Ministry of Agriculture and Rural Affairs (MARA) and China Institute of Veterinary Drug Control are responsible for registration and quality control of FMD vaccines
- For the duration of the vaccination registration process, the ‘Measures for the Administration of Veterinary Drug Registration’ are referred to
- There is an emergency registration process to register FMD vaccines
- Registered vaccines in China (People’s Republic of) are: FMD type O inactivated vaccine; FMD type O synthetic peptide vaccine; FMD type A inactivated vaccine; FMD type O-A bivalent inactivated vaccine; and FMD type O-A bivalent synthetic peptide vaccine.

Vaccine procurement

- There is a formal procurement process to acquire FMD vaccines
- The respective organisation in each province is responsible for the procurement of FMD vaccines (the organisation is different for each province: local ACDC, local veterinary bureau, etc.)
- The main criteria are in accordance with the compulsory vaccination plan announced by MARA
- FMD vaccines are usually purchased once or twice per year
- There is an emergency procurement process to gain access to FMD vaccines.

POST-VACCINATION MONITORING

- The Animal Husbandry and Veterinary Bureau of MARA carries out post-vaccination monitoring activities which include:
 - investigation of outbreaks in vaccinated populations
 - estimation of the vaccination coverage (proportion of the target population to which vaccine was administered during a specified timeframe)
 - serological surveillance to assess the population immunity (proportion of the target population effectively immunised)
- Vaccination coverage in the vaccinated herd: data not provided
- There are reports of FMD outbreaks in the vaccinated herd
- Virus involved in FMD outbreak was typed and the virus types/strains are similar to the vaccine types/strains.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by government veterinarians and veterinary paraprofessionals; private veterinarians and veterinary paraprofessionals; and Community Animal Health Workers
- Vaccination teams are trained by government veterinary officers from the Animal Disease Prevention and Control Agency and National Reference Laboratory for FMD
- A basic cold chain is available for vaccine transport.

Expected support from the OIE and other partners

- Regular update on the FMD situation and circulating virus strains in the region and in neighbouring countries
- Coordination to send field samples to Reference Laboratories.

Laos

Foot and mouth disease remains endemic in Laos and causes sporadic disease outbreaks in its susceptible livestock population, particularly in cattle and buffaloes. From 2016 to 2019, Laos developed an FMD Risk-Based Strategic Plan (RBSP) and has progressed from PCP-FMD Stage 1 to Stage 2. During the current phase of the campaign, Laos is implementing the RBSP with a focus on strategic vaccination.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks
- Establish FMD-free zones with vaccination.

Vaccination strategy

The following strategies are employed when implementing FMD vaccination:

- ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)
- targeted vaccination (vaccination of a subpopulation of susceptible animals).

Animals vaccinated

- Cattle, buffalo and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination: 4 to 5 months of age
- Booster vaccination: one month after the first vaccination (first dose)
- Time of vaccination: November to December of each year
- Frequency of FMD vaccination: every six months.

Vaccines used in the country

- Vaccine type: killed vaccine
- Valency: trivalent vaccine
- Combination with another vaccine: not combined, only FMD vaccine used separately
- Compliance with OIE *Terrestrial Manual*: yes, quality control is systematic and only vaccines that comply with OIE standards are used
- Source of FMD vaccines: People's Republic of China
- Quantity procured/produced: 1,500 doses (from January to June 2020)
- Number of animals vaccinated:
 - cattle: 740
 - buffalo: 19 (from January to June 2020).

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to purchase FMD vaccines: US\$ 100,000
- 100% of vaccine costs are borne by the central government

- There is a budget available for field operations of FMD vaccination
- The government does not charge farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations.
- Commercial farms are required to submit FMD vaccination reports to the government.
- Livestock traders are required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination; for example, the Livestock and Veterinary Law and FMD Risk-Based Strategic Plan
- The legislative environment supports Veterinary Services in terms of FMD vaccination
- The main point to be adjusted in terms of legislative tools to better support FMD vaccination is mandatory vaccination.

Vaccine registration

- There is no formal vaccine registration process in Laos.

Vaccine Procurement

- There is a formal procurement process to access FMD vaccines
- The Department of Livestock and Fisheries (DLF) is responsible for the procurement of FMD vaccines
- The main criteria followed for procurement of FMD vaccines include the details of the FMD vaccine producer, the type of FMD vaccine, expiry date and shipment condition
- The duration of the procurement process is approximately one month
- There is no emergency procurement process to acquire FMD vaccines.

POST-VACCINATION MONITORING

- DLF Laos carries out post-vaccination monitoring activities, which include investigation of outbreaks in vaccinated populations
- Vaccination coverage in the vaccinated herd is cattle 80% and buffalo 95%. This estimate is based on vaccination carried out in 2001 in one district
- Satisfied with the existing FMD vaccination coverage
- There are no reports of FMD outbreaks in the vaccinated herd.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by government veterinarians and veterinary paraprofessionals
- Vaccination teams are trained by DLF officials.
- Basic cold chain and refrigerated vans are available for vaccine transport.

Expected support from the OIE and other partners

- Support is required (no detail provided).

Malaysia

Malaysia is in PCP-FMD Stage 3 and is in the process of submitting a dossier to the OIE for the endorsement of its official control programme. Vaccination is one of the main strategies implemented for the prevention and control of FMD and its being implemented on a regular basis.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks
- Protect higher value animals, herds or production systems
- Establish FMD-free zones with vaccination.

Vaccination strategy

The following strategies are employed when implementing FMD vaccination:

- ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)
- blanket vaccination (vaccination of all susceptible animals in a delineated area surrounding the location where an outbreak has occurred)
- targeted vaccination (vaccination of a subpopulation of susceptible animals).

Animals vaccinated

- Cattle, buffalo, sheep, goats and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination: 4 months of age
- Booster vaccination: usually conducted one month after the first vaccination
- Time of vaccination: months of January and June each year
- Frequency of FMD vaccination: every six months.

VACCINES USED IN THE COUNTRY

- Vaccine types: killed vaccine
- Valency: trivalent vaccine
- Combination with another vaccine: not combined, only FMD vaccine used separately
- Compliance with OIE Terrestrial Manual: yes, quality control is systematic and only vaccines that comply with OIE standards are used
- Source of FMD vaccines: Boehringer Ingelheim, United Kingdom
- Quantity procured/produced: 300,000 doses
- Number of animals vaccinated: 348,973 heads
 - o cattle: 217,469
 - o buffalo: 10,826
 - o pigs: 64,562
 - o sheep/goats: 56,116.

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to purchase FMD vaccines: 2–3 million Malaysian ringgit
- 100% of vaccine costs are borne by the central government for ruminants. Pig farmers have to bear the cost of FMD vaccine and vaccination themselves.
- There is a budget available for field operations of FMD vaccination
- The government does not charge farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations
- Commercial farms are required to submit FMD vaccination reports to the government
- Livestock traders are required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination; for example: Law of Malaysia, Animal Act 1953 (Act 647)
- The legislative environment supports Veterinary Services in terms of FMD vaccination.

Vaccine registration

- There is a formal vaccine registration process in Malaysia which is governed under the Law of Malaysia, Animal Act 1953 (Act 647)
- The Department of Veterinary Services (DVS) of Malaysia is responsible for the registration and quality control of FMD vaccines
- Aftovaxpur and Aftopor are currently registered in Malaysia
- The duration of the registration process is at least one year
- There is an emergency registration process to register FMD vaccines
- Registered vaccines in Malaysia: information not provided.

Vaccine procurement

- There is a formal procurement process to acquire FMD vaccines
- DVS Malaysia is responsible for the procurement of FMD vaccines for ruminants and pig farmers procure their FMD vaccine from registered companies
- The main criteria followed for the registration of FMD vaccines are the specifications of the vaccine and budget availability
- The duration of the procurement process is between six and nine months
- There is no emergency procurement process to acquire FMD vaccines.

POST-VACCINATION MONITORING

- DVS Malaysia carries out post-vaccination monitoring activities which include:
 - o monitoring the number of outbreaks in vaccinated areas vs non-vaccinated areas
 - o investigation of outbreaks in vaccinated populations
 - o estimation of the vaccination coverage (proportion of the target population to which vaccine was administered during a specified timeframe)
 - o serological surveillance to assess the population immunity (proportion of the target population effectively immunised)
- Vaccination coverage in the vaccinated herd is high: cattle 61.6%; buffalo 40.8%; pigs 19.4%; and sheep/goats 24.1%
- There are reports of FMD outbreaks in the vaccinated herd
- The virus involved in FMD outbreak was typed and the virus types/strain is not similar to the vaccine types/strain.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by government veterinarians and veterinary paraprofessionals
- Vaccination teams are trained by government veterinary officers
- Basic cold chain and refrigerated vans are available for vaccine transport.

Expected support from the OIE and other partners

- Monitor and control price of FMD vaccines
- Establish a regional vaccine bank for FMD vaccines
- Allow access to the vaccine virus which is used in the Malaysian FMD vaccine for the purpose of post-vaccination monitoring.

Mongolia

Mongolia had their Official Control Program for FMD endorsed by OIE and remained in PCP Stage 4. During the current phase of the campaign, Mongolia is trying to progress to PCP Stage 5 in selected zones. Vaccination is one of the main strategies implemented for prevention and control of FMD with an aim to achieve FMD free zone with vaccination.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks
- Limit the impact of FMD
- Establish FMD-free zones with vaccination.

Vaccination strategy

Following strategies are employed when implementing FMD vaccination:

- blanket vaccination (vaccination of all susceptible animals in a delineated area surrounding the location where an outbreak has occurred)
- targeted vaccination (vaccination of a subpopulation of susceptible animals).

Animals vaccinated

- Cattle, sheep, goat and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination: 1.5 months of age
- Booster vaccination: rarely done
- Time of vaccination: months of May and October each year
- Frequency of FMD vaccination: once every six months.

VACCINES USED IN THE COUNTRY

- Vaccine types: killed vaccine
- Valency: bivalent vaccine
- Combination with another vaccine: not combined, only FMD vaccine used separately
- Compliance with OIE *Terrestrial Manual*: quality control is systematic and only vaccines that comply with OIE standards are used
- Source of FMD vaccines: no information provided
- Quantity procured/produced: no information provided
- Number of animals vaccinated: no information provided.

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to purchase FMD vaccines: USD 3.2 million

- 100% of vaccine costs are borne by the central government
- There is a budget available for field operation of FMD vaccination
- The government does not charge farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations
- Commercial farms are required to submit FMD vaccination reports to the government
- Livestock traders are required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination; for example: FMD control programme, FMD strategy, FMD guidelines
- The legislative environment supports Veterinary Services in terms of FMD vaccination.

Vaccine registration

- There is a formal vaccine registration process in Mongolia which is governed by the Law on Animal Health
- The General Authority of Veterinary Services (GAVS) is responsible for the registration and quality control of FMD vaccines
- There is an emergency registration process to register FMD vaccines
- Registered vaccines in Mongolia: ARRIAH FMD vaccine.

Vaccine procurement

- There is no formal procurement process to acquire FMD vaccines.

POST-VACCINATION MONITORING

- GAVS Malaysia carries out post-vaccination monitoring activities, which include serological surveillance to assess the population immunity (proportion of the target population effectively immunised)
- Vaccination coverage in the vaccinated herd: no information provided.
- There are no report of FMD outbreaks in the vaccinated herd.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by private veterinarians and veterinary paraprofessionals
- Vaccination teams are trained by the provincial government veterinary officers
- Basic cold chain and refrigerated vans are available for vaccine transport. Additional refrigerated vans are hired during the vaccination campaign.

Expected support from the OIE and other partners

- None

Myanmar

Foot and mouth disease is endemic in Myanmar and has been recorded in all states and regions of the country. During Phase 5 of the SEACFMD campaign (2016 to 2019), Myanmar developed an FMD Risk-Based Strategic Plan (RBSP) and moved from PCP Stage 1 to PCP Stage 2. During the current phase of the campaign, Myanmar is implementing the RBSP with a focus on strategic vaccination.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks
- Limit the impact of FMD
- Establish FMD-free zones with vaccination.

Vaccination strategy

The following strategies are employed when implementing FMD vaccination:

- ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)
- blanket vaccination (vaccination of all susceptible animals in a delineated area surrounding the location where an outbreak has occurred)
- targeted vaccination (vaccination of a subpopulation of susceptible animals).

Animals vaccinated

- Cattle, buffalo, sheep, goats and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination: 3 months of age
- Booster vaccination: conducted six months after the first vaccination
- Time of vaccination: variable, depending on the targeted area
- Frequency of FMD vaccination: every six months.

VACCINES USED IN THE COUNTRY

- Vaccine types: killed vaccine
- Valency: monovalent and trivalent vaccines
- Combination with another vaccine: not combined, only FMD vaccine used separately
- Compliance with OIE *Terrestrial Manual*: yes, quality control is systematic and only vaccines that are compliant with OIE standards are used
- Source of FMD vaccines: Boehringer Ingelheim, United Kingdom; and **India Immunosobant Ltd, Inada**
- Quantity procured/produced:
 - o government: 412,700 doses
 - o private: 13,080 doses
- Number of animals vaccinated: 118,695 heads of cattle

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to purchase FMD vaccines: 482.31 million Myanmar kyats
- 100% of vaccine costs are borne by the central government
- There is a budget available for field operations of FMD vaccination
- The government does not charge farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations
- Commercial farms are required to submit FMD vaccination reports to the government
- Livestock traders are required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination; for example: Animal Health and Livestock Development Law (13/2020) and its directives
- The legislative environment would need to be adjusted to fully support the implementation of FMD vaccination
- The main points to be adjusted in the legislative tools to better support FMD vaccination is mandatory vaccination.

Vaccine registration

- There is a formal vaccine registration process in Myanmar which is governed under the Animal Health and Livestock Development Law (13/2020) and its by-law, directives
- Livestock Breeding and Veterinary Department is responsible for registration and quality control of FMD vaccines
- Aftovaxpur is currently registered in Myanmar
- The duration of the registration process is less than six months
- There is an emergency registration process to register FMD vaccines
- Registered vaccines in Myanmar are: Merial FMD vaccine from Boehringer Ingelheim; Indian Immunologicals Ltd, Inada

Vaccine Procurement

- There is a formal procurement process to obtain FMD vaccines
- Department of Veterinary Services (DVS) is responsible for the procurement of FMD vaccines
- The main criteria followed for the registration of FMD vaccines are safety, sterility, purity, efficacy, potency tendering, technical specification and requirement, bidding, contracting, taxation and delivery
- The duration of the procurement process is between three and six months.
- There is no emergency procurement process to procure FMD vaccines.

POST-VACCINATION MONITORING

- DVS Myanmar carries out post-vaccination monitoring activities which include:
 - o monitoring of the number of outbreaks in vaccinated areas vs. non-vaccinated areas

- investigation of outbreaks in the vaccinated population
 - estimation of the vaccination coverage (proportion of the target population to which vaccine was administered during a specified timeframe)
 - serological surveillance to assess population immunity (proportion of the target population effectively immunised)
- Vaccination coverage in the vaccinated herd: cattle 1.5%
 - Not satisfied with the existing FMD vaccination coverage. Measures to improve FMD vaccination coverage include legislation, additional budget resources, zoning approach and movement control, local government involvement and private sector participation
 - There is no report of FMD outbreaks in the vaccinated herd.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by government veterinarians and veterinary paraprofessionals, as well as Community Animal Health Workers
- Vaccination teams are trained by the Livestock Breeding and Veterinary Department officials and officers
- Basic cold chain and refrigerated vans are available for vaccine transport
- Refrigerated vans are hired from private companies when required for vaccine transportation.

Expected support from the OIE and other partners

- Assist in the selection of matched vaccine to local scenario
- Support virus typing (both genetic topotyping and virus neutralisation test R-value) at OIE Reference Laboratory, including logistics and shipment of samples
- Recommend suitable vaccine type including qualified FMD vaccine manufacturers.

Thailand

Foot and mouth disease outbreaks mainly occur in cattle, and mostly in the central part of Thailand. The official FMD control programme was endorsed by the OIE and currently Thailand is at Stage 4 of the PCP-FMD. Vaccination is one of the main strategies implemented for the prevention and control of FMD, with the ultimate aim to achieve an FMD-free zone with vaccination.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks
- Protect higher value animals, herds or production systems
- Limit the impact of FMD
- Establish FMD-free zones with vaccination.

Vaccination strategy

The following strategies are employed when implementing FMD vaccination:

- barrier vaccination (vaccination in an area along the border of an infected country or zone to prevent the spread of infection into or from a neighbouring country or zone)
- ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)
- blanket vaccination (vaccination of all susceptible animals in a delineated area surrounding the location where an outbreak has occurred).

Animals vaccinated

- Cattle, buffalo, sheep, goats and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination: 4 months of age
- Booster vaccination: usually conducted one month after the first vaccination
- Time of vaccination: months of May and November each year
- Frequency of FMD vaccination: every six months.

VACCINES USED IN THE COUNTRY

- Vaccine types: killed vaccine
- Valency: trivalent vaccine
- Combination with another vaccine: not combined, only FMD vaccine used separately
- Compliance with OIE *Terrestrial Manual*: yes, according to the specifications given by the producer, but not controlled by an independent third party
- Source of FMD vaccines: Department of Livestock Development (DLD), Thailand
- Quantity procured/produced: 14,793,080 doses
- Number of animals vaccinated: 11,663,800 heads
 - o cattle: 9,336,840

- buffalo: 1,656,064
- sheep/goats: 671,896.

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to purchase FMD vaccines: US\$ 2 million
- 100% of vaccine costs are borne by the central government
- There is a budget available for field operations of FMD vaccination
- The government does not charge farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations
- Commercial farms are required to submit FMD vaccination reports to the government
- Livestock traders are required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination; for example: DLD proclamations under the Animal Epidemics Act B.E.2558 (2015)
- The legislative environment supports Veterinary Services in terms of FMD vaccination.

Vaccine registration

- There is a formal vaccine registration process in Thailand which is governed under the Drug Act
- The Thailand Food and Drug Administration (FDA) is responsible for the registration and quality control of FMD vaccines
- There is no emergency registration process to register FMD vaccines
- Registered vaccines in Thailand: information not provided.

Vaccine procurement

- There is a formal procurement process to obtain FMD vaccines
- DLD is responsible for the procurement of FMD vaccines
- There is no emergency procurement process to acquire FMD vaccines.

POST-VACCINATION MONITORING

- DLD Thailand carries out post-vaccination monitoring activities, which include:
 - monitoring of the number of outbreaks in vaccinated areas vs non-vaccinated areas
 - investigation of outbreaks in the vaccinated population
 - estimation of the vaccination coverage (proportion of the target population to which vaccine was administered during a specified timeframe)
 - serological surveillance to assess population immunity (proportion of the target population effectively immunised).

- Vaccination coverage in the vaccinated herd is high (cattle: 92.7%; buffalo: 92.6%; and sheep/goats: 99.3%)
- There are reports of FMD outbreaks in the vaccinated herd
- The virus involved in FMD outbreaks was typed and the virus types/strains are similar to the vaccine types/strains.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by government veterinarians and veterinary paraprofessionals; private veterinarians and veterinary paraprofessionals; and Community Animal Health Workers
- Vaccination teams are trained by government veterinary officers
- Basic cold chain and refrigerated vans are available for vaccine transport.

Expected support from the OIE and other partners

- Support is required for the domestic production of FMD vaccines.

Vietnam

Vietnam is in PCP-FMD Stage 3 and is in the process of submitting a dossier to the OIE for the endorsement of its official FMD control programme. Vaccination is one of the main strategies implemented for the prevention and control of FMD and it is being implemented on a regular basis.

FMD VACCINATION PROGRAMME

Purpose of FMD vaccination

- Limit the spread of ongoing outbreaks.
- To protect higher value animals, herds or production systems.
- Limit the impact of FMD.
- Establish FMD-free zones with vaccination.

Vaccination strategy:

The following strategies are employed when implementing FMD vaccination:

- barrier vaccination (vaccination in an area along the border of an infected country or zone to prevent the spread of infection into or from a neighbouring country or zone)
- ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)
- targeted vaccination (vaccination of a subpopulation of susceptible animals).

Animals vaccinated

- Cattle, buffalo, sheep, goats and pigs are vaccinated.

Vaccination schedule

- Age of primary vaccination: depending on the recommendation of the vaccine manufacturer
- Booster vaccination: usually conducted four weeks after the first vaccination
- Time of vaccination: months of April and September each year
- Frequency of FMD vaccination: every six months.

VACCINES USED IN THE COUNTRY

- Vaccine types: killed vaccine
- Valency: monovalent, bivalent and trivalent vaccines
- Combination with another vaccine: not combined, only FMD vaccine separately
- Compliance with OIE *Terrestrial Manual*: yes, according to the specifications given by the vaccine manufacturer, but not controlled by an independent third party
- Source of FMD vaccines: Boehringer Ingelheim/ Merial Animal Health Ltd/ NAVETCO.
- Quantity procured/used: 2,916,532 doses

FUNDING MECHANISM

Government-supported FMD vaccination programme

- Annual allocated budget to purchase FMD vaccines: US\$ 100,000
- There is a budget available for field operations of FMD vaccination
- The government charges farmers for FMD vaccine.

Private sector-initiated FMD vaccination programme

- Commercial farms are required to carry out regular FMD vaccinations
- Commercial farms are required to submit FMD vaccination reports to the government
- Livestock traders required to have their animals vaccinated before shipments.

ENABLING ENVIRONMENT

Legislation for FMD control and vaccination

- There is legislation related to FMD control and vaccination; for example: Circular No.07/2016/TT-BNNPTNT dated 31 May 2016 of the Ministry of Agriculture and Rural Development
- The legislative environment supports Veterinary Services in terms of FMD vaccination.

Vaccine registration

- There is a formal vaccine registration process in Vietnam which is governed under the Veterinary Law
- The Department of Animal Health of the Ministry of Agriculture and Rural Development is responsible for the registration and quality control of FMD vaccines
- There is an emergency registration process to register FMD vaccines
- Registered vaccines in Vietnam are: Avac-V6 FMD Emulsion; Aftovax trivalent O, A & ASIA1; Aftovax mono O; Aftovax Bivalent O&A; Aftogen OLEO; Bioaftogen, Inactivated, Type O (O/Mya98/XJ/2010+O/GX/09-7).

Vaccine procurement

- There is a formal procurement process to obtain FMD vaccines
- There is no information on an emergency procurement process.

POST-VACCINATION MONITORING

- DAH Vietnam carries out post-vaccination monitoring activities which include:
 - o estimation of the vaccination coverage (proportion of the target population to which vaccine was administered during a specified timeframe)
 - o serological surveillance to assess population immunity (proportion of the target population effectively immunised)
- Vaccination coverage in the vaccinated herd: Cattle - 43.5%; Buffalo – 17.9%; Pig – 2.8%; and Sheep/ Goat – 3.9%.
- There are no reports of FMD outbreaks in the vaccinated herd.

LOGISTICS FOR FMD VACCINATION

Available logistics

- Vaccination is carried out by government veterinarians and veterinary paraprofessionals; and by Community Animal Health Workers
- Vaccination teams are trained by provincial sub-Departments of Animal Health
- Basic cold chain facilities are available.

Expected support from OIE and other partners

- Support is required for post-vaccination monitoring design, testing methods (liquid-phase blocking and virus neutralisation tests) in some laboratories and vaccine matching analyses.

Annex 2: Outcome of the questionnaire response by FMD-free countries

Brunei

Brunei is FMD-free without vaccination.

The country has a contingency plan for FMD in place.

In case of FMD incursion, FMD emergency vaccination is not yet considered by the Veterinary Services.

Suggestion or support going forward

An FMD simulation exercise with joint partners/neighbouring countries could be considered as a regional preparedness strategy for FMD.

Indonesia

The country is FMD-free without vaccination.

Indonesia has a contingency plan for FMD in place.

In case of FMD incursion, FMD emergency vaccination will be considered by the Veterinary Services.

Even though the stockpile of FMD vaccine is not being considered yet, the Veterinary Services identified the company from where the FMD vaccines could be sourced in compliance with OIE standards to respond to the emergency in the event of FMD incursion.

Suggestion or support going forward

Technical assistance and specific guidelines/template to conduct in-country risk assessment should be provided. Additionally, a risk-based vaccination strategy as part of the contingency plan (including vaccination decision tree) would be another important component to consider to enhance FMD vaccination preparedness of FMD-free countries.

Since Indonesia has experience in producing FMD vaccine during eradication campaign, the country also needs to explore the feasibility of vaccine production in an emergency (reactivate FMD vaccine production laboratory).

The Philippines

The country is FMD-free without vaccination.

The Philippines has a contingency plan for FMD in place.

In case of FMD incursion, FMD emergency vaccination will be considered by the Veterinary Services.

The Veterinary Services identified the company from where the FMD vaccines could be sourced in compliance with OIE standards to respond to an emergency in the event of FMD incursion. At this juncture, the stockpile of FMD vaccines is not being considered.

Suggestion or support going forward

Technical support on capacity building on vaccine matching as well as post-vaccination monitoring (PVM) would be useful.

Singapore

Singapore is FMD-free without vaccination.

The country has a contingency plan for FMD in place.

The Veterinary Services' comply with OIE standards to respond to an emergency in the event of FMD incursion. At this stage, emergency vaccination, stockpile of FMD vaccines, and source of vaccine procurement are not being considered; however, if the situation demands an emergency vaccination, the Veterinary Services might consider the option.

Suggestion or support going forward

Training on FMD vaccination strategies, covering lessons learned from constraints faced by member countries, should be provided. Additionally, training on epidemiological and disease investigation could be considered.

Annex 3: Questionnaire on the implementation of FMD vaccination programmes in SEACFMD member countries

Several FMD-infected SEACFMD member countries carry out vaccination against FMD; however, they may follow different purposes: limit the spread of ongoing outbreaks; protect higher value animals, herds or production systems; conduct risk-based vaccination focusing on high-risk areas; limit the impact of FMD; pilot a vaccination strategy in certain areas; or establish FMD-free zones with vaccination.

On the contrary, FMD-free countries may have included vaccination as a response, containment and control strategy in case of a re-incursion of FMD.

Through this questionnaire, the SEACFMD Secretariat expects:

1. To map the current FMD vaccination situation and strategies followed in your respective countries.
2. To identify potential challenges in vaccines procurement (legislation, procurement process).
3. To identify technical challenges (quality check of the vaccines, implementation of the vaccination programme, vaccine matching).
4. To identify potential success stories, in particular (but not limited to) the establishment of public-private partnerships.
5. To have a rough estimation of FMD vaccine needs.

Name of the country:

To redirect you to the tailored questions, please indicate whether:

- Your country is officially recognised as free of FMD (without vaccination) **Go to Q16**
- Has your country conducted FMD vaccination in the last 3 years? **Go to Q1.**
- Is your country infected with FMD but has not conducted vaccination in the last 3 years? **Go to Q17**

FMD VACCINATION PROGRAMME

1. [What was the purpose of FMD vaccination? \(Select one or more\)](#)

Limit the spread of ongoing outbreaks

To protect higher value animals, herds or production systems

Limit the impact of FMD

Pilot a vaccination strategy in certain areas

Establish FMD-free zones with vaccination

2. [What species of animals are vaccinated against FMD in your country? \(select one or more\)](#)

Cattle | Buffalo | Sheep | Goat | Pig

3. What vaccination strategy is followed in your country? (Select one or more)

Barrier vaccination (vaccination in an area along the border of an infected country or zone to prevent the spread of infection into or from a neighbouring country or zone)

Ring vaccination (vaccination of all susceptible animals in an area or an entire country or zone)

Blanket vaccination (vaccination of all susceptible animals in a delineated area surrounding the location where an outbreak has occurred)

Targeted vaccination (vaccination of a subpopulation of susceptible animals)

4. When is FMD vaccination carried out?

At what age is the primary vaccination carried out in young animals?

Answer:

Do you conduct a booster vaccination? (Select one)

Yes, systematically | Yes, most of the time | Rarely | No

How long after the first vaccination do you usually do the booster vaccination?

Answer:

What is the frequency of FMD vaccination? (select one)

Once in six months | Once a year | Once every two years

Which month of the year is FMD vaccination usually carried out?

Answer:

VACCINE USED IN THE COUNTRY

5. What type of FMD vaccine is used in your country?

Vaccine types used in your country (select one or more)

Killed | Attenuated

Valency of vaccines used in your country (select one or more)

Monovalent | Bivalent | Trivalent

FMD Vaccine combined with another disease? (select one or more)

FMD + BQ + HS | FMD + BQ | FMD + HS | FMD + other (which one)

6. Are the used vaccines compliant with the OIE standards for FMD vaccine (OIE Manual): select one

Yes – quality control systematic and only use of compliant vaccines

Yes – according to the specifications given by the producer, but not controlled by a third independent party

Partially – some of the vaccines used are compliant, some are not yet

Not yet, but we plan to move to compliance within the next 5 years

No and we do not have plan to move to compliant in the 5 coming years

7. What are the sources and quantity of vaccines used in 2020?

Source	Number of <u>doses</u>	Types (indicate subtype combination for bivalent & trivalent vaccines)	Manufacturer and country
Government purchase			
Donor purchase			
Private sector (commercial farms, traders)			

Indicate the source and quantity of vaccines procured in 2020? Please upload Excel file 'Annual FMD Vaccination Report' here.

8. For government-supported FMD vaccination campaign:

How much is allocated for annual budget to buy FMD vaccines?

Answer:

What is the percentage sharing between the central government and local government (State/Province)

Answer:

Is there a budget for field operations for vaccinations (e.g. Travel allowances and gasoline of vaccinators)

Yes | No

Does the government charge farmers for FMD vaccine?

Yes | No

If you charge, how much?

Answer:

9. For private sector-initiated vaccination:

Are commercial farms required to conduct regular FMD vaccinations?

Yes | No

Are commercial farms required to submit FMD vaccination reports to government?

Yes | No

Are livestock traders required to have their animals vaccinated before shipments?

Yes | No

ENABLING ENVIRONMENT

10. Is there any legislation related to FMD control and vaccination?

Yes | No (If yes, answer the following)

Name the legislation related to FMD control and vaccination:

Answer:

Are the current legislation or regulations appropriate for the Veterinary Services to implement the needed vaccination campaign?

Yes, the legislative environment supports Veterinary Services in terms of FMD vaccination

The legislative environment would need to be adjusted to fully support the implementation of FMD vaccination

Note: Provide detail in next question.

What are the main points to be adjusted in the legislative tools to better support FMD vaccination?

Answer:

11. Is there any formal vaccine registration process in your country?

Yes | No

If yes, name the organisation responsible for registration and quality control of FMD vaccines?

Answer:

Name the legislation related to vaccine registration:

Answer:

What are the main criteria followed for registration of vaccines?

Answer

What is the duration of the registration process?

Answer:

Is there any emergency process?

Yes | No

What are the FMD vaccines currently registered in your country?

Answer:

12. Is there any formal procurement process to access FMD vaccines?

Yes | No

If yes, name the organisation responsible for procurement of FMD vaccines.

Answer:

What are the main criteria followed for procurement of FMD vaccines?

Answer:

What is the duration of the procurement process?

Answer

Is there any emergency process?

Yes | No

POST-VACCINATION MONITORING

13. Do you carry out any post-vaccination monitoring activities?

Yes | No

If Yes, what kind of activities are you conducting?

- a. Monitoring of the number of outbreaks in vaccinated areas vs. non-vaccinated areas
- b. Investigation of outbreaks in vaccinated population
- c. Estimation of the vaccination coverage (proportion of the target population to which vaccine was administered during a specified timeframe)
- d. Serological surveillance to assess the population immunity (proportion of the target population effectively immunised).

14. Are you satisfied with the existing FMD vaccination coverage/population immunity?

Yes | No

If No, any measures you would undertake to improve the coverage:

Answer:

15. Any FMD outbreak reported in the vaccinated herd?

Yes | No

If yes, did you type the virus types/strain?

Yes | No

Is the virus strain/types involved in FMD outbreak similar to the vaccine types/strain or due to another virus types/strain?

Yes | No

Please go to question 17 after completing this.

16. For FMD-free countries, please complete the following questions:

Does your country have an FMD Contingency Plan?

Yes | No

Is FMD emergency vaccination included in the Contingency Plan?

Yes | No | No, but we would consider vaccination anyway, even if not specified in case of FMD incursion

Do you stockpile FMD vaccines to be used during the FMD incursion in your country?

Yes | No

If yes, which vaccine have you stockpiled (manufacturer, valences, number of doses)?

Answer:

If not, have you identified the source/company from where you will get the FMD vaccination in case of FMD recursion in your country?

Yes | No

Is compliance with the OIE standard a prerequisite for the vaccine to be purchased/used in emergency?

Yes | Yes, but in case of real emergency we would also consider not fully compliant vaccines | Yes, but the cost of the vaccine would be a more important factor | No

AVAILABILITY OF LOGISTICS FOR FMD VACCINATION

17. Who carries out FMD vaccination in your country?

Government Vets and Paravets | Private Vets and Paravets | Community Animal Health Workers | Others (specify)

18. Do you train the vaccination team?

Yes | No

If yes, who provides the training?

Answer:

19. Do you have cold chain and refrigerated van to transport vaccines over long distances?

Basic cold chain facilities available | Refrigerated van available with VS for vaccine transport | Refrigerated van hired from private companies when required for vaccine transportation

OTHER

20. What support (excluding project funding) would you like the OIE and other partners to provide to enhance FMD in vaccination in your country?

Answer:

21. Any other comments?

Answer:

Thank you for completing the questionnaire.