



Manual 4

Animal movement management and quarantine



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Background

Movement of animals and animal products are the main risk factors involved in cross-border spread of transboundary animal diseases such as FMD. This is especially true in countries where such movements are poorly regulated (Di Nardo *et al.*, 2011). In South-East Asia, live animal movement is the single most important factor in the dissemination of FMD (Gleeson, 2002) and the distribution of viral strains isolated from this region reflect the trade-related movement pathways of livestock (Di Nardo *et al.*, 2011). In addition, the countries which occupy mainland South-East Asia share extensive land borders which are often poorly regulated and provide opportunity for unofficial movement of livestock. Throughout this manual, the term ‘illegal movement’ refers to movement which occurs without official recognition and oversight.

Close contact between infected and susceptible animals is the most common way in which FMDV is spread, based on aerosol transmission or environmental contamination. Animal movement is thus an important factor in allowing contact between infected and susceptible livestock and enabling the spread of FMD to new areas or even new countries. Livestock movement at a local level such as mixing with other livestock at water sources or common grazing areas, etc. may be important in local spread of disease (Naing Oo, 2010), but disease spread over significant distances and across borders is generally associated with trade-related movement. This type of movement, and its management, will be the main focus of this manual.

The manual will begin with a description of the current livestock movement trade pathways in South-East Asia and China (focusing on trade-related movement of large ruminants) and the specific challenges faced by SEACFMD Member Countries in relation to animal movement management (focusing on cross-border movement), followed by a generic discussion on quarantine procedures.

The reader is encouraged to refer to Manuals 1, 3, 8, 11, and relevant chapters from the OIE *Terrestrial Animal Health Code* (particularly Section 5 and Chapter 8.8). A number of references have been included throughout this manual to provide additional information on the topic of animal movement management.

Livestock trade and FMD in South-East Asia

Throughout the world, the volume of livestock trade is increasing as the demand for livestock product grows.

The distances over which animals and animal products are transported to meet these demands is also increasing. South-East Asia is no exception and, with emergence of major markets for livestock and livestock products, particularly in China, the volume of livestock being traded has increased significantly in recent years (Smith *et al.*, 2015). While the globalisation of livestock trade offers many benefits and economic opportunities, it also represents a consistent and increasing threat for the persistence and spread of transboundary diseases such as FMD (Hueston *et al.*, 2011).

In South-East Asia and China, a number of factors exist which create additional challenges for the control of animal movements, including: disparity between demand and supply of livestock across the region, causing significant price differentials which act as drivers for livestock movement (Smith *et al.*, 2015); FMD is endemic in the main livestock source areas in the region, and there is limited capacity and/or resources to control the disease in these areas; extensive illegal livestock movements occur within and between countries in mainland South-East Asia and China. These factors should be taken into account when developing strategies for livestock movement management on a national, as well as regional, level.

As this manual will demonstrate, there are often conflicting priorities involved with animal quarantine and movement management, such as: enabling trade in livestock while minimising the risk of disease spread; preventing animal movement to control an outbreak, while minimising the economic and animal welfare issues that can result from movement standstills (Schley, *et al.*, 2009); and minimising the risk of importing FMD infected livestock while encouraging traders to follow official import procedures. All of these factors must be carefully balanced so as to achieve an optimally low level of risk while still meeting demands for livestock and livestock products.

Drivers of animal movement

The major driver of livestock trade movement is price. Price differentials generally occur due to a disparity in demand and supply in a given area. Where there is insufficient amount of a product to meet demand, the value of that product increases and thus attracts movement of that product from areas where it carries a lower value. As described above, this is the principal driver involved in movement of livestock across South-East Asia and China.

There are also seasonal drivers of livestock movement. While again related to supply and demand, it is worth noting that specific events in the region create fluctuations in demand

which, in turn, cause fluctuations in the volume of livestock traded. These include: periods in the agricultural calendar such as the end of the cultivation season in Myanmar, Lao PDR and Cambodia, when there is an excess of livestock and less available land on which to graze them; and periods of high demand for consumption of livestock such as religious festivals in Malaysia and Southern Thailand, Tet in Vietnam and Chinese New Year.

Development of trade corridors which facilitate transportation of commodities between countries are expanding in this region (ADB, 2014; Hong Kong Trade Development Council, 2015). These developments could impact on movement of livestock through establishing better transport infrastructure to allow more rapid movement over longer distances. However, as most movement of livestock within the Greater Mekong Sub-region (GMS) takes place unofficially, traders tend to use smaller roads and unofficial border crossings. Therefore, the benefit of these trading corridors to facilitating livestock trade may be limited by failure to establish officially recognised cross-border movement of livestock in this region. However, improved transport infrastructure is likely to drive movement over longer distances and possibly from different sources, even if cross-border movement continues to occur through traditional unofficial crossing areas.

Current livestock movement pathways in South-East Asia and China

This summary focuses on large ruminant movements in the GMS. For more detailed information on trade pathways of large ruminants in the GMS, readers are directed to a recent study commissioned by OIE SRR-SEA (Smith *et al.*, 2015). There have not been recent, detailed studies on movement of other FMD susceptible livestock in this region. However, these could be conducted where necessary by individual countries as needed. It is very important that individual countries are able to identify and characterize the pattern of local animal movements (or by-products) not only for regional purposes but for decision-taking at local level. This will also permit to have a systematically updated information for regional concerns.

The movement pathways for large ruminants in South-East Asia and China (particularly the GMS) reflect disparity in supply and demand for livestock products across the region. The major source of livestock movement in the region is Central Myanmar, where there is a high population of

livestock paired with a relatively low demand for livestock products. Conversely, China, Malaysia and Vietnam have strong demands for livestock products which cannot be satisfied by domestic production. This situation results in a marked disparity in price of livestock across the region which then drives movement of livestock from areas where prices are low (e.g. Myanmar) towards areas where prices are much higher (e.g. China, Malaysia and Vietnam).

Other GMS countries, namely Thailand, Lao PDR and Cambodia tend to be involved in the trading pathway primarily as transit countries. While there is some cross-border movement of locally produced cattle in these countries, the vast majority of trade is in cattle originating from Central Myanmar. The movements now seen in this region take place almost completely by unofficial pathways and are therefore unregulated. While some measures have been put in place to manage the risk of these movements (e.g. Thailand implemented a system of quarantine measures and certifying cattle which enter illegally from Myanmar), the majority of cross-border movements take place without any risk mitigation measures.

Figure 1 illustrates the major cross-border movement pathways amongst GMS countries identified by the study of Smith *et al.* (2015).



Figure 1: A map showing the main cross-border movements of large ruminants in the Greater Mekong Sub-Region (Smith *et al.*, 2015)

As shown in Figure 1, livestock are being moved over vast distances to reach high value markets, creating a risk for FMD spread not only to the destination countries but also to transit countries where there may be gathering of traded livestock and mixing with local populations. There are also reports of livestock entering the GMS region from India and Bangladesh. These movements could represent a risk for introduction of exotic strains of FMD into the region.

The risk of FMD transmission through trade-related movement is increased in those areas where livestock densities are high and/or where there is mixing of livestock from different areas. These areas may be identified as critical points, where FMD control measures may be targeted to achieve optimum benefit. The identification of these areas and implementation of targeted control measures will be described in Manuals 3 and 4.

Facilitating safe trade in livestock amongst SEACFMD Member Countries

There is a high and increasing volume of trade in livestock and livestock products amongst several SEACFMD Member Countries. As described in the OIE *Terrestrial Animal Health Code* (chapter 2.1) the importation of animals and animal products involves a degree of disease risk to the importing country. As the volume of trade increases, the magnitude of the risks of disease introduction and spread increase dramatically. Where livestock are moved by land, there is also the risk of those animals either becoming infected by, or infecting, resident livestock populations in transit areas.

Where strong drivers for livestock trade exist, attempting to prevent movement of livestock is both unrealistic and fails to address the existing demand for livestock products. However, Veterinary Services should implement measures which aim to facilitate the safe movement of livestock in order to manage the risks associated with this trade. In this way, movement of livestock may be permitted, but the movement would take place under specific (and achievable) sanitary conditions.

Several options for facilitating safe trade in livestock are outlined below. This list is not exhaustive and one or more of these options may be used in combination in order to achieve an optimal outcome for exporting, transit and importing countries. Note that this section refers, in general, to trade in livestock between two countries where FMD is endemic in both countries. However, some of the material

may also be relevant where countries are of different FMD statuses. Where the importing or transit country is officially recognised by the OIE as free from FMD with or without vaccination, import procedures applied should be in accordance with the OIE *Terrestrial Animal Health Code*.

Facilitating official cross-border movement of livestock and reducing illegal movements

As described above, there is a high volume of cross-border livestock trade operating throughout the South-East Asia/China region. Despite the significant drivers for livestock trade and the high volume of livestock being moved across borders, the proportion of animals being moved through official pathways is negligible compared to the massive volume of unofficial trade (Smith *et al.*, 2015). As described by Hueston *et al.* (2011), the greater the disparity between demand and supply then the higher the price consumers are willing to pay for a product. Such price signals provide an incentive for traders to use illegal methods if formal trade channels do not exist or cannot address demand.

Throughout many of the GMS countries, import regulations are such that it is either impossible or prohibitively difficult for traders to move animals between neighbouring countries via official pathways (Widders, 2015). It is presumed that one of the intended purposes of these strict regulations is to minimise the risk of introducing livestock diseases. However, where extensive land borders exist, and where animals can readily be moved through unofficial pathways, such strict regulations are likely to increase the overall risk of disease incursion through driving movement of livestock of unknown sanitary status through informal and unregulated pathways (Hueston *et al.*, 2011; Smith, 2012).

Paradoxically therefore, by addressing the regulatory barriers to formal trade, importing countries may actually reduce the risk of spreading livestock diseases, by creating incentives for increased trade through legal (and regulated) routes (Hueston *et al.*, 2011). When Veterinary Services are designing import requirements for live animals in an area where there is potential for illegal trade, risk assessments should consider the impact that sanitary conditions have on promoting official, versus unofficial, movements of livestock (see example in figure 3). In developing sanitary conditions for import of animals and animal products, importing countries should base these conditions on the OIE Standards (*Terrestrial Animal Health Code*; see below)

Widders (2015) outlined some of the consequences of illegal livestock trade (figure 2). These consequences would suggest that development of accessible official pathways for cross-border livestock movement, based on appropriate

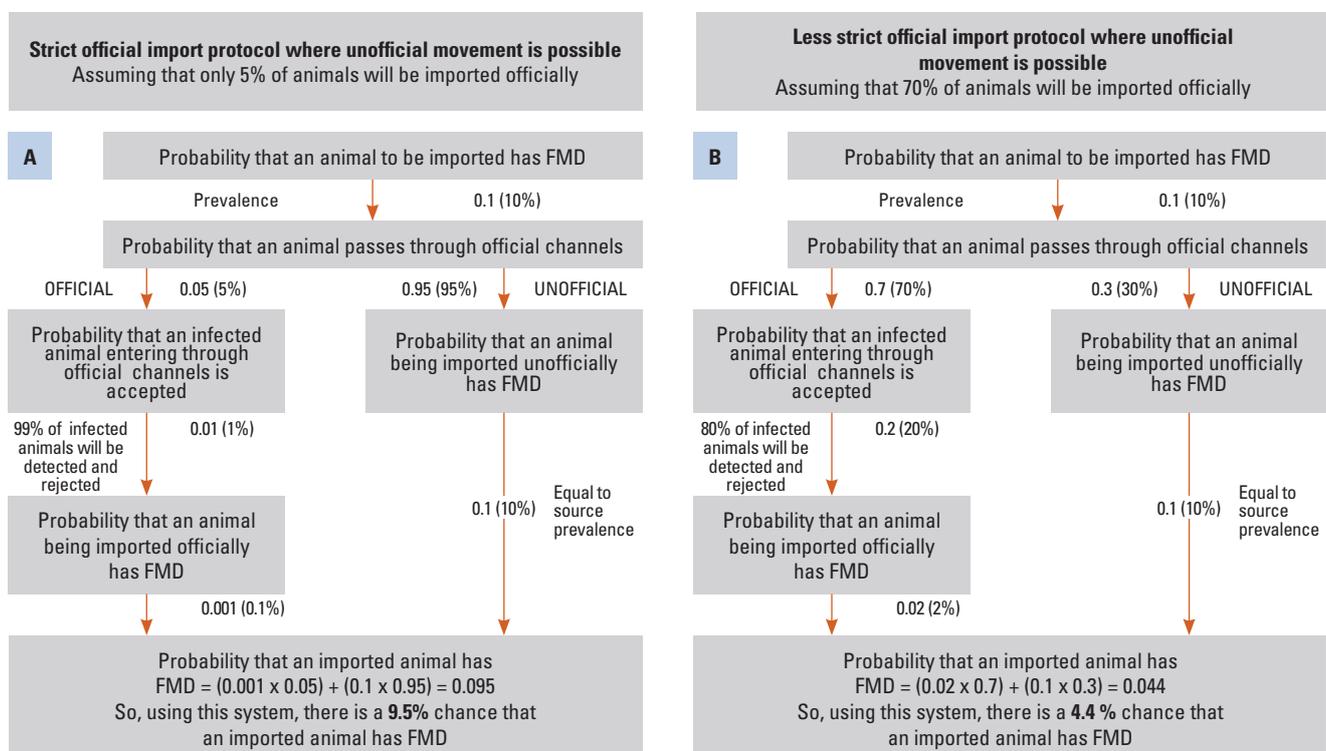
Consequences of unofficial and unregulated livestock trade (Widders, 2015)

- Price
 - Inefficient process with increased costs (small consignments to avoid detection, poor roads/access over unofficial border crossings, payment of 'unofficial taxes')
 - Possibly limits the total number of livestock that can be moved (supply-side constraints)
- Resources
 - Windfall profits outside of member countries' tax system
 - Profits go to people who are acting outside of the law, not to producers
 - Governments are paying for control of diseases that are spread by 'unofficial' movements
 - Governments or donors are paying for vaccines where they could easily be covered by the profits gained by illegal traders
- Control
 - Livestock trade industry is underground, therefore it can't be brought into strategies for movement and disease control ('part of the solution')
 - Loss of options for FMD control
 - No control of other significant diseases such as TB, brucellosis, HS, etc.

sanitary standards, could provide a favourable alternative for both the control of FMD and for the traders involved in cross-border movement of livestock. It may, therefore, be possible to achieve, via appropriate communication and engagement with traders and establishment of appropriate import protocols, an increase in official cross-border livestock movement.

While describing here that introduction of appropriate sanitary standards may encourage livestock traders to use official import pathways, the importance of quarantine procedures for the protection of livestock and human health should not be overlooked. By the time a country seeks OIE recognition for FMD freedom, either with or without vaccination, it will need to demonstrate adequate measures in place to prevent entry of livestock from FMD infected areas (including both official and unofficial movement). Quarantine procedures are described in more detail below.

Figure 2: A list of consequences of unofficial and unregulated livestock trade (Widders, 2015)



In this example: under the strict protocol (A), there is over twice the risk that an animal imported through process A would be infected, compared to process B. Even though the risk of importing an infected animal through the official system is greater for process B, there is less unregulated movement. This demonstrates the importance of taking unofficial movements and unofficial movements into account when using risk analysis to help make decisions on import protocols.

Figure 3: An example of simple scenario trees demonstrating how the overall risk of importing infected livestock might be affected when taking into account unofficial movements as well as official movements.

The OIE *Terrestrial Animal Health Code* (article 5.1.2.) outlines the responsibilities of the importing country in terms of certification requirements for imported livestock. In particular:

- ‘The international veterinary certificate should not include requirements for the exclusion of pathogens or animal diseases which are present in the importing country and are not subject to any official control programme
- The measures imposed on imports to manage the risks posed by a specific pathogen or disease should not be more stringent than those applied as part of the official control programme operating within the importing country
- The international veterinary certificate should not include measures against pathogens or diseases which are not OIE listed, unless the importing country has demonstrated through import risk analysis, that the pathogen or disease poses a significant risk to the importing country’

Veterinary authorities of SEACFMD Member Countries should refer to these standards to ensure that import requirements comply with OIE standards. Agreement on import requirements and certification between the exporting, transit and importing countries should be in place as part of an effort to facilitate trade. These may be achieved through establishment of bilateral and multilateral trade agreements.

A number of approaches to facilitating cross-border trade in livestock in order to reduce the drivers for illegal movement are outlined below. Again, these may be applied in combination and the list is not exhaustive.

- Increase bilateral and multilateral trade agreements between neighbouring countries (to reduce/remove tariffs and transaction costs on cross-border trade). A number of bilateral and multilateral agreements have already been established amongst SEACFMD Member Countries
- Engage with all agencies that have a role in regulation of cross-border transport of commodities, to develop ‘single window inspection’ and ‘single stop inspection’ procedures that can facilitate more rapid and less cumbersome cross-border movement of livestock and livestock products. Details of these concepts can be found in the Greater Mekong Sub-Region Cross-Border Transport Facilitation Agreement (ADB, 2011). Relevant agencies may include Quarantine, Customs, Immigration, and Departments of Transport and Finance

- When designing risk mitigation measures at the border, Veterinary Services should take into account the risk posed by unofficial movement and the impact that official regulations have on overall risk of disease incursions (Hueston *et al.*, 2011; Smith, 2012)
- Engage stakeholders, particularly traders, in development of effective but practical risk mitigation measures that promote the use of official border crossings over unofficial routes. This should include educating traders and other stakeholders on recognition of FMD, transmission of FMD and the impacts of the disease. It should also include demonstrating the short and long-term benefits of FMD control and eradication. Importantly, it should involve inclusion of stakeholders in the development of risk mitigation measures, to ensure that they are practical, but also to foster a sense of ownership and support for any measures implemented (see Manuals 6 and 12)
- Develop transport infrastructure and economic corridors. Establishment of economic corridors to facilitate trade within the GMS and between the GMS and other regions has grown in recent years (ADB, 2014; Hong Kong Trade Development Council, 2015). These pathways could bring additional risks in terms of livestock diseases (higher volume of animals being moved and establishment of new sources of livestock which potentially have different sanitary status). However, as this movement will take place along major transport routes, allowing for movement of larger vehicles and larger consignments of livestock, there may be greater incentives for traders to use these official routes rather than unofficial pathways where transportation is less efficient. Animals may also be moved more directly from source to destination resulting in less mixing of livestock populations and, therefore, less risk of disease transmission in transit countries

Controlling disease at source/establishing higher status export zones

Controlling disease in key livestock source areas and/or establishing specific FMD-free export zones or compartments could create a safe source of livestock within the South-East Asia/China region, allowing exporting countries (including livestock producers) to benefit from improved access to higher value markets and reducing the risk of FMD incursion into transit and destination countries.

The higher the prevalence of disease in a source area, the greater the risk that an animal moved from that area will be infected with FMD. Thus, by implementing targeted disease control measures in strategic source areas, or establishing

FMD-free export zones or compartments, the risk is reduced that livestock leaving those areas are infected with FMD. If vaccination is used as part of this control strategy it will also help to prevent infection of traded animals during transit (see Manuals 3 and 4). Establishing export zones or compartments of assured sanitary status will also help to facilitate cross-border trade of livestock into countries or zones with equivalent health status or where an official FMD control program is in place.

The economics of disease control for transboundary animal diseases, including FMD, warrants close examination by regulatory authorities, to ensure that the balance between, and the distribution of, costs and benefits is set appropriately. At present, government and/or donor funding supports FMD vaccination programs in affected SEACFMD countries. The benefits of FMD control accrue to livestock owners, traders and importing countries, although it is likely that the major share of those benefits are captured by traders who move livestock across international borders. As indicated above, the majority of such movements in GMS countries are unofficial, suggesting that, while the major costs are borne by governments and donors, the benefits are largely captured by operators acting illegally. Hence, regulation and enforcement of livestock movement represents a significant opportunity to enhance disease control in a sustainable manner, by directing the costs of disease control activities to traders who move animals across borders.

Facilitating the movement of vaccinated livestock

Establishing a system that favours the movement of vaccinated livestock should be considered as a measure to facilitate safer trade (see Manual 4). This might include measures whereby animals which have official certification verifying vaccination within an appropriate time period are allowed to move within and between countries more easily than unvaccinated animals, thus providing an incentive for traders to vaccinate.

Increased movement of product versus movement of live animals

Regardless of the regulations in place and the control measures implemented, whenever live animals are imported or moved from an area in which FMD is endemic, there is a risk that they may introduce or spread FMD. Although livestock products may also be contaminated with FMDV, the health status of animals at slaughter can be better managed, and the risk of FMD introduction through animal product is far less than through movement of live animals. Therefore, a further measure which may be used

to reduce the risk of FMD transmission through livestock movement is to meet a greater proportion of demand with livestock product, thus reducing the volume of live animal movement.

Establishment of slaughterhouses in livestock source areas (which may be approved and audited by importing countries) could help to address this. In SEACFMD Member Countries, this would reduce the risk of FMD spread not only to importing countries but also to transit countries located along the livestock trade pathways. However, due to cultural and religious practices and practical constraints such as inadequate refrigeration in some areas, trade in animal products is unlikely to completely replace movement of live animals.

Quarantine and Inspection

Quarantine may be defined as: A strict isolation imposed to prevent the spread of disease (dictionary.com). Quarantine measures may be applied to animals which are being moved between countries, animals being introduced to a new area (farm, village, etc.), to animals with infectious diseases or to animals which may have been in contact with infected animals.

Quarantine systems on a national level

Animal Health quarantine systems are generally applied to prevent the entry and/or spread of animal diseases into, and within a country or zone. According to Geering *et al.* (1999) quarantine programmes should include the following:

- International border controls to prevent the smuggling or uncontrolled entry of animals, animal products and other potentially dangerous goods. At the same time, border programmes should provide a legal method for entry of the above through sound animal health certification and pre- and post-quarantine measures. It is noted that sensitivity will be necessary when there are uncontrolled animal movements across borders as harsh quarantine restrictions may just encourage smuggling and be counter-productive (see earlier section on facilitating safe trade in livestock)
- Agreed quarantine conditions that have been negotiated with exporting countries for the safe importation of animals and animal products. Conditions may include pre-export testing and quarantine, animal health certification and any necessary post-arrival inspection, testing and quarantine. The OIE *Terrestrial Animal Health Code* provides further details on establishing these systems

- Quarantine inspection of people and goods arriving at international airports and seaports
- Safe disposal of international aircraft and ship food waste through incineration or deep burial

Although this manual focuses on the control of FMD, cross-border movement of animals may involve inspection and quarantine for different diseases and there will also be border controls in place for different commodities. The number of agencies involved in cross border inspections can make the process cumbersome and time consuming. Therefore, where possible, single-stop and single-window inspection should be considered. This will not be described in detail here but readers should refer to the Greater Mekong Sub-Region Cross-Border Transport Facilitation Agreement (ADB, 2011) for further information on these processes.

Amongst South-East Asian countries with the same disease status for FMD, bilateral trade agreements can be established for movement of livestock across borders. As described above, a prerequisite will be agreement on certification requirements between the Veterinary Authorities of both the importing and the exporting country (and any transit countries) which should adhere to guidelines set out in Chapter 5.1. of the OIE *Terrestrial Animal Health Code* regarding international health certification.

Quarantine/import regulations for cross-border movement of livestock

When making decisions about the type of risk mitigation measures to employ for cross-border movement of livestock (quarantine), the importing country may use risk assessment to identify the level of risk of importing animals from a given source and the impact of different risk mitigation measures. As described earlier, these risk assessments should take into account the impact that restrictions have on the probability that traders will adopt unofficial movement pathways. The decisions should also take into account the guidelines provided in Chapter 5.1. of the OIE *Terrestrial Animal Health Code* regarding international certification. Countries, zones or compartments recognised by the OIE as free from FMD, with or without vaccination, should follow the relevant guidelines in the OIE *Terrestrial Animal Health Code* on quarantine.

Where should quarantine take place?

According to the OIE, a quarantine station is defined as:

an establishment under the control of the Veterinary Authority where animals are maintained in isolation with no direct or indirect contact with other animals, to ensure that there is no

transmission of specified pathogen(s) outside the establishment while the animals are undergoing observation for a specified length of time and, if appropriate, testing and treatment.

How and where quarantine is undertaken should be decided jointly by the exporting country and the importing country. Each country should be able to provide sufficient evidence to the other country that the quarantine facilities in place are fit for purpose. This should be documented such that the veterinary authority of the importing country has confidence in the systems implemented in the exporting country, and that certification issued or signed by the competent authority of the exporting country is accurate and accepted by the importing country (and any transit countries).

Quarantine stations may be run by the government or owned and managed by the private sector (with approval of the governments of the importing country and/or the exporting country). Figure 3 shows a private quarantine station in Thailand for animals being exported to Malaysia. These stations were approved by both Thai and Malaysian Veterinary Authorities.



Figure 4: A private quarantine station located in Thailand. This station was located close to sources of livestock feed so the animals were effectively held in a feedlot throughout the quarantine period

Quarantine and movement restrictions during an outbreak

During an outbreak, both in an area historically FMD-free or where FMD is endemic, movement controls and quarantine will play an integral part of outbreak control, usually in combination with other measures. The reader is referred to Manual 11 for more detail on quarantine and movement restrictions applied during an outbreak.

Identification and traceability

In order to manage animal movement (particularly involving cross-border trade) which depends upon certification of the health and/or vaccination status of individual animals, livestock must be individually identified. It must be possible to link an individual animal with recorded information on health or vaccination status, e.g. on a vaccination certificate and/or Departmental records. This is not only necessary for international trade of livestock but also for domestic movements (where health certification is required) and for post-vaccination monitoring in areas where vaccination is applied. While several SEACFMD Member Countries have

implemented identification and traceability systems, there are still considerable gaps across the region. Expanding the use of individual animal identification systems and recognition of those systems amongst SEACFMD Member Countries is a necessary part of regional disease control and trade facilitation.

A detailed description of animal identification and traceability systems will not be included here but readers should refer to relevant chapters of the OIE *Terrestrial Animal Health Code* for further information.

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