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Indonesian import quarantine facility

Biosecurity framework for site selection

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Abbreviations and acronyms

Abbreviation	Definition
AIAO	All In - All Out
ESCAS	Exporter Supply Chain Assurance System
FMD	Foot and Mouth Disease
FMDV	Foot and Mouth Disease Virus
LSD	Lumpy Skin Disease
LSDV	Lumpy Skin Disease Virus
N/A	not applicable
RFID	Radio Frequency Identification
UK	United Kingdom



Background

Foot and Mouth Disease (FMD) and Lumpy Skin Disease (LSD) are viral diseases of cattle currently causing significant production losses in Indonesia and across southeast Asia. Both diseases can be controlled with vaccination and improved biosecurity, but these can be challenging to operationalise in the commercial feedlot context.

Naïve Australian feeder cattle¹ are arriving in Indonesia, with some becoming infected with one or both viruses in Indonesian feedlots. Their naïve immune status means they are at higher risk of developing severe clinical disease and may play a role in actively perpetuating the outbreaks within the feedlot.

A potential solution is the development of a dedicated import quarantine facility. In this facility, high biosecurity measures could reduce the risk of disease in these cattle until they are adequately protected by vaccination. At this point, they could enter standard feedlots.

A trial of an import quarantine facility has been proposed, requiring the selection of a high biosecurity site to demonstrate the utility of this approach. This guide presents the biosecurity standards required for an import quarantine facility in Indonesia.

¹ Cattle that have not previously been exposed to FMD or LSD virus and are therefore highly susceptible to infection and clinical disease



1 Site selection for an import quarantine facility

1.1 How to use the framework

This guide presents the biosecurity standards required for an import quarantine facility in Indonesia.

Biosecurity considerations of site selection (or items) are discussed in detail in Section 2. For each item, justifications for their inclusion from the literature on FMD and LSD control are outlined. Each item is given a biosecurity priority level and risk management options available should the item not currently meet the standard. Each risk management option is assigned a level of investment.

Section 3 outlines logistical considerations that may make the site untenable. These considerations come with no biosecurity risk but may result in the site being rejected.

Items are extracted into a simple site assessment tool provided in Annex 1. Investigators can assess each biosecurity standard and logistical consideration to determine if the standard is met and if not, what actions are required. If items are of high biosecurity priority but no action can be taken to reach the standard (because it is impractical or cost prohibitive), the site should be rejected. The assessment tool can also be used to determine the level of investment required to meet the standard as this can vary for some items depending on the site.

1.2 Biosecurity priority

The selection of a site requires prioritisation of items according to their overall impact on biosecurity. Levels of biosecurity risk associated with each item can be categorised as:

High biosecurity priority: Item that poses a high risk to biosecurity if the standard is not met. If changes cannot be made to meet the standard, the site is untenable as a quarantine facility.

Moderate biosecurity priority: Item that poses a lower risk to biosecurity if the standard is not met. It is preferable that items of moderate biosecurity priority still meet the standard. However, if the changes required necessitate impractical levels of investment, the site may still be tenable as a quarantine facility.

Low biosecurity priority: Item poses a very low risk to biosecurity if the standard is not met. The site should still be considered if the standard isn't met. Individual facilities can decide if they would like to take steps to meet these standards or not.

These priority levels are subject to discussion and confirmation with the importer.

1.3 Level of investment

Where an item does not initially meet the relevant standard, changes that reduce the biosecurity risk (risk management) may be possible to allow the standard to be met. Different changes will be associated with different levels of investment. Investment associated with each of these can be categorised as:

High level of investment: Risk management measure required to meet the standard necessitate a high level of investment.

Low level investment: Risk management measure required to meet the standard necessitate a low level of investment.



The thresholds of low and high levels of investment are at the discretion of the importer and vary depending on the item and the site.



2 Biosecurity standards and risk management measures

Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
Site location				
1.1	Nearest abattoir is >5km away	FMD transmission risk increases with the presence of active disease, and if FMD affected animals have been trucked to an abattoir they will present a significant transmission risk, thereby necessitating a reasonable distance away from the quarantine site (Coffman et al., 2021; Donaldson et al., 2001). LSD risk equally increases with the presence and movement of clinically affected cattle if suitable insect vectors are present (Tupparainen et al., 2017). This rule also applies to live animal markets.	High	FMD – N/A LSD – Integrated pest management plan is already in place with focus on keeping vector breeding sites to a minimum (low).
1.2	Nearest large unvaccinated group of cattle (~4000 head +) is >10km away	See justification above. In addition, outbreaks of FMD in a feedlot of 40,000 cattle has been modelled with estimated risk of spread <1% about 10km (Coffman et al., 2021). LSD vectors are unlikely to travel long distances unassisted - commonly only travel a few kms per day (Tupparainen et al., 2018). However, if there are regular cattle trade activities occurring risk of vector spread is increased (Tupparainen et al., 2017).	High	Create a vaccination buffer (low to high depending on the site). LSD – Integrated pest management plan is already in place with focus on keeping vector breeding sites to a minimum (low).
1.3	The nearest medium unvaccinated group of cattle (100-4000 head) is >5km away	See justification above. Modelled transmission of FMD in a feedlot of 4,000 cattle estimated risk of spread at ~1% at 5km away (Coffman et al., 2021).	High	Create a vaccination buffer (low to high depending on the site). LSD – Integrated pest management plan is already in place with focus on keeping vector breeding sites to a minimum (low).
1.4	The nearest small group of unvaccinated cattle (100 or less) is >1km away	FMD outbreak in a smaller group of 100 or less is only likely to spread 1km away (Donaldson et al., 2001). LSD vectors are more likely to travel small distances (Tupparainen et al., 2018)	High	Create a vaccination buffer (low). LSD – Integrated pest management plan is already in place with focus on keeping vector breeding sites to a minimum (low).



Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
1.5	The nearest unvaccinated piggery is >6km away	Pigs excrete aerosolised FMD at a higher level than cattle, and a piggery of 1,000 animals can infect cattle from up to 6km away (Donaldson et al., 2001).	High	Create a vaccination buffer (low to high depending on size of piggery and availability of pig-safe vaccines).
1.6	The nearest smallholding of unvaccinated pigs (<100) is >1km away	A smaller group of pigs (<100) can infect a group of cattle from 2km away (Donaldson et al., 2001).	High	Create a vaccination buffer (low to high depending on size of piggery and availability of pig-safe vaccines).
Site facilities				
2.1	Quarantine site has capacity to implement 'all-in/all-out' ² or an alternative equivalent system. Ideally the whole site should be depopulated and decontaminated with integrated pest management activities focussing on removing insect breeding sites. There should then be a 50 day wait before induction.	The risk of infection for new animals is high if there is active FMD infection or environmental contamination from recent infection (Colenutt et al., 2020). High relative humidity (70-90%) can increase survival on vegetation and other surfaces not easily decontaminated (Mielke and Garabed, 2020). For cleaning and disinfection to be effective, the surfaces must have time to dry fully after washing. LSD virus can remain present in the environment for long periods (up to 35 days in desiccated crusts), and actively infected animals are a source of new infections (Namazi and Khodakaram Tafti, 2021). AIAO management is a common practice in piggeries where many highly infectious disease challenges must be managed, as it decreases the risk of transmission between different groups of animals (OIE/World Bank/FAO, 2010). In addition, ongoing environmental decontamination and biosecurity measures will be easier to implement if all animals arrive at the same time, thereby reducing the risk of environmental transmission. (Colenutt et al., 2020; Lyons et al., 2015).	High	Induct to capacity and then sell on remaining cattle to other ESCAS feedlots (low). Create two adjacent sites within 10km of each other (low to high). Create two areas within the same facilities where animals can be kept separate (e.g. separate buildings) with no direct contact (low to high). Practice AIAO without a stand-down period (low if facilities allow)

² All-in all-out (AIAO) is the complete emptying of a feedlot site with subsequent cleaning and disinfection prior to adding new animals



Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
2.2	There is a dedicated hospital for sick animals that is clearly separated from other pens and has effluent runoff directed away from pens and other animals.	Sick animals can present a direct and indirect infection risk. FMD survives at length (days) in faecal slurry, and run off from hospital pens poses a significant risk to healthy animals within the same facility (Colenutt et al., 2020; Mielke and Garabed, 2020). Build-up of faeces creates breeding grounds for flies that can act as vectors for LSD (Animal Health Australia, 2022).	High	Identify a hospital pen within the existing facility with appropriate manure management and run off (low). Build a new facility (high).
2.3	Pens are located away from perimeter fencing and perimeter fencing effectively prevents feral animals from contacting feedlot animals.	FMD can spread via direct, over-the-fence, contact with cattle, pigs and other small ruminants (Alexandersen et al., 2003). Passers-by may be inadvertently carrying fomites (Auty et al., 2019).	High	Fences are relocated or rebuilt (low to high depending on facility).
2.4	Insect vector breeding sites can be kept to a minimum	The common vector species for LSD of the region have been identified and their potential breeding sites are able to be managed. See “Integrated Pest Management” handout for insect specific recommendations. For example, if the drains do not flow well and instead create pools of standing water.	Moderate	Potential breeding sites are identifiable and managed according to an integrated pest management plan (low)
2.5	Dedicated facilities for induction/vaccination (ie race, crush)*	A fully operational crush and race is necessary to safely vaccinate and sample cattle. This is an important safety consideration if a vaccine trial is to take place. This should be a separate facility from the hospital area, as inducing animals through the hospital area presents a high fomite transmission risk. For the standard to be met the site will have AT LEAST 2 separate cattle crushes.	High	Enough crushes present in the facility for at least two to be dedicated to induction activities (low) New crushes to be purchased to ensure two are available to be dedicated to induction activities (high)
2.6	Footbath and handwashing stations are located at the facility entry/exit*	Due to FMD’s survival in water, faecal matter and bodily fluids (median 5 days), all staff and visitors onsite should be able to decontaminate themselves upon entry and exit (Mielke and Garabed, 2020).	Moderate	Footbath and handwashing stations are installed that the entry and exit of facility (low to high depending on the infrastructure present)



Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
2.7	Facilities to clean and disinfect equipment	See 2.6	Moderate	Cleaning and disinfection stations are implemented throughout the facility (low to high depending on infrastructure present)
2.8	Clothing laundry facilities and provision of clean clothing/boots to staff and visitors	See 2.6	Moderate	Laundry facilities are installed, enough clothing and boots available for staff and visitors (low to high depending on infrastructure present and clothing and boot supplies needed to be purchased)
2.9	Facilities for decontamination of staff after managing sick animals	See 2.6 Ideally staff will manage sick animals last every day, then be able to shower and change into clean clothes before leaving the facility. If decontamination facilities are not possible dedicated clothing and other personal protective equipment should be made available, so staff do not contaminate their personal clothing	Moderate	Showering facilities to be installed (low to high depending on infrastructure present) Personal protective equipment available (low) Laundry facilities installed (low to high depending on infrastructure present)
Site access				
3.1	There is only one access for entry and exit onto the site (including dedicated loading area) and all visitors report to site office on arrival.	Access to the site by visitors and personnel will be easier with only one access point. This can also limit the number of vehicle washdown bays required	Moderate	Facility to be redesigned to control entry and exit of people and vehicles (low to high depending on the original design of the facility).
3.2	Parking area is located away from feedlot pens at the edge of the site and vehicles do not enter the feedlot site.	By preventing vehicle access to high traffic areas of the facility the risk of pathogen transmission can be reduced as the undercarriage and tyres of vehicles can be a source of pathogen introduction if they have passed through an infectious property or region (Yang et al., 2020).	Moderate	Facility to be redesigned to control parking areas (low to high depending on the original design of the facility).



Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
3.3	Site office is located next to site entry	Staff and visitors should report to the site office and undergo a biosecurity risk assessment before being allowed access to the facility as they can pose a risk if they have recently been in an outbreak area.	Moderate	Facility to be redesigned to locate the office neat the site entry (low to high depending on the original design of the facility).
3.4	Feedlot access can be restricted to necessary personnel only (people and vehicles)	A smaller number of people and vehicles will both reduce the chances of infection and make biosecurity training easier. In the UK 2001 FMD outbreak, foot traffic through rural properties was implicated in the spread of the disease, and as such should be minimised in a high biosecurity site (Auty et al., 2019).	Moderate	Control access through single entry and exit, fencing and gates (low to high depending on existing infrastructure and access points)
3.5	Entry of all staff and visitors to the site can be documented	A visitor log allows for trace-forward and trace-back activities to be performed in the event of an outbreak, in addition the feedlot can use this to continually monitor risk if an outbreak occurs nearby (Yang et al., 2020).	Moderate	Ensure entry logs are regularly used and kept, including a biosecurity assessment (low)
3.6	Staff can remain onsite during quarantine period.	Staff owning or coming into contact with FMD infected animals at home are a fomite transmission risk (Alexandersen et al., 2003; Lyons et al., 2015)	High	Staff do not have contact with livestock outside the premises, or animals they have contact with are vaccinated (low to high depending on the number of livestock requiring vaccination) Shower-in facilities developed at boundary of quarantine site AND animals in contact are vaccinated (high)
Transportation conditions				
4.1	Transport route to site from port can avoid any FMD or LSD outbreaks	Whilst the FMD risk of aerosolised transmission is usually over several days, it may present a risk if trucks need to stop next to an infected site (Donaldson et al., 2001). The risk for LSD transmission associated with stopping is due to the risk of insect vectors being attracted to new animals.	High	Create a vaccination buffer along the transport route (low to high depending on the length of the route and the population of susceptible species present). Have alternate routes available to cattle transporters (low).



Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
4.2	There are dedicated transportation vehicles between port and quarantine site with appropriate access to decontamination facilities	Vehicles which have recently transported FMD affected cattle pose a major transmission risk. Vehicles which have not be regularly cleaned and organic material removed create LSD insect vector breeding sites.	High	All cattle transport vehicles are required to be processed by a vehicle washing facility before presenting to the port (low) If commercial vehicle washing facilities are not available in a reasonable vicinity, facilities need to be built at the ports (high)
Waste management				
5.1	Manure stockpiles and effluent ponds are located away from feedlot pens	FMDV can survive up to three weeks in bovine faecal slurry (Mielke and Garabed, 2020). Manure stockpiles can serve as breeding sites for potential LSD vectors and other insect pests	High	Locate all manure and effluent ponds away from feedlot pens (low to high depending on the availability of space) Ensure manure stockpiles and vegetation around effluent ponds are managed in line with an integrated pest management plan to reduce attractiveness to insects (low)
5.2	Wastewater/effluent drainage is controlled so effluent from FMD affected pens does not travel past finishing and quarantine pens	See 5.1	Moderate	Wastewater and effluent drainage system is designed so that it runoff from hospital pens doesn't openly pass through normal feedlot pens (high)
5.3	Access paths to manure stockpile or effluent ponds should not pass by feedlot pens.	See 3.1 and 3.4	Moderate	Manure stockpiles and effluent ponds are located away from feedlot pens and routes to these do not pass through the main facility and access to paths can be monitored and restricted (low to high depending on infrastructure already present)



Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
5.4	Burial or composting pits should not allow wastewater or fluids to leach out into the environment	By-products from decomposing carcasses can pose a health hazard to staff, animals, and the environment. FMDV is likely to be neutralised by the decomposition process and while LSDV is more resistant, insects that feed on decomposing flesh do not feed on live animals so unlikely to pose a transmission risk	Low	Soil is assessed prior to digging relevant pits and if deemed permeable, linings are added to reduce the risk of leachate leakage (low)
5.5	Burial pits or composting sites are adequately fenced to prevent wild animals scavenging	Wildlife and free-roaming dogs could carry or act as fomites into the facility	Low	Secure carcass disposal areas with animal proof fencing (low)
Food, bedding and water				
6.1	Bedding and feed are stored in a location free from vermin and insects, are kept dry.	Bedding or feed that becomes damp or contaminated with vermin faeces can become ideal breeding sites for insects. Feed cannot also be contaminated with FMD virus. Cattle require a large dose of FMD virus to sustain an infection via the oral route, however they become more susceptible if there are cuts and abrasions in their mouths (for example if the feed matter is coarse or contains foreign bodies)	Moderate	A secure shed that is free from rain water and has dry flooring, along with an integrated pest management plan that addresses vermin and insect vectors (low to high depending on infrastructure already present).
6.2	Bedding available from a reliable source.	Examples of safe bedding include sawdust from a mill with no FMD susceptible species grazing in the area.	Moderate	A list of reputable bedding suppliers is available to ensure it can be safely sourced even when outbreaks may be occurring (low).
6.3	Feed available from a reliable provider.	FMDV can survive at length (>50 days) on vegetation materials in high relative humidity (Mielke and Garabed, 2020). Examples of safe feed sources include reputable feed mills and forage grazing areas that are protected from unvaccinated animals grazing on them.	Moderate	A list of reputable feed suppliers is available to ensure it can be safely sourced even when outbreaks may be occurring (low)
6.4	Water sources are protected from contamination of bird or other wild animal faeces and other organic material.	Water can carry FMDV for 11 to 30 days, with a median survival time of 28.5 days (Mielke and Garabed, 2020).	Moderate	Infrastructure installed to protect water sources from contamination – e.g. covered water tanks that water is pumped into after being treated from the original source (low to high depending on the infrastructure already present)



Item	Standard	Details and justification	Biosecurity priority level	Risk mitigation measures (level of investment)
6.5	Water is sourced from a 'safe' source – free of contaminants or water treatment available onsite.	Examples of safe water include water treated for human consumption, or water that has been treated onsite.	Moderate	Install water treatment infrastructure (high)
Staff training				
7.1	Staff are appropriately trained in vaccine handling and administration to prevent vaccine failure and iatrogenic disease spread.	Vaccine failure can occur through failure to comply with handling, storage, administration, and cold chain requirements (Rice et al., 1986). LSD can be spread iatrogenically through reuse of vaccine needles (Gupta et al., 2020).	High	Provide regular training in safe vaccine practices to ensure staff remain skilled and new staff are captured in regular training (low)
7.2	There are dedicated feed and bedding providers and transporters that have been trained in appropriate biosecurity measures.	Provision of education to truck drivers has been modelled to inhibit the spread of the disease (Yang et al., 2020).	Moderate	Provide regular biosecurity training for suppliers (low)



3 Logistical considerations

Logistical considerations that do not pose a biosecurity risk but should be considered in reference to site selection include:

- Distance to the nearest port – long distances will increase transport costs
- ESCAS approval status – sites must be ESCAS approved to accept Australian cattle
- Sufficient storage space for equipment – ideally equipment is safely stored between uses to prevent contamination when not in use. However, well implemented decontamination protocols can be used if equipment storage is not available.
- Cold chain infrastructure – facilities should have refrigeration equipment to safely store vaccines and other medications. If not vaccines and medications can be purchased on an ‘as needed’ basis and used immediately
- Infrastructure for data entry into the facilities animal record keeping system – computerised databases for vaccination and other animal health records are preferred for ongoing monitoring. However, paper-based records can be sufficient.
- Infrastructure for scanning and recording RFID tags to maintain traceability and attach animal health data to the animals.



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Annex 1: Site selection criteria

Item	Standard	Biosecurity priority level	Standard met (Y/N)	Level of investment required to meet standard (low/high)	Notes
Site Location					
1.1	Nearest abattoir is >5km away	High			
1.2	Nearest large unvaccinated group of cattle (~4000 head +) is >10km away	High			
1.3	The nearest medium unvaccinated group of cattle (100-4000 head) is >5km away	High			
1.4	The nearest small group of unvaccinated cattle (100 or less) is >1km away	High			
1.5	The nearest unvaccinated piggery is >6km away	High			
1.6	The nearest smallholding of unvaccinated pigs (<100) is >1km away	High			
Site facilities					
2.1	Quarantine site has capacity to implement 'all-in/all-out' ³ or an alternative equivalent system. Ideally the whole site should be depopulated and decontaminated with integrated pest management activities focussing on removing insect breeding sites. There should then be a 50 day wait before induction.	High			

³ All-in all-out (AIAO) is the complete emptying of a feedlot site with subsequent cleaning and disinfection prior to adding new animals



Item	Standard	Biosecurity priority level	Standard met (Y/N)	Level of investment required to meet standard (low/high)	Notes
2.2	There is a dedicated hospital for sick animals that is clearly separated from other pens and has effluent runoff directed away from pens and other animals.	High			
2.3	Pens are located away from perimeter fencing and perimeter fencing effectively prevents feral animals from contacting feedlot animals.	High			
2.4	Insect vector breeding sites can be kept to a minimum	Moderate			
2.5	Dedicated facilities for induction/vaccination (ie race, crush)*	High			
2.6	Footbath and handwashing stations are located at the facility entry/exit*	Moderate			
2.7	Facilities to clean and disinfect equipment	Moderate			
2.8	Clothing laundry facilities and provision of clean clothing/boots to staff and visitors	Moderate			
2.9	Facilities for decontamination of staff after managing sick animals	Moderate			
Site access					
3.1	There is only one access for entry and exit onto the site (including dedicated loading area) and all visitors report to site office on arrival.	Moderate			
3.2	Parking area is located away from feedlot pens at the edge of the site and vehicles do not enter the feedlot site.	Moderate			
3.3	Site office is located next to site entry	Moderate			
3.4	Feedlot access can be restricted to necessary personnel only (people and vehicles)	Moderate			
3.5	Entry of all staff and visitors to the site can be documented	Moderate			
3.6	Staff can remain onsite during quarantine period.	High			



Item	Standard	Biosecurity priority level	Standard met (Y/N)	Level of investment required to meet standard (low/high)	Notes
Transportation conditions					
4.1	Transport route to site from port can avoid any FMD or LSD outbreaks	High			
4.2	There are dedicated transportation vehicles between port and quarantine site with appropriate access to decontamination facilities	High			
Waste management					
5.1	Manure stockpiles and effluent ponds are located away from feedlot pens	High			
5.2	Wastewater/effluent drainage is controlled so effluent from FMD affected pens does not travel past finishing and quarantine pens	Moderate			
5.3	Access paths to manure stockpile or effluent ponds should not pass by feedlot pens.	Moderate			
5.4	Burial or composting pits should not allow wastewater or fluids to leach out into the environment	Low			
5.5	Burial pits or composting sites are adequately fenced to prevent wild animals scavenging	Low			
Food, bedding and water					
6.1	Bedding and feed are stored in a location free from vermin and insects, are kept dry.	Moderate			
6.2	Bedding available from a reliable source.	Moderate			
6.3	Feed available from a reliable provider.	Moderate			
6.4	Water sources are protected from contamination of bird or other wild animal faeces and other organic material.	Moderate			
6.5	Water is sourced from a 'safe' source – free of contaminants or water treatment available onsite.	Moderate			
Staff training					



Item	Standard	Biosecurity priority level	Standard met (Y/N)	Level of investment required to meet standard (low/high)	Notes
7.1	Staff are appropriately trained in vaccine handling and administration to prevent vaccine failure and iatrogenic disease spread.	High			
7.2	There are dedicated feed and bedding providers and transporters that have been trained in appropriate biosecurity measures.	Moderate			

<i>Logistical considerations</i>			
Feature	Present or absent	Level of investment required to implement or improve (low/high)	Notes
Close proximity to nearest port			
Site is ESCAS approved			
Storage availability for equipment			
Cold chain infrastructure			
Electronic record keeping infrastructure			

