ASEAN LSD PREVENTION AND CONTROL STRATEGY

2024 - 2030

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Acronyms

ASEAN – Association of Southeast Asian Nations

AMS – ASEAN Member States

AMAF – ASEAN Minister for Agriculture and Forestry

ASWGL – ASEAN Sectorial Working Group for Livestock

ACCAHZ – ASEAN Coordinating Centre for Animal Health and Zoonoses

ALDF – ASEAN Laboratory Directors Forum

AVEG – ASEAN Veterinary Epidemiology Group

ARAHIS – ASEAN Animal Health Information System

ALPCS - ASEAN LSD Prevention and Control Strategy

ALRL – ASEAN LSD Reference Laboratory

ALTF – ASEAN LSD Task Force

ACDP – Australian Centre for Disease Preparedness

SOM-AMAF – Senior Officers Meeting of ASEAN Minister for Agriculture and Forestry

FAO – Food and Agriculture Organization of the United Nations

GF-TADs – Global Framework for the Progressive Control of Transboundary Animal Diseases

IUCN – International Union for Conservation of Nature

LSD – Lumpy skin disease

LSDV – Lumpy skin disease virus

M&E – Monitoring and evaluation

PPP – Public-Private-Partnership

PFP - Partnerships and Financing Panel

PVS – Performance of Veterinary Services

RSC – Regional Steering Committee of GF-TADs for Asia and the Pacific

TADs - Transboundary Animal Diseases

VLSP – Veterinary Legislation Support Programme

WAHIS – World Animal Health Information System

WOAH – World Organisation for Animal Health

WOAH SRR-SEA - WOAH Sub-Regional Representation for Southeast Asia

WCS – Wildlife Conservation Society

1. Introduction

Lumpy skin disease (LSD) has recently spread to new regions in Europe and Asia in addition to its traditional range in Africa and the Middle East. The ongoing LSD prevention and control in South-East Asia is making steady progress with the interventions by Member countries, WOAH and partners.

Following the first report of LSD in Asia in 2019, the LSD has continued its spread across continental Asia with many countries in Asia confirming LSD outbreaks. The LSD has been introduced in Vietnam and Myanmar in 2020, Thailand, Cambodia, Laos and Malaysia in 2021 and in Indonesia in February 2022 and Singapore in March 2022.

Recognizing the significance of regional coordination in controlling TADs, the GF-TADs Strategy for 2021-2025 recommends the development of strategies for priority TADs at regional and sub-regional levels. The 12th Regional Steering Committee Meeting for GF-TADs in Asia and the Pacific identified and listed LSD as a priority disease for the region.

Given the widespread nature of LSD in Southeast Asia (8 out of 10 countries are affected) and the importance of regional coordination, the Second Virtual LSD Coordination Meeting in December 2021 and the 30th ASEAN Sectorial Working Group for Livestock (ASWGL) Meeting in June 2022 recommended the development of an ASEAN LSD Prevention and Control Strategy (ALPCS) in line with GF-TADs Strategy for 2021-2025, Regional GF-TADs Strategy for Asia and the Pacific 2023–2027, international standards and ASEAN strategies - ASEAN Strategic Plan of Action for Cooperation on Livestock (2021-2025) and ASEAN Strategy for Exotic, Emerging, Re-emerging Diseases and Animal Health Emergencies (2021).

The ASEAN LSD Prevention and Control Strategy 2024 – 2029 was developed by the Core Group comprising Members from WOAH, FAO, ASEAN lead Country (Thailand), two Co-Lead countries (Indonesia and Myanmar) and ASEAN Secretariat through series of virtual consultations and one in-person meeting. The Members of the Advisory Group provided continuous support and guidance to the Core Group Members during the development of the strategy.

During the 4th LSD Coordination Meeting for Southeast Asia held in Bangkok, Thailand from 28 – 30 November 2023, series of brainstorming sessions were held to define the problems, goals, objectives, outcomes, and outputs of the strategy, leading to the development of a theory of change and an outline for the ASEAN LSD strategy.

AMS provided final inputs on the draft strategy during the Virtual ASEAN LSD Meeting in 14 June 2024, where the monitoring and evaluation (M&E) framework and Priority Actions for the implementation of ALPCS were also discussed.

The ASEAN LSD Prevention and Control Strategy aligns with global strategies and guidelines developed by FAO and WOAH, as well as ASEAN strategies and the evolving LSD situation in Southeast Asia. It is expected to enable coordinated actions to effectively control and prevent the spread of LSD in the region and mitigate its impacts.

2. The Cattle Production System in Southeast Asia

2.1 Dairy Cattle production System

Dairy and beef cattle production in Southeast Asia play a crucial role in the agricultural landscape, contributing significantly to both food security and economic development. Moreover, buffalo production holds a central position in the small-scale farming systems across various countries in this region [1].

The dairy production farming system in Southeast Asia is multifaceted, reflecting a diverse array of production scales, farming practices, and economic contexts. Smallholder farms coexist with larger commercial enterprises, creating a dynamic landscape for dairy production [2]. Countries like Vietnam and Thailand often feature prevalent small-scale dairy farming, where local farmers engage in traditional methods to meet regional demand for milk. However, the dairy industry in these nations is undergoing expansion, adopting modern technologies and practices to enhance overall milk production. This growth is driven by the increasing domestic consumption of dairy products and the pursuit of opportunities in the export market.

2.2 Beef Cattle Production System

Beef cattle production in Southeast Asia is a crucial component of the agricultural landscape of the region, contributing significantly to food security and economic development. In many Southeast Asia countries, traditional and small-scale cattle farming predominates. These systems play a vital role in rural livelihoods, providing farmers with a source of income and nutrition. Several countries in Asia have a significant presence of smallholder beef farms. Some notable examples include: Thailand, Viet Nam, Indonesia and Philippines [3].

2.3 Buffalo

Water buffaloes, especially the domestic water buffalo (Bubalus bubalis), are vital to smallholder farming in Southeast Asia, serving as draft animals, sources of meat, and providers of milk. Their significance is evident in countries like Vietnam, Thailand, Cambodia, and the Philippines, where water buffalo production is deeply rooted in local traditions and economies. Smallholder farmers depend on these versatile animals for fieldwork, transportation, and essential food production like meat and milk [4].

2.4 Cattle value chains

The cattle value chain in Southeast Asia is a intricate network encompassing diverse practices from production to consumption. Smallholder farmers and larger operations rear both indigenous and crossbred cattle to meet regional demands for meat, milk, and by-products. Intermediaries such as traders, transporters, and feed suppliers facilitate the movement of cattle. The processing and marketing phases involve slaughterhouses, processors, and distributors connecting production to consumers.

3. LSD situation

3.1 Disease

Lumpy skin disease (LSD) is a viral infection caused by the lumpy skin disease virus (LSDV), a DNA virus belonging to the *Capripoxvirus* genus in the Poxvirus family. Cattle and water buffalo (Bubalus bubalis) serve as the primary hosts for LSDV, yet instances of LSD infection have also been documented in certain wildlife species [5, 6] . The morbidity rates for LSD during outbreaks vary between 10 and 20% although it has been reported in some places to be as high as 45%, and mortality rates of 1 to 5% are considered usual. LSD heavily impacts animal health and welfare and can lead to severe economic losses in affected farms. The disease is primarily transmitted mechanically by blood sucking arthropod vectors and has the potential to spread across countries or even continents via the movement of live animals [7]. Notably, biting insects such as *Stomoxys* spp. and *Tabanidae* spp. are recognized as important vectors for LSDV [6]. The transmission of the disease can also occur through direct contact and contaminated food and water [8]. Direct contact is a less prevalent mode for the spread of the LSD virus among animals. This may happen when infected animals interact with healthy ones during activities like grazing, feeding, or mating. Infected animals release the virus through their saliva, nasal discharge, and skin nodules [6]. Although non-vector transmission is considered little important for the clade 1.2 LSDV field strains, recent literature indicate that direct and indirect transmission occurs more efficiently between cattle infected with the recombinant clade 2 strains which are currently present in South-East Asia.

Under ambient conditions, LSDV exhibits prolonged viability. It can persist for months in crusts formed on necrotic skin nodules. While sunlight and lipid detergents can easily destroy the virus, it can endure for months in dim environments like feed warehouses and animal pens.

3.2 Epidemiology of LSD

LSD has spread to new regions in Europe and Asia in addition to its traditional range in Africa and the Middle East [6, 9]. Recently, LSDV is spreading into several countries in Asia and Southeast Asia [10]. The long distance transmission of LSD are due to movement of animals, thus the animal trade and movement of animals in this region is considered to be a driver of LSD introduction and spread [11]. LSDV is highly host-specific and causes disease only in bovine species such as cattle and water buffalo. However, LSDV have been found in various wild ruminants [6]. In Southeast Asia, amidst the LSD outbreak in Thailand, LSDV affected a range of wildlife, including Gaur, Mainland serow, and Banteng [12]. LSD in wild animals including potential presence of reservoir and its implication on some of the endangered species of ungulates in SEA is not fully understood.

Risk factors for LSD encompass animals, husbandry systems, and environmental conditions such as temperature, humidity, and rainfall [13]. The spread of LSDV between countries or regions is primarily associated with introduction of new livestock or illegal animal transportation [11]. Notably, LSDV has been reported without new livestock introduction, indicating possible transmission via vectors or other blood-sucking arthropods.

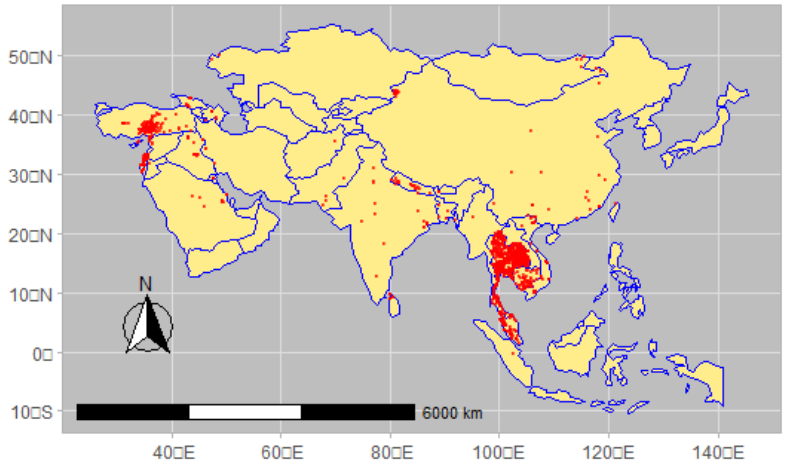

Figure 1: Distribution of LSD outbreaks from 2012–2022. The red dots depict the denser areas of outbreaks in the Asian region. The map was created based on the data from WAHIS.

3.3 LSD Prevention and control

Prevention and control of LSD involve a comprehensive strategy addressing various key aspects. Diagnosis plays a crucial role, utilizing effective methods to identify and confirm LSD cases promptly. Various diagnostic methods are employed, with polymerase chain reaction (PCR) being a widely used method to detect LSD virus DNA. Additionally, serological tests, such as enzyme-linked immunosorbent assay (ELISA), help identify antibodies produced in response to the LSDV or vaccination. Additionally, the confirmation of LSD can be performed using other methods such as viral neutralisation, immunological blotting (Western blotting), real-time PCR (qPCR) and Loop-mediated isothermal amplification (LAMP) [14].

Evidence from the recent LSD epidemic in Europe and western Asia has revealed that successful control and eradication of LSD relies on early detection of the index case, followed by a rapid and widespread vaccination campaign. It is unlikely that total stamping-out (killing all clinically affected cattle and unaffected herd-mates) and partial stamping-out (killing only clinically affected cattle) alone, in the absence of vaccination, can eradicate LSD.

At present, based on the practical experience of countries, the effective strategy for LSDV control and eradication involves vaccination. To date, no country has been able to eradicate LSD without vaccination. There are currently two main types of LSD vaccines - 'homologous' which are based on Neethling-type strains of LSD virus, and 'heterologous', which is based on sheep pox or goat pox virus [15]. Heterologous vaccines are regularly used in countries where sheep and goat pox are also known to occur. Several countries in Southeast Asia used live attenuated homologous vaccines to control the LSD outbreaks [16]. If multiple options are available, it is advisable to select the homologous live attenuated vaccine as it has shown to provide better protection than heterologous vaccines, both in experimental settings and in the field. In unaffected countries or zones, it is also important to prepare any preventive vaccination or emergency vaccination plans.

Controlling animal movement is imperative, regulating the spread of the disease within and between regions. Trade considerations encompass import/export regulations, market access, and sanitary requirements to prevent the international spread of LSD. Additionally, safeguarding free countries and specific zones requires robust protective measures to prevent the introduction and spread of LSD in line with WOAH Terrestrial Animal Health Code [11].

Although vector control can be another aspect in the control programmes, focusing on measures to manage and mitigate the role of disease-transmitting vectors including control of breeding sites for insects such as standing water and dung, there is currently no evidence of the efficacy of vector control in preventing the disease. [17]. In case the insecticides are applied, its use should be carefully assessed given the health and environmental side effects, and growing resistance of insects to these.

Overall, a multifaceted approach is essential for the prevention and control of LSD, addressing diagnosis, vaccination, vector control, biosecurity, animal movement, trade regulations, and protection of disease-free areas.

4. Socio-economic impact of LSD

The economic impact of LSD is substantial, affecting both individual farmers and the broader livestock industry. It is estimated that the economic cost of LSD in South, East, and Southeast Asia could be as high as USD 1.45 billion [11].

Direct economic losses result from decreased milk production, reduced meat and hides quality, and lower reproductive performance in infected cattle. The costs associated with veterinary care, treatment, and management of infected animals contribute to the financial burden. Indirect economic impacts include trade restrictions, quarantine measures, and the implementation of control programs [5, 18, 19].

LSD outbreaks often lead to increased expenditures on disease control, such as vaccination campaigns and vector control measures [20]. Furthermore, the negative effects on animal welfare and productivity have long-term economic repercussions. In regions heavily reliant on livestock for livelihoods, the economic constraints extends to the entire community. The mitigation of LSD's economic impact requires a comprehensive approach, incorporating preventive measures, timely diagnosis, and effective control strategies to safeguard the well-being of both cattle and the livestock-dependent economies.

5. Guiding Principles

The ASEAN LSD Prevention and Control Strategy is in line with and refers to:

- ASEAN Strategic Plan of Action for Cooperation on Livestock (2021-2025)
- ASEAN Strategy for Exotic, Emerging, Re-emerging Diseases and Animal Health Emergencies (2021)
- The GF-TADs founding document, the 2004 GF-TADs Agreement - Since 2004, the FAO and WOAH have cooperated in the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) to reduce the threat from TADs to food security, livelihoods and safe trade.

- The GF-TADs Strategy for 2021–2025: Enhancing control of transboundary animal diseases for global health launched recently recommended the establishment of strategies for priority TADs at the sub-regional, regional and global levels.
- WOAH Standards – Chapter 11.9. Infection with Lumpy skin disease virus of the WOAH Terrestrial Animal Health Code, Chapter 3.4.12. Lumpy skin disease of the WOAH Terrestrial Animal Health Manual and other relevant chapters and WOAH guidelines.
- The FAO Strategic Framework (2022-2031), and the WOAH 7th Strategic Plan (2021-2025), are the 'corporate' Strategies of the FAO and the WOAH, respectively;
- FAO publications: Lumpy skin disease – A field manual for the Veterinarians and Lumpy skin disease Contingency Plan.
- WOAH publications: Report on LSD epidemiology in South-Asia, Economic impact of LSD, FAQ on LSD and LSD vaccination.
- The LSD coordination Meetings for South-East Asia – First Virtual coordination meeting in June 2021, Second virtual coordination meeting in December 2021; third virtual coordination meeting in December 2022 and Fourth In-Person LSD Coordination meeting held in Bangkok, Thailand in November 2023.
- The 30th meeting of the ASWGL in June 2022 recommended the WOAH to support the development of the ASEAN LSD Prevention and Control Strategy
- The 31st ASWGL meeting held in July 2023 in Manila, The Philippines endorsed the concept note for development of ASEAN LSD Prevention and Control Strategy; and composition of the Core group and Advisory Group Members including their terms of references.
- LSD was designated as one of the priority diseases for the Asia-Pacific region during the 12th Regional Steering Committee Meeting (RSC) for GF-TADs meeting held in February 2023.
- the importance of regional coordination for the effective prevention and control of LSD and other emerging TADs.

6. Key challenges to the prevention and control of LSD in the ASEAN region

The rapid spread of Lumpy Skin Disease Virus (LSDV) in Southeast Asia presents several key challenges for effective cross-border coordination, information exchange, and collaboration:

1. **Widespread LSD outbreaks:** LSD has become widespread in the ASEAN region, affecting 8 out of 10 Member States. Controlling LSD requires a long-term commitment from all involved parties due to the scale of national and regional challenges.
2. **Small holding cattle production system:** The extensive small holding cattle production system with low biosecurity measures in Southeast Asia poses a significant risk of LSD outbreaks. Surveillance and control efforts for LSD must consider the local production system and social and cultural aspects of communities.
3. **Delays in reporting:** Significant delays have been observed in submitting immediate notifications after confirming LSD cases, highlighting the need to enhance the regional early warning system by reporting cases through WAHIS or other agreed-upon platforms.

4. **Coordinated approach:** Effective LSD control in Southeast Asia requires a coordinated approach to address key challenges in disease management. Leveraging the existing ASEAN mechanism can enhance prevention and control efforts.
5. **Implementation of international standards:** While international standards, guidelines, and tools for LSD control exist, effective implementation has faced challenges due to diverse and challenging scenarios in different countries.
6. **Vaccination coverage:** Despite the availability of reliable and quality vaccines, some Member States have limited vaccination uptake and coverage due to factors like non-availability or limited funds and resources. Support from policymakers and development partners is crucial to promote LSD vaccination with quality vaccines.
7. **Livestock sector specificities:** Identifying regional specificities within the livestock sector and timely exchange of information and best practices are crucial for building and implementing science-based national and regional control strategies.
8. **Understanding LSD epidemiology in wild animals:** There is still a poor understanding of the role of wild animals in LSD epidemiology in the region. Stronger coordination and collaboration among the veterinary and wildlife/environment sectors are needed to enhance surveillance and biosecurity at the domestic-wildlife interface.
9. **Resource challenges:** Access to adequate and sustainable resources to implement recommended measures for preparedness, prevention, detection, and control will be a challenge for many countries and will require support from development partners.

The ASEAN LSD Prevention and Control Strategy aims to address these strategic challenges and reduce the adverse impact of LSD on the livestock sector in Southeast Asia by defining objectives and providing a structure for specific outputs and outcomes to be achieved.

7. LSD Strategy

Strategy: July 2024 to 2030

7.1 Vision/ Goal

Vision: To achieve ASEAN region free from LSD by 2030.

Goal: To achieve regional control (prevent, detect and respond) and elimination of LSD that will result in a reduction of the adverse impact of LSD in the ASEAN region.

The achievement of the goal will be indicated by:

- free country and zones maintain LSD free status (through self declarations),
- reduction in the number of countries and territories affected by LSD,
- reduction of the number of LSD outbreaks within affected countries and territories/ reduced virus circulation in the region

7.2 Objectives

i) To enhance the capability of ASEAN Member States for effective prevention and control of LSD and other emerging TADs using best practices and implementation of international standards.

ii) To enhance ownership and enabling environment at national level for effective prevention and control of LSD and other emerging TADs.

iii) To improve the effectiveness and sustainability of LSD prevention and control through multi-sectoral stakeholders engagement and multidisciplinary partnerships.

iv) To improve regional coordination and cooperation for more effective mitigation of the impacts of LSD in Southeast Asia and beyond.

7.3 Outcomes

Outcome 1: Strengthened capacity for prevention and control of LSD and other emerging TADs

Output 1.1: Fit for purpose LSD integrated surveillance system established

Efficient surveillance is essential for monitoring LSD situations, rapidly detecting outbreaks, initiating emergency responses, collecting risk analysis data, and demonstrating LSD-free status. General principles and essential elements of animal disease surveillance are set out in Chapter 1.4 of the WOAH *Terrestrial Animal Health Code (Terrestrial Code)*. Some specific guidelines for LSD surveillance is provided in Article 11.19.15 of the *WOAH Terrestrial Animal Health Code* which highlights the importance and procedures for each of the surveillance types: Clinical surveillance, virological and sero-logical surveillance and surveillance in high risk areas.

In line with Chapter 1.1. of the *WOAH Terrestrial Animal Health Code*, the WOAH Member Countries are required to share necessary information to minimize disease spread and assist in global disease control. WOAH Members are required to share the information about the listed disease (Chapter 1.3) with other Members via WAHIS through immediate notification, six monthly reports and annual reports. Since LSD is WOAH listed disease, Members are required to notify through an Immediate Notification via WAHIS within 24 hours after confirming the event, followed by a weekly follow-up report. The epidemiological information related to LSD should be collected and reported via the prescribed immediate notification and follow-up report form via WAHIS reporting platform. Members are also required to submit six-monthly reports on the absence or presence and evolution of the listed diseases and information of epidemiological significance to other Member Countries.

ASEAN established the ASEAN Regional Animal Health Information System (ARAHIS) for sharing timely livestock disease information among member countries to improve regional disease control. Therefore, LSD should be included in ARAHIS reporting list and AMS ARAHIS Focal Point should immediately report any outbreak of LSD via ARAHIS.

Members are encouraged to monitor the LSD situation in the region and, in particular, in neighbouring countries that share borders. An effort should be made to establish good relationships and communication with neighbouring countries and trading partners to share information about any suspected LSD outbreaks among the Members.

Considering the under reporting of LSD and other TADs, Members could utilize available disease intelligence systems, such as the Epidemic Intelligence from Open Sources (EIOS), to strengthen the country's capacity to track disease rumours. Members should also leverage on the advancement of information technology to understand the epidemiological trends and to predict/ forecast future disease outbreaks.

Output 1.2: Strengthened laboratory diagnostic system

Developing and strengthening laboratory diagnostic capacity is crucial for early detection, diagnosis, and response to emerging TADs like LSD. Animal health policymakers should prioritize this to ensure laboratories have robust LSD testing capabilities. The WOAH *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Terrestrial Manual)* Section 3.4.12 (B) provides guidelines for laboratory diagnostic techniques for LSD detection, where AMS are encouraged to follow to develop their diagnostic capacities in line with WOAH standards.

To support the ASEAN LSD strategy, ASWGL will designate and establish ASEAN Reference Laboratory for LSD (ARLL) in consultation and consensus of all AMS through the recommendation of the ASEAN LSD Taskforce. The ARLL will serve as a reference laboratory to all AMS in accordance with its Terms of Reference (Annex II). The WOAH/FAO Reference Laboratories, should provide technical guidance and support to ARLL throughout the implementation process.

With support from the WOAH, and FAO, and in collaboration with the WOAH LSD Reference Laboratories Network, ARLL will collect and disseminate information available for LSD diagnosis and field testing.

Laboratory confirmation of LSD is most rapid using a real-time or conventional polymerase chain reaction (PCR) method specific for capripox viruses in combination with a clinical history of a generalised nodular skin disease and enlarged superficial lymph nodes in cattle. A recent survey to assess LSD diagnostic capacity indicates that all AMS have RT-PCR facilities and they are further encouraged to maintain their capacity for molecular diagnosis.

Besides, the national LSD laboratories should initiate a quality assurance programme, including participation in proficiency testing and laboratory twinning programme with WOAH and other International Reference Laboratories.

Output 1.3: Improved movement control, quarantine and biosecurity

Animal movements are the primary driver of long-distance spread of TADs within countries and across borders in South-East Asia as evidenced by the rapid spread of diseases like ASF and LSD, and recent incursions of FMD into previously unaffected countries. This also highlights the weaknesses in regional biosecurity systems in keeping pace with increasing TADs risks due to rapid socio-economic development.

Implementing WOAH standards for safe animal trade can guide the development of bilateral protocols for cross-border movements. Efforts to formalize cross-border animal movements have been made, such as agreements between the People's Republic of China and countries like Laos and Myanmar to establish disease control zones for livestock trade.

There is a need for cross-border risk assessment studies, appropriate legislation and stronger enforcement of regulations, effective awareness campaigns, among livestock farmers and traders about the risks

associated with uncontrolled animal movement. Better collaboration between countries in the region is also essential to address the risks of cross-border movement of animals.

Strengthening regional biosecurity strategies involves reducing and eliminating informal cross-border movement of livestock and their products, enhancing border controls and improving quarantine facilities.

Sub-regional platforms like the Upper Mekong Working Group on FMD can be utilized to discuss and strengthen transborder prevention and control of TADs, including LSD. The public-private partnerships should be pursued to facilitate safer cross-border animal movement.

Studies are needed to understand animal movement dynamics, risk pathways of TADs spread, and stakeholders' behaviours to engage them in disease surveillance and control.

The study conducted by WOAH showed that price changes for large ruminants have led to significant changes in the movement pathways of large ruminants in the Greater Mekong Subregion. Monitoring animal price changes can help assess associations with animal movements and disease trends, enabling timely adjustments to risk mitigation measures and promoting transparent and safer trade.

Output 1.4: Enhanced LSD vaccination and access to quality vaccines

Vaccination of cattle is crucial for controlling and eradicating LSD, as no country has been able to eradicate LSD without vaccination. Member countries (AMS) are encouraged to refer to Chapter 4.18 of the WOAH *Terrestrial Code* on vaccination and Section 2.3. of WOAH *Terrestrial Manual*) on veterinary vaccines; and Chapter 3.4.12 of the WOAH *Terrestrial Manual* on the requirements for the vaccines to be used for LSD control.

There are currently two main types of LSD vaccines - **'homologous'** which are based on Neethling-type strains of LSD virus, and **'heterologous'**, which is based on sheep pox or goat pox virus. Heterologous vaccines are used in countries where sheep and goat pox are also known to occur. Homologous live attenuated vaccines are preferred as they offer better protection than heterologous vaccines in both experimental and field settings. Vaccines successfully used for LSD control are largely live attenuated, with AMS typically using commercially available live attenuated Neethling strain vaccines.

Annual vaccination of cattle with good quality live attenuated vaccines is essential for LSD protection, requiring vaccination coverage of 80 – 100%. Depending on the climate conditions of AMS, vaccination of cattle prior to higher vector season should be emphasised. The effectiveness of vaccination campaigns depends on factors like cold chain maintenance and host-related factors.

In cases of limited resources, targeted vaccination in high-risk sub-populations along the value chains in specific areas is recommended. Coordinated vaccination with neighbouring countries, especially along international borders, promotes better regional LSD control.

Active clinical surveillance is a valuable tool for assessing the effectiveness of a vaccination campaign against LSD. Given the distinctive clinical signs of LSD, thorough physical examinations conducted by veterinarians are considered effective for active clinical surveillance. Additionally, antibody ELISA tests can be employed for post-vaccination monitoring, typically performed 2 to 3 months after vaccination. It's important to note that not all vaccinated animals may test positive in the ELISA.

Output 1.5: Capacity building programmes strengthened

There are number of technical guidelines and resources developed by FAO, WOAH and other Partners on prevention and control of LSD and other TADs. These guidelines and tools may be used by the AMS to enhance LSD prevention and control in their respective countries and to strengthen coordination and collaboration in the ASEAN region. The lists of available guidelines and resources are provided in Annex III.

To address capacity-building priorities holistically, FAO, WOAH, and other partners, including donors, should coordinate efforts based on existing gap analyses. Capacity-building initiatives should address critical needs, promote synergy, and avoid duplications.

Training programs should focus on various aspects such as risk assessment, biosecurity, outbreak investigation, surveillance, laboratory and field diagnosis, vaccination, emergency response, contingency planning, risk communication, zoning, compartmentalization, and facilitation of safer trade.

Training for animal health officials at national and regional levels should be organized based on needs assessments and may be conducted virtually or in person, considering effectiveness and cost implications. Self-paced virtual learning courses provided by WOAH, FAO, and other partners should be encouraged for ongoing professional development.

AMS should advocate policymakers to support LSD prevention and control efforts, utilizing available Information, Education, and Communication (IEC) materials and policy briefs developed by WOAH and other partners.

Strengthening existing regional networks of epidemiology and laboratory, such as the ASEAN Veterinary Epidemiology Group and ASEAN Laboratory Directors Forum, is crucial to disseminate LSD surveillance and epidemiological data among AMS. This facilitates better coordination, harmonized approaches, and enhanced quality of information sharing critical for implementing the ASEAN LSD Prevention and Control Strategy.

LSD free countries should focus on enhancing LSD prevention, detection, response and recovery including development and testing of their LSD Contingency Plans. Establishing mechanisms for obtaining emergency funding for the containment of reported LSD outbreaks and other emerging TADs.

Outcome 2: Improved ownership and enabling environment at national level

Output 2.1: Country ownership of the LSD and other TADs control enhanced

The ownership of the ASEAN LSD Prevention and Control Strategy is paramount for ensuring full engagement and effective implementation of the activities at both national and regional levels. Member countries' ownership is crucial as it facilitates the achievement of desired impact and sustains prevention and control efforts for LSD and other TADs.

Each AMS should nominate a National LSD Focal Person to coordinate LSD activities at the national level and with other AMS and partners in the region. The National LSD Focal Person should ensure the implementation of this strategy within their country. Member countries are expected to develop National LSD Control Plans aligned with the ASEAN LSD Prevention and Control Strategy and its Monitoring and Evaluation (M&E) logical framework; and relevant regional and international guidelines and standards,

including the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) Strategy, the Regional GF-TADs Strategy for Asia and the Pacific, and WOAH standards. This alignment ensures consistency and coherence in implementation across the region.

To maintain political commitment and secure resources for LSD and TADs control, advocacy efforts targeting high-level decision-makers are essential. Member countries should engage in advocacy efforts to mobilize funds and resources for the implementation of National LSD Control Plans, both domestically and from potential donors and partners interested in supporting LSD and TADs control efforts.

Efficient control and prevention of LSD and other TADs require strong veterinary services with adequate institutional, financial, logistical, and technical capacities. Member countries aiming to control or eradicate LSD should ensure that their veterinary services are adequately resourced and capable of planning and implementing control measures effectively.

WOAH has developed a set of tools to support its members in strengthening their veterinary services. The WOAH Performance of Veterinary Services (PVS) Pathway offers evaluation, planning, and targeted support tools relevant for implementing control strategies for LSD and other animal diseases.

WOAH will encourage and support AMS interested in benefiting from the PVS Pathway by providing various missions and evaluations, including PVS Evaluation, PVS Evaluation Follow-up, PVS Gap Analysis, Strategic Planning, Veterinary Legislation Support Programme, PVS Laboratory Mission, and workforce development. AMS will be also supported to conduct PVS self-evaluation to identify gaps in implementing LSD-related activities.

AMS will be encouraged to identify national experts and expose them to regional and international activities such as conferences, trainings, missions, and webinars. The experts from the ASEAN region will be encouraged to collaborate with the international experts to facilitate access to broader technical knowledge and create joint research opportunities.

Output 2.2: National legal and regulatory framework is enhanced

The emergence of LSD in the ASEAN region indeed underscores the importance of reviewing, revising, or developing legislation and policies to effectively prevent and control the spread of the disease. The Chapter 3.4 of the WOAH *Terrestrial Animal Health Code* provides guidance on veterinary legislation, which can be a valuable reference for AMS seeking to strengthen their legal frameworks.

An assessment of the existing legislation should be conducted by AMS to benchmark the existing legislation, as well as the identify current gaps. It is crucial to identify which policies and legislation are effective, and which are irrelevant and impractical.

One approach that AMS can consider is requesting support from WOAH for a Veterinary Legislation Support Programme (VLSP). Through this programme, WOAH VLSP Experts can offer technical assistance to systematically review legislation, identify gaps and weaknesses, and strengthen countries' capacity to develop legislation related to animal health.

Critical areas to consider are to include legislation and regulations to support effective surveillance, early detection and response to outbreaks, effective vaccination, and animal movement management and quarantine. AMS should ensure legislation includes provisions for financing disease control efforts and a fair compensation scheme.

Policy decisions regarding resource allocation for LSD control and vaccination protocols should also be included in legislative frameworks. It's crucial for AMS to effectively implement relevant legislation and policies to enhance LSD prevention and control, contributing to regional control efforts against this emerging disease.

Output 2.3: Cost efficient synergies with other livestock production /animal health/other TADs control activities developed

Recent introductions of emerging TADs like ASF, LSD, and Peste des petits ruminants (PPR) in the South-East Asian region have impacted the control efforts of other priority endemic diseases such as FMD, avian influenza, and rabies. It's crucial to explore cost-efficient synergies for preventing and controlling TADs at both country and regional levels to maximize the impact of resources invested and improve the cost-effectiveness of control initiatives.

Common diseases that may be considered for control alongside LSD include FMD, haemorrhagic septicaemia (HS), brucellosis, contagious bovine pleuropneumonia, tuberculosis, anthrax, blackleg, epizootic haemorrhagic disease (EHD), and rabies.

To improve working efficiency, FMD activities can be combined with other health-related initiatives within Veterinary Services. For example, LSD training could be synergized with animal nutrition programs or other TADs topics; LSD vaccination for cattle could be combined with vaccinations against FMD, HS, and blackleg; and awareness programs for LSD prevention could be combined with extension campaigns and training for other TADs.

Broadening program effects involves common horizontal approaches like movement control and biosecurity, which not only benefit LSD control but also aid in preventing or containing other livestock diseases. Strengthening movement regulation and border control has broader impacts, while enhancing biosecurity practices reduces the risk of major diseases like LSD and benefits the entire livestock sector.

Sharing resources is vital due to resource limitations in Veterinary Services. Integrating resources, programs, and activities between sectors can optimize resource use, such as utilizing the cold chain facility of the human health sector for vaccine delivery in Veterinary Services. Furthermore, well-equipped FMD/ LSD laboratories can be expanded for diagnosing other diseases and vice versa, maximizing utility.

Output 2.4: Enhanced communication, advocacy and stakeholder engagement

The ASEAN LSD Prevention and Control Strategy underscores the critical role of communication in its successful implementation. Effective communication, characterized by clarity, transparency, and efficiency, is essential for engaging stakeholders and securing support from policy and decision-makers.

All AMS are encouraged to develop a communication plan within their National LSD Control Strategy or overall livestock disease communication framework. This plan should ensure timely and accurate dissemination of information to the public, livestock owners, and relevant authorities.

Leveraging existing information technologies is recommended for efficient information dissemination. This includes utilizing online platforms, mobile applications, and other digital tools to reach target audiences effectively.

The WOAH and other development partners should provide existing communication materials to the AMS and assess needs to develop new communication materials in collaboration with AMS. In designing and developing communication materials, collaboration with Socio-Anthropologists and communication experts is advised. These materials should align with the background, knowledge, and education level of the targeted audience.

The communication on LSD should prioritize raising awareness among farmers, livestock owners, traders, and animal health staff about reporting sick animals promptly and implementing biosecurity measures on farms. Additionally, emphasizing the importance of LSD vaccination and the use of quality vaccines is essential for effective LSD prevention and control efforts.

Advocacy efforts targeting ministries, politicians, policymakers, and high-level decision-makers within the ASEAN mechanism should be emphasized. These efforts are aimed at persuading decision-makers to support the implementation of the strategy, including the allocation of adequate resources.

Supporting the development of an ASEAN policy brief is proposed, particularly highlighting the impact of LSD and Transboundary Animal Diseases (TADs), as well as the benefits of the strategy and proposed actions. This is intended to assist policymakers in making informed decisions based on evidence.

Outcome 3: Improved effectiveness and sustainability of LSD and other TADs control through multi sectoral and multi-disciplinary partnership

Output 3.1: Engagement and partnership with relevant key stakeholders, including the private sector strengthened

The prevention and control of LSD involves engagement of wide range of organizations and stakeholders at various levels. Mapping and categorizing these stakeholders based on their interests and influence is crucial for developing a comprehensive stakeholder engagement strategy. This strategy aims to engage priority stakeholders, foster communication, build partnerships, and adapt to changing circumstances.

Given the complexity of LSD and TADs, multisectoral and multi-institutional cooperation is essential. The GF-TADs have identified key roles for countries, WOAH, and FAO in the global and regional control of the disease. FAO and WOAH should continue to guide and support LSD control in the sub-region, working closely with the ASEAN Secretariat, ASWGL, ACCAHZ, and Members under the GF-TADs umbrella. Regional and sub-regional FAO and WOAH representations, along with other development partners, play a pivotal role in supporting the implementation of the ALPCS and contributing to global LSD control efforts through initiatives like the GF-TADs.

Additionally, the involvement of international, regional, and national associations, wildlife organizations, research institutions, laboratories, academia, and universities enhances the overall reach, experience, expertise, and impact of LSD prevention and control efforts.

Collaboration and coordination among public sector and relevant stakeholders are essential for a comprehensive and effective approach to LSD prevention and control. Ministries and authorities responsible for animal health, livestock production, welfare, and wildlife health play important roles, along with law enforcement agencies such as police, customs, immigration, and disaster management authorities.

Engaging with the private sector transparently and collaboratively is crucial for the success of LSD prevention and control. This multi-stakeholder approach ensures that all facets of the cattle value chain are addressed, including emerging industry players like e-commerce platforms.

Promoting effective collaboration between the public and private sectors through public-private partnerships (PPPs) is essential for addressing complex challenges and fostering sustainable development. The WOAH PPP Handbook provides a guidelines for the Public Private Partnership's in the Veterinary domain.

Coordination among stakeholders, particularly animal health and livestock authorities, is a prerequisite for any disease prevention and control program, as is regional cooperation amongst Veterinary Authorities for transboundary animal disease as described in Chapter 4.1 of the WOAH Terrestrial Animal Health Code. This coordination and collaboration among authorities is encouraged at national and regional levels to enhance the efficiency and effectiveness of LSD prevention and control.

Output 3.2: Multi-disciplinary collaboration and coordination for the prevention and control of LSD and emerging TADs strengthened

The introduction and spread of TADs, including LSD, in Southeast Asia in recent years underscore the need for a multi-sectoral approach. Managing these diseases and mitigating their impact necessitate the involvement of multiple actors and sectors beyond just veterinary services.

The strategy highlights the need for a coordinated, interdisciplinary, and integrated approach to effectively prevent and control LSD and other emerging TADs. Collaboration and resource optimization are crucial for sustainable and efficient disease management.

Regulatory provisions and policy alignment support the formation of interdisciplinary teams, comprising various experts such as agriculture specialists, veterinarians, economists, epidemiologists, and socio-anthropologists, to address complex issues related to disease prevention and control.

Collaborative research initiatives are encouraged to enhance understanding of diseases including epidemiology, vaccine quality, and vectors, informing more effective prevention and control strategies. LSD in wild animals needs to be assessed as it may have implication in particular on biodiversity if affecting one of the many endangered species of ungulates in SEA and potential presence of reservoir.

Raising awareness among farmers, traders and players along the cattle value chains about LSD prevention and control measures is crucial. Community-based participatory approaches ensure interventions are tailored to specific socio-economic contexts, enhancing effectiveness and sustainability.

A "whole-of-government" approach involves integrating animal health considerations into the policies, regulations, programs, and operations of various government sectors such as agriculture, commerce, trade, law enforcement, and others. This approach fosters collaboration and coordination across sectors in responding to disease emergencies and to address the complex challenges associated with TADs prevention and control.

Regional coordination among countries and partners is essential to prevent disease spread across borders. Fostering coordination between the animal health sector and other relevant sectors like environment and wildlife promotes a holistic One Health approach, mitigating the impact of diseases on animal health, food security, and livelihoods.

Output 3.3: Sustainable funding mechanism promoted

Prioritizing needs based on risk assessment, data analysis, and strategic planning allows for more efficient allocation of resources to control and prevent the spread of LSD. Regular monitoring and adaptation to changing risk profiles are crucial components of a successful risk-based approach.

ASEAN Coordinating Centre for Animal Health and Zoonoses (ACCAHZ) along with AMS may need to review and update policies and legislation to include provisions specifically addressing financing for TADs prevention and control, including LSD, with an emphasis on government support, partnerships, donors, and PPPs. Establishing policies and regulations that encourage private sector participation, investment, and public sector incentives for sustainable funding is essential for LSD control and eradication in Southeast Asia.

Forming alliances to leverage resources, accessing diverse expertise, and expanding networks are crucial for effective and sustainable LSD control. Engaging policymakers at national and regional levels to create an enabling environment and mobilize human and financial resources is key for strategy implementation.

Development partners, including FAO, WOAH, and WOAH/FAO Reference Laboratories, can provide technical guidance, inputs, and financial contributions throughout the implementation process. Additionally, financial support is available from various regional and national projects and programs.

Integrating risk management approaches like insurance, microfinance, market access, incentives, compensation mechanisms, and restocking policies into LSD prevention and control is crucial for sustainable development in AMS. Tailoring these approaches to specific contexts and continuously evaluating their effectiveness in addressing evolving challenges is essential. The strategy promotes LSD control benefits for all stakeholders, including farmers, smallholders, and industry players, contributing to the resilience of the entire cattle value chain and long-term sustainability of the agricultural sector.

8. Governance and Implementation arrangement

The implementation of the strategy can be facilitated through several mechanisms at international, regional and national levels (Figure 2). The coordination of the implementation will be overseen by the ACCAHZ/ ASEAN Secretariat in collaboration with AMS and Partners under relevant frameworks.

ASEAN framework for control of TADs including LSD

The ASEAN Coordinating Centre for Animal Health and Zoonoses (ACCAHZ) serves as the regional technical arm to combat threat of highly pathogenic emerging and re-emerging high-impact transboundary animal diseases, including LSD. The ACCAHZ will work closely with partners and donors to deliver support aligned with regional strategies. The ASEAN Sectoral Working Group on Livestock (ASWGL) will provide policy guidance for implementing the strategy. The ASWGL meets annually to monitor progress and coordinate activities.

The ASEAN Lead Country appointed by the ASWGL will provide support to ACCAHZ/ ASEAN Secretariat in the day-to-day coordination and implementation of the strategy. The ASEAN Lead country for LSD will report the ASEAN LSD situation and the progress of implementation of the strategy to ASWGL/ACCAHZ annually or when needed, with support from WOAH and FAO (TOR).

ASEAN Reference Laboratory for LSD is responsible for serving as a reference to all AMS, following its Terms of Reference (TOR), in executing this strategy

Close collaboration with various ASEAN groups, such as the ASEAN Laboratory Directors Forum (ALDF), ASEAN Veterinary Epidemiology Group (AVEG), and others, is essential for successful strategy implementation.

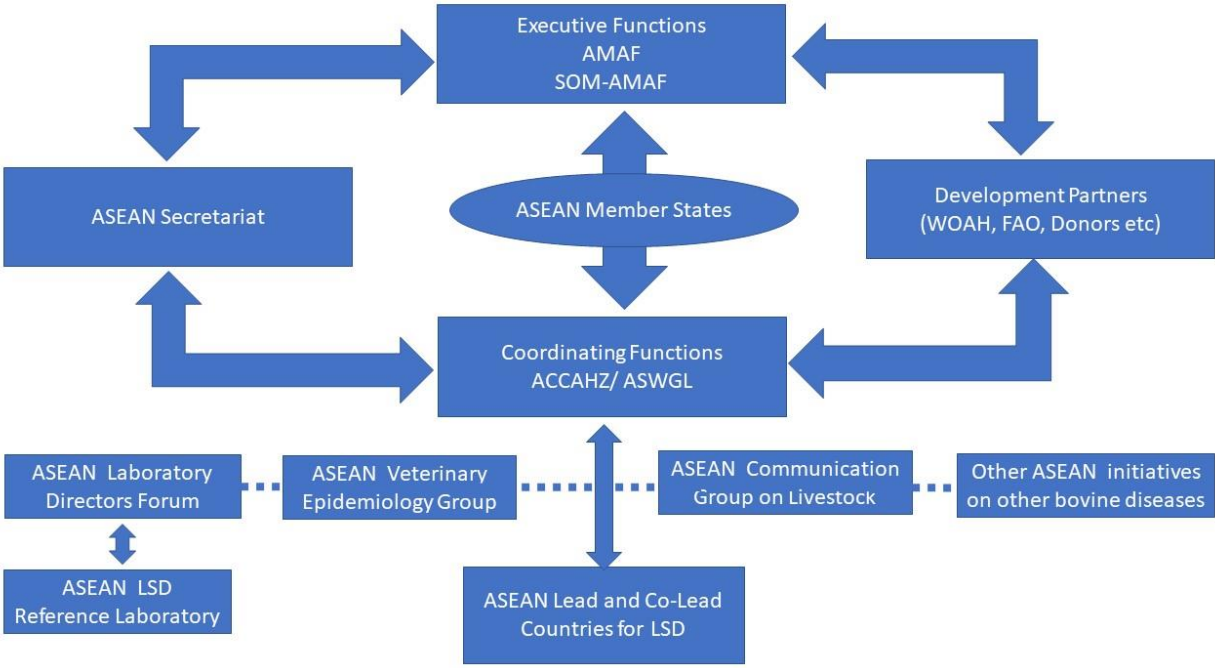

Figure 2: ASEAN LSD Coordination Mechanism (will be revised based on the feedback from ASEC and AMS)

Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs)

The GF-TADs involves collaboration between FAO and WOAH to mitigate the threat of transboundary diseases to food security, livelihoods and safe trade. At the global level, the GF-TADs Global Steering

Committee provides guidance on technical activities of global scope to be implemented by the GF-TADs Global Secretariat under the supervision and agreement of the GF-TADs Management Committee. Specific disease groups at the global level support and guide the implementation of GF-TADs strategy and Global Disease Control Strategies.

The Regional Steering Committee (RSC) for GF-TADs meets every two years or on an ad hoc basis to monitor progress, coordinate activities related to regional priority TADs, and promote harmonized and coordinated planning among FAO, WOAH, Member Countries, and other development partners.

Sub-regional GF-TADs meetings, organized by WOAH and FAO, serve as coordination mechanisms at the sub-regional level among its members, secretariats of Regional Economic Communities such as ASEAN, FAO, and WOAH. These meetings are held in close collaboration with the ASEAN Secretariat, back-to-back with ASWGL meetings and other GF-TADs meetings.

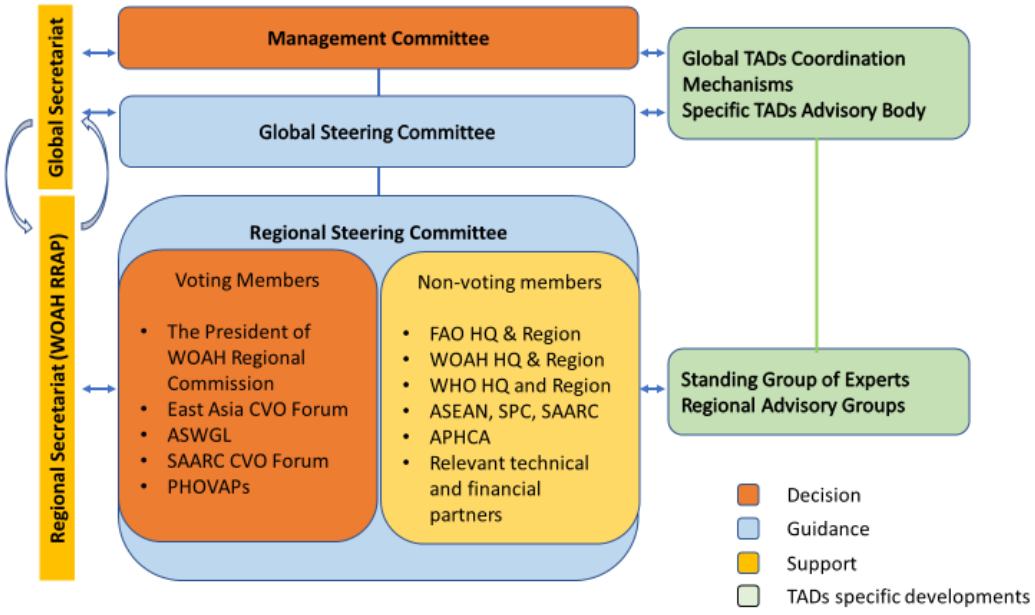

Figure 3: Mechanism of Global Framework for the Progressive Control of Transboundary Animal diseases (GF-TADs) - adapted from Regional GF-TADs Strategy for the Asia and the Pacific.

Other sub-regional Platforms

Other sub-regional platforms, like the SEACFMD Campaign and the Upper Mekong Working Group, play roles in preventing and controlling diseases like FMD and can contribute to efforts against LSD. Furthermore, the collaboration with other sub-regional economic platforms such as the Mekong River Commission (MRC), the Brunei, Indonesia, Malaysia, and the Philippines – East ASEAN Growth Area (BIMP-EAGA), and the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) should be explored to enhance regional efforts to combat TADs.

At the national level:

Each ASEAN Member State (AMS) is responsible for implementing the ALPCS. The implementation of this strategy at the national level involves several key steps:

i. Nominate a National LSD Focal Person who will coordinate LSD activities at the national level and with other AMS and Partners in the region.

ii. Establish national level committee to ensure the collaboration of the public and private sectors should their intervention be required, including for foreign trade, finances, customs, environment, law enforcement and transport, cattle industry, among others relevant.

iii. Assign adequate financial and logistical resources, as well as legal and regulatory tools to implement or put in place the recommendations of the GF TADs.

iv. Promote and establish Public Private Partnership initiatives in relevant areas for the prevention, control and eradication of the LSD.

v. Initiate and develop a country-level LSD Prevention and Control Strategy.

vi. Implement the recommendations and proposals of the Regional GF-TADs Steering Committee for the Asia and the Pacific, ASWGL Meetings, ACCAHZ meetings and recommendations of GFTADs Meetings (Global, regional and sub-regional) related to LSD.

The priority actions for the implementation of ASEAN LSD Prevention and Control Strategy for the first two years (July 2024 – June 2026) is provided in Annex IV.

9. Monitoring and evaluation

A monitoring and evaluation (M&E) framework for the ASEAN LSD Prevention and Control Strategy is developed to monitor the efficiency and effectiveness in the implementation of the strategy. The framework selects key outcome and output indicators, elaborating methodologies for how each indicator will be measured (indicator definition, means of verification, benchmarking and setting indicator targets).

The baseline and targets for indicators are required to measure the progress of LSD prevention and control at the country and regional level.

- A **baseline** will be set for each indicator in 2024 by a) using existing data, or b) measuring the indicator in cases where there is no existing data. This will be done by the relevant stakeholders (member country, regional platform) involved in measuring that indicator and collated at regional level.
- The output indicators will have life of strategy targets as well as yearly interim targets set. However, outcome indicators will be set for 2029 and the mid term of 2026. Relevant stakeholder (member country, regional platform) will be involved in setting these targets.

The Members need to be able to monitor their progress of ALPCS, with a method that is both specific enough to reflect progress at the national level, yet harmonised enough to allow progress to be monitored at the regional level. The M&E system for the ALPCS will be improved progressively to provide clearer definitions of targets and indicators, more explicit descriptions of achievements, systematic data collection methods and to support the proper allocation of resources. The M&E Logical framework for ASEAN LSD Prevention and Control Strategy is provided in Annex V.

References

1. Teufel N, Markemann A, Kaufmann B, Valle-Zárate A, Otte J. Livestock production systems in South Asia and the Greater Mekong sub-region. A Quantitative Description of Livestock Production in Bangladesh, Cambodia, India. 2010.
2. Devendra C. Smallholder dairy production systems in developing countries: characteristics, potential and opportunities for improvement-review. Asian-Australasian Journal of Animal Sciences. 2001;14(1):104-13.
3. Smith SB, Gotoh T, Greenwood PL. Current situation and future prospects for global beef production: overview of special issue. Asian-Australasian journal of animal sciences. 2018;31(7):927.
4. Cruz L. Trends in buffalo production in Asia. Italian Journal of Animal Science. 2007;6(sup2):9-24.
5. Tuppurainen ES, Oura CA. Review: lumpy skin disease: an emerging threat to Europe, the Middle East and Asia. Transbound Emerg Dis. 2012;59(1):40-8. Epub 2011/07/14. doi: 10.1111/j.1865-1682.2011.01242.x. PubMed PMID: 21749675.
6. Akther M, Akter SH, Sarker S, Aleri JW, Annandale H, Abraham S, et al. Global Burden of Lumpy Skin Disease, Outbreaks, and Future Challenges. Viruses. 2023;15(9):1861.
7. Sprygin A, Pestova Y, Wallace D, Tuppurainen E, Kononov A. Transmission of lumpy skin disease virus: A short review. Virus research. 2019;269:197637. Epub 2019/06/04. doi: 10.1016/j.virusres.2019.05.015. PubMed PMID: 31152757.
8. Bianchini J, Simons X, Humblet M-F, Saegerman C. Lumpy Skin Disease: A Systematic Review of Mode of Transmission, Risk of Emergence and Risk Entry Pathway. Viruses. 2023;15(8):1622.
9. Anwar A, Na-Lampang K, Preyavichyapugdee N, Punyapornwithaya V. Lumpy Skin Disease Outbreaks in Africa, Europe, and Asia (2005–2022): Multiple Change Point Analysis and Time Series Forecast. Viruses. 2022;14(10):2203. Epub 2022/10/28. doi: 10.3390/v14102203. PubMed PMID: 36298758; PubMed Central PMCID: PMCPMC9611638.
10. Wilhelm L, Ward MP. The Spread of Lumpy Skin Disease Virus across Southeast Asia: Insights from Surveillance. Transboundary and Emerging Diseases. 2023;2023.
11. Roche X, Rozstalnyy A, Tago D, Kamata A, Claudia P, Beltran-Alcrudo D, et al. Introduction and spread of lumpy skin disease in South, East and Southeast Asia - Qualitative risk assessment and management. 2020. doi: 10.4060/cb1892en.
12. WOAH. Lumpy skin disease (LSD): An update on LSD Prevention & Control with focus on LSD Vaccination in Thailand. 2021.
13. Renald E, Buza J, Tchuenche JM, Masanja VG. The role of modeling in the epidemiology and control of lumpy skin disease: a systematic review. Bulletin of the National Research Centre. 2023;47(1):141.
14. Liang Z, Yao K, Wang S, Yin J, Ma X, Yin X, et al. Understanding the research advances on lumpy skin disease: A comprehensive literature review of experimental evidence. Frontiers in Microbiology. 2022;13:1065894. Epub 2022/12/16. doi: 10.3389/fmicb.2022.1065894. PubMed PMID: 36519172; PubMed Central PMCID: PMCPMC9742232.

15. Tuppurainen E, Dietze K, Wolff J, Bergmann H, Beltran-Alcrudo D, Fahrion A, et al. Review: Vaccines and Vaccination against Lumpy Skin Disease. Vaccines (Basel). 2021;9(10). Epub 2021/10/27. doi: 10.3390/vaccines9101136. PubMed PMID: 34696244; PubMed Central PMCID: PMCPMC8539040.

16. WOAH. 2nd Lumpy skin disease (LSD) coordination meeting for South East Asia - Implementation of LSD vaccination 2021. Available from: https://rr-asia.woah.org/en/events/second-lumpy-skin-disease-lsd-coordination-meeting-for-south-east-asia-implementation-of-lsd-vaccination/?preview=true.

17. Arjkumpa O, Suwannaboon M, Boonrod M, Punyawan I, Liangchaisiri S, Laobannue P, et al. The first lumpy skin disease outbreak in Thailand (2021): Epidemiological features and spatio-temporal analysis. Frontiers in Veterinary Science. 2022;8:1580. Epub 2022/01/25. doi: 10.3389/fvets.2021.799065. PubMed PMID: 35071388; PubMed Central PMCID: PMCPMC8782428.

18. Gari G, Bonnet P, Roger F, Waret-Szkuta A. Epidemiological aspects and financial impact of lumpy skin disease in Ethiopia. Preventive veterinary medicine. 2011;102(4):274-83. Epub 2011/08/20. doi: 10.1016/j.prevetmed.2011.07.003. PubMed PMID: 21852008.

19. Limon G, Gamawa AA, Ahmed AI, Lyons NA, Beard PM. Epidemiological characteristics and economic impact of lumpy skin disease, sheeppox and goatpox among subsistence farmers in northeast Nigeria. Frontiers in veterinary science. 2020;7:8.

20. WOAH. Lumpy skin disease (LSD): An update on LSD situation and its control in Thailand 2022. Available from: https://rr-asia.woah.org/wp content/uploads/2022/12/thailand_lsd_update_presentation-1.pdf

21. WOAH. Frequently Asked Questions (FAQ) on lumpy skin disease. Availabel from: https://www.woah.org/app/uploads/2022/06/faq-lsd-faired-v2-4forpublication.pdf

22. WOAH. Chapter 1.1. Notification of disease and provision of epidemiological information. *WOAH Terrestrial Animal Health Code*. Available from: https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_notification.htm

23. WOAH. Chapter 1.3. Diseases, infections and infestations listed by WOAH. *WOAH Terrestrial Animal Health Code*. Available from: https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_oie_listed_disease.htm

24. WOAH. Chapter 1.4. Animal health surveillance. WOAH *Terrestrial Animal Health Code.* Available from: https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_surveillance_general.htm

25. WOAH. Chapter 4.18 . Vaccination. WO*AH Terrestrial Animal Health Code. Available from:* https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_vaccination.htm

26. WOAH. Chapter 11.19 of Infection with LSD virus. WO*AH Terrestrial Animal Health Code. Available from:*

27. WOAH. Chapter 11.19. Infection with Lumpy skin disease virus. WO*AH Terrestrial Animal Health Code. Available from: https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/?id=169&L=1&htmfile=chapitre_lsd.htm*

28. WOAH. Section 2.3. Veterinary vaccines. WOAH *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Terrestrial Manual)*. Available from: https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-manual-online-access/

29. WOAH. Section 3.4.12 (B). Lumpy skin disease – Diagnostic Techniques. WOAH *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Terrestrial Manual)*. Available from: https://www.woah.org/fileadmin/Home/eng/Health_standards/tahm/3.04.12_LSD.pdf

30. WOAH. Chapter 3.4.12 (C). Lumpy skin disease – Requirement for vaccines. WOAH *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Terrestrial Manual)*. Available from: https://www.woah.org/fileadmin/Home/eng/Health_standards/tahm/3.04.12_LSD.pdf

Annexes

Annex I: List of contributors

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Annex II: Terms of reference for ASEAN LSD Reference Laboratory

I. Introduction

The fourth ASEAN Laboratory Directors Forum (ALDF) Meeting recommended the establishment of ASEAN Reference Laboratories (ARL) for the priority animal diseases and the elements for the ARL was discussed during this meeting. Following this, the core countries (Malaysia, Thailand, and Viet Nam) with assistance from the ASEAN Secretariat developed the Terms of References (TOR) for the ASEAN Reference Laboratories (ARL) based on the key elements agreed at the ALDF Meeting. The TOR was endorsed by the 27th ASEAN Sectorial Working Group for Livestock (ASWGL) Meeting prior to Senior Officers Meeting of ASEAN Minister for Agriculture and Forestry (SOM-AMAF). The TOR also covers the procedure for AMS to apply as ASEAN Reference Laboratory for the priority diseases (Refer Section IV).

II. Objective and scope of activities

1. To act as reference laboratory for LSD virus (LSDV) in the ASEAN region including providing confirmatory diagnostic test on specimens received from AMS in accordance with procedures described in the WOAH *Terrestrial Manual*.
2. To facilitate harmonised diagnostic techniques to make results comparable between different laboratories in the ASEAN region, which could be achieved by:
    a. Promoting the use of harmonized laboratory manuals and SOPs
    b. organizing inter-laboratory proficiency testing with laboratories of the AMS for the relevant tests to ensure equivalence of results
    c. providing reference materials and other standardized reagents used for the diagnosis and control of LSD.
3. To provide scientific and technical training for the ASEAN Member States (AMS) in collaboration with WOAH LSD Reference Laboratories.
4. To maintain a system of quality assurance, biosafety and biosecurity for LSD virus by validating and accrediting the tests to ISO17025.
5. To collaborate and exchange with the WOAH LSD Reference Laboratories and other International Reference Laboratories to ensure that diagnostic tests and methods employed as well as harmonisation of techniques are in line with international standards and International Reference Laboratories
6. Contribute to the sharing of LSDV genetic data which would provide a better understanding of the LSD molecular epidemiological features and virus transmission pathways.

III. Mode of operation/ Prerequisites:

1. The ALRL should closely liaise with the National LSD Reference Laboratories of the AMS to enhance LSD diagnosis in the region.
2. The ALRL is expected to test at least 20 samples per year from the AMS for free of cost. However, cost of shipping the samples to ALRL should be borne by AMS referring the samples.

3. To provide results of laboratory test (isolation and molecular test) within seven days for molecular test and 14 working days for virus isolation.
4. To respect intellectual property rights on samples received and keep all information on cases handled as confidential except to the relevant senders and share information only upon consent from the senders.
5. To provide an annual report summarising the activities of the ALRL.
6. To report the activities of the reference laboratory to the ASEAN laboratory Directors Forum, ASWGL, ASEAN Coordinating Centre for Animal Health and Zoonoses (ACCAHZ) and regional and sub-regional GFTADs forums.
7. The ALRL should seek commitment of their respective Government to fund the activities including support to other AMS.
8. The ALRL should seek technical and financial support from the international organisations and partners to support its programmes and activities.

IV. Procedures for establishment of ASEAN LSD Reference Laboratory

In line with the agreed ASEAN procedures to recognize as ASEAN Reference Laboratories:

- Any ASEAN Member States (AMS) may propose the establishment of an ASEAN LSD Reference Laboratory from any suitable government laboratory in their respective country.
- The proposal must be submitted to the ASWGL/ ACCAHZ for discussion and recommendation to SOM-AMAF approval.
- Based on the recommendation from SOM-AMAF, AMAF will approve the establishment of ASEAN Reference Laboratories.

Annex III: lists of available guidelines and resources to enhance prevention and control of LSD and other TADs

General tools and guidelines

1. WOAH LSD webpage - https://www.woah.org/en/disease/lumpy-skin-disease/
2. WOAH Asia-Pacific LSD webpage (https://rr-asia.woah.org/en/projects/lumpy-skin-disease-lsd/)
3. FAO LSD Manual for Field Veterinarian (https://openknowledge.fao.org/items/ec5cdedd-5c8c-4026-ab26-52c42b925d13)
4. WOAH Standards – Chapter 11.9. Infection with Lumpy skin disease virus of the WOAH Terrestrial Animal Health Code, Chapter 3.4.12. Lumpy skin disease of the WOAH Terrestrial Animal Health Manual.
5. EFSA LSD resources and summary page

   https://www.efsa.europa.eu/en/topics/topic/lumpy-skin-disease
6. LSD information – The Centre for Food Security and Public Health, Iowa State University

   https://www.cfsph.iastate.edu/diseaseinfo/disease/?disease=lumpy-skin-disease&lang=en
7. GFTADs Standing Group of Experts on LSD in South-East Europe

   https://rr-europe.woah.org/en/Projects/gf-tads-europe/2-standing-groups-of-experts-on-lumpy-skin-disease-in-south-east-europe/
8. Merck Veterinary Manual – LSD in cattle

   https://www.merckvetmanual.com/integumentary-system/pox-diseases/lumpy-skin-disease-in-cattle?autoredirectid=14252

Risk Assessment

9. Import Risk analysis - Chapter 2.1. of the WOAH Terrestrial Animal Health Code Biosecurity

Farm Biosecurity

10. Zoning and Compartmentalisation - Chapter 4.4. of the WOAH Terrestrial Animal Health Code

Outbreak investigation

11. WOAH Field Manual for Animal Disease Outbreak Investigation and Management (https://rr-asia.woah.org/en/projects/foot-and-mouth-disease-fmd/seacfmd-campaign/seacfmd-manual/

Surveillance

12. Animal health surveillance - Chapter 1.4. of the WOAH Terrestrial Animal Health Code.
13. Infection with African swine fever virus - Chapter 11.9. of the WOAH Terrestrial Animal Health

Vaccination

14. Manual of Diagnostic Tests and Vaccines for Terrestrial Animals - https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-manual-online-access/
15. Veterinary Vaccines - Section 2.3 of the Manual of Diagnostic Tests and Vaccines for Terrestrial

Animals.

16. Lumpy skin disease – Chapter 3.4.12C: Requirement for LSD vaccines under Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.

Emergency Preparedness Response

17. WOAH Manual for Emergency Preparedness and Response Planning (https://rr-asia.woah.org/en/projects/foot-and-mouth-disease-fmd/seacfmd-campaign/seacfmd-manual/)

Laboratory and field diagnosis

18. Diagnosis of Lumpy skin disease virus – Chapter 3.4.12B. of the WOAH Manual of Diagnostic Tests and Vaccines for the Terrestrial Animals.

19. WOAH LSD Reference Laboratories (https://www.woah.org/en/what-we-offer/expertise-network/reference-laboratories/)

Sl. No.	Name of Expert	Name of Laboratory	Contact details
1	Dr Nick De Regge (Belgium)	Sciensano	+32 23790514 nick.deregge@sciensano.be
2	Dr Antoinette Van Schalkwyk (South Africa)	Onderstepoort Veterinary Institute, Agricultural Research Council, Private Bag X05, Onderstepoort 0110	+27125299108 vanschalkwykA1@arc.agric.za
3	Dr Georgina Limon-Vega (United Kingdom)	Pirbright, Ash Road, Woking, Surrey GU24 0NF	+44-1483 23.24.41 georgina.limon-vega@pirbright.ac.uk

Communications and awareness materials

20. WOAH Communication material for local veterinarians and animal health workers

    Poster – Lumpy skin disease: a threat to the region

    Leaflet – Lumpy skin disease: a threat to the region

21. WOAH Communication material for Cattle owners, dairy farmers and dairy animal traders.

    Poster – Protecting your animals from Lumpy skin disease

22. WOAH Frequently Asked Questions (FAQ) on LSD for the public and veterinary services.

    FAQ on LSD (14 Jun 2022)

    FAQ on LSD Vaccination (3 Sep 2021)

23. FAO Bluetongue and LSD - Awareness video

    FAO Bluetongue and Lumpy skin disease – awareness and prevention video

Annex IV: Priority actions for the implementation of **ASEAN LSD Prevention and Control Strategy**

Results	Priority Actions
Goal: To achieve regional control of LSD that will result in reducing the adverse impact of the disease and achieving freedom by progressively eliminating the disease from ASEAN region	
Outcome: 1: Strengthened capacity for prevention and control LSD and other TADs	
Output 1.1: Fit for purpose LSD integrated surveillance system established	• Propose inclusion of LSD in priority disease for reporting for AMS • Immediately notify LSD outbreaks via WAHIS system • Share LSD outbreak information to the neighbouring countries and trading partners
Output 1.2: Strengthened laboratory diagnostic system	• Designate ASEAN LSD Reference Laboratories (AARL) with endorsed TORs. • AMS to participate in proficiency testing programme with WOAH Reference Laboratory • Develop capacity of laboratories in AMS to diagnose LSD with molecular diagnostic techniques
Output 1.3: Improved animal movement control, quarantine and biosecurity	• Conduct studies to understand animal movement dynamics, value chains and risk pathways of TADs spread
Output 1.4: Enhanced LSD vaccination and access to quality vaccines	• Conduct advocacy and communication on LSD vaccination
Output 1.5: Capacity building programmes strengthened	• Interested AMS to propose WOAH to conduct PVS evaluation and other evaluations • Encourage countries with historical freedom status to apply for self declaration
Outcome 2: Improved ownership ad enabling environment at national level	
Output 2.1: Country ownership of the LSD and other TADs control enhanced	• AMS to develop National LSD Control Plan • Align National LSD Control Plan with ALPCS

Results	Priority Actions
Output 2.2: National legal and regulatory framework is enhanced	• Bench mark available policies and legislations related to prevention and control of LSD and other TADs
Output 2.3: Cost efficient synergies with other livestock production/ animal health and TADs control activities developed	• Identify and implement activities that are in synergy with other priority TADs and bovine diseases (FMD, livestock production and other TADs activities)
Output 2.4: Enhanced communication, advocacy and stakeholder engagement	• Adapt and translate available communication materials for their use by AMS • Develop communication materials (if not available) and communication plan by AMS
Outcome 3: Improved effectiveness and sustainability of LSD and other TADs control through multisectoral and multi-disciplinary partnership	
Output 3.1: Engagement and partnership with relevant key stakeholders, including private sector strengthened	• Conduct stakeholder mapping at national and regional level
Output 3.2: Multidisciplinary collaboration and coordination for the prevention and control of LSD and emerging TADs strengthened	• Promote multisectoral and interdisciplinary partnerships through regular meetings and workshops to enhance LSD and other TADs prevention and control at the national and regional level • Reinforce communication activities to sensitize all the key stakeholders on LSD prevention and control • Initiate and conduct collaborative research /studies to enhance understanding of disease
Output 3.3: Sustainable funding mechanism promoted	• Prepare policy briefs highlighting the impact of LSD and benefit of its control to the country's economy and livelihood of stakeholders. • Organize advocacy activities for the Policy Makers, high-level decision makers and Partners to allocate resources for LSD prevention and control

Annex V: Monitoring and evaluation framework for the ASEAN LSD Prevention and Control Strategy

Results	Success Indicators	Baseline	Targets		Means of Verification	Assumptions and Risks
		2024	2027	2030		
Goal: To achieve regional control of LSD that will result in reducing the adverse impact of the disease and achieving freedom by progressively eliminating the disease from ASEAN region	**These indicators serve to monitor the LSD situation** 1. Number of AMS declared LSD free through self declaration (applying WOAH guidelines) 2. Number of new LSD outbreaks within affected AMS	Two countries are historically free from LSD Baseline to be obtained from WAHIAD			Annual report of the ASEAN LSD Prevention and Control Strategy (ALPCS) WOAH webpage on Members with self-declaration for LSD WAHIS Obtain information from National LSD Focal Person	Countries demonstrate political and policy commitment to LSD prevention and control, and transparency in disease notification. Sufficient financial and human resources support from national budgets, Partners and donors Risks (political instability, delay in policy implementation)
Outcome: 1: Strengthened capacity for prevention and control LSD and other TADs	1 A. Number of LSD outbreaks successfully controlled within an epidemiological unit 1.B. Percentage of reported outbreaks with full investigation including confirmation with molecular diagnosis	Baseline to be obtained through survey of AMS and Key Informant Interviews (KII) - National LSD Focal Points			ALPCS Annual Reports Outbreak investigation reports Questionnaire survey	Members willing to adopt new tools The right people are being trained, knowledge retained by trained participants Funds are available on time to support implementation of LSD

Results	Success Indicators	Baseline	Targets		Means of Verification	Assumptions and Risks
		2024	2027	2030		
						vaccination, laboratory diagnostics and surveillance activities AARL fully functional in line with endorsed TOR
Output 1.1: Fit for purpose LSD integrated surveillance system established	1.1.1: Average time for immediate notification of LSD, follow up reports, six-monthly and annual reports of disease situation by AMS (WAHIS)	Baseline to be obtained from WAHIAD Baseline to be obtained through surveys	x	x	WAHIS Reports	
Output 1.2: Strengthened laboratory diagnostic system	1.2.1: Designate ASEAN LSD Reference Laboratories (AARL) with endorsed TORs. 1.2.2: Number of laboratories in ASEAN region that participated in LSD proficiency testing with International Reference Laboratories	AARL not designated Six laboratories from four AMS participating in LSD PT programme with WOAH Ref lab at Belgium Survey results for national lab activities			Designated AARL with endorsed TOR Proficiency test results AARL reports NAHL reports Partners reports	AARL, NAHL and partners allocate resources to strengthen surveillance including early detection and laboratory diagnosis AMS engaged in bilateral and multilateral agreement with neighbouring countries and Partners to improve trade. Sufficient human and financial resources allocated by AMS and resource partners Key partners, such as WOAH, FAO and donors,
Output 1.3: Improved animal movement control, quarantine and biosecurity	1.3.1: Number of agreements signed between the countries to facilitate livestock trade and legal movement of livestock	Number of agreements signed as of 2024			Agreement signed between countries Study Report	

Results	Success Indicators	Baseline	Targets		Means of Verification	Assumptions and Risks
		2024	2027	2030		
	2.3.2: Number of AMS conducted /participated in studies to understand animal movement dynamics, value chains and risk pathways of TADs spread,	Baseline to be obtained through surveys				continue collaborations with the ASEAN and AMS to enhance LSD control
Output 1.4: Enhanced LSD vaccination and access to quality vaccines	1.4.1: Number of countries that achieved expected vaccination coverage in targeted area(s) 1.4.2 Number of countries with LSD controlled situation prohibiting vaccination to prepare for self declaration	Baseline to be obtained from LSD vaccination survey conducted in 2023			LSD vaccination report of AMS	
Output 1.5: Capacity building programmes strengthened	1.5.1: Number of regional training activities conducted by WOAH, FAO and other Partners on LSD prevention and control 1.5.2: Number of in-country training activities conducted on LSD prevention and control by AMS 1.5.3: Number of countries benefiting from the trainings and other capacity building programmes	To ask during consultation with Partners or through surveys Baseline to be obtained through and surveys and KII - National LSD Focal P			Training reports from partners Training reports from AMS Reports	

Results	Success Indicators	Baseline	Targets		Means of Verification	Assumptions and Risks
		2024	2027	2030		
Outcome 2: Improved ownership ad enabling environment at national level	2. Number of countries with 1) LSD prevention and control plan endorsed by the relevant Ministry 2) with fund commitment	Baseline to be established through surveys, KII, focused group discussions (FGD) with the AMS and Partners			Country level endorsed LSD Prevention and Control Plan ALPCS Annual report	Sufficient human and financial resources allocated by AMS and resource partners AMS and their veterinary services committed to develop and implement a risk-based LSD prevention and control plan AMS continue to show political and policy commitment to LSD and TADs control to promote safe trade AMS willingness and interest to revise legislations and policies Donors and AMS to interest to support TADs control AMS have access to available communication tools and materials with fund
Output 2.1: Country ownership of the LSD and other TADs control enhanced	2.1.1 Number of AMS that developed National LSD Control Plan and aligned with ALPCS	0	1	1	Country level LSD Prevention and Control Plan	
Output 2.2: National legal and regulatory framework is enhanced	2.2.1: Number of countries that have adopted policies and legislations on LSD.				New and revised Legislations	
Output 2.3: Cost efficient synergies with other livestock production/ animal health and TADs control activities developed	2.3.1: Percentage of 1) identified and 2) implemented activities that are in synergy with (LSD, livestock production and other TADs activities				Activity reports	

Results	Success Indicators	Baseline	Targets		Means of Verification	Assumptions and Risks
		2024	2027	2030		
Output 2.4: Enhanced communication, advocacy and stakeholder engagement	2.4.1: Number of countries that have available communication materials and plan for control of TADs including LSD 2.4 2. Percentage of planned communication activities implemented at country level to improve stakeholder awareness and engagement				Communication materials Activity reports	and capacity to disseminate it to the targeted stakeholders
Outcome 3: Improved effectiveness and sustainability of LSD and other TADs control through multisectoral and multi-disciplinary partnership	3. Percentage of targeted stakeholders engaged in LSD prevention and control	Baseline to be established through surveys, KII, focused group discussions (FGD) with the AMS and Partners			ALPCS Annual report Activity reports Survey reports Analysis of stakeholder data annually	Technical partners, Private sector value chain actors and countries continue to commit to LSD and TADs control including willingness to establish or participate in inter-sectoral and interdisciplinary task forces Target countries continue to show political and policy commitment to LSD and other TADs control to promote safe trade
Output 3.1: Engagement and partnership with relevant key stakeholders, including private sector strengthened	3.1.1 Number of AMS that have performed stakeholder mapping 3.1.2: Number of meetings/ events supported by FAO and/or WOAH (and other Partners) to enhance LSD and other TADs control				Activity reports Stakeholder mapping report	

Results	Success Indicators	Baseline	Targets		Means of Verification	Assumptions and Risks
		2024	2027	2030		
	3.1.3: Number of LSD activities/partnerships co-organized with the public and private sectors at national level.					Donor and AMS interest in LSD and TADs control is sustained Key partners, such as WOAH, FAO and donors, continue collaborations with the ASEAN and AMS to enhance LSD control Funds are available on time to support implementation of ALPCS
Output 3.2: Multidisciplinary collaboration and coordination for the prevention and control of LSD and emerging TADs strengthened	3.2.1: Average number of 1) disciplines/sectors and 2)technical resource persons involved in LSD prevention and control at country level 3.2.2: Number of collaborative research /studies conducted to enhance understanding of disease	Baseline will be obtained from the AMS/ Partners through questionnaire surveys and Key Informant interviews (KII)			Survey reports Joint research, studies and publications	
Output 3.3: Sustainable funding mechanism promoted	3.3.1: Number of countries reported having secured budget for LSD control for a defined period of time (to be determined if annual or more) and for how long they have visibility	Baseline to be obtained through questionnaire surveys or KII of the AMS and Partners			Survey report	