# Report on the
# Review of Namibia's Foot-and-mouth Disease Status

United States Department of Agriculture
Animal and Plant Health Inspection Service
Veterinary Services

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# Executive Summary

The United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) has conducted a review of Namibia for foot-and-mouth disease (FMD). APHIS currently considers Namibia (excluding the region north of the Veterinary Cordon Fence (VCF)) -hereafter Namibian export region (NER)- to be free of FMD. The last outbreak of FMD in the NER occurred in 1964 and eradication was achieved in 1965. The NER has been recognized as free of FMD by the World Organisation for Animal Health (WOAH) and several other countries and entities including the United States. The United States has recognized the NER as FMD-free in 2006. Namibia began to export small quantities of beef from the NER to the United States in 2020.

The objective of this review is to determine whether conditions in Namibia justify maintaining the FMD free status of the NER. To conduct this review, APHIS has collected and analyzed information relevant to the factors used to conduct evaluations to establish initial animal health status. All information was collected from records of Namibia's Directorate of Veterinary Services (DVS) and from disease reports available at the WOAH website. APHIS decided that a document review is sufficient for reviewing Namibia's animal health status; therefore, a site visit to Namibia was not conducted.

APHIS concluded that the likelihood that FMD is present in the NER is negligible, and that sufficient import measures exist to mitigate its entry into the region. Review of the veterinary infrastructure information provided by Namibia demonstrated an adequate infrastructure for rapid detection of foreign animal diseases, disease surveillance, control and eradication, and export certification programs. In addition, Namibia has demonstrated a history of prompt reporting of disease events, and if FMD were to be detected in the NER, Namibia would take appropriate measures to halt their exports to the United States.

Therefore, APHIS has concluded that the information provided by Namibia supports the continuation of the APHIS-granted FMD free status of the NER and related import requirements. The free status should be maintained until the next APHIS review or until a change in Namibia's animal health status is reported.

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# Acronyms

| | |
|---|---|
| AHT | Animal health technician |
| AI | Agricultural inspector |
| APHIS | Animal and Plant Health Inspection Service |
| BCP | Border control post |
| BVI | Botswana Vaccine Institute |
| CAHT | Chief animal health technician |
| CBPP | Contagious bovine pleuropneumonia |
| CFR | U.S. Code of Federal Regulations |
| CV | Chief veterinarian |
| CVL | Central Veterinary Laboratory |
| CVO | Chief veterinary officer |
| DMA | Disease management area |
| DVS | Directorate of Veterinary Services |
| ELISA | Enzyme-linked immunosorbent assay |
| EU | European Union |
| FMD | Foot-and-mouth disease |
| FMDV | Foot-and-mouth disease virus |
| MAWF | Ministry of Agriculture, Water and Forestry |
| NCA | Northern communal area |
| NFEC | National FMD Emergency Committee |
| NER | Namibian export region |
| NSP ELISA | Non-structural proteins ELISA |
| WOAH | World Organisation for Animal Health |
| OV | Official veterinarian |
| OVI | Onderstepoort Veterinary Institute |
| PCR | Polymerase chain reaction test |
| PPR | Pest de Petits Ruminants |
| PVM | Post vaccination sero-monitoring |
| PVS Tool | WOAH Tool for the Evaluation of Performance of Veterinary Services |

| | |
|---|---|
| RFEC | Regional FMD Emergency Committee |
| RFID | Radio Frequency Identification Device |
| RSA | Republic of South Africa |
| RT-PCR | Real-time polymerase chain reaction Test |
| SV | State veterinarian |
| SVO | State Veterinary Office |
| TAHC | WOAH's Terrestrial Animal Health Code |
| VCF | Veterinary cordon fence |
| VHC | Veterinary health certificate |

# Report on the Review of Namibia's Foot-and-mouth Disease Status

# Introduction

Consistent with regulations in title 9 of the *Code of Federal Regulations* (9 CFR 92) [1], the Animal and Plant Health Inspection Service (APHIS) has conducted a review of Namibia's animal health status for foot-and-mouth disease (FMD)[1]. A status review is an assessment of the animal health conditions in a foreign region that currently has one or more animal health statuses recognized by APHIS. These reviews are conducted periodically to determine whether the conditions in the region support the continuation of APHIS' recognition of the region's animal health status. The number of reviews conducted each year will vary depending on availability of resources such as travel funds, emerging issues, and other competing priorities. A site visit was performed with the initial evaluation. APHIS conducts a document review to analyze information obtained for a status review. A site visit is not necessary unless there is a need to evaluate deficiencies or concerns. as More details of APHIS' review program are available on its website at: APHIS Animal Health Status Review [2].

APHIS currently recognizes the region south of the Veterinary Cordon Fence (VCF) in Namibia as free of FMD -hereafter Namibian export Region (NER). APHIS conducted this review to determine whether conditions in Namibia justify maintaining the status of the NER. APHIS has collected and analyzed information relevant to the factors used to conduct evaluations to establish initial animal health statuses as described in 9 CFR Section 92.2 [3]. All information for this review was collected from records of the Directorate of Veterinary Services (DVS) and from disease reports available at the World Organisation for Animal Health (WOAH) website [4-8]. APHIS gathered sufficient information to conduct a document review and evaluate the FMD status of the NER in Namibia.

This review report presents a comprehensive overview of Namibia's veterinary infrastructure, livestock demographics, livestock movement controls and marketing patterns, surveillance programs, disease control capabilities, veterinary laboratory diagnostic capabilities, identification and traceability systems, import and export requirements, and emergency response systems for FMD. APHIS aimed to determine the following: 1) FMD is not present in the NER; 2) FMD is unlikely to be introduced into the NER and ultimately infect or contaminate the commodity being exported to the United States because of measures taken by DVS and/or epidemiological barriers; and 3) if a FMD incursion occurs in the NER, it will be rapidly detected and eradicated, and exports to the United States will be promptly stopped. In addition, APHIS evaluated Namibia's ability to control export procedures and to certify its exports in accordance with APHIS import requirements. These elements will be addressed in the following sections followed by APHIS' conclusions and recommendations regarding the status of the NER.

# 1. Veterinary authority and infrastructure

## 1.1 Legal authority

The main animal health authority for implementing and enforcing all animal health, veterinary public health, and welfare policies and regulations in Namibia reside with DVS. The main laws providing DVS

[1] Lists of APHIS-recognized animal health statuses of regions regarding specific animal diseases or pests, or acceptable commodities are available at: APHIS Animal Health Status of Regions.

with authority for conducting animal health activities is the Animal Health Act No. 1 of 2011 (the Act) and its two associated regulations: the Animal Identification Regulations of November 2017 and the Animal Health Regulations of December 2018. The Act and regulations specify the main tasks and responsibilities of DVS and provides the legal powers of inspection and enforcement, including the power to impose administrative penalties, lay down rules for import, export, and border security, enforce movement controls, specify the requirements for herd registration and animal identification, and describe general disease control and eradication measures. The Act also stipulates the obligations of veterinary officials, private veterinarians, and animal keepers to report animal infectious diseases. In addition, the Act prohibits the feeding of kitchen and plate waste to pigs [4, 5].

The Meat Safety Act lays the rules for the registration of slaughter plants, hygienic slaughter of livestock, ante- and post-mortem meat inspection, processing of meat, and import and export of meat. Additional Acts are the Undesirable Residue in Meat Act which provides authority to control of harmful residues in meat and prohibit feeding of animal protein products and the Stock Brands Act which provides the mandate for animal identification. DVS issues various Circulars detailing rules and procedures for specific aspects of its official animal health programs [4, 5].

## 1.2 Organizational structure and functions

The DVS resides within the Department of Agricultural Development, which is part of the Ministry of Agriculture, Water and Forestry (MAWF). The DVS maintains its presence at national, regional, and local levels through a decentralized network of veterinary infrastructure managed centrally by the Chief Veterinary Officer (CVO) who is responsible for administering all animal health policies and activities and is currently assisted by five Deputy CVOs. As shown in Figure 1, the DVS is divided into four divisions, namely: Animal Disease Control; Veterinary Public Health; Epidemiology, Import and Export Control, Traceability, Medicine Control and Advisory Services (Epidemiology Division); and Diagnostic Services and Research [4-6].

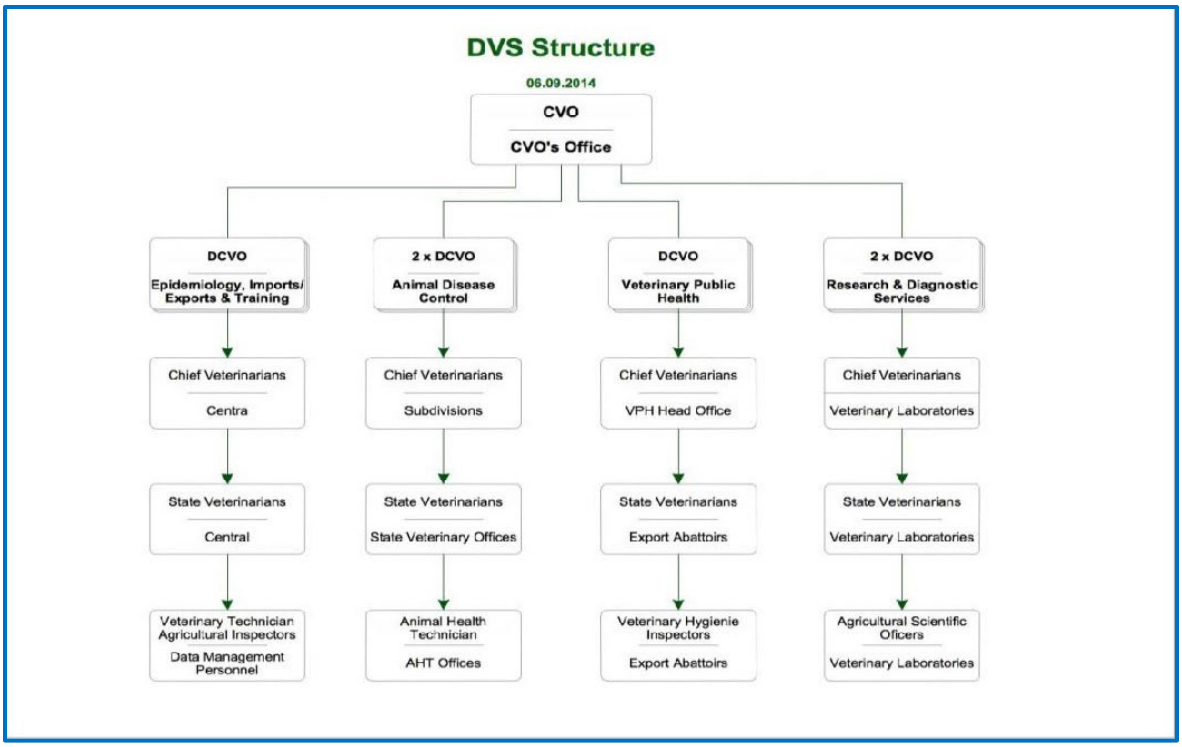


**Figure 1: DVS organizational structure**

### 1.2.1 Animal Disease Control Division

The Animal Disease Control Division is the largest Division within DVS and is divided into North and South divisions each of which is headed by a Deputy CVO. The North and South divisions are subdivided into Central, South, North-east, North-west subdivisions to cover the whole country, each subdivision is headed by a chief veterinarian (CV). Each subdivision is divided further into Sections called State Veterinary Offices (SVOs) which are equivalent to local field offices with authority over animal health programs in a veterinary district. Each SVO is managed by a state veterinarian (SV) who could be assisted by an official veterinarian (OV), a chief animal health technician (CAHT), or one or more animal health technicians (AHTs), and other administrative personnel—all of whom are DVS employees. Under the SVOs, there are 77 subsection offices called Animal Health Technician Offices, quarantine farms, and internal checkpoints. As shown in Figure 2, there are 24 SVOs in Namibia, strategically located in major cities or other geographic locations as determined by DVS [4-6].

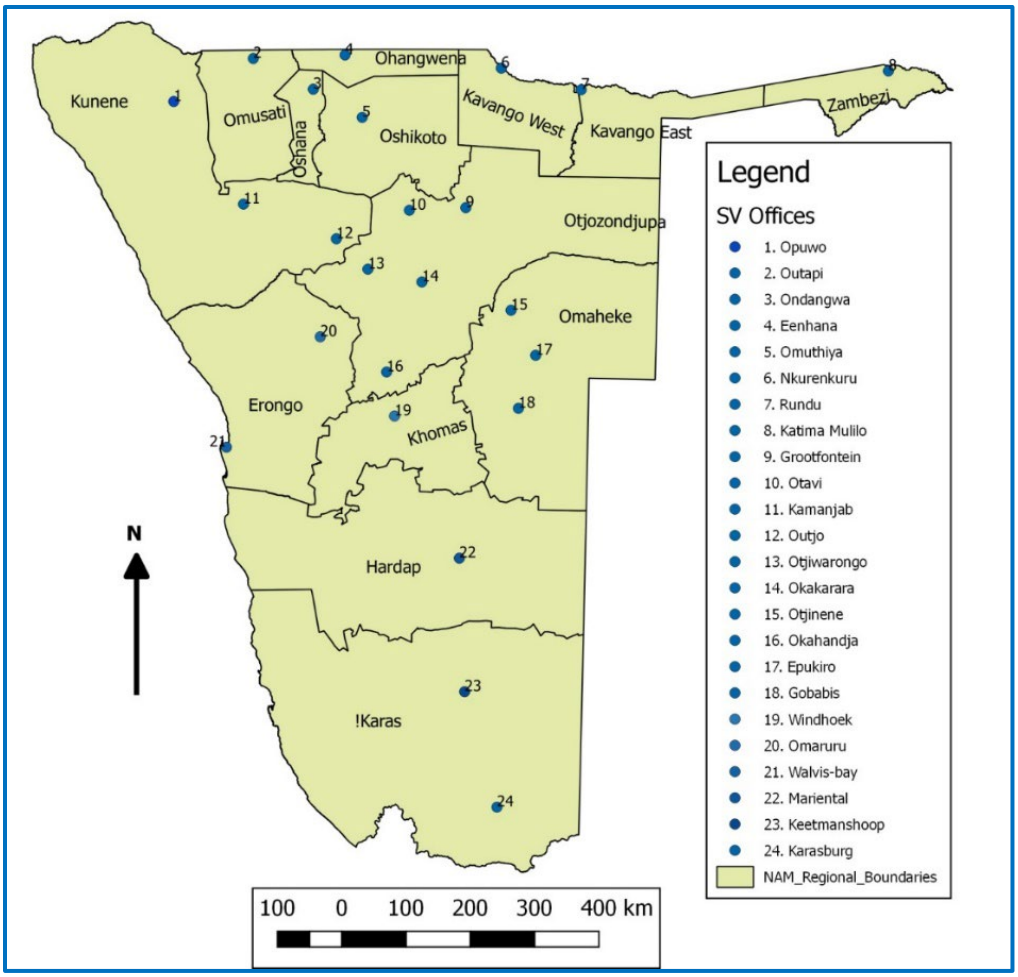


**Figure 2: State Veterinary Offices in Namibia**

The functions of the Animal Disease Control Division are summarized as follow [4, 5]:

- Plan and implement monitoring, surveillance, and control and eradication programs for diseases of economic and public health significance such as FMD, Contagious Bovine Pleuropneumonia (CBPP), Anthrax, and Rabies.
- Safeguard against the introduction and/or spread of animal diseases and pests through implementation of movement controls.
- Draft, review, and enforce animal health legislations.
- Inspection and approval of export establishments.
- Provide clinical, surgical, and extension services to small farmers.

### 1.2.2 Epidemiology Division

The Epidemiology Division is responsible for all operations dealing with veterinary epidemiology, import and export control, medicines control, livestock identification and traceability as well as continuous

professional development and advisory services. The functions of the Epidemiology Division are summarized as follows [4, 5]:

- Collation, processing, and analysis of animal health data and dissemination of animal health and disease reports and other data at local, regional, and international levels.
- Development and management of computer-based data management and reporting system. This includes developing and day-to-day management of the Namibia Livestock Identification and Traceability System (NamLITS) database.
- Assistance in development of animal disease surveillance and control strategies, risk analysis and implementation plans.
- Safeguard the national animal health status through ensuring that animals and animal products imported into the country meet import permit requirements; developing and negotiating import requirements/protocols; and ensuring that export certification meet the requirements of trading partners.
- Development and implementation of inspection and biosecurity procedures at border control points (BCPs) located at Namibia's land borders, harbors, and international airports.
- Development of training materials, and delivery of continuous education in epidemiology to DVS staff at various levels.

### 1.2.3 Veterinary Public Health Division

The Veterinary Public Health Division is headed by a Deputy CVO and is responsible for public health safety at slaughter establishments. The division maintains permanent presence at all export slaughter and processing establishments and is responsible for ensuring that export establishments meet the import requirements of trading partners. In this regard the division is tasked with the following functions [4, 5]:

- Interpreting, advising, and ensuring compliance with international legislation, protocols, and trade agreements.
- Inspecting, evaluating, and recommending approval of establishments for export.
- Guiding export establishments on implementation of minimum standards for infrastructure specifications, procedures, and quality and monitoring compliance with such standards.
- Export certification of animal products consignments from export establishments.

### 1.2.4 Veterinary Diagnostics and Research Division

The Veterinary Diagnostics and Research Division consists of three subdivisions namely: Food Science, Diagnostic Services, and Biotechnology under which are the Toxicology and Residue Analysis; Food Hygiene; Clinical Microbiology; Serology; Pathology; Food Safety; and Animal Health sections/laboratories are located. There is a functional molecular diagnostic laboratory equipped with real-time polymerase chain reaction (RT-PCR) testing facilities for microbiological diagnosis as well as for the detection of ruminant derived protein in animal feeds. The Central Veterinary Laboratory (CVL) in Windhoek is the official national veterinary laboratory which conducts testing for animal diseases, micro-organisms, and chemical residues. The CVL has two regional branches, namely, Ondangwa veterinary laboratory and Grootfontein veterinary laboratory [4, 5].

### 1.2.5 Human and financial resources

In 2014, a new and expanded staffing structure was approved to gradually increase the number of OVs and other personnel to a total of 1173 DVS employees. The new structure is part of the strategy to for achieving FMD and CBPP freedom in the Northern Communal Area (NCA) in areas north of the VCF, and to protect the NER from incursion of any other trans-boundary animal diseases. Since then, DVS has steadily hired new personnel to meet that target. As of July 2021, DVS had 738 total employees which include 79 SVs and OVs, 211 AHTs, 33 veterinary technicians, and 116 veterinary hygiene inspectors who work at slaughter establishments. In addition, DVS' new structure plan included the hiring of 84 agricultural inspector (AI) positions at the BCPs to enhance border security and ensure that imported and exported commodities meet all applicable requirements. As of July 2021, DVS reported hiring only 7 AIs, however, efforts to fill additional positions are ongoing [4-6].

There are 99 private veterinarians who are registered with the Namibian Veterinary Council which sets the veterinary profession standards. Private veterinarians may be accredited by DVS to perform specific official animal health activities such as collecting surveillance samples, conduct inspections, seal vehicles, etc. as deemed appropriate by the SV. To be accredited, a private veterinarian must apply for approval which can only be granted by the CVO. Approvals are valid for 24 months and a service contract must be signed between the private veterinarian and the SV who supervises and evaluates their performance of official duties. Accredited veterinarian cannot sign export health certificates (except for animals exported to the Republic of South Africa (RSA)) or certify animals moving to export slaughter establishments. The number of accredited veterinarians in any given year varies depending on DVS' needs. For example, in 2020 there were five accredited veterinarians while in May 2022, DVS reported that there are no accredited veterinarians contracted to perform official duties [4-7].

Additionally, DVS recruits community animal health workers in the NCA on a 12-month contract (subject to renewal) who are compensated in accordance with national policies for the temporary employees. Their responsibilities are to report suspect cases of FMD and other notifiable disease such as rabies and CBPP. Currently, there are 10 community animal health workers per region in the NCA (80 in total) [7].

The annual budget for DVS has been steady for the past few years totaling NAD 300 million (approximately $21.5 million). Around NAD 190 million is spent on operational line items such as salaries and NAD 110 million are used for purchasing goods and services, and capital acquisitions such as construction of new slaughter facilities and cold storages in the NCA [4-6].

### 1.2.6 Training

All official and private veterinarians must be graduates of an accredited college of veterinary medicine. The School of Veterinary Medicine at the University of Namibia is the only veterinary school in the country. Many veterinarians are graduates of foreign veterinary schools particularly schools in South Africa and Zimbabwe. The Veterinary Association of Namibia is the official veterinary professional organization in Namibia and most official and private veterinarians are members of this association. To be hired by DVS, AHTs must have a 3-year college degree [4, 5].

All newly recruited DVS staff members including OVs must undergo training on FMD legislations, surveillance, and response. All DVS' animal health officials must satisfy continuing education requirements on a regular basis. DVS officials provide training sessions to stakeholders and community members on how to recognize and report clinical signs of FMD and other important diseases. There is

strong commitment by local communities and the private sector in supporting FMD eradication program as demonstrated by strong involvement in program activities such as vaccination campaigns, education and outreach programs, and community meetings [4, 5].

# 2. Status of FMD in Namibia

## 2.1 FMD regions of Namibia

As shown in Figure 3, Namibia has three distinct zones for the purposes of FMD control and eradication which are physically separated from each other by stock- and game-proof fences. The three zones are [4]:

- The infected zone (shown in red in Figure 3) located in the northeastern part of the country and consists of the Zambezi region and part of the East Kavango region. This zone is endemic for FMD because of the presence of free-roaming African buffalo that are long-term carriers of the FMD virus (FMDV).
- The protection zone (shown in green in Figure 3) located north of the VCF and consists of the rest of Kavango East, Kavango West (except southwestern part), Ohangwena, Oshikoto (except southeastern part), Oshana, Omusati, and the northern part of Kunene regions. This area is in proximity to the infected zone and high-risk areas in neighboring countries.
- The NER (shown in white in Figure 3): located south of the VCF and comprises the commercial farming area of Namibia but also includes communal areas. In the northern part of the NER, there is an area of heightened surveillance (surveillance area) bordering the VCF considered to be part of the NER. This area has a width of at least two adjacent farms or a minimum of 10 kilometers (km).

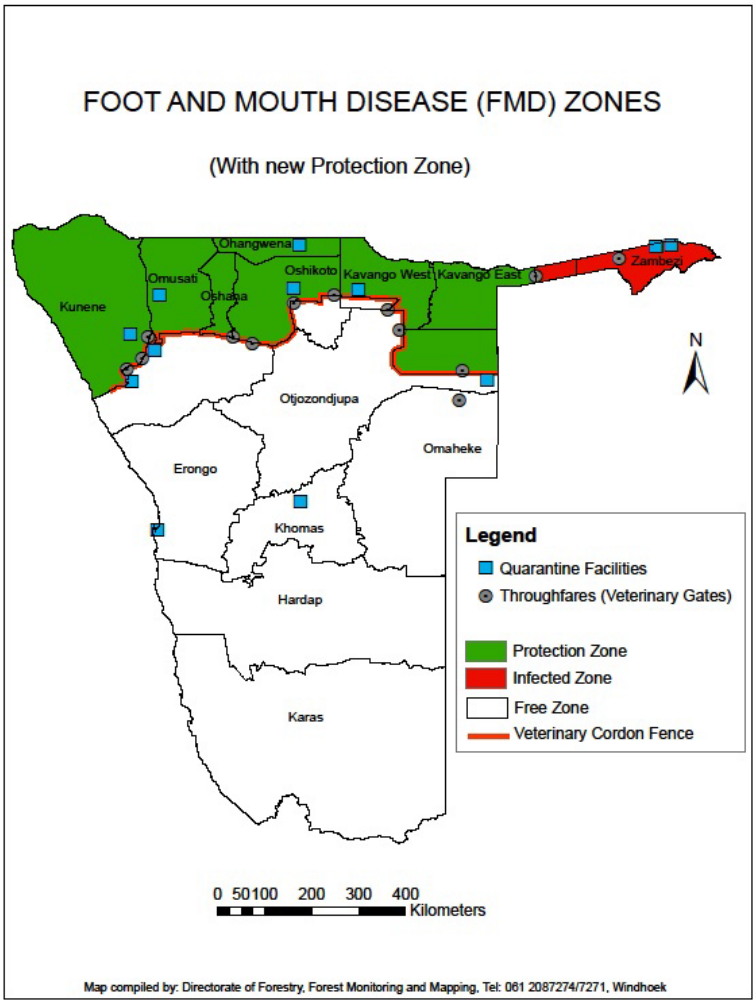


**Figure 3: FMD zones in Namibia**

## 2.2 Disease occurrence

The last outbreak in the NER occurred in 1964 in cattle, and the disease was declared eradicated from the NER in 1965. The WOAH has evaluated and endorsed Namibia's FMD official control program and currently lists the NER as an FMD free region where vaccination is not practiced [4-6].

Ten FMD outbreaks were confirmed in 2020 and early 2021 in the protection zone - in the regions of Kavango East, Kavango West, Ohangwena, and the parts of Oshikoto that falls in the protection zone. The first outbreak was confirmed on September 28, 2021, in the Kavango East region. DVS swiftly responded by implementing its FMD contingency which included the following actions [5, 6]:

- Zoning via implementation of a disease management area around each outbreak consisting of an infected area (the affected farm or village) and a 30-km surveillance zone around the infected area.
- Enforcement of a total ban on movement of all cloven-hoofed animals and all potentially infectious materials from and within the infected areas by halting issuance of movement permits

and setting up strategic road-blocks/checkpoints manned by DVS officials and the Namibian Police.

- Conduct of active surveillance and traceback investigations in the entire protection zone to determine the extent of the spread of the disease. At that time, initial surveillance established that the disease had not spread beyond the Kavango East region.
- Implementation of cleaning and disinfection of affected farms and vehicles traveling out from the disease management areas.
- Emergency vaccination using a trivalent purified FMD vaccine initially targeting 100% of cattle population in all crush-pen[2] areas/epidemiological units and villages located within 30 km radius around the village where the index case was detected.
- Implementation of awareness campaigns and stakeholders' engagements to enhance reporting of the disease.

By the beginning of October to end of November 2020, the disease was confirmed in additional epidemiological units within Kavango East and Kavango West regions. All outbreaks in both regions showed a consistent geographical pattern in that they were all located within 5 to 50 km from the Kavango River which is a shared border between Namibia and Angola [5, 6].

On December 28, 2020, an outbreak was detected in Ohangwena region where 4 cattle out of 36 cattle from one village farm tested positive for FMD. Following epidemiological and traceback investigations, it was established that a farmer brought his 36 cattle from Angola to plough his farm in Namibia. The outbreak was confirmed by CVL on January 1, 2021. On December 29, 2020, an outbreak was confirmed in Oshikoto region after a farmer reported cattle salivating and limping in his herd of 5 cattle. On January 6, 2021, veterinary officials detected 5 cases of FMD in two village farms with 60 cattle in Oshana region. For each outbreak in Kavango West, Ohangwena, Oshikoto, and Oshana regions, DVS implemented the same response measures as detailed above for the initial outbreak in Kavango East. DVS eventually expanded the vaccination campaign to include all cattle in the protection zone which lasted until June 2021. DVS reported attaining 85% vaccination coverage after two rounds of vaccination [5, 6].

In accordance with the FMD contingency plan, DVS opted not to depopulate the infected animals, instead, DVS conducted trace back investigations and enhanced surveillance. DVS declared the outbreaks resolved to the WOAH on April 20, 2021. Prior to that, the last detection of FMD in the protection zone occurred in May 2015. There was no spread of FMD into the NER [5, 6].

FMD outbreaks have occurred periodically in the infected zone due to presence of free-roaming African buffalo which are carriers of the FMDV. The two most recent outbreaks in the infected zone were confirmed in 2021. Prior to that, the last outbreak in the zone occurred in August 2019 [5, 6].

[2] A crush-pen is defined as a geographical area that encloses different herds belonging to different owners that usually share grazing and water resources. A crush-pen area can be made up by 1 to 3 villages or by an individual farmer who has a fenced-off farming area in a communal area. A crush-pen area is regarded as an epidemiological unit and each area has an animal handling facility that caters for handling livestock within that vicinity during mass vaccination campaigns, ear-tags and brand applications, livestock loading in vehicles and offloading, surveillance and all other activities. There are 2,644 crush-pens that are well distributed in the protection and infected zones which are covered by 213 DVS officials.

## 2.3 Wildlife

Wild African Buffalo (*Syncerus caffer*) has been shown to be the reservoir for infection of domestic animals with the FMDV in Namibia, and several recent outbreaks in the infected and protection zones have been attributed to their presence. There is a population of FMDV positive free-roaming African buffalo residing in the infected zone and a high percentage (70 to 80 %) of these animals over three years old carry FMDV in their pharynx. Young animals are typically infected after losing maternal immunity and they remain carriers of the FMDV for up to five years. Individual animals may be infected with multiple FMDV serotypes, however, transmission to cattle is an uncommon event and requires very close contact. Other wild cloven-hoofed animals (such as impala and kudu) may play an important role as an intermediate host between the African buffaloes and cloven hoofed domestic animals. There have not been records of FMD infection in wild animals during the 1964 outbreak in the NER and in the protection zone during recent outbreaks in 2020 and 2021 [4-6].

There are no free-roaming African buffalo in the NER or the protection zone. However, there are herds of African buffalo kept in the fenced National Park in the protection zone. There is also a herd of African buffalo in the Waterberg Plateau National Park in the NER which has historically tested negative for FMD. Buffalo from this national park are serologically tested every second year and whenever they are exported from the park to other countries such as RSA [4-6].

According to the Animal Health act, Act 1 of 2011, individuals and farmers are not allowed to keep African buffalo in the NER. In addition, African buffalo cannot be kept outside National Parks except in the infected zone where these animals are free-roaming. If a buffalo stray from any National Park into the NER or the protection zone, it must be immediately destroyed and disposed of by burning and burying. The area into which the buffalo strayed must be put under movement restrictions which can only be lifted if the destroyed animal tests negative for FMDV or no evidence of FMD transmission to susceptible animals is found after a series of FMD surveillance activities in the area [5].

# 3. Vaccination

Vaccination against FMD does not occur in the NER. In fact, vaccination was prohibited following eradication of the disease in 1965 [4].

In accordance with the Animal Health Act 1 of 2011, compulsory FMD vaccination of all cattle is carried out in the infected zone and in certain high risk areas of the protection zone adjacent to the infected zone and Namibia's border with Angola. Cattle in the infected zone are vaccinated three times per year due to the potential high risk of infection from free-roaming African buffalo, while cattle in high risk areas of the protection zone are vaccinated twice per year. In addition, vaccination is carried out in the infected and protection zones to control and eradicate FMD outbreaks [5].

FMD vaccination campaigns are carried out by AHTs under the supervision of CAHTs who are in turn supervised by the SV. DVS officials are trained to conduct vaccination and access to equipment, vehicles, livestock handling facilities, and cold chain equipment to carry out the vaccination campaigns. Farmers must present their animals at certain vaccination points located strategically across each region. The vaccine used is a trivalent SAT 1, 2, and 3 vaccine purchased from the Botswana Vaccine Institute (BVI). All FMD vaccines must be registered by the Namibia Medicines Regulatory Council in accordance with the

Medicines and Related Substances Act No. 13 of 2003 as amended. All vaccines are under strict control by DVS and only official DVS staff are authorized to use and administer the vaccine during vaccination campaigns. DVS provides and administer the vaccine free of charge [4, 5].

DVS aims to achieve vaccination coverage above 80% during each vaccination campaign. In recent years, coverage rates were affected by lack of rainfall and severe drought conditions which resulted in high number of cattle dying or were simply too weak to make the trip to vaccination points. However, the conditions have since improved as evident by the high coverage rate (85%) achieved after the two rounds of mass vaccinations conducted to control recent outbreaks in 2020 and 2021 in the protection zone. Verification of vaccination is accomplished by means of scanning the animal's Radio Frequency Identification Devices (RFID) and automatically transferring the individual identification numbers into the NamLITS. For animals that do not have RFID, DVS staff record their ear tag numbers and manually enter the numbers into the NamLITS. Vaccinations must also be recorded in the farmers' stock cards (see section 6.3). DVS staff produce vaccination reports after each vaccination campaign which are sent to DVS' headquarters through the SV [4-6].

Post vaccination sero-monitoring (PVM) studies have been conducted in 2015 and 2017 in the infected zone to gauge the level of antibodies protection in the vaccinated cattle population. Serum samples were collected three to four months after booster vaccination and tested by Liquid Phase Blocking enzyme-linked immunosorbent assay (ELISA) for antibodies to FMDV serotypes SAT 1, SAT 2, and SAT 3 at the BVI. A titer of ≥ 1.6 Log10 is considered to provide adequate protective immunity in the vaccinated cattle. The results from the studies in the infected zone in 2015 and 2017 has shown an acceptable level of immunity against serotypes SAT1 and SAT2. However, results for serotype SAT 3 showed significant variation in protective antibody levels ranging from very low or inadequate in 2017 to very high in 2015, although possible natural infection is suspected to have confounded the 2015 results. DVS, in conjunction with BVI, planned a study to investigate the low antibodies level for serotype SAT 3. A separate PVM study is planned in the protection zone to gauge the response from the mass vaccination campaigns conducted to control the outbreaks in 2020 and 2021 [6].

In October 2021, DVS started a longitudinal study in the infected region aimed at establishing the serological response of cattle to the FMD serotypes O, SAT 1, SAT 2, and SAT 3. Two groups of cattle 60 cattle per group are being sampled once every 30 days for this purpose. The results of the study were not available at the time of writing this report [7].

# 4. Separation from regions of higher risk

DVS maintains a network of stock- and game-proof fences to prevent the introduction of notifiable animal diseases (mainly FMD and CBPP). Some of the fences are internal while others run along sections of Namibia's international borders with Botswana and RSA. The VCF, which is the main fence separating the NER in the south from the protection zone in the north, runs some 1251 km from the Palmgrave Point in the west of Namibia to the Gam Area in the east. The VCF consists of a game-proof fence of 2.4 meters (approximately 8 feet) in height on the north side towards the protection zone, a dead space of 10 meters (approximately 32 feet), and a stock-proof fence of 1.4 meters (approximately 4.5 feet) in height on the south side towards the NER. In addition, the NER has been divided into game compartments by use of game-proof fences around National Wildlife Parks and certain other areas which

will be used to establish control zones of different disease status should an outbreak of FMD occurs in any one of these game compartments [4, 5].

Two fences separate the infected zone from the protection zone. The first is an electrified double fence (stock- and game-proof) and the second is a non-electrified game-proof fence. Stock- and game-proof fences have been constructed along international borders with Botswana and RSA except for parts bordering FMD free zones in Botswana and RSA that are recognized by the WOAH. Certain sections of the international border fences have been electrified to prevent damage caused by elephants in areas where they are prevalent such as close to Namibia's northeastern border with Botswana. To ensure the integrity of all disease control fences, dedicated teams continuously patrol to fix any holes or breaches and perform required maintenance. Several checkpoints exist along these fences which are manned by veterinary officials. Figure 4 shows the locations of the VCF, other stock and game proof fences, and the veterinary control gates [4, 5].

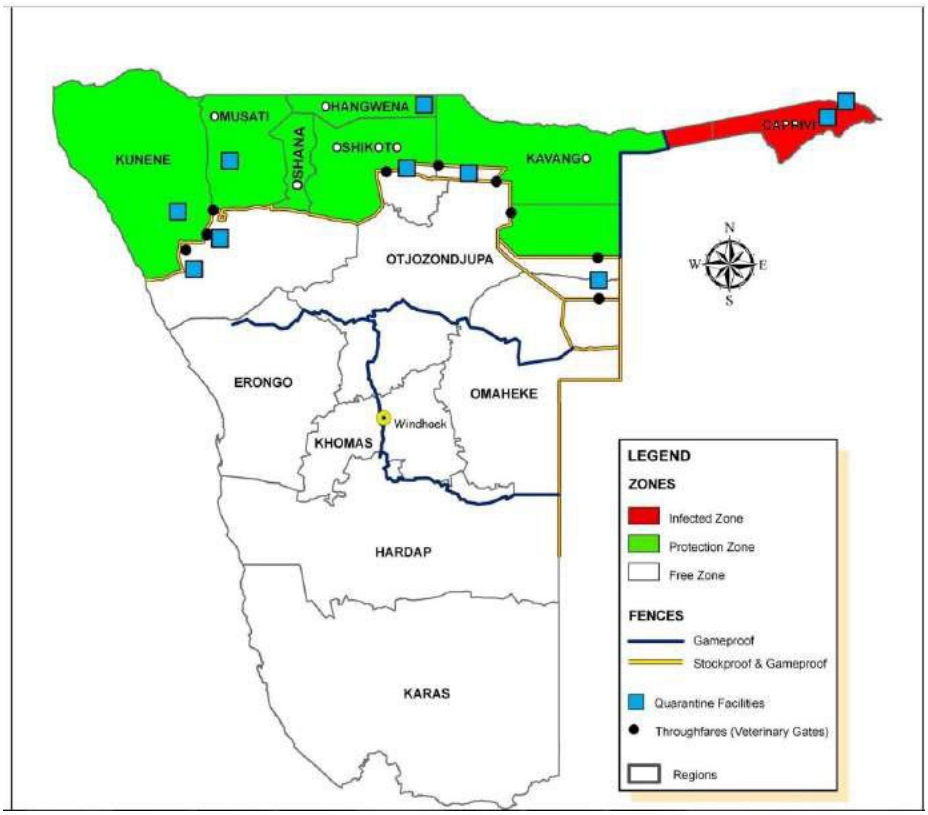


**Figure 4: Locations of the VCF, stock and game proof fences, and veterinary gates**

There are eleven veterinary gates along the VCF located on major roads and are the only through points for movement of people, vehicles, and goods between the NER and the protection zone. The checkpoints at these gates are monitored on a 24-hour basis by DVS' staff and police personnel who are authorized to inspect vehicles and personal luggage to prevent entry/smuggling of prohibited animals, meat and meat products, or other potentially infected materials (such as milk, manure, hides, skins, etc.) into the NER. In the event of outbreaks in the infected or protection zones, disinfection of vehicles at these veterinary checkpoints is carried out. There are two similar veterinary gates/checkpoints on the two fences that separate the infected and the protection zones to control movement of people and animal and animal

products between the two zones. Figure 5 shows the locations of the veterinary gates on the VCF and the fences between the infected and protection zones [5, 6].

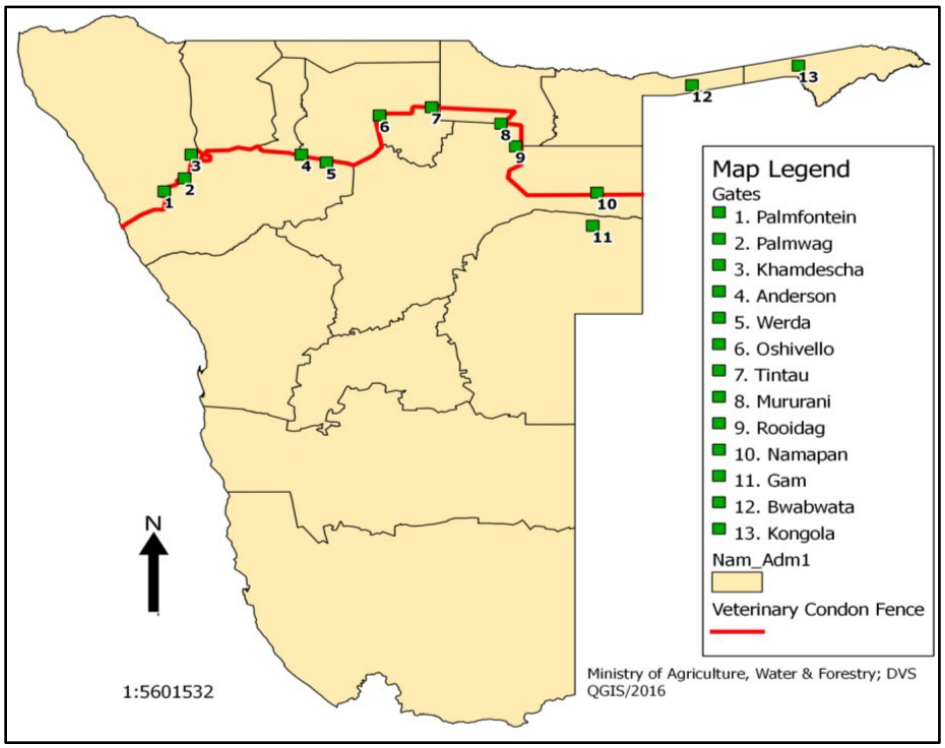


**Figure 5: Veterinary gates along the VCF and fences between infected and protection zones**

In 2013 and 2014, the DVS constructed new houses and offices for staffs at several of the veterinary gates on the VCF; there are now permanent staffs at these checkpoints. Similar construction projects are underway at other checkpoints [5].

# 5. Livestock demographics

According to information received from DVS, there are 10,242 cattle, sheep, goats, pigs, and game animals farms in the NER. Cattle are predominant in the northern part of the NER (north of Windhoek), while sheep and goat farms are more common in the southern part.

Most farms in the NER are considered commercial farms which are large privately owned commercial farms comprising approximately 10,000 to 50,000 acres and are uniformly fenced. About 70% of the commercial farms keep domestic livestock (cattle, sheep, goats, and pigs) while the remaining 30% keep mainly game animals with some farms keeping both cattle and game animals. Cattle from these farms are marketed at local slaughterhouses or auctions that are conducted at permanent facilities located mostly in larger cities and towns as well as in communal areas [5, 6].

Few areas of communal land exist within the commercial farming areas of the NER. Each communal area consists of several communal farms and is treated as one epidemiological units for the purposes of animal disease management and control because of lack of physical barriers and potential of commingling of animals. An additional category of farms are resettlement farms, which were commercial

farms in the past that were subdivided into several smaller plots of lands and were distributed to dozens of disadvantaged families to farm. Communal and resettlement farmers mainly keep domestic livestock. Table 1 presents the numbers of domestic animal farms and the number of animals kept on these farms in the NER [5, 6].

**Table 1: Number of farms and domestic animals in the NER**

| Type | Number of farms | Number of animals |
|---|---|---|
| **Cattle** | 4,265 | 970,000 |
| **Sheep** | 3,132 | 1,640,000 |
| **Goats** | 2,901 | 967,000 |
| **Pigs** | 55 | 12,800 |

# 6. Identification and registration

In Namibia, all cattle, sheep, and goats must be identified and all farms keeping these species must be registered with the DVS in accordance with the Act and its associated regulations the Animal Identification Regulations of November 2017, the Animal Health Regulations of December 2018, and the Stock Brands Act 24 of 1995. DVS uses a combination of identification and registration systems to determine the location and movements of animals, which include holding registration, brand registration, and individual or group animal identification [4-6].

## 6.1 Holding registration

By law, all holdings where animals are kept must register with DVS and have their information entered in the computerized livestock identification and traceability system or NamLITS. The NamLITS has been implemented in the NER since 2006 and has subsequently been expanded to all farming areas of Namibia. The NamLITS includes an extensive database of all holdings such as farms, communal areas, feedlots, and other short-term locations such as auctions, exhibition grounds, slaughter and export collection centers, VCF entry points, border posts, quarantine camps, auctions, and slaughter and processing establishments [4, 5].

Detailed information on each holding must be recorded including owner's name and contact information, location number, GPS location, unique NamLITS property code, area SVO, veterinary district, magisterial district, and political region. These details ensure that the holding is located within a short time should a need arises. All livestock owners are linked in the NamLITS to their holdings to ensure accountability for all animal health reports and movement transactions. The NamLITS is regularly audited by DVS to ensure that all identification and movement information are accurate and current[4, 5].

## 6.2 Brand registration

The Stock Brands Act 24 of 1995 requires all owners of cattle, sheep, and goats to register their stock brand symbols to identify ownership and verify the herd or flock of origin. For cattle, the registered stock brand symbols are marked by hot irons on visible locations on the animals. For sheep and goats, the owner's stock brand symbols are imprinted on approved ear tags or, alternatively, the symbols can be tattooed inside the pinnae of both ears. Branding of animals is mandatory at the age of six months in

cattle and three months in sheep and goats. It is mandatory to brand the animals prior to movement from their birth holding if they are younger than the prescribed age for branding [4, 5].

### 6.3 Animal identification

In addition to being branded, all Namibian-born cattle are individually identified using a set of official tamper-resistant and tamper-evident ear tags by the age of 6 months or whenever they are moved from the farm of birth. A conventional ear tag must be placed on the right ear while a Radio Frequency Identification Device (RFID) ear-tag must be placed the left ear. Both ear tags must bear the same unique 8-digit number consisting of a 7-digit serial number and a check digit. All imported cattle are individually identified by one regular and one RFID red-color official ear tags bearing the DVS logo and a unique 7 digit serial number plus a check digit which are laser-printed in black color [4-6].

Sheep and goats are largely identified by means of a group identification system based on the owner's registered stock brands as described above. However, imported sheep and goats, and Namibian-born ones being moved from the FMD protection zone into the NER are required to be individually identified by a brass ear tag bearing a unique set of numbers [4, 5].

Owners can purchase the ear tags and apply them on their animals and must submit a completed Animal Registration Cards to DVS within 14 days of tagging for entry into the NamLITS database. In addition, each owner is required to record all farm events in his/her stock card in which animal movements into and out of the holding, births, deaths, vaccinations, treatments, and feed supplements are recorded. Owners must notify all farm events to DVS within 14 days for entry into the NamLITS [4-6].

Non-compliance with identification requirements will result in the holding being placed under movement restrictions and no animal movements in or out of the holding is authorized until the non-compliance is corrected and DVS reinspects the holding. In addition, the owner/keeper could be prosecuted for violating the regulations, and if convicted, will be liable to a fine not exceeding NAD 20,000 (approximately $1350) or imprisonment for a term not exceeding two years or both. There were 26 violations of the Stock Brand Act that resulted in movement restrictions during the between 2019 and 2022 [5-7].

## 7. Movement controls

The animal and products movement control system in Namibia plays a central role in FMD prevention and control. DVS enforces movement controls for all animals moving from farm to farm, farm to slaughter, and farm to auctions and exhibitions/shows. The legal authority for enforcing movement controls lies in the Act, the Animal Health Regulations of 2018, and Animal Identification Regulations of 2017. DVS uses several circulars and standard operating procedures as implementation guidelines. In addition, DVS works in cooperation with the State police to operate checkpoints during peace time (times free of animal disease outbreaks), and in the event of a foreign animal disease outbreak, will install and operate roadblocks to prevent movement of animals and potentially contaminated products from affected areas [4-6].

### 7.1 General requirements and movement patterns

In all regions of Namibia, all animals leaving any holding and moving to another holding, a slaughter establishment, or an auction, must be accompanied by a valid and properly-endorsed veterinary

movement permit. Livestock owners, their representatives, or any authorized persons can obtain the movement permit from the local SVO or the NamLITS website. The permit is strictly valid for a period of 7 days from the date of issue. One copy of the permit is kept at the SVO in the region of origin, one copy is kept by the owner, the original goes with the consignment, and one copy with the new owner. Cattle leaving the holding must also be accompanied by a cattle movement notice in which the ear tag numbers of each animal in the shipment are clearly and accurately recorded by the owner. At destination, the recipient of the animals must note all animals he/she received on the cattle movement notice and submit it together with original permit to the local SVO within 14 days. Figure 6 shows a flowchart of the animal movement process [4-6].

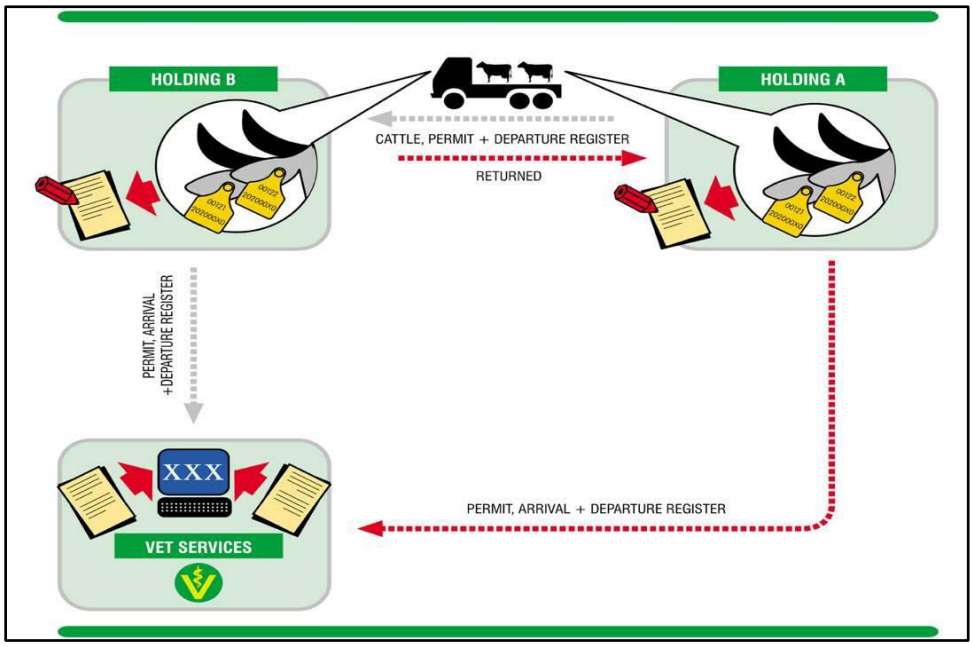


**Figure 6: Flowchart of the animal movement process**

The DVS also use a specialized permit, called the "red cross permit", which has a large red watermark to distinguish it from a regular movement permit. The red cross permit is used to alert DVS officials that there are certain special conditions listed on the permit such as requiring transport of animals via specific routes, quarantine at destination, etc. [5, 6].

Movement records for each producer must be kept at the SVO, in the farm files of the producer, and saved in the NamLITS. Rebranding with the new owner's brand and recording the movement in farm files and the NamLITS are required. A permit is not required for movement of animal products within each of the FMD regions (i.e., the NER, protection, or infected zone) [5, 6].

Within the NER, the main movement patterns in order of frequency include: 1) movement to auctions; 2) exports to feedlots in South Africa; 3) movement to other farms; 4) movement to slaughterhouses; 5) movement to protection and infected zones; and 6) movement to Namibian feedlots (there are 16 feedlots in the NER). In all instances, owners must obtain a movement permit as described above. Table 2 presents the number of livestock that moved from farm to farm within the NER and within the areas north of the VCF between October 2019 and September 2020 [5].

**Table 2: Number of livestock moved within regions of Namibia – October 2019 to September 2020**

| Region | Cattle | Sheep | Goats |
|---|---|---|---|
| **NER** | 162262 | 653847 | 254714 |
| **North of the VCF** | 61473 | 1804 | 19151 |

The points where livestock comingle the most are livestock gatherings such as auction sites and public livestock sales. Only locations licensed by the CVO can conduct auctions and public sales and all events must be authorized by the SV. Currently, there are 187 auction points and 191 auction farms in the NER which are authorized to conduct public sales. Animals are moved to these gathering points under a movement permit a day before the event and must be properly identified. All events are conducted under the supervision of one or two DVS officials who are assigned to conduct inspections and veterinary controls. Specific standard operating procedures for all activities conducted at livestock gathering points including biosecurity measures are included in DVS' Circular V4/2011- Standard operating procedures for Livestock Gatherings. The DVS official must submit an auction report form to the SV within 1 day of the event and must ensure that the NamLITS is updated with all movement into and out of the event within 3 days [5, 6].

Traceability requirements for auction sites and public livestock sales are specified in Circular V12/2005 which include the following [5]:

Livestock Identification System

- All cattle arriving at an auction, or any public sale must be individually identified by an approved ear tag.
- All small stock arriving at an auction, or any public sale are to be clearly identified by means of a tattoo or metal ear tag bearing the owner's registered stock brand.
- All imported cattle and small stock, in addition to the brand mark "(-)" on the neck, must be tagged with green ear tags bearing a serial number and DVS logo.
- All imported small stock, in addition to the brand mark "(-)" on the cheek, must be tagged with brass ear tags bearing a serial number with the prefix "VS".

Cattle Movement Registers

- All cattle arriving at an auction, or any public sale are to be accompanied by a Departure Register on which the ear tag numbers of all cattle must be correctly recorded.
- Upon arrival at an auction, or any public sale, ear tag numbers of all cattle in the consignment must be recorded manually or electronically in an Arrival Register by the auction operator or organizer of the public sale.
- All cattle leaving an auction, or any public sale must be accompanied by a Departure Register on which the ear tag numbers of cattle being moved are correctly recorded by the auction operator or organizer of the public sale.

Livestock Movement Permit

- All animals arriving at an auction, or any public sale must be accompanied by a valid livestock movement permit.

- The registered stock brands on the animals arriving at an auction or any public sale must be clearly recorded on the livestock movement permit.
- The permit will be strictly valid for a period of 14 days from the date of issue. No animals may be accepted when accompanied by an expired permit.
- The permit, along with the Departure and Arrival Registers in the case of receiving cattle, must be submitted to the attending DVS official before animals are offered for sale at auction pens or other public sales facilities.

Other commingling points in communal areas of the NER are community drinking water points or boreholes where animals from the same village are taken on foot to drink. However, these animals are in the same epidemiological unit and are regarded as having the same disease status [6].

## 7.2 Movement of animals into the NER

Movement of cattle and other cloven hoofed animals from north of the VCF into the NER is prohibited regardless of their vaccination status. Prior to 2015, DVS allowed movement of sheep and goats from the protection zone into the NER under the following conditions [4-6]:

- A movement permit must be issued by the SV and a copy of the permit is sent to the destination SV who ensures that isolation facilities are prepared at the farm of destination.
- All animals must originate from an area where cattle are not vaccinated for FMD and bear a legible tattoo and/or metal ear tag bearing the registered brand mark of the owner.
- Prior to loading, the SV must inspect the animals and seal the transport trucks. The consignment must proceed directly to one of the official quarantine stations and the transport trucks must be cleaned and disinfected after unloading the animals.
- The animals must be quarantined for 21 days under the supervision of the OV who is stationed at the quarantine station. After release from quarantine, the animals are loaded on cleaned and disinfected trucks and the truck is sealed by the OV.
- At destination, the animals cannot be unloaded until the seal is broken by the destination SV.
- The animals must undergo a 21-days quarantine at the farm of destination under the supervision by the DVS and must be inspected prior to release from quarantine.
- If the animals are destined for slaughter in the NER, the consignment is sent under seal from the quarantine station to the slaughter establishment. Sheep and goats are sent to slaughter in the NER for local consumption only and cannot be moved to an export slaughter establishment.

In 2015, DVS suspended movement of sheep and goats from north of the VCF into the NER due to the perceived high risk of introduction of Pest de Petits Ruminants (PPR) into the protection zone from Angola. However, the DVS has plans to resume this type of movement since it conducted several serological survey and found no evidence of circulating PPR virus in the zone. If resumed, sheep and goats can move into the NER under the conditions specified above.

Although the surveillance area is part of the NER, the DVS enforces restrictions on livestock movement from this area to the rest of the NER. Movement to holdings or facilities (i.e., farms, auctions, or slaughter facilities) is allowed under a movement permit following quarantine of the animals for 3 weeks at one of the two quarantine stations located in the surveillance area. Quarantine of animals is not required for animals moving direct to slaughter at a slaughter facility authorized to receive such animals [5, 6].

A movement permit is also required for movement of animals from the NER to the NCA. Prior to issuing the permit, the origin SV must receive a letter from the destination SV (or the Traditional Authority) authorizing the movement. A copy of the letter must be attached to the movement permit and checked by the DVS official at the VCF gate before the consignment can cross the VCF. The DVS official must record the consignment arrival and departure into the register. A copy of the movement permit and the VCF gate arrival/departure register must be sent back to SVO of origin for capturing into the NamLITS and the monthly summary report. The destination SV must verify the arrival of animals to their destination. Exempted from these conditions is movement of five or less animals and movement to slaughter establishments or auctions in the NCA. However, consignments of animals originating from an auction in the NER are not exempted and must comply with all movement conditions [5, 6].

## 7.3 Movement of animal products into the NER

The DVS allow movement of fresh (chilled or frozen) and processed beef products from the NCA into the NER for local consumption in the NER [5, 6]. Movement is allowed under the following conditions:

- The cattle have remained in the zone for at least three months prior to slaughter. Cattle from the infected zones or areas of vaccination in the protection zone, must be vaccinated against FMD at least twice, with the first vaccination been within the last 12 months, and the last vaccination not more than 6 months and not less than 30 days prior to slaughter.
- The cattle must undergo a period of quarantine of at least 30 days at a quarantine facility approved by DVS and must be inspected for clinical signs of FMD on arrival at the quarantine facility. While in quarantine, all cattle will be inspected for clinical signs of FMD by the DVS officials on day 15 or 16 or whenever necessary.
- Cattle which were vaccinated within the last 6 months must be re-vaccinated on Day 1 of quarantine. For cattle that have never been vaccinated, their last vaccination was more than 6 months ago, or their vaccination status is unknown must be inspected by the DVS officials for signs of FMD and vaccinated during quarantine on Day 1 and on Day 21 or Day 28, then quarantined for an additional 30 days.
- The cattle must be inspected for clinical signs of FMD by the DVS official prior to loading onto cleaned and disinfected trucks for transport to the slaughter facility. Transport to the slaughter facility must occur one day prior to slaughter to allow the animals to rest.
- The slaughter facility must be approved by the DVS for marketing to the NER. The animals must receive antemortem inspection by an OV and be slaughtered under his/her supervision to ensure proper bleeding of the carcass. Postmortem inspection must also be carried out by the OV.
- Carcasses must be matured in chillers at a constant temperature greater than +2˚C for a minimum period of 24 hours after slaughter, then pH tested in the middle of the Longissimus dorsi muscle by the DVS official. Only carcasses with pH less than 6.0 are eligible to be marketed in the NER. Carcasses with pH of 6.0 or above are either marketed in the NCA or be processed.
- The carcasses must be deboned, and all major lymph nodes and blood vessels must be removed. Meat cuts must be hard frozen before it leaves the plants and is held for 3 weeks before it leaves the facility.
- Processing of beef must be carried out at approved processing facilities to ensure inactivation of the FMDV. Processing must be carried out by thorough cooking, canning, or drying after salting, in accordance with WOAH recommendations.

Low risk commodities of domestic or game animals such as trophies and skins and hides may be moved into the NER under permit if they undergo treatment to inactivate the FMD virus. The OV responsible for supervising the processing of these commodities at the processing plant must certify that all treatments were carried out as required in the movement permit. The origin SV must ensure that the products comply with all other permit requirements, then signs the permit authorizing the movement. The DVS official at the VCF gate must inspect the consignment to ensure that the products comply with the permit conditions. Prior to unloading at destination, a DVS official must reinspect the products before unloading the consignment. Table 3 lists the number of treated product consignments by type moved into the NER from areas north of the VCF [5, 6].

**Table 3: Number of treated product consignments by type introduced into the NER from areas north of the VCF, January 2017 – December 2020**

| Species | Description of product | No. of Consignments |
|---|---|---|
| **Bovine** | Hides (wet and salted) | 9 |
| **Buffalo** | Skulls, cape, back skin, flat skin, and Feet | 5 |
| **Lechwe** | Skull, horn, half mount, capes, back skin, flat skin, full mount | 4 |
| **Kudu** | Skull, horn, full mount, capes, and back skin | 3 |
| **Reed Buck** | Full mount, cape and back skin, skull, horn, and cape | 3 |
| **Roan** | Skull, horn, cape, and back skin | 4 |
| **Impala** | Skull, horn, capes and back skin, feet, and full mount | 9 |
| **Wildebeest** | Skull, back skin, and cape | 8 |
| **Sable** | Skull, horn, cape and back skin, flat skin, and feet | 6 |
| **Warthog** | Skull with low jaws and tusks, skull and cape, back skin, and tusks | 6 |
| **Bushbuck** | Full mount, cape, and back skin | 5 |
| **Springbok** | Skulls and skins | 4 |
| **Eland** | Skull and cape | 1 |
| **Waterbuck** | Cape | 1 |

Noncompliance with movement regulations results in restriction of market access for farmers. Between January 2019 to March 2022, 66 farmers were restricted from moving animals due to violations of the movement requirements and 26 farmers were restricted due to violations of the Stock Brand Act and the Animal Identification Regulations [7].

# 8. Import controls

## 8.1 General requirements

Namibia prohibits imports of animals or animal products into the NER from countries or zones not recognized by WOAH as free from FMD, except when products are treated to inactivate the FMDV in

accordance with recommendations in the WOAH's Terrestrial Animal Health Code (TAHC). All animal commodities intended for importation into Namibia or transit purposes must meet all Namibian import requirements. To determine the FMD status of the exporting country, DVS uses WOAH's FMD status list of free regions or countries and engages in bilateral negotiations with the exporting countries to ensure that all import veterinary health certificates (VHCs) comply with all applicable import requirements [4-6].

All consignments of animal commodities must be accompanied by valid import permits which specify the conditions under which such commodities may be imported. These conditions are based on WOAH standards and designed to minimize the risk of introduction of FMD into Namibia. In addition, each consignment of animal commodities must be accompanied by a VHC that contains specific statements about the origin and health status of the animal commodities, the disease status in exporting country, and any other required information. Importers must apply for an import permit which DVS will only approve if all specific requirements on the VHC can be met. The competent authority of the exporting country must endorse the VHC to certify that all import conditions have been met [5, 6].

Live animals must originate from a WOAH recognized FMD free zone where vaccination is not practiced, thus, DVS does not require their quarantine upon arrival. On the day of departure, an official veterinarian employed by the competent authority of the exporting country must examine the animals to ensure that they are free from signs of FMD and other communicable diseases prior to endorsing the VHC. All necessary required tests must be done in the exporting countries and the test results attached to the import permit and the VHC. All trucks and containers carrying imported animal commodities must be sealed by a veterinary official from the exporting country before they can be allowed to enter Namibia and the seal number must be recorded on the VHC [5, 6].

Imported cattle must be branded by a clear and recognizable brand on the left neck. In addition, each animal is identified by means of a set of official tamperproof red color RFID ear tags which display a unique black color identification code and DVS' logo on a red background. The movement of imported animals will be traced but they are not allowed to be slaughtered approved for exports to certain countries or regions such as the United States. Imported sheep and goats must be identified by branding on the left cheek and a metal ear tag marked with the letters VS followed by a serial number. These identification marks will disqualify them from slaughter at export abattoirs approved for export to the United States.

During the previous three years, Namibia imported 901 cattle, 3174 sheep and goats, and 972 pigs from South Africa; and 13,328 cattle for direct slaughter from the WOAH recognized FMD free zone of Botswana. Namibia also imported 127 bovine semen straws from Australia and 477 bovine semen straws from Canada [5, 6].

Animal products must be derived from unvaccinated animals free from any signs of FMD. The animals must originate from zones or countries not under any restrictions due to FMD and are subject to regular FMD surveillance. For fresh meat and meat products, the animals must originate from premises where FMD has not occurred during the previous 12 months. For premises where FMD has occurred during the previous 12 months, the products must be treated to ensure destruction of the FMDV in accordance with WOAH's recommendations. Fresh meat shipments from Botswana can transit Namibia en route to the Walvis Bay seaport under strict requirements specified in the veterinary transit permit and VHC [4-6]. Table 4 present the type and quantity in kilograms of animal products that were imported into Namibia during 2021 up to May of 2022 [7].

**Table 4: Type and quantity (in kilograms) of animal products imported into Namibia – January 2021 to May of 2022**

| Country | Beef | Pork | Mutton |
|---|---|---|---|
| **Argentina** | | 7,000 | |
| **Australia** | 626,223 | 31,500 | 138,962 |
| **Botswana** | 190,000 | | |
| **Canada** | | 24,999 | |
| **Denmark** | | 257,460 | |
| **France** | 188,030 | 546,720 | |
| **Germany** | | 2,651,550 | |
| **Indonesia** | | | |
| **Ireland (Tripe only)** | 467,604 | 201,870 | 4,000 |
| **Netherlands** | | 772,040 | |
| **New Zealand** | | | 4,000 |
| **South Africa** | 283,756 | 4,144,032 | |
| **Spain** | 100,000 | 2,462,297 | 30,000 |
| **United Kingdom** | 983,128 | 1,078,793 | 24,000 |
| **USA (Red Offal only)** | 1,187,457 | 107000 | |
| **Total** | **4,026,798** | **12,285,261** | **200,962** |

## 8.2 Border inspection

The Epidemiology Division is responsible for all import and export control and inspection operations. As shown in Figure 7, there are 17 BCPs in all of Namibia. Six (6) of these BCPs are in the NER, namely, Noordoewer and Ariamsvlei (border with South Africa), Trans-Kalahari (Buitepos) and Dobe (border with Botswana's FMD free zone), the Hosea Kutako International Airport (HKIA) in Windhoek, and the Walvis Bay port on the Atlantic Ocean. The Walvis Bay port has a quarantine cold storage facility. Commercial imports of animal commodities are only allowed through 5 BCPs namely Noordoewer, Ariamsvlei, Buitepos, Hosea Kutako International Airport, and Walvis Bay port [6].

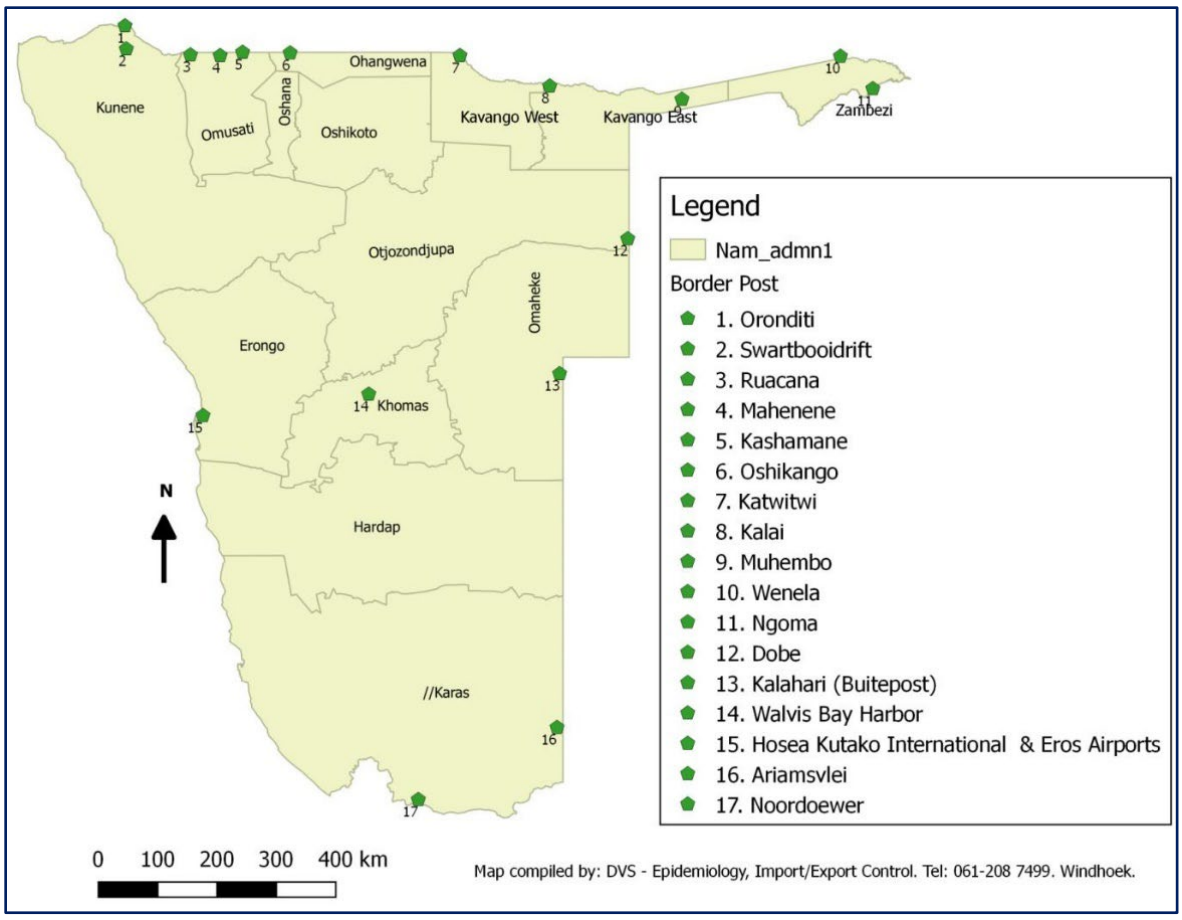


**Figure 7: Border inspection posts (BCP) in Namibia**

DVS has permanent staff stationed at each BCP who are responsible for inspecting consignments of animal commodities to verify compliance with all import requirements and export requirements. A fulltime AI supervises the BCP at each of the four main ports of entry into the country (Noordoewer, Ariamsvlei, Buitepos and the Hosea Kutako International Airport). The BCP and quarantine cold storage at the Walvis Bay port are under the supervision of an SV. The rest of the BCPs in Namibia are manned by full-time AIs who have three-year diplomas in Agriculture or Animal Health, assisted by veterinary hygiene inspection assistants. DVS planned to construct new BCP offices at the Hosea Kutako International Airport and Walvis Bay port by 2023, however, the plans were postponed due to other competing priorities [5-7].

Documentary and visual inspections of all consignments of animal commodities is carried out at the BCP, while physical inspections of consignments is carried out at the place of destination. Upon arrival at the BCP, each consignment must be accompanied by an original import permit and other required documents such as the VHC, testing results, etc. Failure to present an original signed permit will lead to the consignment being denied entry and returned to origin, detained until the original permit is provided, or destroyed. Consignments without the required test results will be denied entry. The BCP official will inspect all import documents and ensures that all import requirements have been met and will verify that the seal number on the consignment matches the one on the documents. In some instances, the BCP official may request the offloading of the consignment for further inspection. If all is found to be

satisfactory, the DVS official notifies the destination SVO about the arrival and passing of the consignment and that it is allowed entry into Namibia. On the other hand, if any irregularities are encountered, the DVS official has the authority to detain and destroy the consignment. Customs officials may also hold consignments of animal commodities from entering the country if not accompanied by required veterinary documents and will notify the DVS officials for further action [4-6].

Seals can only be broken at the destination point under the supervision of a DVS official conducting the physical inspection of the consignment. Live animals are unloaded and clinically inspected by the DVS official and are identified with special ear tags to differentiate them from Namibian cattle. All trucks entering Namibia must be inspected for cleanliness from animal waste before they are allowed to enter the country regardless of whether they are carrying animals or being empty. Dirty trucks will not be allowed entry [5, 6].

Consignments that do not pass veterinary inspections are detained by BCP officials and importers are given the option to send the consignments back, and if they fail to do so, the commodities will be disposed of by DVS at the importers' expense. From January 2020 to May 2022, only one shipment of 46 cattle from Botswana was rejected due to suspicion of having undesirable residues (injection marks). Prohibited animal commodities seized from passengers are seized and destroyed [6, 7].

At BCPs, signs and notice boards are posted to inform travelers of entry requirements and prohibited animals and animal products. Travelers must declare any animals and animal products to the BCP officials. From January 2020 to May 2022, BCP officials confiscated 30 kilograms of beef at the international airport, 93 cartons containing meat, dairy, and chicken feet illegally imported from China, and 160 kilograms of game trophies illegally imported from Germany [6, 7].

Regulations under the Act prohibit the feeding of uncooked animal derived products or food to animals. By law, waste from buses coming from neighbouring countries must be placed in waste bins which are emptied by local authorities in a particular city or town and incinerated. At the international airport in Windhoek, the airport management is responsible for collection and destruction of all waste collected from planes and any products or materials confiscated from passengers. Such waste is taken to a dumpsite within the airport complex where it is incinerated. The disposal of garbage from ships is handled by the Port Health Authority which falls under the Ministry of Health and Social Services. At the Walvis Bay port, all leftover food and other waste materials collected from ship is incinerated. Smuggled animal commodities will be immediately seized and destroyed, and the culprits will be charged in accordance with the Animal health Act of 2011 [7].

# 9. Disease detection and response

## 9.1 Passive surveillance and reporting

Passive surveillance consists of mandatory notification of FMD suspect cases in accordance with the Act. All DVS officials must immediately report any animals that show clinical signs compatible with FMD to their Chief SV. Private veterinarians, owners, or any person responsible for the animals must report suspect cases to the nearest SVO within 24 hours. Wildlife species susceptible to FMD are also subject to passive surveillance and notification. Failure to report will result in heavy fines [4-6].

All suspect FMD cases are subject to investigation and response measures in accordance with the Act. The Chief SV must immediately notify the CVO who in turn notifies the Minister of MAWF. As an active member of the WOAH, Namibia has promptly reported all incidents of FMD to the WOAH as well as its trading partners. International trading partners are notified though letters from the Namibian CVO [4-6].

There were no suspect cases of FMD in the NER in the past 3 years. It is important to note that in communal areas across the country, famers rely mainly on OVs and AHTs for clinical veterinary services which provides additional opportunities for DVS officials to conduct clinical inspections of animals. For example, during 2020, DVS' officials responded to sick calls in 10,242 premises across the country which involved 808,787 animals and resulted in investigation of 8,508 cases for various diseases. None of these cases showed clinical signs or tested positive for FMD [5, 6].

DVS officials conduct FMD outreach campaigns to farmers, private veterinarians, and the public to increase awareness, recognition, and reporting of FMD. In addition, DVS conducts Farmers' days and community visits to educate/train farmers in animal health, handling of veterinary drugs, livestock feeding, relevant laws etc., Farmers' days must be conducted at least twice each year in every veterinary district. DVS uses farmers associations in communal and commercial areas as focal points for veterinary surveillance, data gathering, and information dissemination. Refresher trainings and workshops for official and private veterinarians are normally carried out as part of their continuing education and development [4, 5].

## 9.2 Active surveillance

DVS has the authority to conduct routine or ad hoc farm inspections to collect the history of diseases that occurred on each farm and ensure adherence to and monitor compliance with various animal health requirements. Routine activities include scheduled annual farm inspections, community visits, antemortem and postmortem inspections at slaughterhouses, supervision of livestock auctions, export certification and inspection of imported animals and animal products, responding to disease reports. Between 2017 and 2019, DVS conducted 2165 farm inspections, and inspected more than 2.3 million cattle and more than 2.9 million sheep and goats at slaughter establishments, feedlots, auctions, and import and export channels [5].

Prior to June 2019, farm inspections in the NER were carried out once per year in commercial farm areas, and twice per year in communal areas. However, in June 2019 DVS published Circular V5 of 2019 in which it discontinued its routine farm inspections program and, instead, required that all farmers in the NER submit an Animal Health Declaration Forms (AHDF) twice a year to collect disease history information, treatments, vaccinations, animal movements, and other farm events. Circular V5 of 2019 also include provisions for conducting a full farm inspection in any establishment should any need arises. [6].

DVS officials go through the submitted AHDFs to ensure their completeness and verify diseases that have been reported. Should there be any disease trends or any irregularity in reported information, the farms will be inspected, and any disease will be investigated. In addition to submitting the ADHF, farmers must report diseases that have occurred in their farms in the previous 30 days when they apply for a movement permit via the NamLITS which will alert DVS officials to promptly investigate further, if needed. If an owner does not submit their AHDF, movement restrictions are automatically imposed on the farm/establishment via the NamLITS until the AHDF is submitted and the situation resolved.

From the implementation of the AHDF in June 2019 until May 2022, DVS received 31,823 AHDFs involving more than 1.4 million animals (cattle, sheep, goats, and pigs) out of a total number of 10,242 farms. ADHF data throughout the implementation phase submitted by DVS shows that on average only 60% of AHDFs submitted in all districts are captured by DVS and that there are significant differences among districts in the percentage of captured AHDFs, ranging from 44% to 91% [6, 7]. Because of this, Namibia continues to reassess the system and make adjustments, as described in the following paragraphs.

For communal farms in the NER, rather than ending the inspection program, DVS initially opted for gradual reduction in farm inspections for the first three years (2019 - 2021), with inspection of at least 80% of farms once a year, thereafter, DVS intended to reduce the inspection percentages be reduced until full implementation of the ADHF submission requirement. However, DVS subsequently decided to inspect all communal and resettlement farms which are viewed as risky because of the lack of physical barriers with other farms increasing the likelihood of commingling of animals from different herds. DVS decided to inspect a maximum of 5% of risky resettlement farms per veterinary district as decided by the SV in each district. From July 2020 to March 2022 under this program, DVS inspected only 355 farms; of these, 261 were communal farms and the rest were resettlement farms. Because only few farms were inspected since 2019, in January 2022, DVS decided to inspect at least 80% of communal farms annually, and at least 80% of commercial farms within three years. In the surveillance area of the NER, DVS continued to inspect all farms (commercial, communal, and resettlement farms) four times per year. DVS requires livestock owners who are scheduled for an inspection visit to complete the AHDF ahead of the inspection so that the information is readily available at each visit [5-7].

At slaughter establishments, the SV must conduct ante-mortem inspection of animals within 24 hours of slaughter to rule out any evidence of disease or abnormality. During postmortem inspection, a thorough examination of the head and feet is carried out to detect any lesions suggestive of FMD. All feedlots must be inspected at least four times per year. Farms located in areas bordering Botswana's infected zone must also be inspected four times per year. Additionally, DVS officials must conduct full inspections whenever they visit a farm or establishment to conduct official animal health program activities, such as vaccination campaigns, sample collection for surveillance of other diseases, responding to sick calls, disease investigations, introduction of imported animals into farms, establishing new wildebeest camps and pigsties, or detection of illegal movement and other suspected activities. Furthermore, animals are inspected during movement to auctions and slaughter establishments, and in import and export channels [5, 6].

In the protection and infected zones, DVS officials conduct thorough animal inspections during community visits in which farmers receive animal health services and provide DVS officials information about various animal health issues affecting their livestock. DVS also conducts inspections during mass vaccination campaigns, auctions, animal shows, and random ante-mortem and post-mortem inspections at informal slaughter sites. When conducting disease investigation at a village or a crush-pen, DVS officials must visit at least 50% of the households in the same village or crush-pen to establish the extent of disease spread in the area. Investigation reports are filed at the office and copies are submitted to the Chief SV. Additionally, DVS has continued to conduct PVM studies to monitor the response to the vaccination campaigns in the protection and infected zones [5, 6].

As mentioned in Section 2.3, there is a historically FMD-free African buffalo herd in the Waterberg Plateau National Park. DVS collects serological samples from a representative number of animals to test for FMD. To date, no FMD has been detected in this herd.

Other surveillance activities applicable to all zones in Namibia include official disease surveillance programs such as bovine spongiform encephalopathy, rabies, TB, PPR, and CBPP which are carried out periodically in accordance with established standard operating procedures (SOPs). In addition, reports on the number of animals inspected during pre-slaughter quarantine and animals tested for export and import must be submitted to DVS' Epidemiology Division to include in its routine monthly epidemiological reports [4-6].

### 9.3 Laboratory support

As mentioned previously, CVL is the official national veterinary laboratory in Namibia and is the only laboratory authorized to conduct diagnostic and confirmatory testing for FMD and export certification. For FMD, CVL uses the non-structural protein (NSP) ELISA for serological testing and real-time polymerase chain reaction (RT-PCR) for molecular testing. For FMD confirmation, NSP ELISA positive samples are sent to either the Onderstepoort Veterinary Institute in South Africa or the BVI in Botswana. The average time between sample collection and reporting of results is 5 working days and the average time for receiving results from the Onderstepoort Veterinary Institute or BVI is 10 working days. CVL has the capacity to conduct up to 450 NSP ELISA tests and 100 RT-PCR test per day [4-6].

CVL's FMD laboratory tests are accredited by Southern African Development Community Accreditation Services under ISO/IEC 17025 certification and accreditation standards. CVL participates annually in RT-PCR proficiency testing in accordance with the Proficiency Testing and Inter-laboratory Comparison Procedure and NSP ELISA proficiency testing SOPs provided by the Pirbright Institute in the United Kingdom. CVL follows established SOPs for handling and reporting of results of notifiable diseases [4-6].

## 10. Emergency response

As mentioned previously, disease reporting is required, and all notifications are subject to investigation and emergency response measures in accordance with the Act and the Animal Health Regulations of 2018. Namibia has a formal FMD contingency which provides detailed response measures to control and eradicate the disease.

### 10.1 Emergency structure

Namibia has a formal emergency response structure. At the central level, the National FMD Emergency Committee (NFEC) is responsible for directing response operations during outbreaks and conducting an annual review of the FMD contingency plan during peace time. The CVO, assisted by his/her deputies, is responsible for convening the NFEC, coordinating control strategies, dissemination of information and press releases, and deployment of human and material resources [5, 6]. In addition to the CVO and deputy CVOs, the NFEC consists of the following members:

- Specialist Epidemiologist responsible for compiling reports, advice and documentation, disease control plans, statistical sampling, etc.

- Designated veterinarian/virologist/serologist responsible for laboratory, preparation of sampling kits and materials, transportation of samples to reference laboratories, and communication of results.
- Relevant stakeholder representatives from the Ministry of Environment and Tourism, Police, Army, Farmers Unions, Meat Board of Namibia, Abattoir Association, Livestock Agents Brokers, and Transporters Association.

At the regional level, the area CV is responsible for setting up and convening the Regional FMD Emergency Committee (RFEC) and execution of control efforts at the regional or sub-regional level [6]. The RFEC consists of:

- The CV who is responsible for deploying of human and material resources, designating control zones, and develop compensation plans. The CV is assisted by key staff members in the region (SV, AHTs, and CAHTs).
- Relevant stakeholder representatives from the police, army, farmers, customs officials, auctioneers, abattoir operators, transporters, hunters, feed companies, private veterinarians, extension staff, and local leadership (governors, councilors, and chiefs etc.). It is the duty of the CV to draw up the list and contact details of the organizations or individuals that need to be informed and to contact them in the event of a FMD emergency. The list is updated annually.

The NFEC and RFEC are supported by an Expert Group, headed by the Deputy CVO of the Epidemiology Division, consisted of experts on epidemiology, traceability, and training from within the Epidemiology Division, and the head of virology and serology section at CVL. The group reports to the CVO and provides expert advice and broad assessments during FMD outbreak. The group is also responsible for conduct of epidemiological investigations, training of DVS staff on the FMD contingency plan, and production and dissemination of epidemiological reports [6].

In the event of an outbreak, the DVS draws on personnel resources within DVS as well as from other Directorates and Ministries. All DVS staff will be on high alert and ready to be deployed at relatively short notice when required. Key decision makers (CVO, Deputy CVOs, and CVs) must be available during outbreaks and those on leave will be recalled. Private veterinarians may also be called upon to assist at the discretion of the CVO. Laborers may be hired depending on need. DVS may also draw on personnel from the police and army for enforcement of movement controls in accordance with standing agreements with the Namibian Defense Forces and the Ministry of Safety and Security [5, 6].

The immediate expenditure for an FMD outbreak is covered by DVS. In case of a major FMD outbreak, DVS may request additional funding from the National Emergency Fund to hire additional personnel and purchase materials and equipment such as vaccines, fencing materials, disinfectants, camping equipment etc. Procurement of materials must follow the normal ministerial procurement procedure under the Public Procurement Act. Compensation for slaughtered animals will be in accordance with provisions of the Act. The area SV must ensure that owners are compensated within 2 months of the date of depopulation of the animals [6].

## 10.2 Suspect case investigation

Suspect cases are investigated in accordance with the protocol in DVS' Circular 7 of 2016. The investigation can be carried out by a DVS investigating official who can be the SV or an AHT (accompanied by an experienced official) and other supporting staff. The investigating official must ensure that relevant

forms, equipment, disinfectant, water, containers, etc. are included in the investigation kit. Upon arrival on the farm, the investigating official must take the full history of the case including date and time of first suspicion, signs observed, number of animals affected, any movements to and from the property, and the full vaccination history. The investigating official must then proceed to inspect all susceptible animals (cattle, sheep, goats, and pigs) on the property which include observing for clinical signs such as salivation, lameness, lip smacking, etc., and thorough examination of the mouth and feet for FMD lesions (vesicles, blisters, etc.). If FMD signs are evident, he/she must take photographs of the signs/lesions observed and count the cases to estimate the prevalence. Relevant samples must be collected (vesicular fluid, tissue, or blood) according to the stage of disease. In early cases, before healing of lesions, tissue samples must be collected. If there is advanced healing of lesions with fibrin present, two sets of blood samples are collected two weeks apart. Samples must be collected in 3-layer containers, followed by disinfection of the outside of each container and preservation in cooler boxes. The CVL must be notified in advance before samples are shipped. The SV will arrange shipping of samples by car or plane [5].

The investigating official must issue a "Declaration of infected place" order which includes prohibiting the movement of susceptible animals and products. On copy of the order is left with the owner and the duplicate is filed at the local office. The owner shall be advised to isolate the affected herd to prevent disease spread and the local headman shall also be notified to assist with movement control. All equipment, protective clothing, etc., must be thoroughly disinfected and/or properly disposed of before leaving the property. The investigating official must immediately brief the SV or supervisor upon returning to the office. The SV must report the incident to CVO through the CV and Deputy CVO. Disease Report Forms must be faxed or emailed to the Epidemiology Division immediately [5].

At the CVL, initial epithelium, vesicular fluid, probang, and whole blood samples are immediately forwarded to the BVI to confirm the disease; subsequent samples are forwarded to the OVI. Tissue samples for vaccine matching will be sent to the Pirbright Institute in the UK. Sera will be tested by NSP ELISA at CVL. All positive and suspect NSP ELISA specimens will be sent to OVI for further confirmation by the virus neutralization test [5].

## 10.3 Response measures

Upon laboratory confirmation of FMD, the CVO will immediately notify the Minister of MAWF through the Ministry’s Executive Director who, in turn, will inform the Police and the Army. The CVO will activate the FMD contingency plan and will issue an internal memorandum to all DVS offices that includes definition of restriction zones, suspension of all movements of FMD-susceptible animals and potentially contaminated animal products and other materials, cancellation of import and export permits and health certificates, and laboratory results. The contents of the internal memorandum are included in a press release issued by MAWF to inform stakeholders and the public. If FMD is confirmed in the NER, the press release will also announce an initial ban on all movements of FMD-susceptible animals throughout the country since movement from the NER to anywhere in the country is allowed. The ban will be reduced after the extent of the outbreak is established. The CVO will also inform countries of the Southern African Development Community, other trading partners, and the WOAH [6].

At regional level, the local SV will convene meetings of the RFEC. Four working groups/teams will be established as follows [6]:

- Logistics – responsible for recruitment of personnel, acquisition and deployment of vehicles, materials, and equipment.
- Information management – responsible for data collection and analysis, production of reports, and recording of meeting minutes.
- Surveillance and vaccination – responsible for surveillance and vaccination, and PVM activities (infected and protection zones only).
- Movement controls – responsible for implementing movement control for animals, animal products, and other potentially infectious materials.

In accordance with the FMD contingency plan, a disease management area (DMA) is established consisting of an infected area around the infected establishment and a 30-km containment zone around the infected area. A census of all establishments in the DMA is made available using the NamLITS database [6].

Response measures applied in the infected holding include [6]:

- The infected holding is cordoned off completely. Personnel will be deployed every 2 km on the periphery of the infected properties as part of the cordon. In addition, casual laborers will be hired to establish a human cordon.
- In communal areas where possible, temporary portable electric fences are used to separate infected or potentially infected animals from the rest of the livestock population.
- All FMD-susceptible animals from camps on the perimeter of the farm will be moved to the central parts of the farm where possible to minimize the risks of contact with animals from neighboring farms.
- DVS will ensure that drinking water and fodder is available for animals in restricted holdings or areas which may entail the construction of boreholes or arranging transport of water or fodder. This is particularly important in communal areas where animals share water and grazing resources to ensure that the pressure to move animals for these purposes is minimized.
- All movement of animals, animal products, and potentially contaminated materials into/out of the holding will be strictly controlled. No movement will be allowed out of the holding unless by permit from DVS, and all vehicles and people leaving the holding must be properly disinfected.
- Information on movements into/out of the infected holdings must be compiled from the NamLITS database and movement restrictions are placed on all contact holdings or establishments.
- Traceback inspections of FMD-susceptible animals are conducted on days 0, 14, and 28 of the outbreak at all contact holdings or establishments including auctions and gathering points which moved animals to the infected holding during the previous month. Weekly inspections are conducted at all holdings which received animals from the infected holding during the previous month. Follow-up visits to the infected holdings/establishments will depend on strategies adopted and whether stamping out is applied or not.
- Depopulation is the preferred option if the outbreak is of a limited nature. However, if the outbreak is extensive making stamping out unviable, ring or mass vaccination will be considered as alternative. Depopulation must be carried out using an approved method and should be done in such a way as to avoid the risk of spreading the virus during putting the animals down and/or transport. In most situations, firearms are used to depopulate cattle and buffalo, and captive-bolt is used for smaller animals such as pigs or when larger animals can be restrained.

- Burial on the infected or dangerous contact holding is the most used method for carcass disposal; however, on-site burning and rendering could also be used. When on-site disposal is not feasible, carcasses and contaminated materials can be transported in covered leak-proof containers to specific disposal sites using designated means of transportation, considering the risk of virus spread during transport.
- Once depopulation is complete, all potentially contaminated materials and waste such as feeding stuffs, manure, and slurry must be disposed of by burial, burning, or rendering. All buildings and vehicles used for transport of carcasses and equipment likely to be contaminated with the FMDV must be cleaned and disinfected.

The following movement restrictions are enforced in the containment zone [6]:

- Roadblocks must be set up an all roads/routes out of the containment zone to enforce the movement controls and minimize the risk of spread of the FMD virus. Trained personnel supported by the police operate these roadblocks and conduct inspections of all vehicles exiting the containment area. All prohibited products must be entered in a log/register and destroyed by burning and records of destruction kept.
- Initial ban on the movements of FMD susceptible animals and animal products within and into/out of the containment zone must be enforced. Thereafter, movements will only be permissible under a red-cross movement permit after thorough inspection of the mouths and muzzle (mouthing) of 80% of cattle and 100% of small stock in the holding and all animals to be moved immediately prior to movement. The animals must be transported in sealed vehicles and the transport route must be described in the red-cross permit.
- If movement is to another farm, the SV of the destination area must be notified in advance and must impose movement restrictions on the destination farm for 28 days.
- At slaughter plants, the animals must be slaughtered within 24 hours of arrival and carcasses must be adequately matured and de-boned. The meat and meat products produced from animals slaughtered in the DMA cannot be exported.
- Processed products for personal use may be allowed without a permit. A special permit issued by DVS is required for commercial shipments of processed products.

Active surveillance consisting of inspections of all farms in the containment area must be conducted to detect the level of spread of the disease. All FMD-susceptible animals present on the farm must be inspected by mouthing initially, and every 7 days thereafter, inspection of the feet is carried out, and mouthing is done only on suspect animals. If FMD is confirmed in a game compartment, the frequency of inspections carried out every two weeks or monthly depending on the epidemiological situation [6].

At slaughter plants, the SV must ensure that the inspection staff is vigilant and immediately report and vesicular disease suspect cases. If a suspicion is reported, the SV must immediately investigate and inspect all animals in the consignment and, if the suspicion is valid, he/she must immediately stop all slaughter activities, take samples as appropriate, and inform the CVO through his/her Chief Veterinarian, the slaughter plant manager, and the SV of the area of origin of the consignment. The SV must take following actions [6]:

- Stop entry and offloading of animals into the plant and must immediately inform livestock owners booked for slaughter not to bring animals.
- Suspend all movements of animal products and waste material out of the slaughter plant.

- Install disinfection stations to disinfect shoes, protective clothing etc. and ensure that disinfecting solutions are readily available.
- Ensure proper cleaning and disinfection of the slaughter facilities, equipment, etc.
- Enforce strict movement restrictions and disinfection procedures for staff and people working with animals (boots, hands, clothing etc.).
- If slaughter is allowed, arrange for treatment of products by specific processes such as heat treatment if necessary whilst awaiting the confirmation of FMD.
- Identify all people who could have been in contact with suspect animals such as agents, farmers, transporters, staff etc., and instruct them to avoid contact with or handling other animals for at least 72 hours.

An initial countrywide ban on all livestock auctions or gatherings must be implemented if FMD is confirmed in the NER. Thereafter, livestock auctions may be allowed outside the DMA provided that no animals are moved to or through the DMA. Detection of infected animals at a livestock auction or gathering will result in destruction of all animals and their disposal by burning or rendering. Additionally, a total ban on hunting will be imposed except for trophy hunting which may only be allowed outside the containment zone however, a movement permit is required for moving the trophies. These measures will also be carried out in consultation with Ministry of Environment and Tourism [6].

A stand-down phase is implemented in accordance with Article 8.8.7 of the WOAH's TAHC when the threat from FMD is no longer present and/or most key notifiable animal disease investigation and operational activities cease. When all investigations confirm the absence of FMDV, the CVO will inform relevant governmental agencies that disease has not been confirmed and that the emergency no longer exists. A debriefing on all outbreak and response activities will be conducted within 30 days of stand-down. All records related to the outbreak will be collected and filed at the central DVS office, and final operational and financial reports will be prepared and disseminated to all relevant officials. The CVO will declare the outbreak eradicated and notify trading partners and the WOAH [6].

# 11. Export certification

## 11.1. Approval of establishments

In principle, all livestock farms in the NER are eligible for sending their animals to slaughter at export approved establishments provided that the farms are not under any animal health restrictions and meet the import requirements of the importing country. DVS does not approve farms for export [7].

All establishments (slaughter plants, cutting plants, or cold storages) intending to export meat or meat products must be approved by DVS. Prior to seeking export approval, the establishment must be registered with the local authority and other relevant organizations such as the Meat Board of Namibia, as well as obtain environmental clearance (Environmental Impact Assessment and/or Management) from the Environmental Commissioner in accordance with relevant environmental regulations. The establishment must follow a structured approval process consisted of the following steps [7]:

- Complete an application form in which the species intended for slaughter, product(s), and intended export market(s) are specified.

- The application must be accompanied by detailed existing or proposed plans/drawings including copies of the site plan, floor plans for every level of the establishment, water reticulation map, and wastewater disposal and treatment procedures.
- Submit detailed documentation of the hygiene management procedures, sanitation standards and procedures, food safety management standards (such as HACCP), and animal welfare/humane handling procedures.
- DVS will review and assess all documentation and will only grant its approval after a series of onsite inspection visits/verification audits demonstrate that the establishment meets all national regulations and importing country requirements.
- Once approved, DVS will assign an establishment number and inform the competent authority in the importing country in writing giving assurance of the establishment's compliance with all relevant regulatory requirements.
- Production for export commences once the importing country has responded in writing approving DVS' recommendation and/or has included the establishment in its list of establishments approved for exporting livestock products to that country.
- All export establishments must be under direct and continuous supervision by DVS. Official controls include ante mortem inspection, humane handling of animals, post-mortem inspection of carcasses and organs, sanitation and food safety systems checks as well as verification of all operational procedures such as HACCP, sanitation performance standards, etc.

Establishments approved for exports to the United States must be listed in the Food Safety and Inspection Service (FSIS) list of approved establishment list. Currently, there is only one Namibian slaughter establishment listed by FSIS as eligible to export raw intact beef (except cheek meat, head meat, heart meat, and weasand meat) to the United States. All beef shipments must comply with APHIS' FMD import requirements specified in 9 CFR 94.1(a), 94.11, and the Bovine Spongiform Encephalopathy (BSE) requirements specified in 9 CFR 94.18 or 9 CFR 94.19, as well as FSIS' requirements in 9 CFR 327.2.

## 11.2. Certification process

DVS utilizes a structured system of inspections, slaughter controls, identification and traceability, and movement controls to ensure that all exported consignments of animal commodities comply with DVS export regulations as well as requirements of the importing country. All consignments of animal commodities must be accompanied by a VHC issued by an authorized OV in accordance with the general principles of certification in Circular 5 of 2008 entitled "Principles of Certification" [4-6].

Only authorized OVs can sign the VHC. OVs are trained by their CVs on how to complete model VHCs in compliance with export regulations and requirements of the importing country. OVs have at their disposal Circulars detailing which records to use to complete model VHCs and ensure their accuracy and prevent errors. OVs are prohibited from certifying data that he/she has no personal knowledge of or cannot verify, or sign VHCs for consignments of animal products that were not produced under his/her direct control [5, 6].

Prior to issuing the VHC for consignments of animal products destined for the United States, the OV must conduct a pre-export inspection which includes verification of all documentation on the products batch such as dates of slaughter, cutting, production, and labeling, expiration date of the product, etc. The documentation review also includes confirmation of APHIS and FSIS requirements and checking the

establishment's specifications of shipments. The OV will only sign the VHC after confirming that all documents are correct, and the shipment complies with all requirements. The OV must keep hard copies of all issued VHCs and accompanied information including details of conveyance; pre-shipment reviews including inspection verification forms and test results; and livestock movement permits and notices. All inspection marks, seals, official stamps, and inspection certificates must be always under full control of the OV. This information is verified by the CV during quarterly supervisory reviews [5, 6].

OVs certifying shipments of meat and meat products destined for the United States must ensure that [5, 6]:

- The consignment has passed the pre-shipment review;
- Animals presented for slaughter comply with the Act and Animal Identification Regulations;
- The meat or meat products come from animals that were born and raised in the NER of Namibia and are registered in NamLITS and traceable to the farm of origin;
- The meat or meat products meet all APHIS and FSIS requirements including separation or non-commingling of the meat or meat products with meat or other animal products that do not meet the conditions in the VHC; and
- Labelling and stamping of products are carried out under their DVS' direct supervision.

Currently, Namibia only exports live animals to neighboring countries. In general, DVS' export control process consists of the following [5, 6]:

- The exporter must submit a form to the SVO requesting an inspection appointment specifying the venue which could be the farm of origin or a loading place, and the time of loading. Animals coming to a loading place must already be branded/tattooed or tagged at the farm of origin.
- Before the actual inspection of the animals starts, the DVS official must inspect all documents including the vehicle disinfection certificate, movement permit from the farm to the relevant border post, and in case of cattle, the cattle movement notice. The DVS official must make sure that the exporter is in possession of other relevant documents necessary for export issued by other offices or stakeholders such the Meat Board of Namibia or the Ministry of Environment and Tourism.
- When the DVS official is satisfied with the export documents, he/she will inspect the transport vehicle for cleanliness and make sure it can be sealed. This is followed by close inspection of the animals for their health and Identification. Unfit animals must be disqualified and if a serious disease is suspected the whole consignment must be suspended and the SV immediately notified.
- Loading of animals is carried out under close supervision of the DVS official. He/she must check for the presence of the ear tags and brand marks and count the animals. The number of animals loaded must be verified with the exporter/agent and the driver before the vehicle is sealed. No overloading is allowed.
- After all animals are loaded, the DVS official must seal the vehicle with new seals. All doors must be sealed irrespective of their location on the vehicle, and it is the responsibility for the exporter to make sure that adequate number of seals is available. The seal's brand/make, serial numbers, and total number of seals used on that vehicle is then recorded on the VHC.
- The DVS official then completes the export VHC as required and hand it to the exporter for certification at the SVO. At the SVO, the authorized OV certifies the export VHC based on the declaration of the inspecting official and files copies of the VHC at the SVO.

At the Walvis Bay port, consignments of animals or animal products must be reported in advance by the certifying OV and the owner of the consignments to the DVS official responsible for receiving, inspecting, and releasing the consignments. All consignments must be kept at designated facilities under direct control of the DVS official prior to departure. On the day of departure, the DVS official will inspect the consignment and verify all documents and seals, and if everything is in order, he/she will release the consignment for loading onto the vessel. The original documents are handed over to the owner or representative of the consignment to present to the veterinary authority at the country of destination. Loading of animal products from one container to another or moving the products to a cold storage facility for packaging or re-packaging must be carried out under direct supervision of DVS officials, and once that is complete, the DVS official will seal the container and issues a non-manipulation certificate and the consignment is allowed to be loaded onto the vessel [5, 6].

At land BCPs, the certifying OV must notify the AI in advance of arrival of the consignment at the border. Upon arrival, Customs agents will notify the AI who will verify the documents and seals and, if necessary, conducts physical inspection in case of live animal consignments. Once everything is verified, the AI will stamp the export documents and release the consignment. The procedures for receiving and inspecting consignments at the airport is similar to the procedures at land BCPs, however, at the airport, there is a designated “cargo area” where consignments are received and inspected by DVS officials [5, 6].

# 12. Conclusions

APHIS concludes that DVS has sufficient legal authority to carry out official animal health program activities including FMD prevention, control, and eradication. Review of information provided by DVS demonstrated adequate technical infrastructure of official and authorized veterinarians, support personnel, and financial resources for carrying out multiple disease control and eradication programs.

## 12.1. Likelihood of FMD presence in the NER

Based on the review of documentation provided by DVS and available public information, APHIS did not find evidence to suggest the presence of FMD in the NER. There have been no detections of FMD since 1965 in the NER. Although periodic detections of FMD have occurred in the infected zone of Namibia and to a lesser degree in the protection zone, the disease has not spread into the NER during outbreaks in those zones. During the 2020 and 2021 outbreaks in the protection zone, DVS swiftly responded in accordance with its FMD contingency plan and successfully controlled the outbreaks by implementing emergency vaccination around the outbreaks followed by mass vaccination of all cattle in the protection zone. In addition, there is no evidence available to APHIS to suggest that the disease may exist in wildlife populations in the NER, which is supported by active surveillance in susceptible wild-life populations in the national parks and in domestic populations with the highest risk of contact with wild animals. Vaccination against FMD in the NER is prohibited and has not been used since 1965.

Therefore, APHIS concludes that the likelihood of presence of FMD in the NER is negligible.

## 12.2. Likelihood of FMD introduction into the NER

APHIS considers that the presence of the VCF and the network of stock- and game-proof fences at international borders, and around certain areas and game parks constitute sufficient barriers for introduction of FMD-susceptible animals and potentially contaminated animal products from the

protection and infected zones and infected regions of neighboring countries. The VCF is a very effective tool for restricting the movement of animal commodities, free-roaming wild animals and human traffic. The veterinary gates on the VCF are the only through points into the NER from the protection zone, and each gate is manned, on a 24 hours/7 days basis, by DVS and police who inspect all commercial and passenger traffic. In addition, DVS has dedicated teams that continuously monitor the VCF and other fences to maintain and fix any breaches in the fences. These strategies reduce the likelihood of exposure of domestic animals to infected wild animals to a negligible level.

Currently, DVS prohibits the movement of all FMD-susceptible species from north of the VCF into the NER. There is a potential that DVS will resume allowing the movement of sheep and goats across the VCF; however, this will be carried out under strict movement controls and quarantine requirements designed to prevent the introduction of FMD via such movements. DVS allows fresh meat and other low-risk or treated products from the NCA into the NER; however, such products are only allowed under stringent requirements to ensure inactivation or destruction of the FMDV, if present.

DVS imposes a stringent system for legal importation of animals and animal products that consists of certification requirements, transit controls, transport requirements, and border inspection controls to mitigate against introduction of FMD. There is no evidence available to APHIS to suggest that illegal movement of animal and animal products occurs through international borders. In addition, there appear to be sufficient controls on passenger traffic coming from third countries, as well as handling of international waste (flights from third countries, ships, cruises, etc.). The feeding of waste of animal origin originating from international sources, slaughterhouses, restaurants, hospitals, or other establishments is prohibited.

Therefore, APHIS concludes that DVS has demonstrated that sufficient controls exist to mitigate the likelihood of FMD introduction via legal importation of FMD-susceptible animals and animal products from affected regions to a negligible level.

## 12.3. Detection, response, and effective control

By law, FMD is reportable, and DVS' passive surveillance program is dependent on this mandatory reporting requirement. DVS enhances its passive surveillance by conducting various outreach and training activities to educate veterinarians, farmers, and the public utilizing multiple modes of delivery and dissemination.

Active and passive surveillance systems for FMD are in place and are appropriate given the disease history, import practices, and separation from affected regions by man-made barriers. DVS takes into consideration important factors such as higher risk areas, production type, and presence of and interaction with susceptible wild animals when designing its surveillance programs. Adequate laboratory procedures and capabilities are available to support surveillance programs and testing is conducted in accordance with the WOAH's Diagnostic Manual and latest scientific methods.

For many years, DVS conducted on-farm inspections in commercial and communal farming areas of the NER. DVS replaced the system of routine farm inspections with a system requiring farmers in the NER submit AHDFs twice a year to collect disease history information and monitoring compliance with DVS' requirements. This system also includes provisions for conducting a full farm inspection in any establishment should the need arise. AHDF data obtained during the implementation phase provided by DVS indicate that a significant percentage of collected AHDFs appear to not be captured or reviewed by DVS in a timely manner. However, DVS continued to collect

relevant animal health information and continued to monitor compliance through the required inspections of animals at auctions, feedlots, and slaughter establishments and during movement in commercial domestic and import and export channels. DVS also reevaluated the success of the system and opted to resume farm inspections of most communal and commercial farms in the NER to make up for the issues with the AHDF system while continuing to require submission of AHDFs by farmers.

APHIS considers Namibia to have sufficient controls in place to rapidly detect FMD and manage its animal disease investigation, response, and control programs effectively using comprehensive emergency response plans and available resources. Adequate protocols and authority for implementing controls of potential occurrences of FMD are in place and all animal disease events are investigated by trained official veterinarians and staff. DVS has demonstrated that it can promptly notify the United States and/or the WOAH of FMD outbreaks, and its mandatory identification systems are sufficient to implement controls to trace and prevent product shipments from being exported to the United States.

Therefore, APHIS concludes that DVS' has adequate systems in place to detect and respond to FMD incursions. APHIS further concludes that if FMD were to be introduced into the NER, the likelihood of broad spread without detection is negligible.

### 12.4. Export certification

DVS applies adequate movement controls on animals and animal products, implements appropriate animal identification and traceability systems, and has stringent systems of verification and inspections for certifying exports of animals and their products. Export verification and certification systems ensure that exported animals and animal products, beginning at the farm, and extending through all components of production meet import requirements of the United States. Therefore, APHIS concludes that the likelihood that ineligible animals and fresh meat and meat products be certified for export to the United States is negligible.

## 13. Recommendation

Based on the conclusions of APHIS' review of the FMD status of the NER, APHIS recommends that the current conferred status and import mitigations for FMD are appropriate. Recognition of the FMD free status of the NER should be maintained until the next APHIS review or until a change in the animal health status is reported.

# References


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