Health Services responsible for the Foot and Mouth Disease programmes of the Expanded MERCOSUR Countries who collaborated in the final elaboration of the document.

To Dr. Luis Eduardo Días, consultant contracted by the IDB/PANAFTOSA – PAHO/WHO project for the drafting of the first version of the Manual.

To the Inter American Bank – IDB for the support in the preparation of this Manual.

TECHNICAL REVIEW
Miguel Angel Genovese
Victor Saraiva
Ingrid Bergmann
José Naranjo
Júlio César Augusto Pompei
Gilfredo Darsie
Viviana Malirat
Rossana Allende

BIBLIOGRAPHICAL REVIEW
Astrid Rocha Pimentel

SOCIAL COMMUNICATION
Rosane Lopes

COORDINATION
Mónica Martini

PHOTOGRAPHS
José Fernando Pereira Dora
Luis Eduardo Días
PANAFTOSA Archives
# TABLE OF CONTENTS

## Preface ................................................................. 09

## Introduction .......................................................... 10

### Chapter 1

**Notification** .................................................... 11
- General Considerations ........................................ 11
- Contingency Plan ................................................ 11
- Receipt of information ......................................... 13
- Recording the notification .................................... 14
- How to Relay the Information ................................. 14
- List of Contacts at the Local Level .......................... 14
- List of Contacts at the Regional Level ...................... 15
- List of Contacts at the Central Level ....................... 15

### Chapter 2

**Response to the Notification and Investigation** .......... 16
- Action of the Local Health Authority ....................... 16
- Action of the Regional/Central Authority .................. 18

### Chapter 3

**Visit to Property with Suspected Vesicular Disease** .... 19
- Transfer ............................................................. 19
- Epidemiological Investigation ............................... 20
- Examination of the Herd ....................................... 20

### Chapter 4

**Foot and Mouth Disease – Clinical and Epidemiological Diagnosis** .................................................. 23
- Clinical Diagnosis .............................................. 23
- Lesions ............................................................. 25
- Epidemiological Diagnosis ................................... 25
- Differential Diagnosis ......................................... 26
- 01. Vesicular Stomatitis. (VS) ................................. 26
- 02. Swine Vesicular Disease ................................... 27
- 03. Swine Vesicular Rash ....................................... 28
- 04. Blue Tongue .................................................. 28
- 05. Infectious Bovine Rhinotrachetis ........................ 29
06. Bovine Viral Diarrhoea/ Mucosal Disease ........................................... 30
07. Malignant Catarrhal Fever (MCF) ......................................................... 30
08. Bovine Herpes Mamrnilitis ................................................................. 31
09. Bovine Papular Stomatitis ................................................................. 31
10. Contagious eczema ............................................................................. 32
11. Poisoning by Fungus of the Genus Clavaria sp ........................................ 33
12. Poisoning by Pithomyces Chartarum (Facial eczema) ............................. 34
13. Actinobacillosis ................................................................................... 35
14. Dermatophilosis .................................................................................. 35
15. Traumatic stomatitis (Glositis) ........................................................... 36

Chapter 5

Samples for Laboratory Diagnosis for Foot and Mouth Disease .......... 37
Collection of Samples ............................................................................. 37
Samples of Tissues .................................................................................. 37
Forms ....................................................................................................... 38
Identification of the animals .................................................................... 38
Quantity of material (weight/volume) ..................................................... 39
Packaging of the Sample (vial and preservatives) ................................. 39
Temperature at which to store and send material .................................. 39
Vial indicated for use ............................................................................... 40
Other Samples ........................................................................................ 40
Esophagic – pharyngeal Liquid (LEF) ...................................................... 40
Serum ....................................................................................................... 41
Swabs ....................................................................................................... 42

Chapter 6

Samples for Differential Diagnosis (based on the Clinical and
Epidemiological Suspicion) ................................................................. 43
For isolation of the Infectious Bovine Rhinotrachitis Virus (IBR) .......... 43
01. Swabs of Secretions and lesions ....................................................... 43
02. Órgans ................................................................................................ 43
For isolation of the Bovine Viral Diarrhoea Virus (BVD) ...................... 44
01. Swabs of Secretions and Lesions ....................................................... 44
02. Whole blood with EDTA or Heparin (1 mg/ml) .............................. 44
03. Órgans ................................................................................................ 44
For isolation of the Blue tongue (LA) Virus ........................................ 44
01. Whole blood with EDTA or Heparin (1 mg/ml) .............................. 44
02. Órgans ................................................................................................ 44
Sera paired for Serology ........................................................................ 45
Contact List and addresses of (th) Laboratory(ies) Official(s) .......... 45
Chapter 7

While awaiting Laboratory Confirmation ............................ 46
  Initial measures .......................................................... 46
  Interdiction of the site ................................................. 46
  Other epidemiological surveillance measures ....................... 48
  Communications to the regional/central health authorities ...... 50

Chapter 8

Procedures subsequent to Laboratory Confirmation ............... 51
  Procedure of the Official Local Veterinarian ....................... 51
  Immediate action to be taken by the Zonal Manager and / or Regional Coordinator ................................. 52
  Procedure of the Central Authority ................................ 52
  By member countries of the Expanded MERCOSUR ............... 53
  By PANAFTOSA –PAHO/WHO ............................................. 53

Chapter 9

Actions in a confirmed Foot and Mouth Disease area ............... 54
  By the Veterinary Administration at the central level .......... 54
  On the Operation Base (Determination of the work zones) .... 55
  Definitions (Glossary) .................................................... 56
  Free Zone .................................................................. 56
  Infected Zone .............................................................. 56
  Area ........................................................................... 56
  Perifocal Zone ................................................................ 57
  Risk or Buffer or Surveillance zone .................................. 57
  Sanitary Barriers ........................................................... 58
  Bio-safety ...................................................................... 58
  Biological Security ......................................................... 58
  Interdiction ................................................................. 58
  Isolation ....................................................................... 58
  Quarantine ..................................................................... 59

Chapter 10

Sanitary Measures in the Infected Zone ............................... 60
  Interdiction of properties .............................................. 60
  Rationale for restrictions in defined areas ......................... 61
  Slaughter of animals ...................................................... 61
  Destination of carcasses ............................................... 61
  Measures in concentrations of animals .............................. 61
Chapter 11

Initial Planning Activities and Emergency Operations

History ............................................... 69
Physical Location ..................................... 70
Formation of the Teams .............................. 70
Establish the initial operational limits .......... 70
Determination of Check and Disinfection points . 71
Definition of Procedures ............................ 71

Chapter 12

On the activities of the Teams and their Leadership

Organization and Operation .......................... 74
Head of Operations (functions) ....................... 74
Administrative team .................................. 76
Legal Support Team ................................... 76
Public Relations and Communication Team .......... 76
Social Assistance Team ................................ 76
Health Education Team ................................ 76
Computer Science and Systems Operation Team .... 76
Complaints Handling and Recording Team .......... 77
Logistical Support Team ............................. 77
Bio-safety Team ...................................... 77
Zonal Tracking Teams (perifocal, monitoring and complaints) .... 78
Containment and Disinfection Sanitary Barriers ....... 81
Appraisal Team – Appraisal Criteria ................. 82
Animal Slaughter Team ................................ 82
Disinfection Team ..................................... 82
Compensation Team – Compensation Procedures .... 83
Chapter 13

Emergency Vaccination ......................................................... 85
Considerations ................................................................. 85
Conditions established by the Sanitary Code (OIE) .................. 85
Vaccination of the infected zone (outbreak) .......................... 87
Vaccination of the area surrounding the outbreak area .......... 87
Points that must be considered for vaccination in the area
surrounding the outbreak. .................................................. 87

Chapter 14

Action following Sanitary Slaughter ........................................ 89
Sanitary Evacuation ............................................................ 89
Sentinel Animals ............................................................... 89
Clinical and Sero-epidemiological surveillance ...................... 91
Repopulation ..................................................................... 92
End of Quarantine ............................................................. 92
Report to the Systems, Countries and Institutions .................. 92

Chapter 15

Annexes ............................................................................... 94
Annex 01 Foot and Mouth Disease ........................................ 94
Annex 02 Laboratory Diagnosis – Principal Tests .................. 102
Annex 03 Sending of Material to PANAFTOSA/PAHO-WHO .... 105
Annex 04 Slaughter equipment and Material ........................ 107
Annex 05 Sanitary Pit ........................................................... 108
Annex 06 Sanitary Slaughter and Procedures ........................ 111
Annex 07 Instructions to Cremate Animal Carcasses ............... 113
Annex 08 Disinfectants and Disinfection Procedures
in Foot and Mouth Disease .................................................. 115
Annex 09 Persistence of the Foot and Mouth Disease Virus .... 123
Annex 10 Guide on Differential Diagnosis (Tables 1, 2 and 3) .. 135

Chapter 16

Bibliographical Reference ..................................................... 141
In 2005, the Inter-American Development Bank – IDB and the Pan American Foot- and-Mouth Disease Center – PANAFTOSA/PAHO-WHO, signed a Technical Cooperation Agreement entitled, “Programme of Regional System for the Control of Foot and Mouth Disease in the EXPANDED MERCOSUR”. The creation of this programme responds to the request made by the Ministres of Agriculture for IDB and PANAFTOSA/PAHO-WHO to cooperate with the countries of the Region.

The Programme has as its objective the establishment of the basis for an efficient regional animal health system, harmonizing the works in the countries of the EXPANDED MERCOSUR. The actions and strategies that were implemented, always were in accordance with international criteria primarily with the recommendations of the World Animal Health Organization – OIE.

The “Procedures Manual for the Attention of Occurrences of Foot and Mouth Disease and other Vesicular Diseases” was created in response to a demand generated within the ambit of the above programme, with the main aim of facilitating the process of treating vesicular diseases in the varying countries and thereby obtaining greater scope for a harmonious and coordinated transfer of technology.

The process of review, updating and adaptation of this Manual, was done through intense consultation of previous editions of manuals edited by PANAFTOSA/PAHO-WHO; consultation of other manuals used by countries of this and other continents and primarily, through conformance to the norms and guidelines contained in the OIE International Animal Health Code for Terrestrial Animals.

The Official Animal Health Services of the EXPANDED MERCOSUR were consulted and their comments included in this manual. The activities carried out in the attention of recent vesicular disease health emergencies in the region provided practical material which resulted in a real content, appropriate for the situation and present contingencies.

It is our desire that this Manual be used by the Official Services of the countries of this and other regions as a strategic source of information and knowledge, constituting thereby another important tool for the standardization of procedures and regional integration.

Miguel Angel Genovese
Director of PANAFTOSA/PAHO-WHO.
INTRODUCTION

The “Procedures Manual for the Attention of Occurrences of Foot and Mouth Disease and Other Vesicular Diseases” will contribute to the dissemination and updating of health emergency attention procedures. It was prepared following a logical sequence of attention by the competent national animal health body of the country. For the application of the procedures here indicated, the productive, environmental, regulatory and social characteristics of the country in which it is to be applied must be considered as well as the pertinent international regulations.

In the manual, the health emergency attention sequence begins with the notification of the suspicion of the emergency to the organ responsible for its attention. It describes how it should be received, and recorded, who should act and who should be notified.

Although the notification is the initial point for attention of the incident, the manual makes it very clear that many preparatory actions must have been carried out way in advance. There should be a system of quick response and it should be used with due frequency. The norms must be updated and available within the framework of the country’s Foot and Mouth Disease Eradication Programme, and financial resources must be projected for and available.

The review of the items and procedures contained in this manual and their required early and detailed preview will serve to avoid improvisation during emergency attention. The equipment, materials and trained personnel who should be found in the local units are meticulously described. It is highlighted that the local unit is the foundation of an Official Service.

The procedures indicated are based on the internationally recognised norms. The Manual describes in its chapters that the selection among the options of procedures can be based on the health situation of each country or area, however, the responsible authorities will be charged with the indication of specific actions based on technical, political, economic and social analysis.

Finally, the annexes of this manual include and share essential technical knowledge for the professionals of the official services, who will face the health emergencies with practical know-how, essential for a rapid resolution of the crisis.
CHAPTER 1

NOTIFICATION

1.1 GENERAL CONSIDERATIONS

1.1.1 Countries should have a health prevention and emergency system which allows for the concentration of efforts and which has the necessary human, material and financial resources, so as to carry out the activities required in the prevention and rapid control and eradication of foot and mouth disease outbreaks at the national level, projecting the risks of its spread in the least time possible and coordinating the operations at the regional and international level.

1.1.2 A Foot and Mouth Disease surveillance programme in accordance with OIE guidelines must include an early warning system which covers production, commercialization and the processing chain to inform on suspicious cases of foot and mouth disease that must be immediately investigated and if the doubts cannot be disparaged by way of epidemiological and clinical research, the actions that are described will be taken.

1.2 CONTINGENCY PLAN

1.2.1 In the Contingency Plan there should be the first and surnames of each one of the officers that comprise it, substantive and alternates, with their positions, official address (and private if necessary), telephone(s), fax, email, cellular or personal phone and the functions to be carried out at the Central Level.

1.2.2 This list would correspond to the officers for each Division or Department of the Ministry of Livestock, including Agriculture and the support Ministries such as the National Defense. (With the different branches), Ministry of Home Affairs (Police), Economy and Finance (Customs), Public Health, Environment, as well as details including identification of the organization being represented, Farmers’ Associations, Trade, Society or College of Veterinary Surgeons.

1.2.3. National Emergency Health System – SINAESA: This is the technical, administrative, and operational organization that the Executive has set up in support of the Veterinary Administration, integrating all the ministries, bodies and institutions associated with the animal health sector, which must act with special delegated powers and the ability to respond quickly and effectively, that is, within hours, to
eliminate an exotic disease, thus meeting the requirements of international trade and international standards and at the same time providing the solution of financial compensation for expenditure and losses arising from the operations. This organization must be established by specific regulation and have its own sources of funds, which should be easily accessible.

1.2.4 As at the national level, in each unit of the local or regional service, links will be established, coordinated and made available by the national authorities, thereby preventing organizational delays at the time of the carrying out of the emergency operations.

1.2.5 The activities, as well as contact with government authorities through the Crisis Committee, will be coordinated on an ongoing basis between the different levels (central, regional and local).

1.2.6 Strategic alternatives to be considered before the technical and political decision is made should be prepared in advance. These alternatives are to be reviewed at regular intervals.

1.2.7 In farming systems possessing similar epidemiological factors, it is advisable to have regionally accepted and coordinated contingency plans.

1.2.8 It is necessary for the system to have the participation of all those Official Service units and public and private institutions and agencies that may have a direct or indirect role in the solution of the problem. Regulations should be previously established for the SINAESA.

1.2.9 There must be a structure of operations to facilitate coordination between the different members of the emergency system at the central levels and the local level where operations are conducted.

1.2.10 The current legislation specifies the obligation of the owners, managers or holders of any title to animals susceptible to vesicular diseases, to report the suspicion of sick animals.

1.2.11 The same obligation applies to veterinarians and professionals involved in agriculture in general, all officials of the official services of the country, administrators and officials from slaughterhouses or animal slaughter plants, dairies, pork processors, etc., administrators or officials of livestock markets, truckers. All are required to notify the Official Veterinary Service, local or central, of the existence of any animal with suspected or obvious symptoms of the disease.
1.2.12 In the event of difficulties being experienced in notifying the official veterinary service, the nearest police authority must be notified of the existence of any animal with signs or symptoms suggestive of Foot and Mouth Disease.

1.2.13 This legislation will be adapted to the strategic changes necessary to detect and quickly effect the control and eradication of Foot and Mouth Disease.

1.2.14 To achieve this objective, an ongoing community sensitization program is necessary, particularly in the livestock sector, and an alertness of the animal health official services, duly trained for the emergency.

### 1.3 RECEIPT OF INFORMATION

1.3.1 A notification of the existence of animals with clinical signs of, or signs similar to, Foot and Mouth Disease having been reported by a producer, veterinary surgeon, official or third party, the first step to be carried out by the official service receiving the notification is to set in motion measures to confirm the existence of the disease or to reject it in the shortest time possible.

1.3.2 This notification may come through different routes, the most common being by way of the local veterinary unit, in the following ways:

- from the owner on observation of symptoms of vesicular disease in animals on his property;
- from the manager of the farm;
- from neighbors;
- from the private veterinarian treating that site;
- detection by the official veterinarian;
- as a result of carrying out an epidemiological survey.
1.4 RECORDING THE NOTIFICATION

1.4.1 This will be done by stating the date and time on a form, notebook, or numbered card from the appropriate office.

- Basic information to be obtained upon initial notification, on the Notification Record form at the local office:
  1. Location (Province / State / Department / City);
  2. informant’s name;
  3. date and time of receipt;
  4. informant’s phone (cell, business and home);
  5. notification received by (indicate name)
  6. owner’s name;
  7. property identification (name, registration number);
  8. location of site;
  9. area (ha.);
 10. species supposedly affected and number;
 11. probable date of onset;
 12. clinical symptoms observed;
 13. veterinarian treating the site;
 14. officer responsible for attending to the call.

1.5 HOW TO RELAY THE INFORMATION

1.5.1 The official or the local official veterinarian, who receives the notification, informs his immediate supervisor, by the quickest means, phone, cell phone, SMS, email, radio, telegram, or in person or through a third party, transmitting the data from the form cited above. It is important that this communication is also recorded.

1.6 LIST OF CONTACTS AT THE LOCAL LEVEL

1.6.1 In the event it is a Sunday or a holiday, the information should be transmitted by telephone to the numbers of the officials designated by the health authority. To this end, a list of names, addresses, private telephones, cell phones and email should be prepared, once available.
1.7 LIST OF CONTACTS AT THE REGIONAL LEVEL

1.7.1 Make a hierarchical list of names, addresses, private telephones, cell phones and email addresses of the senior officials, once available.

1.8 LIST OF CONTACTS AT THE CENTRAL LEVEL

1.8.1 Make a list of names, addresses, private telephones, cell phones and email addresses of the respective political authorities, once available.
RESPONDING TO THE NOTIFICATION AND INVESTIGATION

2.1 ACTION OF THE LOCAL HEALTH AUTHORITY

2.1.1 Basic instructions to the notifier – Instruct the notifier, if it’s the owner or the person responsible for the animals, on the need to keep the suspected animals from moving around, confining them within the premises where they are located.

2.1.2 Collect cadastral information and information on animal movement – It will be arranged that together with the administrative officials, the epidemiological and basic cadastral information will be gathered during their attention of the suspected case, estimating the number and census of all farms (standard) within an area covering a radius of 5 and 10 km around the suspect farm.

2.1.3 Use of the Geographic Information System – To use the Geographic Information System (GIS) available on the network and, if available, the National Animal Identification and Registration System, which allows for the studying of the movements to and from the reported farm over the last 30 days. The information will include the reported site, its boundaries and the compromised area, as well as mapping information, with access roads, number and types of sites, animal population, presence of sites of concentration and marketing of animals, movement of animals, history of vaccinations, previous outbreaks, etc.

2.1.4 Contact with the Police Authority – To inform the police authority about the possibility of temporary interdiction, until further notice, of the property suspected of having vesicular disease.

2.1.5 Basic attention equipment – The local veterinary unit will have transport available (car, truck, motorcycle, boat or inflatable boat based on the area to be
inspected), equipped with means of communication to enable them to communi-
cate at all times. In addition, the Local Unit must always have all equipment critical
for the attention of the suspected cases of vesicular disease, as suggested below:

<table>
<thead>
<tr>
<th>BASIC ATTENTION EQUIPMENT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coveralls and disposable equipment</td>
<td>Rubber boots and shoe covers for special cases</td>
</tr>
<tr>
<td>Pants, waterproof jacket and hat, preferably disposable. Use a mouth cover.</td>
<td>Disposable gloves and surgical masks.</td>
</tr>
<tr>
<td>Cotton or paper towels</td>
<td>Thermometers</td>
</tr>
<tr>
<td>Tweezers and scissors</td>
<td>Syringes and needles</td>
</tr>
<tr>
<td>Gauze and Bandages</td>
<td>pH indicator paper</td>
</tr>
<tr>
<td>Tape or other adhesive material</td>
<td>Sample bottles and screw cap or seal</td>
</tr>
<tr>
<td>Middle Vallée provided by the Lab Officer or glycerol phosphate buffer (TGF)</td>
<td>Other means of differential diagnosis.</td>
</tr>
<tr>
<td>Sterile swabs</td>
<td>Tubes for blood or vacutainer</td>
</tr>
<tr>
<td>Rabbet and nasal cannula</td>
<td>Ribbon or cord for containment</td>
</tr>
<tr>
<td>Plastic pail</td>
<td>Sponge</td>
</tr>
<tr>
<td>Brush for boots and hands</td>
<td>Soap</td>
</tr>
<tr>
<td>Antiseptics</td>
<td>Sodium carbonate 4% or other disinfectant as indicated – See Annex 08</td>
</tr>
<tr>
<td>Portable spray equipment</td>
<td>Small and large sturofoam coolers to transport materials</td>
</tr>
<tr>
<td>All necessary forms (attention, dispatch of materials and interdiction)</td>
<td>Box with necropsy instruments</td>
</tr>
<tr>
<td>Disposable waste bags</td>
<td>Fencing polyethylene tapes</td>
</tr>
<tr>
<td>Means of identification: tattoo forceps, clamp for caravans, caravans, chips and chip readers</td>
<td>Previously prepared posters or notices showing “ROAD CLOSED” and “NO ENTRY”</td>
</tr>
<tr>
<td>Fluorescent road cones and vests</td>
<td>Camera</td>
</tr>
<tr>
<td>Laptop computer equipped with Internet, Which permits the operator to enter the Digital Cattle farmers Records System, With the possibility of using the satellite Mapping system</td>
<td>Means of communication appropriate for the region (handys, radios, cellular or satellite phones, if applicable, cell equipped with SMS, email and photo)</td>
</tr>
<tr>
<td>GPS</td>
<td>Procedures Manual in written form and Computer on CD and DVD</td>
</tr>
</tbody>
</table>
2.1.6 Visit property – urgently undertake visit with the minimum delay possible from the moment of notification. It is felt that this period should be no longer than 12 hours from the time of receiving the notice.

2.2 ACTION OF THE REGIONAL/CENTRAL AUTHORITY

2.2.1 Confirmation of response to the notification – Upon receipt of the notice, a check will be made to ascertain that the investigation is underway and if it is not, an order to this effect is to be immediately given.

2.2.2 Prepare to initiate strategic procedures if the suspicion is confirmed – Based on the nature of the information received from the local unit, make the list of coordinations and activities to be conducted at the national level. Indicate surveillance measures in surrounding areas (if applicable).

2.2.3 Project the dispatch of specialized professionals to the site – Project the dispatch of a specialist vet or team by the quickest route possible. Have the linkages established with the Armed Forces.

2.2.4 Inform the laboratory on the possible dispatch of material and its urgent attention – Ensure that the positive diagnosis is arrived at as soon as possible.
CHAPTER 3

VISIT TO THE PROPERTY WITH SUSPECTED VESICULAR DISEASE

3.1 TRANSFER

3.1.1 The official veterinarian responsible will go to the farm immediately taking care to comply with the strictest standards of bio-security, equipped with supplies and clean disposable clothing as well as the correct disinfectant in sufficient quantities.

3.1.2 Depending on the extent and area of the reported site, one can proceed in different ways. On small sites, mainly of dairy areas, the headquarters of the property is situated a short distance from the main entranceway.

3.1.3 In those cases, the vehicles should not enter property. Veterinarians and/or auxiliary staff, operating still from outside the farm, will change from their common clothing
into overalls, put on their boots and load all the necessary equipment for the attention, including hand pump with disinfectant. It is not advisable to use overalls over ordinary clothing if appropriate disposable equipment is not available.

**3.1.4** On very large properties, often the office or farmhouse is a considerable distance away from the entrance. In such cases it is necessary to drive in, following the procedure described below:

- The vehicle used for moving around must not enter, to the extent possible, into the livestock rearing facilities.
- Go directly to the farmhouse, office, administrative building, or any other place to meet and have an initial interview with the person or persons responsible for the care of the suspect animals.

**3.2 EPIDEMIOLOGICAL INVESTIGATION**

**3.2.1** Record the information on epidemiological forms belonging to each institution.

**3.2.2** Conduct a thorough history and begin to complete the first part of the Epidemiological Investigation Form. If possible, each veterinary administration will have permanent commencement and follow-up investigation forms. As already obtains in some countries in the region, the data can be placed on computerized network of the veterinary service so that at any time each local or central staff member having access to the computerized system through the Service internet can not only print the information, but is required once completed to record the collected information on the Animal Health Information System (SISA), so that all staff with access to the system can read the epidemiological information recorded on it in real time.

**3.2.3** Collect information on populations of existing livestock by species and their location within the different pastures (potreros);

**3.2.4** It is essential to collect (recabar) the revenues and expenditures relating to susceptible animals or persons for the last 30 days prior to the communication and make a sketch of the establishment with the location of pastures and number of animals by age.
3.3 EXAMINATION OF THE HERD

3.3.1 Begin the inspection by observing those animals located at sites or pastures where no suspected cases have been seen by the owner or manager and make clinical examinations using a thermometer.

3.3.2 Proceed to the clinical examination of the animal (or animals) in the very place where they are located. To achieve this objective seek the collaboration of the minimum possible number of official or private staff, avoiding transfers and assembly of susceptible animals.

3.3.3 On observing lesions consistent with Foot and Mouth Disease, take samples of fluid from the fresh sores or epithelium of affected animals. It is recommended that the amount of epithelium be not less than 2 grams. In the case of vesicular fluid, obtain it using preferably disposable syringes.

3.3.4 Make the differential and epidemiological clinical diagnosis with other diseases that present a clinical picture and lesions which can be confused with Foot and Mouth Disease, especially when these cattle have a history of vaccination, such as Bovine Viral Diarrhoea (BVD), Bovine Viral Rhinotracheitis (BVR), Clavaria sp. fungal poisoning or Pithomyces chartarum, etc. thereby ruling out Foot and Mouth Disease and if the result proves contrary, confirming that the case presented is in fact one of Foot and Mouth Disease. (see Chapter 4 and Annex 10).

3.3.5 At times it becomes necessary, when the clinical epidemiology is unclear, to proceed to the slaughter of the animal that most clearly presents that picture, for diagnostic purposes, carrying out the necropsy and anatomo-pathological reading besides taking samples for histopathology in addition to the other laboratory studies.

3.3.6 If necessary, include also animals that have died recently in the necropsy to complete the study.

3.3.7 In all cases, the necessary and appropriate samples must be taken to rule out Foot and Mouth Disease and confirm the presumptive diagnosis made by clinical, epidemiological and pathological studies (BVD, BVR, Clavaria sp. Fungal poisoning (BOCOPA), FCM, popular stomatitis, bluetongue, primary or secondary photosensitization, etc.).

3.3.8 Having obtained the duly identified samples, have them recorded on the form for the sending of samples to the laboratory.

3.3.9 All animals suspected and/or affected will be maintained separate and perfectly identified for further study, if required.
3.3.10 It is advisable that a specific number of sick and exposed animals by species involved in the clinical examination be checked serologically.

3.3.11 If applicable, the central level will send a specialist veterinary doctor or group as a support to the local veterinary doctor to help in the investigation and obtain a greater number of samples for the final diagnosis.
FOOT AND MOUTH DISEASE – CLINICAL AND EPIDEMIOLOGICAL DIAGNOSIS

4.1 CLINICAL DIAGNOSIS

4.1.1 CATTLE

- The first signs observed in animals infected with the foot and mouth virus are pyrexia, anorexia, chills and a decline in the production of milk for 2 to 3 days. Later vesicles appear and cracking of the lips, grinding of the teeth, excessive salivation, limping, kicking, symptoms caused by blisters in the mucous membranes of the mouth and nose and or between the hooves and the coronet can be observed.

- After 24 hours of their appearance, the vesicles burst leaving lesions in the affected areas. Vesicles also tend to appear in the mammary glands.

- The animal only recovers after a period of 8 to 15 days.

- Complications: erosions of the tongue, high infection of the lesions, deformation of the hooves, mastitis and permanent decline in the production of milk, myocarditis, abortion, death of young animals, permanent weight loss, loss of thermal control (“panting”).
4.1.2 BUFFALOES

- The greater part of the population of African buffaloes (*Syncerus caffer*) not held in captivity, at least in East Africa, presents a high incidence of infection with foot and mouth disease and some animals can remain infected for periods of at least 5 years (20).

- Although domesticated water buffaloes (*Bubalus arnee*) are a different species and one cannot extrapolate from the studies on the wild African buffalo, they regularly develop lesions characteristic of foot and mouth disease despite the fact that their susceptibility to the disease and the seriousness of their lesions could vary from in depth to not apparent. Tests show the persistence of the virus in these animals for up to 24 months.

4.1.3 SHEEP AND GOATS

- The lesions are less pronounced. Dental pad lesions may be observed in sheep. Foot lesions, when they occur, could pass unnoticed upon clinical examination. Agalactia is typical in sheep and goats reared for milk. Death may occur among the young.
4.1.4 PIGS

- Pigs can develop serious lesions in the feet, especially when located in concreted areas. High mortality is frequent in piglets. The pig has a special place in the epidemiological surveillance of foot and mouth disease since small quantities of the virus, which enter most of the time through its digestive tract, multiply (it replicates 3,000 times more of the virus than the cow) and it is not a carrier of the virus after its clinical recovery.

4.1.5 OTHER SPECIES

- Deer are susceptible to infection with foot and mouth disease and various species are able to retain the infection persistently such as the fallow deer (Dama dama) and the sika deer (Cervus nipon). The infection is less common in the common deer (Cervus elaphus). The white tailed deer (Odocoileus virginianus) retains the infection up to 11 weeks.

- The infection is indicated in at least 15 species of antelopes, such as the impala (Aepyceros melampus), black antelope (Hippotragus niger), Cape eland (Aurotragus oryx) with the kudu (Tragelaphus strepsiceros) showing great viral persistency.

- Infection has also been observed in the gnu or wildebeest (Connochaetes taurinus).

- It has been shown by experiment that the capybara (Hidrocoerus hidrocoerus) possesses high susceptibility to the virus and is an efficient carrier of the infection to other capybara and to bovines, which makes them a source of infection to be considered. There are other sources such as the agouti, the European and African hedgehog, the armadillo, the beaver, the brown muskrat and the otter, but their epidemiological role is not considered relevant (4).

4.2 LESIONS

4.2.1 Vesicles or blisters on the tongue, dental pads, gums, cheeks, palate and soft palate, lips, nostrils, muzzle, coronary bands, corium of dewclaws and interdigital spaces, teats, udder.

4.2.2 In the post mortem examination, lesions may be evident in the pillars of the rumen and in the myocardium, particularly in young animals (tiger heart).
4.3 EPIDEMIOLOGICAL DIAGNOSIS

4.3.1 To facilitate the epidemiological diagnosis, the following must be taken into account:

- Foot and mouth disease ecosystems (endemic, para-endemic, and free) and their relationship with affected productive systems;
- The particular characteristics of the facilities (breeding, full cycle, fattening);
- Size and type of production (meat, milk);
- Geographic characteristics;
- Animal species (cattle, buffaloes, sheep, goats, pigs, others) healthy and sick;
- Pathology observed and age of the lesions (see guide for estimating age of lesion Annex 01)
- Attack rates;
- Morbidity and mortality by age bracket;
- Immune status of sick cattle;
- Inflows and outflows of animals;
- Time elapsed between the onset of the disease and these movements.

4.4 DIFFERENTIAL DIAGNOSIS

4.4.1 A summary is prepared of some of the diseases that are considered necessary and thus should be present in a differential diagnosis with the foot and mouth disease within the member countries of the Expanded MERCOSUR, which have been diagnosed and some that are exotic to the American continent.

4.4.2 This differential diagnosis is more important in those cases where affected populations are vaccinated against foot and mouth disease.

4.4.3 The “reaction time” elapsed from the time the farmer observes the clinical signs in the animal and reports the suspicion to the official veterinary doctor and the latter arrives at the property in response to the call, are of fundamental importance in the interpretation of the clinical and epidemiological picture and for the estimation of the time of entry and the form of the virus.

4.4.2 This differential diagnosis is more important in those cases where affected populations are vaccinated against foot and mouth disease.

4.4.3 The “reaction time” elapsed from the time the farmer observes the clinical signs in the animal and reports the suspicion to the official veterinary doctor and the latter arrives at the property in response to the call, are of fundamental importance in the interpretation of the clinical and epidemiological picture and for the estimation of the time of entry and the form of the virus.
4.4.4 DISEASES AND LESIONS

1. VESICULAR STOMATITIS

Vesicular stomatitis is caused by a virus of the Rhabdoviridae family. It is a zoonosis.

Clinically indistinguishable from foot and mouth disease when the species concerned are susceptible to this virus, but one must bear in mind that solipeds are refractory to the foot and mouth disease.

It affects domestic livestock including bred horses which many times are the only animals affected and wild pigs.

It is characterized by fever, blisters in the mouth, nose, nostrils, nipples, interdigital spaces, crown, thrush or hasp of the hooves.

It spreads more markedly in times of arthropod vectors. The human is a species in whom the disease is rare, found merely in those veterinary doctors who have direct contact with affected animals without taking major bio-security measures.

Upon becoming infected, they present signs of fever, myalgia and conjunctivitis.

The samples to be taken are indicated in the chapter on laboratory Diagnosis.

2. SWINE VESICULAR DISEASE

Internet images of cases in Italy (14)
Swine Vesicular Disease is a viral disease, *not recorded on the American continent*, affecting only pigs characterized by fever, blisters in the mouth, nose, nostrils, inter-digital spaces, which spread rapidly among susceptible populations. Clinically it is no different from the foot and mouth disease, being a disease caused by a virus of the Picornaviridae family, but of the genus Enterovirus, stable at an ample pH range of 2.5 to 12.0, which must be taken into account when sending materials to the laboratory.

The samples to be taken are indicated in the chapter on Laboratory Diagnosis.

### 3. SWINE VESICULAR RASH

**Swine Vesicular Rash**, is a disease which in its natural form was reported only in the United States, between 1932 and 1955 and since then has not been diagnosed elsewhere in the world. It is a febrile and vesicular disease of the pig caused by various viral serotypes belonging to the genus Calicivirus. It is characterized by the formation of small blisters from the size of a pinhead to others several centimeters in diameter, around the mouth, nose, feet, udder and teats. Its appearance was epidemiologically linked to an interaction between the marine and terrestrial fauna, through the supply of food containing fish or lysate untreated by heat or other inactivating agent to the pig. The spread of the virus would occur by the fecal-oral route or by direct contact.

### 4. BLUE TONGUE

*Lesions – Blue Tongue*
**Blue tongue** is a viral disease. The infection is transmitted by a blood-sucking insect (Culicoides spp.) through infestation of the salivary gland where the virus multiplies actively.

The disease is caused by an Orbivirus of the Reoviridae family. It is characterized by lesions in the nose, severe coronitis, multisystem bleeding and possible malformations. It affects sheep, goats, cattle and wild ruminants. In sheep and goats, the disease is characterized by significant inflammation of the nasal and oral mucosa, which in some cases affects the digestive system. The samples to be taken are indicated in the chapter on Laboratory Diagnosis. All samples are to be refrigerated, do not freeze.

---

### 5. INFECTIOUS BOVINE RHINOTRACHEITIS (IBR)

*Lesions of the nasal mucosa and accumulation of seropurulent mucus (14)*

**Infectious Bovine Rhinotracheitis (IBR)** is a viral disease caused by a herpes virus in bovine cattle, characterized by mouth sores, respiratory and reproductive disorders. It is a disease that affects extensive areas in the Americas. It presents a variety of clinical forms to an inapparent infection. The signs could be: respiratory, digestive, ocular, reproductive, nervous or dermal. The classic clinical picture is: temperature of 40-42 °C, a sudden drop in milk production, anorexia, depression, difficulty breathing, shortness of breath, cough, hyperemia and sero-mucous to purulent mucous nasal liquid discharge, erosion of the nasal and oral cavity, scabs and runny eyes and profuse salivation. Eventually in the congestive and hemorrhagic nasal mucosa, epithelial necrotic foci can form that can develop as far as into diphtheroid necrotic plaques. Conjunctivitis. Abortion often occurs, most commonly after the respiratory form. It was also isolated from clinical conditions of encephalitis or meningoencephalitis in young cows being nurtured for milking purposes (14).
The samples to be taken are indicated in the chapter on Laboratory Diagnosis.

6. BOVINE VIRAL DIARRHEA / MUCOSAL DISEASE (BVD)

![Epithelial necrotic lesions of the nasal and bucal cavity (14).](image)

Bovine Viral Diarrhea / Mucosal Disease (BVD) is a viral disease caused by a Flavivirus / Pestivirus. Both cytopathogenic and non-cytopathogenic strains are known to exist. It affects livestock and is characterized by various clinical forms of which the one in which we are interested is that which manifests as diffuse erosive stomatitis (formation of ulcers) with digestive disorders, (severe diarrhea, even when it can run its course without this manifestation). Dehydration and reproductive problems are also seen (teratogeny). Incubation can last from 1-3 weeks. Sores are seen on the bucal cavity and digestive tract (esophagus, rumen) and affected lymphatic system (leukopenia, neutropenia, lymphopenia).

Cerebellar hypoplasia in calves, congenital malformations, infertility, abortions.

The samples to be taken are indicated in the chapter on Laboratory Diagnosis.

7. MALIGNANT CATARRHAL FEVER (AMERICAN TYPE) (MCF)

![Epithelial necrotic lesions of the bucal and nasal cavity. (14)](image)
Malignant Catarrhal Fever (American type) (MCF) is a lympho-proliferative viral disease of cattle produced by a Herpes virus, Gammaherpesvirinae, DNA. It is linked to the white series.

The virus has a predilection for endothelial tissue. Very sensitive to freezing, through its association with the cells that host it, it depends on the viability of the cell. It is characterized by hyperthermia, oral lesions, conjunctivitis with bilateral corneal opacity, digestive disorders (diarrhea), low morbidity and high fatality. Two types of disease are known, which are clinically indistinguishable: one associated with the alcelaphine virus and another associated with the rearing of sheep or American type. Material for the diagnosis has been acquired through histopathology of tissues of organs such as lymph nodes, trachea, brain, kidney, liver, intestines, through generalized polivasculitis.

8. BOVINE HERPES MAMMILLITIS

Bovine herpes mammillitis is a viral disease caused by bovine herpes virus type 2, which could produce two syndromes, one cutaneous and benign and another that produces a localized ulcerative mammillitis. Both related to geographical factors, the first to tropical and subtropical areas and the second to cold zones. The incubation period is 1-2 weeks. The physical traumas appear to be important in the etiology of the herpes type 2 viruses and the cold season. The clinical signs are flattened and exudative round skin nodules and blisters on skin of the udder and teats with subsequent formation of crusts; vesicular lesions in the oral and nasal cavity and decrease in milk production. They can be confined to one nipple or produce an extensive necrosis in the entire udder (21).

9. BOVINE PAPULAR STOMATITIS

Papular lesions (14)
**Bovine papular stomatitis**, is a viral disease produced by a virus of the genus parapoxvirus of the Poxviridae family.

It is a virus that has high resistance to the environment and drying.

It is thought to be identical to the pseudo smallpox.

It manifests clinically by papular and occasionally erosive lesions in mucous membranes of the nose and mouth of young animals, nursing calves fed with milk supplied “in a bucket”, and can be observed for a period of up to two years. It can spread by contact in the acute phase, by abrasions of the mucosa and transmission has also been considered through sucking insects. Natural infection usually runs its course without a fever. (17, 14)

10. **CONTAGIOUS ECTHYMA**

*Lesions on the outer face of a goat and lips of a sheep (14)*

**Contagious Ecthyma** is a viral disease of sheep and goats characterized by lesions that evolve through phases of vesicle, papule, pustule and eventually scabs.

The virus is a dermatotropic poxvirus.

The lesions are located in the muzzle, nostrils, lips and udders and teats.

It also affects the forelimbs and hindlimbs by causing foot rot.

It is a zoonotic disease and lesions can frequently be seen on the hands of operators who handle infected animals.

Vaccines are available.

The sample to be sent is the papule or scab, from which this virus, which is very resistant to the external environment, can be reproduced.
Poisoning by fungus of the genus Clavaria or Ramaria sp. is a disease caused by ingestion of Clavaria or Ramaria sp macroscopic fungus. It was described in Uruguay in 1957 where it is known as BOCOPA and subsequently in the State of Rio Grande do Sul in Brazil and in the province of Corrientes, Argentina. There is a direct relationship between hot and humid weather, the presence of the Clavaria sp fungus on the Eucalyptus mountains and the presence of sick cattle or sheep that may have been in the mountains and may have eaten the fungus. It has never been observed in horses and pigs.
The fungus is twiggy (without shade) similar to the cauliflower, with a yellow colour, which as it ages changes to brown. It appears in very numerous colonies on the Eucalyptus mountains and colonizes among them. One should not search at the base of the tree, as it is between them and not observed near the trunk of the tree.

The sick cattle cannot eat and drink, or swallow food. They exhibit intense salivation and on inspection of the mouth, particularly of the tongue, complete detachment of the necrosed epithelium. Conjunctival congestion can be observed and in the case of sheep corneal opacity with blindness, difficulty in walking and collapse of animals that cannot remain standing. In cattle can be observed loosening of the cases of the horns, which become easily detached. It is usual for the tail of sows to become detached if pulled. In sheep can be observed the detachment of the clump of wool on pulling. Depending on the amount of fungi ingested by the animals, they can die within a few days. In animals slaughtered for diagnostic purposes, complete necrosis of the epithelium covering the esophagus from its beginning to the entrance to the cardia can be observed (14).

12. POISONING BY THE PITHOMYCES CHARTARUM

Pithomyces chartarum Poisoning (Facial Eczema), is a disease that affects cattle and eventually sheep with a clinical picture of photosensitization. The animals show a very significant sialorrhea, conjunctivitis (purulent in some cases) with closure of the eyelids, blepharitis, lacrimation, rhinitis with desquamation of the epithelium of the nose, and a clear nasal liquid discharge. Clinically, the tongue shows a loss of epithelium on its antero-ventral side or the tip but its dorsal side retains healthy epithelium as does the hard palate and cheeks.
Microscopic fungus – which should be sought in cut grass or grass supplied to the affected animal – contains in the spores, a mycotoxin, sporidesmin, which produces acute toxic hepatitis and biliary obstruction with severe hepatic impairment. It results in loss in the affected animal’s general well-being, jaundice and hematogenous photosensitization.

13. ACTINOBACILLOSIS

There are other conditions that can cause vesicular lesions or lesions that can be confused with foot and mouth disease, especially if the cattle have a history of infectious vaccination, as for example actinobacillosis, of bacterial origin, such as infectious podermatitis in cattle and sheep, necrotic stomatitis, by toxic causes such as the two previously described for their relevance to the livestock of the region, or physiological conditions such as those triggered by photosensitizing plants, or physical or dietary changes due to high levels of uric acid, etc.

14. DERMATOPHILOSIS

Dermatophilosis lesions in a lamb. The disease can produce interdigital proliferative lesions that occur with very obvious foot rot (14)
15. TRAUMATIC STOMATITIS

Traumatic stomatitis by stuck bones or that observed on the taste bud on the dorsal side of the tongue of cattle, caused by thorns, rough grass or another physical agent, which after the initial inflammation evidenced by sialorrhea and pain, evolves into an ulcer located in that place. Lesion located on the taste bud on the dorsal side of the tongue on the protuberance usually caused by physical agents (spines, tough grasses, etc) that damage the taste bud (14).

In Tables 1, 2 and 3 of Annex 10, more details on the more relevant diseases are indicated with their epidemiological and clinical characteristics in relation to the species that make up the population under study, for guidance in the differential diagnosis with foot and mouth disease.
CHAPTER 5

SAMPLES FOR LABORATORY DIAGNOSIS FOR FOOT AND MOUTH DISEASE

In face of the suspicion of FMD, collect adequate samples to confirm the diagnosis. (see Annex 2)

5.1 COLLECTION OF SAMPLES

5.1.1 TISSUE SAMPLES

1. For the diagnosis of vesicular diseases, the primary samples are to be taken from the vesicular epithelial tissue from the mouth, tongue, feet and mammary gland of the sick animals.

2. Whenever possible, the samples should be obtained from fresh, untorn tongue vesicles. The epithelium covering the blisters will be removed with scissors and forceps or previously sterilized cloth.
3. It is better to try to obtain lymph from closed vesicles and this can be done using a sterilized syringe. If the blisters are already open and torn, one resorts to using the epithelium from the edges of the sores.

4. Tissue may be removed from the lesions of the lips, gums or palate, as well as the udder and the legs. In the case of hoof lesions, it is necessary to prewash the feet with abundant clean water without using soap or disinfectants.

5. In the event that the notification of the outbreak was delayed, it is possible to find animals with healed lesions and in those cases, one can resort to the collection of esophageal-pharyngeal material (LEF) to try to isolate virus (see section 5.1.2.1).

6. One can supplement the samples listed above with paired serum samples from convalescent/convalescing animals and from animals which may not have presented clinical symptoms (sintomatologia) and the samples needed for the differential diagnosis (see sections 5.1.2.2 and 5.1.2.3).

7. In cases where necropsies are being performed, take samples of the myocardium and vesicles found in the digestive tract (ruminal (rumen) pillars in cattle).

### 5.1.1.1 Forms

1. Each sample must be accompanied by the form for sending samples to the laboratory.

2. The information should specify:
   - registration number;
   - name of establishment and proprietor;
   - name of affected political division;
   - type of sample;
   - dates of collection and sending of sample;
   - name of sender.

### 5.1.1.2 Identification of animals

1. All animals should be identified by simple or electronic caravans or chips and match their identification with the sample collected;

2. It is common to have to examine several animals before finding suitable lesions from which to extract material;

3. If several animals are tested, apart from obtaining fresh samples of epithelium, it is possible to find lesions in the process of healing that will give indications that would provide a technical basis for the establishment of the most likely date of onset of the infection.
5.1.1.3 Quantity of material (weight / volume)

1. The sample from each animal should weigh at least two (2) grams, roughly equivalent to one square of epithelium of 2 cm per side. It is not essential for it to constitute a single piece: the weight or size indicated can be achieved with several small pieces obtained from one or more lesions, either from the mouth, udder or legs of the same animal.

2. It is advisable to collect samples from various animals, in separate bottles for each sample, duly individualized. Once detached, the material should be placed immediately in a jar of preservative fluid (see item 5.1.5).

3. Lymph samples taken with a syringe from healthy vesicles with preservative medium added such as the *Medium Vallée (pH 7.6)* or *Glycerol Phosphate Buffer (TGF)* are appropriate for diagnosis. Samples of good quality and quantity enable rapid and accurate diagnosis.

5.1.1.4 Packaging of the Sample (vials and preservatives)

1. Samples for the study of foot and mouth disease (epithelium) should be shipped after addition of a preservative medium such as *Medio Vallée (pH 7.6)* or *Glycerol Phosphate Buffer (TGF)*, in sufficient quantity for the sample to be submerged. Before placing the samples in the vials, observe the color of the preservative medium, since it contains a pH indicator, which gives the medium a pink color when the pH status is appropriate, and turns orange or yellow if it is acidified (inappropriate status), in which latter case, the medium should not be used.

2. The samples should be collected preferably in wide-mouth vials fitted with screw caps, properly labeled.

5.1.1.5 Temperature at which to store and send the material

1. Keep the sample permanently refrigerated until it arrives at the laboratory, to which end it is appropriate to have ice available.

2. Conveniently protect the vials with cotton or vegetable fibre and in a thermal box, wrapping them packed in accordance with bio-safety requirements.

3. Urgently send them by the route or medium that ensures their fastest arrival at the laboratory. In the event of a delay, keep the sample refrigerated.

4. Remember that the samples contained in vials without preservative fluid should be maintained at all times on ice.
5.1.1.6 VIAL INDICATED FOR USE

1. The material must be collected in separate wide-mouth vials. If there are not enough vials available, materials from the same animal may be put together in a vial. Epithelia from different animals should never be mixed in one vial.
2. One should ensure that the lid is sealed with tape and a label is added with the following details: a) registration number of the outbreak area with the name of the farm or the location from which the sample was obtained; b) animal from which obtained (cow, bull, pig, etc.); c) material contained (tongue, hoof, udder, etc.), and d) collection date.
3. The very tape provides a good label since it adheres well to the vial if it is very dry. Ensure that the writing on the identification tag is done with material that does not run or blur, becoming unreadable should the labels become moistened.
4. These operations having been completed wash the outside of the vial with clean water and rinse with an approved disinfectant.
5. Notify the laboratory of the sending of the samples, if possible from the very location from which the sample is taken, informing them of the means of transport and the estimated time of arrival at the destination.

5.1.2. OTHER SAMPLES

5.1.2.1 Esophageal-pharyngeal fluid (EPF)
1. The EPF is obtained by scraping the mucosa of the pharynx and front of the esophagus, with an appropriate collector (PROBANG cup). Prior to the collection, the animals should fast if possible, for a period of 12 hours to avoid regurgitations that may contaminate the sample.

2. Select animals which have clearly been infected. This may be verified by the presence of scarring tissue or the formation of new epithelium on the tongue and hooves.

3. In the absence of the desired number of animals, select animals that were in contact with the sick ones.

4. Collect EPF material using the sterilized Probang, a different one for each animal. In the event that there is not a sufficient number of Probangs wash with clean water to collect from another animal and so forth.

5. Drain the EPF material into a wide mouth vial.

6. Add to the EPF an equal amount of Medium EARLE 2x.

7. It is advisable to use vials with screw caps. Seal the vial with tape or adhesive tape, after identifying it with the number or name of the animal, the property name and date of collection.

8. After closing the vial, shake it and place it in a cooler or Styrofoam container. After the external disinfection, place the vial in a container with ice or ordinary salt or refrigerants to -20 °C. Ensure that refrigeration is adequate for the transportation time.

9. Dry ice can also be used, but if the vial was not properly closed, there is risk of acidification of the material by the penetration of CO2, damaging virus isolation.

10. EPF materials should be sent frozen, preferably in coolers with normal ice and added salt.

**5.1.2.2 Serum**

1. It may be useful to collect serum samples to complement the studies.

2. These samples will be collected from animals identified in the acute phase of infection and a second sample could be taken from the same animals 20 to 30 days after the first sample. It is recommended that representative samples be taken from animals in the herd including several species of susceptible animals with and without clinical symptoms.

3. The bleeding should be performed preferably using “vacutainer” like tubes, disposable syringes and test tubes with sterile needles of appropriate sizes and calibers. Keep the tubes containing the blood inclined at an angle, while it clots.

4. Once coagulated (stir if necessary), transfer the serum to 1.5 ml sealed disposable plastic tubes or Eppendorf tubes. Fill them to 2/3 of capacity. Then cool...
in coolers or refrigerators at 4° C until dispatch to the laboratory. Use refrigerants to – 20° C to send. It is important not to forget the animal identification, age, date of last vaccination, along with the identification of the property.

5.1.2.3 Swabs

1. In due course the swabs from the oral nasal, ocular, vaginal mucosa may be sent.

2. To this end, vigorously rub the swab in the mucosa and deposit it in an appropriate tube using the recommended means of storage, the same as with the EPF samples (Middle Earle 2x).
SAMPLES FOR DIFFERENTIAL DIAGNOSIS 

BASED ON THE CLINICAL AND EPIDEMIOLOGICAL SUSPICION

In the event that there is no clear clinical evidence that it is foot and mouth disease, one should obtain the appropriate samples to establish a definitive differential diagnosis considering the other diseases which present clinical pictures which may be confused with foot and mouth.

According to the presentation of the disease, different samples will be taken for viral isolation or serological or histopathological studies for cases such as IBR, BVD or BTV/LA. When a diagnosis of other diseases which can be confused clinically with foot and mouth is required, one should proceed in the following manner:

6.1 FOR ISOLATION OF THE INFECTIOUS BOVINE RHINOTRACHEITIS VIRUS (IBR)

6.1.1 SWABS OF SECRETIONS AND LESIONS:

1. It should contain epithelial cells, for which vigorous rubbing of the swap is recommended. Samples are collected from the eye, nose, mouth, anus, vagina, and foreskin.
2. The swab should be conditioned in a tube containing transport medium in sufficient quantity to keep the swab moist during transport. We recommend EAGLE MEM with 10% fetal bovine serum and antibiotics 2x.

6.1.2 ORGANS:

1. During the necropsy, mucous membranes can be obtained from the respiratory tract, tonsil, lung and lymph nodes.
2. In the event of abortions take samples of the liver, lung, spleen, kidney and placental cotyledons.

3. If any nervous symptoms are observed send cerebrospinal fluid.

4. All samples should be sent refrigerated at 4 °C.

**6.2 FOR ISOLATION OF THE BOVINE VIRAL DIARRHEA VIRUS (BVD)**

**6.2.1 SWABS OF SECRETIONS AND LESIONS:**

1. Nasal and ocular swabs should be forwarded.
2. The ideal time for sampling is when the animal is discharging serous secretions (non-mucopurulent). It should contain epithelial cells and / or white cells (monocytes). Rub the swab vigorously.
3. Use Eagle MEM with 10% fetal bovine serum and 2x antibiotic for transport.

**6.2.2 WHOLE BLOOD EDTA OR HEPARIN (1 MG / ML):**

1. Collect blood at a rate of 3-5 ml per sample. (Do not freeze).

**6.2.3 ORGANS:**

1. Forward samples of small intestine, Peyer’s patches, esophagus, lung, adrenal, mesenteric lymph nodes and fetal tissues. All samples should be sent refrigerated at 4º C.

**6.3 FOR ISOLATION OF THE BLUE TONGUE VIRUS (BTV)**

**6.3.1 WHOLE BLOOD EDTA OR HEPARIN (1 MG / ML):**

1. Collect blood at a rate of 3-5 ml per sample. (Do not freeze).

**6.3.2 ORGANS:**

1. Forward samples of spleen, liver, bone marrow, blood, heart, lymph nodes and epithelium from mouth ulcers. All samples should be sent refrigerated at 4 °C.
6.4 PAIRED SERA FOR SEROLOGY

6.4.1 In all cases (IBR, BVD or BTV/LA), send paired sera of the infected and healthy animals that are in contact with them. It is recommended that the animals to bleed be identified. Between the first and second sample allow 20 to 30 days. All samples should be sent refrigerated at 4 °C.

6.5 LIST OF CONTACTS AND ADDRESSES OF (THE) OFFICIAL LABORATORY(IES)

6.5.1 Indicated for each country, with the first names and surnames of substantive officers and alternates, positions or responsibility, telephones, cell phones, fax, email, official and private address, so that they could be located in time of emergency on any day of the year.
WHILE AWAITING LABORATORY CONFIRMATION

7.1 PREPARATORY MEASURES

7.1.1 The officiating vet will determine as soon as he has examined the animals or at the time he considers appropriate the prohibition of the entry and exit of animals of susceptible and other species.

7.1.2 The clinical picture compatible with foot and mouth disease is considered a “proven suspicion” when the symptoms and signs described in the chapter on foot and mouth disease are observed and the anatomopathological and epidemiological clinical diagnosis so determine.

7.1.3 The proven suspicion determines immobilization, census and clinical inspection of the neighboring farms together with those which are likely to have had an epidemiological relation with the suspect farm, in a period of 30 days prior to the calculated date of infection of the animals.

7.1.4 All these measures may be extended to other premises, depending on whether their location, configuration or contacts with the suspect holding provide opportunity for contamination.

7.2 INTERDICTION OF THE SITE

7.2.1 Record the interdiction of the site on the appropriate and official document.

7.2.2 Decide on the internal confinement of the groups of affected animals in the same place in which they are found, for the period of time which you determine.
7.2.3 During this period, recommend that the tending of affected groups of animals be done by dedicated staff.

7.2.4 Restrict the movement from the affected property of persons and other elements that can carry the virus to other places.

7.2.5 Make provision so that no visits are allowed from other livestock establishments or from persons who because of their work are associated with agriculture and travel to places where there are susceptible animals, such as: livestock shippers, inspectors of genealogical records, inseminators, milk testers, traders and others (beekeepers, etc.).

7.2.6 The proprietor / farm manager shall be informed of and educated on the bio-safety norms that he/she ought to satisfy and also of the disinfection points he/she should set up at all locations that may be so determined.

7.2.7 Put up “No Entry” and “Road Closed” signs or polyethylene tape barriers at all points determined by the official veterinarian.

7.2.8 The entry and exit of persons and vehicles shall be subject to authorization by the competent health authority, which will record them in a daily log, where they will note the date and time, name and surname of the person(s), vehicle registration, origin or destination as appropriate, and comments.

7.2.9 The exit from the farm of meat, carcasses, feed, utensils, milk, manure, hides, wool, etc. shall be prohibited except with the express authorization of the competent authority and in conformity with current legislation.

7.2.10 The results of the investigation shall be immediately communicated to your superiors from the said location by telephone so that they could take appropriate action and alert the National Animal Emergency System (SINAESA).

7.2.11 Everyone who assisted the official veterinarian must comply with the sanitary measures imparted in each circumstance: washing and disinfection of clothing, prohibition of visits to other places or farms with animals susceptible to foot and mouth disease. Such staff will have no contact with susceptible species for a minimum of 72 hours.

7.2.12 The epidemiological form shall be completed paying initial attention to detail, especially in the completion of records of entry and exit of at risk animals and
persons or goods (e.g., dairy establishments) and a copy of that form shall be sent together with the sample(s) collected to the official diagnostic laboratory.

**7.2.13** At the exit of the infected site, the local veterinarian should proceed to clean and disinfect all equipment and materials used in the clinical examinations and in sample collections, doing the same with the means of transport. Finally, remove the disposable work clothes worn or place them in a nylon bag for later sterilization.

### 7.3 OTHER EPIDEMIOLOGICAL SURVEILLANCE MEASURES

**7.3.1** The holdings and any other epidemiologically linked to the suspected holding (by origin, destination) through entry of persons, vehicles or other means, shall be subject to immediate interdiction and inspection by the corresponding official veterinary service and its epidemiological surveillance for the time that is determined.

**7.3.2** The necessary coordination between the officials of the veterinary services and the police undertaking this work shall be done and the necessary equipment provided them (See item 2.1.5).

**7.3.3** Put steps in place to effect the closing of the problem area, indicating the points where the total or partially restricting sanitary control barriers shall be located, and the types of disinfection equipment to be used.

**7.3.4** In the event it is a dairy establishment, immediately advise the processing plant receiving the milk so that measures can be put in place to prevent the spread of the virus to other points, which will be controlled by the official veterinary service through coordination between the company and the health authority.

**7.3.5** Information shall be obtained from and measures to be taken planned with the collection truck and the entire milk collection line of the affected establishment in the 30 days prior to the outbreak. The change of routes is common among dairy firms so it is recommended that this information is obtained.

**7.3.6** In the event it is a plant that manufactures products for export, the milk for domestic consumption shall be derived after a double pasteurization attention. Adoption of measures to products prepared over the last 30 days.
7.3.7 The route for the collection trucks going to the affected property shall be planned. One of these trucks shall be exclusive and equipped with heavy disinfection equipment, which enable the application of the measure.

7.3.8 Apart from the completion of the interdiction forms, the measures relating to the milk that was already collected by the company shall be studied within a period of not less than two incubation periods for the foot and mouth disease (28 days).

7.3.9 Diversion of milk for preparation of products, which by their industrial process deactivate the foot and mouth disease virus. Decide on double pasteurization.

7.3.10 Suspend all types of cattle groupings (fairs, markets and exhibitions) in the area under suspicion, until there is a clear diagnosis of the situation.

7.3.11 Veterinary Emergency measures shall be maintained until the suspicion has been totally rejected.

**7.4 COMMUNICATION TO THE REGIONAL/CENTRAL HEALTH AUTHORITIES**

7.4.1 The nature of the “proven suspicion” determines that the situation be communicated urgently to the central health authorities for the:

1. Adoption of national measures and coordinations.

2. Sending of a team of specialists to provide support for the local service by the fastest means possible (by aeroplane).

3. Request from the central laboratory the urgent diagnosis of the samples sent.

4. Arrange, if deemed appropriate, for the establishment of a quarantine area greater than that proposed.

5. Request all exports and imports up to the present date for the purpose of risk analysis of the affected area.

6. Give priority attention by the central service to all activities that relate and provide support to the local unit.
7. Effect coordination at the international level by informing in detail of the health news.

8. Arrange, if deemed necessary, for the central and regional SINAESA to be alerted.

9. Set in motion the system of animal identification and registration of the country to effect studies of movement associated with the property and carry out a risk analysis using information from the corresponding locations.

10. Have the central office support the local unit.
8.1 ACTIONS OF THE LOCAL OFFICIAL VETERINARIAN

1. Inform the producer associations and unions and those related local government entities, for the control and eradication of the outbreak once it is confirmed.

2. Inform the private vet who attends to the problem establishment and alert him/her to the restrictive measures to follow as well as to the disinfection measures with their equipment and materials.

3. Determine the role to be played by the local office.

4. Confirmation with the police of the definitive interdiction of the premises shall be made by telephone as well as the adoption of the measures necessary for its effective control.

5. List and plan the activities to be carried out in the field.

6. Immediately establish all linkages with the different structures for proper management.

7. Arrange the location and installation of the Emergency Operations Center, which shall operate in a space appropriate for its activities, whether separate or not from the local office.

* The actions that are detailed from this point should be carried out within a time limit of 24 hours.
8. Identify the necessary staff and set up the epidemiological surveillance teams comprised of a vet and an assistant, whose initial role is to conduct an immediate epidemiological survey in the area surrounding the problem farm.

9. Visit bordering and neighboring properties, which can be identified as those within a radius of 3-5 km of the site (predio indice). These teams are high risk and must report immediately any new health development observed.

10. The focal, perifocal zones and zone of epidemiological surveillance as well as the free and initial zones and their duties shall be demarcated with the date and time of their establishment.

11. Alert the Producers’ Associations that support the official services.

**8.2 IMMEDIATE ACTIONS TO BE TAKEN BY THE ZONAL MANAGER AND / OR REGIONAL COORDINATOR:**

- **8.2.1** Identify the physical location for the Emergency Operations Center.

- **8.2.2** Immediately inform the private and official veterinary services in the neighbouring zones or departments and those with possible epidemiological relation, through their organizational structures.

- **8.2.3** Inform the counterpart veterinarian in charge in the neighboring country (by proximity) in the event that he/she has not gone together with the official services for the joint attention of the suspicion.

- **8.2.4** Arrange for and organize the human, material and financial resources of the varying emergency attention teams.

- **8.2.5** Review the delimitation of the affected zone and set them based on health risk.

- **8.2.6** Arrange for the inspection of the premises of the affected area and establish temporary sanitary barriers.

- **8.2.7** Organize the teams necessary to work in the emergency.

**8.3 PROCEDURES OF THE CENTRAL AUTHORITY**

- **8.3.1** Notify the PANAFTOSA-PAHO/WHO Surveillance and Information System, OIE and member countries of the Expanded MERCOSUR and neighboring countries of the health occurrence.
8.3.2 Inform the national, provincial, state, departmental, municipal authorities, etc.

8.3.3 Urgently contact the local members of the Animal Health Emergency System (central, regional and local levels), indicating probable time and place of a meeting at the Emergency Operations Center to be convened for the Emergency.

8.3.4 Indicate the sending of aliquots of the samples by the Official laboratory to PANAFTOSA-PAHO/WHO for confirmation of diagnosis, molecular sub-typing and characterization of the virus (see Annex 2 and 3).

8.3.5 Seek the cooperation of law enforcement (Police, Coast Guard (Prefectura) and others) to ensure compliance with primary health provisions.

8.3.6 Take steps for the eventual evaluation, compensation, culling/slaughter of animals (sacrificio de animales) and disinfection.

8.4 BY THE MEMBERS OF THE EXPANDED MERCOSUR

8.4.1 Alert the community and especially the livestock sector, with regard to preventive measures and the reporting of cases with signs of limpness and excessive salivation/dribbling (babeo).

8.4.2 Organize their Veterinary Administrations for eradication procedures of a possible foot and mouth disease outbreak area.

8.4.3 Advise to strengthen health surveillance and information measures at the border and internally.

8.4.4 Lend support for the eradication of the outbreak once confirmed.

8.5 BY PANAFTOSA-PAHO/WHO

8.5.1 Give priority to the diagnosis of the samples sent by the sending country.

8.5.2 Communicate the results immediately.

8.5.3 Conduct viral characterization studies.

8.5.4 Report the results to all member countries.
ACTIONS IN A CONFIRMED FOOT AND MOUTH DISEASE OUTBREAK AREA

9.1 BY THE VETERINARY ADMINISTRATION AT THE CENTRAL LEVEL

9.1.1 Promote the declaration of a national health emergency.

9.1.2 The outbreak area should be declared a national emergency through the corresponding legal procedures.

9.1.3 Develop and publish the decrees and resolutions that support emergency activities.

9.1.4 Suspend exports of animal products from the affected region and from the areas of possible risk.

9.1.5 Inform the President of the Republic through the Minister of Agriculture and invite the National Emergency Committee or Crisis Committee to coordinate and give support to the veterinary services.

9.1.6 Establish the alternative to follow according to the Contingency Plan, considering that the time periods that must elapse before recovery of the status quo can be requested will depend on the alternative that was adopted (Article 2.2.10.7. Terrestrial Code.) (19). The OIE recognizes four possible strategies:
1. slaughter of all clinically affected animals and all susceptible animals in contact with them;

2. slaughter of all clinically affected animals and all susceptible animals in contact with them, vaccination of the animals posing a risk and subsequent slaughter of vaccinated animals.

3. slaughter of all clinically affected animals and all animals in contact with them, and vaccination of the animals posing a risk without subsequent slaughter of vaccinated animals.

4. vaccination without slaughter of all affected animals neither subsequent slaughter of vaccinated animals.

9.1.7 Immediately invite the members of the central SINAESA

9.1.8 Provide the necessary human, material and financial resources for the emergency.

9.1.9 Initiate the program of systematic communications foreseen during the emergency.

9.1.10 Provide accurate epidemiological data at all levels to:
   1. Inform the general population.
   2. Inform and educate the livestock sector.
   3. Inform and educate the agriculture industry.
   4. Promote cooperation in the emergency.

9.1.11 Reformulation or confirmation of the quarantine established previously shall be effected when the presence of foot and mouth disease is confirmed, together with the reformulation or confirmation of the preliminary sanitary barriers.

9.1.12 24-hour compliance with the terms, including the participation of the police force, shall be ensured until the conclusion of the measures.

9.2 ON THE OPERATION BASE (DETERMINATION OF THE WORK ZONES)

9.2.1 In the initial meeting – urgently convened for the Emergency at the Emergency Operations Centre – the Head of Operations will report in detail on the situation and clarify the technical concepts of delimitation of the sanitary zones in accordance with the glossary and work program.
9.2.2 DEFINITIONS (GLOSSARY)

1. FREE ZONE
   - Free Zone is that territory which does not contain the virus, which is far from the infected area from which is separated from the surveillance zone and which is not epidemiologically linked.

2. INFECTED ZONE
   - The affected Zone is that geographical area which requires a health intervention to contain the foot and mouth disease and avoid its spread. Two zones of epidemiological importance may be considered within it, an *infected zone* where there is the presence of the virus and another *risk or buffer zone* where there is no presence of the virus.

3. OUTBREAK AREA
   - This is property with sick animals and their contacts. In a country free of the illness an outbreak area can be constituted by a single animal. This includes
the bordering or neighboring properties whose animals have the possibility of having been in direct or indirect contact with the affected property.

- It will take into consideration the reaction time or time in which the producer observed the animals with clinical signs compatible with foot and mouth disease and the going to the notified place, determining by the epidemiological study done that the signs observed in the clinical picture are within the incubation period of the disease (14 days).

4. PERIFOCAL ZONE

- An area of radius of 5 to 10 km is established with the affected establishment as its centre.

- It is that territory in the infected area zone which includes the premises next to the infected premises or which are epidemiologically linked to it. There where there is no record of the presence of the agent but there is risk of infection. Therefore, it is also subject to restrictions and surveillance activities. This area is used as a security or buffer area in order to separate the free zone from the infected area.

- Those establishments with high risk of infection are considered, even when no clinically sick animals are observed. It comprises sites that surround the outbreak area within a radius of variable limits (usually with an approximate radius of 5-10 km from the limit of the outbreak area) depending on geographical features (rivers, lakes, mountains, etc.), agricultural zones without livestock, urban areas, etc., which can serve as barriers to avoid the spread of the disease.

5. RISK OR BUFFER OR SURVEILLANCE ZONE

- It is that territory which includes the sites next to the infected zone or which are epidemiologically dependent on it. Where there is no record of the presence of the agent but there is risk of infection. Therefore, it is also subject to restrictions and surveillance activities. This area is used as a security or buffer area in order to separate the free zone from the infected area.

- It is that territory in the infected area zone which includes the premises next to the infected premises or which are epidemiologically linked to it. There where there is no record of the presence of the agent but there is risk of infection.

- The surveillance zone or buffer is established around the outbreak area from the periphery of the perifocal zone and always when the epidemiological studies and tracking corroborate that it is not infected.
• It is intended to maintain the free zone uninfected, having strict supervision and surveillance, with restrictions of movement and controls of the transit of animals, products and by-products and derivatives, by the health authority, with the due support of law enforcement.

• Taking into consideration the productive systems existing in the zone, it should be a minimum of 10 km and could be as much as 20 km, providing that it guarantees effective control, considering as well the existing natural barriers for its delimitation.

6. SANITARY BARRIERS

• These are physical locations (administrative outposts) set up to apply all bio-safety measures to reduce exposure and spread of the pathogen, as directed by the veterinary administration. The barriers may be barriers of containment and barriers of disinfection. The installation of sanitary barriers will be in strategic locations, both on the perimeter of the area to control entry into / exit from them, and internally, to control movements within it.

7. BIO-SAFETY

• Bio-security refers to the procedures, equipment and facilities that help reduce the exposure of individuals or environments to potentially dangerous biological agents.

8. BIOLOGICAL SECURITY

• Biological safety concerns the measures implemented to protect dangerous pathogens from theft or sabotage activities with the intent to perform acts of terrorism or manufacture of biological weapons.

9. INTERDICTION

• Interdiction means the legal action that deprives the owner of animals of their rights of free administration of the goods found in the infected area. Interdiction involves the procedures of isolation and quarantine.

10. ISOLATION

• This is the separation of sick animals and from their direct contacts, during the period of transmissibility, in places and under conditions that prevent the direct or indirect transmission of the infectious agent from infected animals to
other susceptible animals. It is also necessary to isolate animals of species that are not naturally susceptible, as possible carriers of the foot and mouth disease virus.

- This is done in the focal or outbreak area from the verification of a suspicion of vesicular disease until the risks of transmission of infection have disappeared.

11. QUARANTINE

- It is the restriction of movement and observation of apparently healthy groups of animals exposed to the risk of infection, but which have not had direct contact with infected animals.

- Its purpose is to prevent the possible relay of the disease to other animals not directly exposed. It can be:

  - Complete Quarantine. Total restriction of animal movement for a period of no less than 30 days after sending to slaughter or the last clinical manifestation.

  - Attenuated Quarantine. Selective and partial restriction of movement of animals, products and bi-products. Commonly applied in accordance with differences in susceptibility, known or assumed, and for justified economic reasons.

- One measure can be depopulation, with anticipated slaughtering in a slaughterhouse under official control and within the infected zone if possible, where measures of maximum bio-safety will be adopted and the meat will be sent, after a treatment which inactivates the foot and mouth disease virus, to the domestic supply of the region.
**HEALTH MEASURES IN THE INFECTED ZONE**

**10.1 INTERDICTION OF PROPERTIES**

10.1.1 Interdiction of all farms to quarantine the affected areas.

10.1.2 Draft the interdiction document and give appropriate instructions to prevent the spread of the disease.

10.1.3 Confinement of the groups of animals affected to the same place where they were found on the farm with the suspected outbreak.

10.1.4 In conformity with the prevailing health regulations restrict the exit from the affected farm without proper authorization of persons and or elements which may spread the virus to other farms or places with animals susceptible to vesicular diseases.

10.1.5 Allow no visits from people from other cattle farms or those that, through the nature of their work traverse to and from places with animals: inseminators, genealogical records inspectors, drivers and milk collectors, dealers and others.

10.1.6 With regard to milk producing establishments communicate immediately to the recipient plant the fact (in oral and written form, making a record of the month, day and time of such communication), so that measures are taken along the collection route and at the plant, and taking into account the Contingency Plan options.

10.1.7 On leaving the affected property, return directly to the base of operations, without stopping to visit any place where there are animals susceptible to vesicular disease, and not visiting any other farms for a period of 72 hours.
10.1.8 Communicate in detail to your immediate superior the healthcare developments in his jurisdiction. This does not remove the need to use your professional discretion while acting within the laws of the country.

### 10.2 RATIONALE FOR RESTRICTIONS IN THE DEFINED ZONES

10.2.1 The species of animals susceptible to vesicular disease and infected with the virus, either in a state of incubation or showing clinical symptoms, represents the most common means of transmission of the disease.

10.2.2 Therefore, the principal measure employed is to prevent the movement of the animals from an affected area or when not possible, to restrict and constrain it by the imposition of strict controls by the official service for the duration of interdiction measures in the affected zone.

### 10.3 SLAUGHTER OF ANIMALS

10.3.1 The slaughter of sick animals and their contacts, aims to confine “in situ”, the main source of virus dissemination by what must be done in the shortest time possible and according to the animal welfare practices described by OIE.

### 10.4 DESTINATION OF CARCASSES

10.4.1 All products obtained from animals were considered infected and should be subjected to appropriate attentions to destroy any residual virus.

10.4.2 The meat, in particular, should be treated as provided by the Terrestrial Code Appendix 3.6.2, Article 3.6.2.1. (19) if the animal carcasses are not destroyed by burial or incineration.

### 10.5 MEASURES RELATING TO THE CONCENTRATION OF ANIMALS

10.5.1 In the affected area groupings of susceptible animals (fairs, auctions, exhibitions) should remain prohibited by order of the competent health authority for the period of time necessary.
10.6 MOVEMENT TO SLAUGHTER (DEPOPULATION)

10.6.1 Live animals belonging to species susceptible to FMD may not be removed from the infected area except on board a motor vehicle under bio-safety restrictions and heading to the slaughterhouse indicated by the health authority; if possible the slaughterhouse should be located in the buffer or surveillance zone, and the animals immediately slaughtered, under bio-safety conditions, with the necessary inspection and taking of samples done.

10.6.2 If there is no slaughterhouse in the buffer or the surveillance zone the susceptible animals may not be transported to the nearest slaughterhouse located in the free zone for immediate slaughter, unless:

- No animal on the farm of origin has shown clinical signs of FMD for at least 30 days prior to movement. The animals were kept in the holding of origin for at least 3 months prior to transport.
- No FMD has appeared in a radius of 10 km around the holding of origin for at least 3 months prior to the release.
- Animal products are only for consumption in the domestic market.
- The animals are transported under the supervision of the veterinary authority, directly from the farm of origin to slaughter in a vehicle cleansed and disinfected and not in contact with other animals susceptible to the disease.
- The abattoir to which the animals are to be taken is not authorized to export.
- Vehicles and abattoir will be scrupulously cleaned and disinfected immediately after being used.

10.7 MEASURES RELATING TO THE MOVEMENTS OF ANIMAL PRODUCTS AND BY-PRODUCTS AND OTHER ELEMENTS

10.7.1 The products and byproducts of animals susceptible to FMD, which have latent infection, sick animals (unapparent or clinical) and convalescent, may contain the virus and transmit the disease. It is therefore necessary to consider this in planning disease containment and subject any consideration of movement to an evaluation of the risk and seek authorization.
10.7.2 Annex 09 contains tables with data on survival and spread of FMD virus that should be consulted to solve problems of the type discussed in this chapter.

10.7.3 No remains of animals, hay, bedding, manure, cages, baskets, vehicles or other objects, may be taken out of the premises unless **expressly authorized by the official veterinarian**.

10.7.4 No person except authorized officials may enter the area.

10.7.5 When so authorized, the personnel must wear appropriate clothing and disinfect their shoes as they exit. The number of persons entering the focal area will be as small as possible.

### 10.8 REFRIGERATION PLANT MEASURES

10.8.1 Refrigeration should be considered as an alternative to depopulation in the infected area to minimize the risk of spread of the disease.

10.8.2 The carcasses of sick or suspect animals should always be subjected to rigorous cleaning and disinfection measures and subsequent attention for inactivation of the virus after slaughter.

10.8.3 If applicable epidemiological tracking shall be carried out in slaughter plants.

10.8.4 Tracking of animal fresh, chilled or frozen, is a task to be performed regardless of the date of establishment of the disease.

10.8.5 These movements must be recorded to assess the potential risk of spread to distant parts.

### 10.9 DAIRY PLANT MEASURES

10.9.1 The occurrence of an outbreak in a dairy or involving this type of establishment, dictates that immediate and well-coordinated action be taken with industrial cooperatives, so that they limit the problem and prevent the spread of the virus by this means.
10.9.2 Cows infected with FMD virus in milk shed virus for periods that can range from a few days before the onset of clinical symptoms (1-4) up to 2-3 weeks later.

10.9.3 This milk is a vehicle capable of transmitting the disease to susceptible animals through direct means (nursing) or indirectly (feeding bucket, pollution).

10.9.4 In the chain of disease transmission through milk it is important to avoid the use of milk without heat attention to inactivate the FMD virus.

The following measures are recommended for milk from the infected area:

10.9.5 Elimination or domestic consumption, after boiling for at least 5 minutes.

10.9.6 Suspend milk collection vehicle access to the farms in the infected area or alternatively establish a team specially equipped for this task. The team will follow a set route and transport it to a plant where the product will be subjected to attentions to ensure the inactivation of the virus.

10.9.7 Transport the milk boiled or pasteurized double if the facility has the equipment in question, according to a route fixed by the health authority in coordination with the management of the dairy cooperative.

10.9.8 Processing of milk into cheese (aged) or dulce de leche (milk caramel) destroys the respective sera.

10.9.9 Externally disinfect equipment used for collection and transportation of milk with disinfectants that inactivate the virus within the times and concentrations recommended.

10.10 MEASURES WITH OTHER INDUSTRIES

10.10.1 There are a variety of possibilities. Therefore the measures will depend on the risk analysis and the degree of control of the problem; The Health Authority will determine the procedure to follow on a case by case basis always considering the measures of bio-security to be applied.
10.11 MEASURES RELATED TO MOVEMENTS OF ANIMAL PRODUCTS AND BI-PRODUCTS – NON SUSCEPTIBLE ANIMALS

10.11.1 Although birds are not susceptible to foot-and do not replicate the virus, they can act in the epidemiological chain, acting mechanically in spreading the virus.

10.11.2 No movement of poultry and poultry products must be allowed during the first 48 hours of confirmed FMD outbreak.

10.11.3 A large proportion of poultry farms have animals susceptible to foot and mouth disease or have animals susceptible to FMD at their outskirts.

10.11.4 These poultry companies (incubators, broiler breeders, turkeys, ostrich farms, farms producing eggs for consumption, egg packers, etc.) must be aware of the problem and take appropriate bio-security measures in the face of the disease.

10.11.5 Compensation should be paid in respect of the animals not susceptible to the disease that are to be destroyed or be subjected to rigorous quarantine measures for control of the disease in an emergency situation.

10.11.6 Risk factors:

1. Proximity of the poultry farm affected by FMD.
2. Susceptible animal species on the property or neighboring property (pigs, goats, etc.).
3. Number of sick animals on the farm or its neighbors.
4. Prevailing environmental conditions (cold and wet vs. Dry and warm)
5. The traffic model on the poultry farm and in the area.
6. Concentration of virus in the vicinity of the farm (a single property or many).
7. Type of poultry production (confined vs. Unconfined).
8. Destination of poultry production.
### Type of poultry or poultry products

<table>
<thead>
<tr>
<th>Infected contact with dangerous premises</th>
<th>Infected Zone</th>
<th>Surveillance Zone</th>
<th>Free Zone (48 hours after the start of the outbreak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trays of eggs, hatching eggs, day old chicks</td>
<td>No movement at least 96 hours (four days) and then restricted.</td>
<td>Restricted</td>
<td>Restricted</td>
</tr>
<tr>
<td>Movements to other farms of young poultry and shipping to slaughter</td>
<td>No movement at least 96 hours (four days), then restricted based on a risk analysis</td>
<td>No movement for as long as the operations center determines, then unrestricted</td>
<td>Restricted</td>
</tr>
<tr>
<td>Poultry products (meat)</td>
<td>Restricted</td>
<td>Restricted</td>
<td>Unrestricted</td>
</tr>
</tbody>
</table>

### 10.11.7
The 96 hours (four days) are based on the assumption that no viruses survive on the feathers after three days.

### 10.11.8
**Birds:** Live birds may not leave until the security situation in the focal zone poses no risk. Dead birds may be removed after they are plucked, eviscerated and heads and feet removed after written approval from the chief operating officer.

### 10.11.9
**Rabbits, hares:** It is forbidden to remove these alive. The removal of the carcasses of rabbits and hares may be allowed after the passage of 96 hours from the start of the outbreak and after inspection and with written authorization from operations command.

### 10.12 MEASURES RELATING TO OTHER TYPE OF PRODUCT MOVEMENTS

#### 10.12.1 Tubers, fruits and other vegetables for human consumption:
Their removal may be permitted by special authorization of the official veterinary service provided that no soil is removed with them and they are subjected to a washing and disinfection attention ordered by the Head of Operations.

#### 10.12.2 Hay, straw, rice hulls, cotton seed for animal feed, and other elements:
Output is prohibited outside the infected area until the health authority and has determined their status.
(In general, the risk of the above products is contamination of the packaging and means of transportation!)

**10.13 AUTHORIZATION FOR EXIT OF PRODUCTS AND BY-PRODUCTS**

**10.13.1** In very extreme circumstances, the removal of certain products from properties in the focal and perifocal zones, not being extracts from susceptible animals, may be authorized.

**10.13.2** To authorize the removal it is necessary to take into account the type of product and their location within the affected area.

**10.13.3** These products will be accompanied by an authorization signed by the Head of Operations, clearly indicating the product, date and time and destination, authorization and the conditions to be met when handling each item.

**10.13.4** The carrier, the vehicle and the exterior of the containers containing such products and by-products will be disinfected on leaving the infected area (Annex 08).

**10.14 WITH THE ANIMALS OF THE FOCAL ZONE**

**10.14.1** No animal should be removed from a place declared infected.

**10.14.2** The groups of animals which are clinically sick and those that are apparently healthy which have had direct contact with them, should be isolated in their homes or fields where the disease appeared.

**10.14.3** The groups of apparently healthy animals infected area will be quarantined for complete until at least 30 days after the occurrence of the last clinical case in the outbreak and their fate will be the task for domestic supply under official control and bio-security conditions. These periods depend on the strategy used – with or without vaccination.

**10.14.4** Any animal not susceptible to vesicular disease, which should enter the premises, must be put under the interdiction regime imposed.

**10.14.5** In the case of animals which, by the requirements of their rearing, must move about within the infected farm, as commonly happens with milking cows, and all pastures, roads and farms to which these animals have access must be considered as infected and subjected to isolation.
10.14.6 Exit from the infected zone with authorization of animals not susceptible to FMD is allowed after a risk analysis and the passage of at least 72 hours from the time of commencement of the control program, subject to their being restricted to an established health route or their being sent to a location where there are no susceptible animals and having put into effect a program of thorough disinfection. Any animal species whether susceptible or not susceptible to FMD, which enters the infected area will be under the imposed regime of interdiction.

10.14.7 Order the posting of notices such as “NO ACCESS” and “ROAD CLOSURE”, in places deemed appropriate by the official veterinarian.

10.14.8 Post notices prohibiting entry where there are animals.

10.15 WITH THE ANIMALS IN THE PERIFOCAL ZONE

10.15.1 Susceptible animals will be completely quarantined for up to 30 days after the removal of animals from the focal zone. For animals not susceptible to FMD see 10.14 above. When adopting emergency vaccination as a strategy change to the measures described in the rules of the OIE (Chapter 13) (19).
INITIAL PLANNING ACTIVITIES AND ACTIONS OF AN EMERGENCY OPERATIONS CENTER

11.1 BACKGROUND

11.1.1 Attending the area affected by the appearance of foot and mouth disease requires a continuous operation on the part of the officers responsible for its control on to the point of eradication of the outbreak. The veterinary administration must plan for/factor in their 24 hour attention during the emergency and provide the necessary funds.

11.1.2 All sites within the affected zone will follow up with records of the operations conducted in them and the outbreak areas will record the initial epidemiology form and those for follow up that become necessary up to the closing record file, with the definition of the dates of the lifting of the measures implemented.

11.1.3 Attention of an area affected by foot and mouth disease which is located in a frontier area puts the countries involved at risk and establishes that the measures to be developed within them follow the same work strategy, coordinated and audited by a supranational structure formed by officials of the member countries of the Expanded MERCOSUR and PANAFTOSA-PAHO/WHO.
11.1.4 These health measures will be developed until it is deemed, through precise technical indicators, that the virus has been eradicated from the environment and there is no viral activity in the area that constitutes a risk of spread to other parts of the region.

11.1.5 The implementation of the measures described for the eradication of the foot and mouth disease virus in the infected area and its coordination, will be checked daily, and can be expanded in depth if determined by the epidemiological studies.

11.2 PHYSICAL LOCATION

11.2.1 Establish the Local Emergency Operations Center and take all steps necessary to permanently develop the work.

11.2.2 The building must be appropriate, with separate offices for each unit of work, meeting rooms, desks, typewriters, computers and printers, telephone with voice mail, fax, projectors, cafeteria, blackboards, drawing tables, photocopiers, and furniture.

11.3 FORMATION OF THE TEAMS

11.3.1 Summon all necessary Veterinary Service necessary to the Center of Operations and members of the local SINAESA and establish the activities to be undertaken by each work unit.

11.4 ESTABLISH INITIAL OPERATIONAL LIMITS

Decide on the conduct of the following aspects of map work:

- Define the criteria for considering each of the areas.
- Set initial geographical boundaries of the “Focal Zone”, “Peri-focal zone,” “Monitoring or surveillance Zone”, “Risk or Buffer Zone” and “Free Zone.”
- Diagram showing Map of the Zones.

11.4.1 Map with the location of an outbreak site and establishment of the peri-focal zone with a radius of 5 km with data of the total area in hectares and the number of cattle, sheep and horses in the properties included within the area.
11.5 DETERMINATION OF CHECKPOINTS AND DISINFECTION

11.5.1 Define the establishment of containment and disinfection stations in the focal, peri-focal and buffer or risk zone considering roadways, routes and other such issues, while coordinating the support of the police force.

11.5.2 At all points you will determine that work will be carried out together with a representative of the official Veterinary Services.
11.6 DEFINITION OF PROCEDURES

1. List the activities to be performed, in chronological order.
2. Coordinate with the appropriate agencies the placement of (direct) phone lines required.
3. This will mean at minimum one line for the Chief of Operations, another (Internet line) for the epidemiology team and another general line for the operations base.
4. Organize the human, material and financial resources.
5. Material for containment barriers and disinfection.
6. Communications equipment.
7. Set up the offices and computer equipment required for each work unit.
8. Money to take care of the operative.
9. Per diem for food.
10. Vehicles available.
12. Administration support, field and control station personnel, logistics and information technology staff.
13. Establish the place for mandatory disinfection of vehicles and materials used. These must be disinfected daily with high-powered machines at the Operations Center.
14. Have Computerized systems that allow for the exact location of the sites and established strategic points (Internet, GPS) in real time on-line with the Central Level and from there make it available, link it up with the international community through the webpage of the Veterinary Administration, so that the health program could be tracked.
15. As far as possible, a single point of exit from the outbreak area shall be established.
16. This sanitary barrier will have high-powered disinfection equipment, foot baths and wheel baths, etc.
17. Have available epidemiological maps (Maps with details of geography, topography and hydrography, etc) always updated (“enlightened”), with the participation of officials from each of the associated institutions of SINAESA, with routes, walkways, airports or landing sites, places with livestock fairs or exhibitions, points of entry to the sites (“gatekeepers”), the livestock bathing areas, livestock jetties, etc.
18. Determine the feasible points for disposal of animals.
19. Accurately identify on cadastral maps the models of the sites implicated within each defined zone.
20. Characterize the affected ecosystem.
21. List and plot within the affected area:
   • All sites with susceptible cattle.
   • Exhibition sites (concentration of livestock).
   • Sites where animals are slaughtered classifying them according to their activity.
22. Determine the likely origin of the outbreak and immediately put in place all epidemiological tracking to be done.
23. Analyze the probable spread of the disease (epidemiological risk).
24. Issue health alerts, immediately in all places to which animals or products posing a hazard have been sent in the 30 days prior to the outbreak of foot and mouth disease, for their epidemiological analysis.
ON THE ACTIVITIES OF THE TEAMS AND THEIR LEADERSHIP

12.1 ORGANIZATION AND OPERATIONS

To optimize the actions to be taken in the area affected by the emergency, it is necessary to establish cooperation initiatives at the ground and logistical level, which will be the responsibility of the Head of Operations and work teams under his supervision.

12.1.1 HEAD OF OPERATIONS (FUNCTIONS)

1. Integrate and monitor the performance of each team in the Operations Center.
2. Conduct assessment of health status and issue reports to superiors.
3. Reallocate resources based on changes in the epidemiological situation.
4. Request the allocation of resources according to needs, in coordination with the National Authorities of SINAESA.
5. Coordinate staffing and security needs with the security forces.
6. Confirm the outbreak formally in writing as well as by telephone to:
   • The Head of the Military Garrison for the animal slaughter procedure, prior appraisal and drawing up of documents and for support to the health barriers.
   • The Chief of Police for action at health barriers and custody.
   • The local headquarters of the Ministry of Transport and Public Works for the opening of ditches and disposal of slaughtered animals.
   • The members of the Appraisal Committee.
   • The Local government (State, Municipal Departmental).
   • The President of the Local Animal Health Support Committee.
7. Monitor the assembly of field operations, assisted by cartographic material and computer support.
8. Confirm location and operation of sanitary barriers with their respective disinfection teams. Keep them in operation.
10. Organize on the sites the animal population to be slaughtered.
11. Assess epidemiological tracking procedures.
12. Rate the development of the outbreak in terms of scale, evaluating its impact and spread, for the purpose of requesting additional human, material, and financial resources.
13. Hold daily meetings at the end of the day with representatives of the local SINAESA and operational staff for ongoing assessment of the situation and report to the central level.
14. Attend meetings set by the national authorities to provide information and make the relevant adjustments based on the alternative.
15. Request the delivery of the notification of slaughter of cattle.
16. Notify the owner or his legal representatives of the decision, in writing.
17. Notify the owner in writing of the appraisal of his livestock, delivering the appraisal document.
19. Receive the advice necessary to establish the construction site of graves for the burial of animals slaughtered, and in exceptional or necessary cases, advice on the measures for the incineration of slaughtered cattle (Annexes 05, 06 and 07).
20. Resolve, once the preceding item is completed, to proceed to disinfection with disinfectant provided by the Local Operations Center (Annex 08).
21. Prepare daily technical reports on the emergency for the Central Level.
22. Oversee the daily technical report on the emergency, to be given to the media by the communication team.
23. Monitor the implementation and development of the emergency plan, preparing the schedule of future actions and orders.
24. Authorize the process of placement of sentinel animals and future repopulation.
25. Establish a Plan of Surveillance by the epidemiological tracking teams with sero-epidemiological and clinical monitoring of the different zones.
26. Obtain the assistance of specialists in social communication for relating with the community affected through the implementation of the measures.
27. If vaccination is to be administered, do the planning, decide on implementation and do subsequent follow-up.
12.1.2 ADMINISTRATIVE TEAM
- This team will have all the original files and copies of the information that emerged during the emergency.
- Will provide all support as determined by the Head of Operations to the different work units.
- Will develop reports that are decided upon.

12.1.3 LEGAL SUPPORT TEAM
- Will address and resolve legal problems during the emergency.

12.1.4 PUBLIC RELATIONS AND COMMUNICATION TEAM
- In charge of protocol and the public relations required during the emergency.
- Develops programs in accordance with the request of the Chief of Operations.
- Supports and organizes presentations as required.
- Prepares press releases.

12.1.5 SOCIAL ASSISTANCE TEAM
- Specialists in social communication will have the role of relating and interfacing with the community, particularly regarding their response (psychological) to the sanitary measures applied, or which are to be applied.
- The measures and activities will be carried out in schools, community centers, churches, farmers’ groups, indigenous societies with their cultures, service personnel and their families.
- In special cases, the assistance of Public Health Specialists (PHS) will be solicited.

12.1.6 HEALTH EDUCATION TEAM
- Prepares materials to maintain the general public and particularly the agricultural sector informed.

12.1.7 COMPUTER SCIENCE AND SYSTEMS OPERATIONS TEAM
- Comprised of a team of professionals specializing in computer systems, which will have as its mission:
  1. Daily input on the computer of the information generated.
  2. Processing the information collected using the programs developed for that purpose.
  3. Submitting daily reports, as set forth in the information flow chart, with high level oversight.
  4. Preparing a daily report to the Head of Field Operations.
12.1.8 COMPLAINTS HANDLING AND RECORDING TEAM

- Located in the operations center.
- Formed by an official of the veterinary service and the person selected by the Police.
- Record all complaints received and report to the Head of Operations.

12.1.9 LOGISTICS SUPPORT TEAM

- Will be in charge of officers with a team, who will be responsible for:
  1. Performing all coordinating roles which are necessary for the proper functioning of the operative with the institutions associated with him.
  2. Operating the supply warehouse.
  3. Maintaining and repairing disinfection vehicles and equipment.
  4. Supplying inputs to the sanitary barriers.
  5. Operating and maintaining telecommunications equipment.

12.1.10 BIO-SAFETY TEAM

- Orchestrated the identification of all personnel who work in the emergency through the issuance of individual cards and, where appropriate, personal equipment that allow the identification of work areas, visits, special teams (e.g., auditors).
- Avoid the possible transfer of the virus through the movement of people and emergency vehicles, checking if they are taking all necessary hygienic measures.
- Verify that the equipment used for inspection are disposable items or that they can be disinfected between sites.
- Have available disposable overalls. If the use of the disposable kind is not possible, arrange for daily washing and disinfection.
- Have available rain gear or wetsuits that allow for easy cleaning and disinfection between sites. Gloves should be sturdy, of rubber, and preferably disposable. If they have openings, discard them.
- Check that the rubber boots are high. These are to be carefully brushed and disinfected before being used between one site and another.
- Demand that inspection staff be provided with protective cap and mask.
- Check whether all disinfection equipment at the Emergency Operations Center are in working order and provide support to the field structures.
- Demand daily washing and disinfecting of all vehicles used for field work and those determined by the Emergency Operations Management.
- Demand the washing and sterilization of overalls, rubber suits, boots and other such items daily.
• Keep a record of arrangements put in place by the management in relation to staff who have performed work in the field.
• Keep a complete record of all attention equipment used in the outbreak areas (rain gear, boots, disposable equipment, rubber boots, disposable boots, gloves, masks, etc., so that they are never lacking.
• Ensure that materials with potentially hazardous agents in the Operations Center are treated and in good condition so that they do not pose a risk of spread of the virus and do not harm the environment.
• Monitor the bio-safety conditions in the operations center and support the field teams.
• Arrange for the use of a disinfection chamber for the disinfection of contaminated materials from the field.
• After each working day, ensure that the inspection staff shower, wash their hair and change their clothes. This should be done whenever they work in a suspect area.
• It will carry the list of the officers who, because of the contact they’ve had with the virus are restricted to carry out field functions with animals susceptible for 72 hours.

12.1.11 ZONAL TRACKING TEAMS (PERIFOCAL, MONITORING AND COMPLAINTS)

• In face of an outbreak of foot and mouth disease, a prompt and effective tracking in the field and a study of the movements of animals and animal products should be carried out in order to gain control of the situation and determine the origin of the outbreak.
• Tracking the movement of animals, animal products and related materials to and from infected sites is priority.
• Tracking is required within and outside of the perifocal zone from the periphery to the center of the area of greatest risk for adequate and timely handling of slaughter of infected herds, so determined to avoid the spread of the disease.
• If the infection has been present in an establishment some time before, immediately after confirmed diagnosis and together with the initiation of eradication measures, one should obtain from the owner and his staff all the information possible related to the movement of animals, milk, meat, manure, farm equipment, vehicles, food remnants, people, etc., who have entered or left the establishment in the last 30 days or more.
• Depending on the number of movements, tracking can require the intervention of a large number of teams and individuals, with good coordination between them and the local and central Center of Operations.
• Determine the dates, type of movement and their destinations, with the exact addresses of the properties to check, in order to ensure rapid location of exposed sites.

• Record on the epidemiological map, the details of the movements to and from the infected sites.

• Epidemiological research and studies should be conducted on the movements of veterinarians and other experts involved in agricultural work and vehicles that have been used in the infected area.

• Private veterinarians working in the infected area should be informed of the existence of the disease. They should be asked to report:
  1. If they have visited the sites that are considered infected.
  2. If after visiting these sites they have visited others.
  3. If visits were made outside the quarantine zone, these sites will be quarantined.
  4. Detailed reports should be obtained on animals treated, type of attention, methods and equipment used and disinfection procedures used for all sites visited.
  5. The veterinarian’s vehicle, clothing and equipment will be washed and disinfected and he/she will be barred from being in contact with livestock for at least 72 hours.
  6. Surplus drugs used that may have been contaminated should be destroyed.

• Each potentially infected site will remain under observation for a minimum of 30 days.

• The above measures are applicable to the technical staff whose work involves: dairy tests, artificial insemination, embryo transfer, as well as agricultural extension workers and other personnel who perform livestock activities.

• **The teams are different given the different levels of risk involved in the tasks to be performed in each zone.**
  
  • Each team will come together to visit all sites with the material required for each of the indicated work zones, working simultaneously. This must be the system on all farms.
  
  • They will inspect, in the shortest possible time but in the minutest of details, all the susceptible animals on all of the sites of the focal, perifocal and surveillance zones, subjecting them to clinical examinations involving thermometry, and blood sampling in the first stage, with the aim of detecting as early as possible animals with signs of disease or animals in the prodromal phase.
  
  • Recording of each site, including in record, date and time of commencement and completion of work and signature of the person responsible for the property together with that of the service official.
• At each inspection there should be a census of all animals existing, checking it against the latest official records.
• Any discrepancy with the previous census will be noted on the record.
• The frequency of inspections will be dictated by the risk to which each property is exposed due to its proximity or relationship to the outbreak area.
• The sites adjacent to the outbreak area must be inspected daily or every three days subject to availability of resources. This also applies to the rest of the perifocal zone.
• These inspections will continue for 30 days after the slaughter and disposal of animals in the outbreak area.
• The strict bio-safety measures implemented during the emergency will be maintained during all inspections.
• In the perifocal zone, it is advisable to have the tasks performed by high risk teams, those who visit the sites adjacent to the outbreak area, and other teams who at the same time visit the sites that are on the periphery of the boundaries of the focus.
• Perform clinical inspection and sampling in all cases of suspect animals.
• If there is clinical suspicion, interdict the site and issue a document and immediately notify the Operations Center.
• Investigate and collect epidemiological history of the outbreak area, filling the EIF.
• The recording of a new outbreak indicates that the epidemiological map and measures must be revised.
• Every site that, within a period of 30 days prior to the start of the outbreak may have received animals, products or elements capable of carrying the virus, originating from an infected site, will be inspected and quarantined.
• This immediate inspection is a must, whatever the distance between the two sites. From the outcome of the inspection and additional lab tests, a process of attention of the infected outbreak area (if positive) will be commenced or the site will remain under observation (if negative) for at least 30 days.
• When animals that are suspected of having the disease or that have been in contact with sick animals, have been together in a concentration of livestock (fair, market, etc..) within a period of 30 days before the outbreak, they should be examined.
• This examination should be done as quickly as possible, proceeding in addition to disinfecting the areas presumably contaminated by the animals.
• The names and addresses of the sellers and buyers and the location by farmyard for each batch must be listed.
• If the infected animals were driven down a path while sick or in the incubation period of the disease, all properties located in the path travelled by the suspect animals will be put under quarantine for the period determined by the health authority, which will never be less than 30 days.

• It will be ensured that all means of transport and vehicles used in the emergency, which have been linked to the outbreak area, are cleaned and disinfected. In addition, all places visited and that were recorded in their epidemiological study will be visited and inspected and samples will be taken.

12.1.12 SANITARY CONTAINMENT BARRIER AND DISINFECTION TEAMS

• Will be immediately installed (if not already installed) in strategic places: the only allowed exit of the outbreak area, the perimeter of the perifocal zone and the perimeter of the surveillance zone.

• Containment and disinfection stations will be placed on all roads or any proposed transit routes between zones, working 24 hours until the lifting of the emergency.

• Equipped with communication media, allowing the exchange of information on an ongoing basis between each other and with those coordinating the emergency.

• Composed of staff of the official services with backup from the security forces.

• Will continuously control and record all ingress and egress (allowed by pass issued by the health authority), from the moment of establishment, with such comments as appropriate in each particular case.

• Will control the internal movements within the zone under control.

• Will perform the function of containment, avoiding exit and / or entry of unauthorized (forbidden) persons, animals and / or products, unless authorized in writing by the Head of Operations.

• Will perform the task of disinfection, ensuring thorough disinfection of all vehicles and equipment as necessary.

• Inspect vehicles.

• Will seize and destroy any unauthorized products and prepare the relevant document.

• Will ensure that there is round the clock performance of these tasks.

• Will communicate immediately any new animal health development or problem to the appropriate unit in the center of operations.
• Will be provided with all necessary equipment and materials and logistical support for the smooth performance of their role.
• Use power equipment in the washing and disinfection, possibly setting up disinfection arches if these can be used.
• Avoid contamination of the environment, especially waterways.

12.1.13 EVALUATION TEAM – APPRAISAL CRITERIA
• These operations will have legal backing and will be conducted by the Appraisal Committees.
• It will comprise at least one representative from the producer organizations, one from the Veterinary Administration and a neutral member or expert appointed by mutual agreement of both parties.
• Its main function will be to set the amount of compensation to be received by the producer as a result of the elimination of animals, animal products or by-products and destruction of property.
• Review the corresponding documents and submit them to the Head of Operations for immediate processing
• Appraisal criteria: (Will be based on relevant legislation in the country).

12.1.14 SLAUGHTER EQUIPMENT (SEE APPENDICES 4, 5, 6 AND 7)
• Slaughter methods will be adopted which reduce the suffering of the animal to the minimum possible (humane euthanasia) in accordance with the provisions for animal welfare in Annex 3.7.6 of the OIE Terrestrial Code.
• Personnel involved in the slaughter of animals must have the relevant skills and competence.
• This task will be performed by a specialized team led by an official veterinarian.
• The operation must be headed by a veterinarian, assisted only by staff that are strictly necessary, thus preventing the attendance of the curious, and for which, among other things, it is always advisable to have the presence of the security forces.
1. Supervise the Excavation Team.
2. Supervise the slaughter process.
3. The representative of the official veterinary service will clinically check the animals and carry out the sampling and perforation of the rumen in the case of ruminants in order to prevent the formation of gases that cause an explosion in the pit made after the burial.
4. Direct the process of the destruction of the animals and subsequent disinfection of the pit.
12.1.15 DISINFECTION EQUIPMENT (SEE ANNEX 08)

- Carry out the disinfection procedure at time of slaughter (disinfection of machinery, slaughter area, slaughter implements, personnel, etc).
- Sanitize the site where the slaughter and burial of animals were performed, the fencing of the burial pits, disinfection of the pens and feeders, the burning of hay and other contaminated materials and the disinfection of contaminated pastures.
- Supervise and maintain the disinfection teams at all health barriers and provide ongoing support for their smooth functioning.
- The disinfection procedure in each case depends on a variety of circumstances, for example, the nature of the structures or pens, the places to which sick or suspect animals have had access and the amount of manure and dirt, the nature of the products that are considered contaminated, etc.
- The most important factor to ensure the deactivation of a causal agent in an infected site is the cleaning and thorough washing after the preliminary disinfection with the frequency determined for each product used, prior to final disinfection.
- One should bear in mind that almost all substances used in disinfection are toxic to a greater or lesser degree.
- People who work with these substances, or the organizations for which they work should take appropriate measures to protect their health, such as the use of equipment appropriate to the task and use of masks to prevent inhalation of the product.

12.1.16 COMPENSATION TEAM – COMPENSATION PROCEDURES

- The successful implementation of sanitary eradication measures is inter alia, dependent on the speed with which compensation is awarded for animals and goods that are destroyed by order of the health authority.
- For this reason it is considered that the value of the animals slaughtered through the application of sanitary measures and movable property destroyed, will be compensated through supporting legal measures.
- The legal provision shall determine the conditions and requirements for setting the compensation amounts as well as the procedure. Compensation should be paid within a period not exceeding thirty days of the constitution of the Appraisal Committee, and should be issued within a period not exceeding thirty days of the slaughter.
- Within the time limit established (30-60 days) and once all the legal details of the individual appraisal documents are confirmed, the producers will be paid the amounts established by the legislation in force in each country through documents signed by the parties involved.
• Compensation Procedures

1. Whenever there is compulsory slaughter of animals, a document, verified in detail by the acting health authority, shall be prepared. The health authority, in its turn, shall indicate the date of slaughter and forward it, without further delay, to the respective Appraisal Committee.

2. The said Committee will send the report containing the amount of compensation and the criteria applied to the relevant health authority.

3. In the case of compulsory slaughter, the interested party shall advance the payment of the slaughter plants.

4. Finally, after having regard to the person concerned, which does not imply suspension of the slaughter, the relevant health authority will decide the amount of compensation, which it will make available to the person concerned.

5. The said solution involves the administrative resources that may apply.

6. The animals, products and materials to be destroyed due to infection or because they were exposed or infected by the Foot and Mouth Disease must be previously assessed.

7. Make allowances for several operational committees, to which end extra teams should be established.

8. The evaluation will be conducted by the relevant committee and the stock recorded in a special form which shall contain all details (species, age, livestock value, registration number, etc.) which have been used for the assessment.

9. If the owner does not accept the valuation, the form will be used for the subsequent claims before the local courts, but the disagreement must not be allowed to suspend the ultimate slaughter of the animals.

10. In making the assessment the physical condition caused by the disease should not be taken into account.
13.1 CONSIDERATIONS

13.1.1 The strategy to be followed in controlling an outbreak of foot and mouth disease in FMD-free countries or in free zones with or without vaccination, is a decision which should be evaluated bearing in mind the time it would take to reestablish disease-free status, following the guidelines established by the OIE Terrestrial Code.

13.1.2 When FMD occurs in one place, the use of an emergency vaccination can be considered if the population is not vaccinated against FMD in order to check or enhance the level of immunity of the cattle population at risk.

13.1.3 This strategic vaccination will be administered within the framework of the alternatives previously established in a Contingency Plan.

13.1.4 The various combinations of factors involved in this problem determine the need for the competent veterinary authority to decide on the most appropriate actions, based on the analysis of each particular situation and taking into account the reports provided by PANAFTOSA-PAHO/WHO of materials submitted for sequencing and identification of the active viruses.

13.1.5 All activities in the strategic vaccination program will be documented, which allows for monitoring by an audit at any time.

13.2 CONDITIONS SET BY THE HEALTH CODE (OIE)

13.2.1 The conditions set by the OIE Health Code for Terrestrial Animals in its chapter on Foot and Mouth Disease for the return to the status of FMD-free country or zones are:
1. In the event of an outbreak of foot and mouth disease or of an infection by the foot and mouth disease virus in a country or zone free from foot and mouth disease where the vaccine is not administered, the following waiting periods will be required for the country or zone to regain its FMD-free status:

- 3 months after the last case, if slaughter and serological surveillance are carried out in accordance with the provisions of the OIE Health Code for Terrestrial Animals in Annex 3.8.7 is to apply, or;

- 3 months after the slaughter of all vaccinated animals, if sanitary slaughter, serological surveillance and emergency vaccination are practiced in accordance with the provisions in Annex 3.8.7 are to apply, or;

- 6 months after the last case or last vaccination (taking into consideration the most recent of the two), if sanitary slaughter, emergency vaccination without sanitary slaughter of all the vaccinated animals and serological examination are practiced in accordance with the provisions in Annex 3.8.7, whenever and wherever serological examinations based on the detection of antibodies against non-structural proteins of the foot and mouth disease virus demonstrate the absence of infection in the remainder of the population vaccinated.

2. If slaughter is not practiced, the provisions of Article 2.2.10.4 of the OIE Terrestrial Code must apply.

3. In the event of an outbreak of foot and mouth disease or an infection by the foot and mouth disease virus in a country or zone previously free from foot and mouth disease where vaccination is practiced, the country or area will recover its status of FMD free country or zone where vaccination is applied after the following waiting periods:

- 6 months after the last case where sanitary slaughter, serological examination and emergency vaccination is practiced in accordance with the provisions in Annex 3.8.7, whenever and wherever serological surveys based on the detection of antibodies against non-structural proteins of the foot and mouth disease virus show the absence of virus circulation, or;

- 18 months after the last case, if sanitary slaughter is not practiced but emergency vaccination and serological examination are carried out in accordance with the provisions in Annex 3.8.7, whenever and wherever the serological examination based on the detection of antibodies against nonstructural proteins of the foot and mouth disease virus demonstrates the absence of virus circulation.
13.3 VACCINATION OF THE INFECTED ZONE (FOCAL)

13.3.1 Vaccination is not recommended for the infected area. The process of vaccination increases the contact rate between infected and susceptible animals, as the contact rate is exacerbated by the manipulation of undoubtedly contaminated instruments.

13.3.2 The state of direct exposure to the virus implies that this infected zone is the zone of highest risk, making it important from a practical standpoint to consider all the animals as infected and in consequence under the immunological stimulus of the virus.

13.2.3 Together with the clinical cases observed, there may be an unspecified number of unnoticed cases and animals in the incubation period (14 days).

13.4 VACCINATION IN THE PERIFOCAL ZONE

13.4.1 The objective of this action is:
1. to enhance the level of immunity of the cattle population under risk to reduce damage to them and the remaining susceptible population exposed to infection such as sheep and pigs.
2. to build a barrier against transmission of the disease, reducing the chance of virus multiplication, while not ignoring that the animals may be infected without showing symptoms.

13.4.2 All vaccinated animals should be clearly identified by means of caravans and/or microchip so that they can be monitored.

13.5 POINTS TO BE CONSIDERED FOR USE OF VACCINATION IN PERIFOCAL AREA:

13.5.1 Start Date: when it’s an area where the cattle population is subject to periodic vaccinations, it is necessary to consider the time between the onset of the disease and dates of the administered or planned vaccines.

13.5.2 Rapid and timely action: Once the occurrence of foot and mouth disease is confirmed, vaccines should be administered in the perifocal zone as soon as possible, moving from outside to inside. As this is an emergency, where the time factor plays a dominant role, a mass action with extra resources is recommended. This vaccination should be administered directly by the public authorities.
13.5.3 **Vaccine:** Polyvalent or monovalent vaccines will be used based on the type of virus diagnosed and health standards of the country. They must be vaccines of a quality known and approved by the official comptroller, fulfilling the conditions set by the OIE Manual.

13.5.4 **Vaccination of sheep:** Whenever the number is significant and especially if the two species coexist, it is advisable to vaccinate sheep. The same applies to goats.

13.5.5 **Pigs:** This possibility will be assessed, given the fact that it is a species that acts as an excellent sentinel upon multiplication of the virus and vaccination removes this condition.
14 ACTIONS FOLLOWING SANITARY SLAUGHTER

14.1 SANITARY EVACUATION

14.1.1 After sanitary slaughter is completed, the infected zone should be cleared of susceptible animals (sanitary evacuation) for at least 30 days before authorizing its repopulation and as soon as the available sentinelization in these zones establishes the absence of viral activity by biological and serological testing.

14.1.2 Clarify the legal grounds for sanitary evacuation.

14.1.3 During this phase no susceptible animal will be allowed to enter. Should this occur the animals must be immediately eliminated without any compensation to the owner who could face sanctions.

14.1.4 Written records must be kept of the proceedings and these submitted to the Head of Operations.

14.1.5 There will be special monitoring. It will be subjected to veterinary inspection on an ongoing basis as with the rest of the quarantined zone (perifocal).

14.2 SENTINEL ANIMALS

14.2.1 At the end of the period set for sanitary evacuation, susceptible sentinel animals, preferably less than 1 year old cattle and pigs weighing around 45 kg, free of antibodies for foot and mouth disease shall be placed in the sites within the zone initially considered as the focus of infection.
14.2.2 The animals must come from areas recognized as free of the disease without vaccination and must be so endorsed by laboratory tests before intake.

14.2.3 The number of sentinel animals will depend on the size, management, topography of the site and the number of animals that normally are reared on it.

14.2.4 It is estimated that an appropriate amount would be 5% of the usual animal population of the site but never less than 5 animals.

14.2.5 Each group of sentinel animals should be composed of cattle and pigs, possibly including sheep and/or goats free of antibodies, if these species were usually reared on the site at the time of the outbreak:

1. **Species of choice:** Cattle (calves or elderly animals over 150 kilos) and swine (piglets over 30 kilos).

2. **Date of intake of animals:** Once disinfection procedures and destruction of contaminated materials on the site/s are completed and after a period of not less than 30 days from depopulation without animals susceptible to foot and mouth disease.

3. **Conditions for intake:** All animals must be identified with double caravan or by the use of microchip as animals are currently identified in countries of the region.

4. **One should proceed to the clinical and serological examination of each animal** to certify that they are normal and show no lesion confusable with the disease and have tested negative by serology for antibodies to foot and mouth disease.

5. **Sampling (blood – LEF) of all animals:** This will be done on the day of intake, 15 days and 30 days from the introduction of the sentinels and the material sent to the official laboratory. Validation and monitoring of the sentinelization will depend on these results besides the clinical and epidemiological aspects.

6. **Date of end of sentinelization and release of sentinel animals:** On the completion of two incubation periods for foot and mouth disease (28 days) with negative results for FMD.

7. **Destination of animals:** Once the test results are negative the sentinel animals may remain to form part of the animal population of the site or proceed to slaughter after official inspection and destined for domestic consumption.
8. **Number and proportion of animals from each site:** No less than 10% of the population of pre-existing cattle in the affected pasture and 30% of pigs.

9. **Health checks prior to intake:** The sentinel animals should be dewormed, with products that do not stimulate the immunocompetent system.

10. **In zones with ticks, these animals should be dewormed.** They must be preimmunized against hemoparasites present in the country for the purpose of preventing the action of these blood parasites, so as to avoid possible interference in the operational procedure.

11. **Health checks during sentinelization:** Record on computerized sheets all data from each of the establishments to be monitored with the introduction of sentinel animals. In the different rows of the template place the numbers of identifying caravans of the animals and the daily entries which will be made twice daily at the same time in each case, with a check in the morning and afternoon. The rectal temperatures of each animal and the observations of the clinical inspection at the time will be recorded.

12. **Location on the site of animals to be sentinelized:** The area which houses the graves are those that were most exposed to the virus because of the concentration of animals and thus the location of animals in that zone by rotating them around its entire perimeter is considered of strategic importance. In addition, animals will be allowed to move around freely within the area exposed to contamination by the foot and mouth disease virus.

13. **Working conditions:** The teams will work in conditions of maximum biosafety, taking all appropriate precautions.

14. **Confirmation of any case of foot and mouth disease in the sentinel animals:** In this event, all sentinel animals will be slaughtered and the procedure recommenced. The fact shall be communicated immediately to the international community.

### 14.3 CLINICAL AND SEROEPIDEMIOLOGICAL SURVEILLANCE

**14.3.1** This must be maintained with a regimen of daily inspection with clinical observation and thermometry for at least 30 days, collecting sera According to 14.2.5 – 5.

**14.3.2** All these observations are to be recorded from the two daily visits (every 12 hours) on each of the farms.
14.3.3 Serum samples will be collected from the animals on intake, after 15 days and 30 days later.

14.3.4 If the disease appears, or antibodies are detected in animal sentinels, the entire eradication process must be repeated.

14.4 REPOPULATION

14.4.1 If the tests prove negative, allow the restocking of the farms in the focal area, with 20% of its original population. These animals will be monitored for 60 days and at least once a week, at the end of which the owner will be authorized to fully restock.

14.5 END OF QUARANTINE

14.5.1 The country’s health authority and health emergency structure (SINAESA), will declare the end of the health emergency, lifting the quarantine in the area that was affected.

14.5.2 To this end, it will have all documentation properly sequenced and duly detailed of the procedures followed during the different stages of eradication in field and laboratory.

14.6 REPORT TO THE SYSTEMS, COUNTRIES AND INSTITUTIONS

14.6.1 Will communicate the fact to the Continental Regional Surveillance System of PANAFTOSA-PAHO/WHO and the OIE international system, and related agencies, countries with trade links and others, including the various zonal authorities.

14.6.2 The technical documents which confirm the eradication of foot and mouth disease will be handed over to the OIE as well as to the supranational organization of the CVP and PANAFTOSA-PAHO / WHO for the relevant purposes and detailed information provided of the entire process of eradication and control carried out in the determination of the restoration of FMD-free status.

14.6.3 From the end of the quarantine, the zone shall be made a part of the random and continuous national seroepidemiological monitoring system with a view to certifying the restored sanitary condition. At the same time, it will be made part of the ongoing surveillance system for certifying FMD-free status at any given time.
14.6.4 The information must be submitted on a weekly basis during the entire control and eradication process, with a final report on cessation of the emergency.

To achieve complete transparency of actions in the field and laboratory, it is accepted that the credibility of the region is enhanced by the country affected by an emergency seeking the assistance of regional and international observers to accompany the entire process.

14.6.5 Prepare a detailed report on the actions and closing steps of the emergency.
ANNEXES

ANNEX 1. FOOT AND MOUTH DISEASE

An infectious and contagious disease of the vesicular type, of extreme diffusibility, which affects cloven-hoofed animals, both domestic and wild species. It is characterized by fever, blisters in the mouth, nose, nostrils, nipples, interdigital spaces, rumen, lesions of myocardial necrosis, especially in young animals, and rapid spread in susceptible animal populations.

It is based on the data sheet of the Health Code for Terrestrial Animals of the World Animal Health Organisation (OIE) whose website can be accessed at the following address http://www.oie.int, to which facts some epidemiological information has been added.

1.1 ETIOLOGY

CLASSIFICATION OF THE CAUSATIVE AGENT

Virus of the family Picornaviridae, genus Aphthovirus.
Seven immunologically distinct serotypes: A, O, C, SAT1, SAT2, SAT3, Asia1.

RESISTANCE TO PHYSICAL AND CHEMICAL ACTION

| Temperature | Temperature: Preserved by refrigeration and freezing and progressively inactivated by temperatures above 50 °C |
| pH:         | pH: Sensitive to acidic or basic pH (pH <6.0 or> 9.0) |
| Disinfectants | Susceptible to attention with solution of sodium hydroxide (2%), sodium carbonate (4%), and citric acid (2%), 2% acetic acid, formaldehyde 10%, the Iodophors 1 litre of product in 200 of water, solution of didecyl dimethyl ammonium chloride (quaternary ammonium new generation) Triple solution of monopersulfate potassium salt at a dilution of 1:1,300 for FMD and 1:200 for the virus of swine vesicular disease and 1:120 for general use. (see Annex 08). |
| Survival   | In the post-mortem period, the virus survives for varying periods in the lymph nodes and bone marrow at neutral pH. It is destroyed (made inactive) in the muscles at pH <6.0, i.e. after rigor mortis. In the environment including contaminated fodder, the virus can survive for as long as one month, varying depending on the temperature and pH. |
1.2 EPIDEMIOLOGY

One of the most contagious animal diseases, which cause significant economic losses. Low mortality rate in adult animals, but often high mortality in the young due to myocarditis.

HOSTS

Bovine (cattle, zebu, domestic buffaloes, yaks), sheep, goats, swine, all wild ruminants and swine, are the species most susceptible to infection by the foot and mouth disease virus. The camelids (camels, dromedaries, llamas, vicuna) have low susceptibility.

TRANSMISSION

• Direct or indirect contact with infected animals.
• By remote aerosols from infected animals (droplet infection).
• By eating food (waste) that is contaminated: meat, milk, blood, glands, bones and leather (animal products).
• Live Vectors (human by breathing, hands, contaminated shoes, mechanically by non-susceptible animals and birds, arthropods and parasites etc.)
• Inanimate vectors (contaminated objects, vehicles, appliances) (fomites).
• Airborne Virus, especially in temperate zones (up to 60 km on land and 300 km by sea).
• Artificial insemination: infected semen.
• Contaminated biological products.
• Sabotage (sabotage, rather than a means of transmission, is a malicious action with the aim of causing loss. Perhaps could be included a text explaining that because of the economic impact of the FMD virus, it can be used in acts of sabotage to harm the economy in certain sectors, countries, regions etc.)

VIRUS SOURCES

• Animals in the incubation period and clinically affected animals. The pig is a great virus multiplier and acts as a sentinel and oftentimes as an indicator of infection within the region.
• Expired air, saliva, feces and urine, milk and semen (up to 4 days before the appearance of clinical symptoms).
• Meat and meat products in which the pH remained above 6.0. The virus survives for weeks or months in bone marrow, lymph nodes and blood clots (see the attached tables).
• Carriers: particularly cattle and the water buffalo, exposed convalescing and vaccinated animals (the virus persists in the oropharynx up to 30 months in cattle or longer in the buffalo, 9 months in sheep). The African Cape buffalo is the major host of SAT serotypes.

**GEOGRAPHICAL DISTRIBUTION AND ITS RELATIONS WITH THE ECOSYSTEM**

FMD is endemic in parts of Asia, Africa and South America where there occur outbreaks that can negatively impact disease-free zones. For more information on the current geographical distribution, see recent issues of World Animal Health and the OIE Bulletin, as well as information on the OIE website (www.oie.int).

The presence of the disease in a region and the formal and informal system of commerce that exists in that ecosystem, is a very important aspect, for cases of foot and mouth disease to be detected in due time and form, through interlinked epidemiological surveillance among countries in that region. The knowledge of those endemic ecosystems, where there is viral circulation, linked to productive zones with common areas between countries, as occurs frequently in South America, are of paramount importance in the prevention of the disease.

Historically, the spread of the foot and mouth disease virus and clinical manifestations of the disease have been from the breeding systems – particularly extensive ones – to those of termination or fattening, possibly including tangentially paraendemic or free ecosystems, which since they do not act in form will have undesirable consequences as the ecosystem could become endemic if it has the complete cycle of a cattle rearing system. In paraendemic or free ecosystems, the agent is introduced by means of an external or exogenous source as described in transmission. The age range within which manifestations of the disease are generally observed is usually that of the over one year old, making it a category to be well controlled in areas with a history. The cattle in regions of the Southern Cone is the key species in the control of foot and mouth disease, with the sheep, goat and pig of secondary importance in the epidemiological chain.

**INCUBATION**

The incubation period begins from the introduction of the virus into the host through the relevant channel, the respiratory tract being the natural channel, with its intracellular penetration and the emergence of the first lesions. Its maximum timespan ranges from 12 hours to 14 days and is characterized by two distinct phases:

• The *eclipse phase* where the virus is usually not found, even by sophisticated means, can last a few hours and
• The prodromal phase, which is the viremic phase where the animals present nonspecific symptoms or symptoms difficult to identify (fever, anorexia, ruminal atony, agalactia, etc.), which precedes the appearance of typical vesicular lesions.
• This is the phase of highest risk and is where the disease is highly contagious since the animals shed virus in their secretions and excretions possibly lasting from 2 to 10 days depending on the amount and rate of replication (4).
• Four days after, clinical signs appear and, in cattle, virus is eliminated through all their secretions, especially milk and semen (14).
• According to the OIE Terrestrial Code, the incubation period is 2-14 days.

**PATHOGENY**

The first phase of viral replication is in the epithelial cells of the upper airway (nasal cavity, pharynx and esophagus) and lymphatic tissues, especially in cattle, sheep and goats.

Viremia is established subsequently with generalization of infection and replication in selected areas such as the germinative layer of epithelial tissue (lining of mouth, interdigital spaces ruminal pillars, mammary epithelium and myocardial tissue) (24-72 hours) and consequent appearance of the lesions and symptoms (72-96 hours).

The digestive tract can also be considered through contaminated food, the pig being the main channel in the studies carried out in the Expanded Mercosur countries. Other pathways may be the conjunctiva, and all the natural orifices and channels of the nipples. Less common but considered likely are other avenues such as subcutaneous, intramuscular and intradermal inoculation.

The rupture of the vesicles and the end of fever occurs within 120 hours and starts with the production of antibodies.

There is a decrease of virus titre in various tissues and fluids after 8 days.

At **10 days** there is already a partial cure of the lesions and the animal begins to eat.

At **15 days** there already is a reduction of virus excretion and increase in specific antibodies.

From the above dates, the animal begins to heal and the virus persists in the pharynx.
GUIDE FOR ESTIMATING AGE OF FOOT LESIONS

<table>
<thead>
<tr>
<th>Lesions</th>
<th>Cattle</th>
<th>Pigs</th>
<th>Sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breaking vesiculation</td>
<td>![Cattle Image]</td>
<td>![Pigs Image]</td>
<td>![Sheep Image]</td>
</tr>
<tr>
<td>24 hours</td>
<td>24 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breaking vesiculation</td>
<td>![Cattle Image]</td>
<td>![Pigs Image]</td>
<td>![Sheep Image]</td>
</tr>
<tr>
<td>48 hours</td>
<td>48 hours</td>
<td>1-3 days</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Lesions</td>
<td>Sheep</td>
<td>Sheep</td>
<td>Sheep</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pigs</td>
<td>Pigs</td>
<td>Pigs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erythema and movement of epithelium</td>
<td>36 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interdigital podal lesion</td>
<td>96 hours</td>
<td>4-5 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesions</td>
<td>Cattle</td>
<td>Pigs</td>
<td>Sheep</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>Red and eroded surface</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td>Beginning of Healing</td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>Advanced Scarring</td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>Lesions</td>
<td>Cattle</td>
<td>Pigs</td>
<td>Sheep</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Healing almost complete</td>
<td>![Cattle Image]</td>
<td>168 hours (7 days)</td>
<td>9-21 days</td>
</tr>
<tr>
<td></td>
<td>![Cattle Image]</td>
<td>216 hours (9 days)</td>
<td>14 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healing almost complete</td>
<td>![Cattle Image]</td>
<td>10-14 days</td>
<td>9-21 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>240 hours (10 days)</td>
<td>14 days</td>
</tr>
<tr>
<td>Separation of hooves</td>
<td></td>
<td>3-12 weeks</td>
<td>1-4 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1-3 weeks</td>
</tr>
</tbody>
</table>
ANNEX 2. DIAGNOSTIC LABORATORY – MAIN TESTING

2.1 FOR DETECTION / TYPIFICATION
Identification of the type of virus present in the sample.

FOOT AND MOUTH DISEASE: O, A, C*
VESICULAR STOMATITIS: NEW JERSEY – INDIANA.

Sample
Gallbladder epithelium.
Vesicle fluid.
Esophageal-pharyngeal fluid.
Blood.
Cell culture or suckling mice (bioassay).

<table>
<thead>
<tr>
<th>Technique</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC 50%</td>
<td>4 – 6 hours</td>
</tr>
<tr>
<td>ELISA SI</td>
<td>4 – 6 hours</td>
</tr>
<tr>
<td>PCR</td>
<td>- 6 hours</td>
</tr>
</tbody>
</table>

PANAFTOSA-PAHO/WHO has available reagents for identification of extra-regional viruses (SAT1, 2-3, Asia 1 and Swine Vesicular Disease).

2.2 VIRAL ISOLATION
Amplification and / or recovery of infectious virus from the original material. (Bioassay).

Sample
Gallbladder epithelium.
Vesicle fluid.
Esophageal-pharyngeal fluid.
Blood.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell culture</td>
<td>24 – 48 hours **</td>
</tr>
<tr>
<td>Suckling mouse</td>
<td>10 days **</td>
</tr>
</tbody>
</table>
2.3 VIRAL CHARACTERIZATION

2.3.1 ANTIGENIC CHARACTERIZATION

- **SUB-TYPIFICATION**
  Comparative study of isolated virus reactivity against a panel of referenced polyclonal antisera.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallbladder epithelium.</td>
<td></td>
</tr>
<tr>
<td>Macerated of suckling</td>
<td></td>
</tr>
<tr>
<td>mouse.</td>
<td></td>
</tr>
<tr>
<td>Cell culture supernatant</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technique</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC 50%</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

- **CHARACTERIZATION BY MONOCLONAL ANTIBODIES**
  It is the comparative profile of reactivity of the isolated virus in face of a panel of referenced monoclonal sera.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallbladder epithelium.</td>
<td></td>
</tr>
<tr>
<td>Macerated infant mouse.</td>
<td></td>
</tr>
<tr>
<td>Cell culture supernatant</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technique</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELISA with monoclonal Abs</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

2.4 MOLECULAR EPIDEMIOLOGY

- **SEQUENCING**
  Analysis of the nucleotide sequence of the region encoding the VP1 protein. Establishment of genetic kinship with other variants of interest.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallbladder epithelium.</td>
<td></td>
</tr>
<tr>
<td>Macerated infant mouse.</td>
<td></td>
</tr>
<tr>
<td>Cell culture supernatant</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technique</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequence / Phylogenetic Analysis</td>
<td>24 – 48 hours</td>
</tr>
</tbody>
</table>
2.5 RELATIONSHIPS WITH VACCINE STRAIN

- SEROLOGICAL/IMMUNOLOGICAL RELATIONSHIP
  Is the relationship between the titer of a control serum against field virus and the homologous virus.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Cell culture supernatant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique</td>
<td>Result</td>
</tr>
<tr>
<td>FC 50%</td>
<td>4 hours</td>
</tr>
<tr>
<td>VN</td>
<td>72 hours</td>
</tr>
</tbody>
</table>

2.6 IMMUNOLOGICAL COVERAGE

This estimates the quantity that the antibodies induced by vaccine seed strains would have to protect the strain found in the field.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Cell culture supernatant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique</td>
<td>Result</td>
</tr>
<tr>
<td>CFL ELISA / EPP</td>
<td>4 hours</td>
</tr>
<tr>
<td>VN / EPP</td>
<td>72 hours</td>
</tr>
<tr>
<td>PGP</td>
<td>Equal or more than 36 days</td>
</tr>
</tbody>
</table>

2.7 TESTING FOR ACTIVE SURVEILLANCE OF FOOT AND MOUTH DISEASE

- VIRAL TRAFFIC
  Detection of antibodies against capsid proteins (ACP)
  Detects viral circulation independent of serotype and vaccination status of the sampled bovine population.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Blood Serum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technique</td>
<td>Result</td>
</tr>
<tr>
<td>I-ELISA – 3 ABC</td>
<td>2 hours</td>
</tr>
<tr>
<td>EITB</td>
<td>4 hours</td>
</tr>
<tr>
<td>IDGA – VIAA</td>
<td>48 –72 hours</td>
</tr>
<tr>
<td>ELISA CFL***</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

*** In unvaccinated populations
2.8 POPULATION IMMUNITY

**DETECTION OF STRUCTURAL ANTIBODIES**

Measures structural antibodies as a means of estimating population immunity in vaccinated cattle.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Serum</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Technique</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFL ELISA</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

**ANNEXE 3. SENDING OF MATERIALS TO PANAFTOSA-PAHO/WHO**

3.1 All boxes and containers containing biological material should be correctly labeled and accompanied by documentation that supports its export and / or an Animal Health Certificate which **specifies the type of material being sent, its biological risk and that it was packed in accordance with Bio-safety standards.**

3.2 An envelope with the documents should be affixed to the outside of the box, allowing easy access, so as to guide the customs authorities of the exporting country and country of destination. It must be accompanied by protocols containing the epidemiological information relevant to the case and organized in a way that allows for matching and identification of the samples sent.
3.3 These requirements relating to “packaging samples for transport” give effect to international standards and to Decree No. 177/94 of the Secretariat for Agricultural Protection, Ministry of Agriculture, Livestock and Supply of Brazil, which approves the Bio-safety norms for Handling of the Foot and Mouth Disease virus in their territory. Therefore, pack them in a new cooler (not reused) by introducing VDFKHWVIUR\HQDWž&LQVXIÀFLHQWTXDQWLW\WRODVWIRUWKH GXUDWLRQRIWKHWLPH estimated for arrival at the destination. In a moisture resistant envelope put copies of all documents (certificates and records). Use tape to paste the envelope to the inside of the lid. Cover the box and seal it with packing tape. Then disinfect the external surfaces of the box.

3.4 Put the infectious material or material suspected to be infected with vesicular disease (epithelium, Probang, sera from confirmed or suspected outbreaks) in separate boxes from those with other non-infectious material or those for diagnosis of other diseases.

3.5 Place the appropriate label, according to the material being sent with the sender information duly completed in Portuguese. Cover the label with clear tape to prevent it from becoming unreadable from any potential wetting. Place in a moisture-resistant envelope the export permit, the Animal health certificate, and copies of the documents accompanying the dispatch (reports on investigations of the outbreak with relevant epidemiological data and the of sample dispatch record) and
paste it onto the outer surface of the box. Remember that copies of the documents must be enclosed in the box as well.

3.6 Report the details of the dispatch (date, mode of transport, company, tracking number, date and time of arrival) immediately by fax, phone and email to PANAFTOSA-PAHO/WHO, for the purpose of expediting processing by the Customs and animal health authorities on arrival. Fax (55 21) 3661-9001 Phones (55 21) 3661-9056/9066 Email: e-mail@panaftosa.ops-oms.org with a copy to: imarceli@panaftosa.ops-oms.org, jireis@panaftosa.ops-oms.org.

ANNEX 4. SLAUGHTERING EQUIPMENT AND MATERIALS

4.1 TOOLS

Nail puller, heart shaped shovel, vibratory hammer, club (4 kg), Nails, pliers, saw, electric circular saw, manual drill (> 10 mm), Hand Axe, fence posts (size depends on tree species), butcher knife, short pliers, California spanner, barbed wire, drink corks, landscape rake, manual sprayer (capacity 10 liters), Tape (25 m), Bottle of gas (1 kg) with heater, point shovel, pick axe, carpenter’s hammer, small club (1 kg), pincers, Saw, Saw blades, drill for wood (hand action), Wicks (several measures), chutes (size according to species), Tourniquets (swallow type 2 pronged), medium resistance wire, battery-powered stimulator, iron rods, water Whetstone, chair, wooden stakes, manual sprayer (capacity 20 liters), backpack sprayer (combustion engine), numbered seals.

4.2 CLEANING AND DISINFECTION

Plastic bucket, plastic drums, plastic Basin, White Soap (washing, plain), disinfectant, polyethylene gloves (large size), rubber gloves, first aid kit, trash bags (consortium type).

4.3 FIREARMS

22 calibre LR Rifle, semi-automatic .22 LR Revolver, long high velocity rifle, .22 Bullets, rotating brass ramrod 22 caliber rifle, .22 caliper bronze brush, anticroosive lubricant (cleaning weapons).

4.4 CLOTHING

Mamluk white cloth or another color, Mamluk disposable (medium and large sizes), cap, jacket, dust and mist respirator, goggles, rubber boots.
4.5 COMMUNICATIONS
Cell Phone, Fax, handheld radio (SSB), fixed radio equipment (BLU), telescopic antenna BLU

4.6 MACHINERY
Front Loader (3m cubic), Backhoe (2m cubic)

4.7 VEHICLES
Trucks for transport of animals, trucks for transporting heavy equipment.

ANNEX 5. THE SANITARY PIT

5.1 FUNCTION
The sanitary pit plays a dual role: it is the place where the animals are euthanized with a firearm and is also the site of their burial.

5.2 COMPONENTS AND DIMENSIONS
5.2.1 It consists of two parts: the access ramp and the trench itself.
- The access ramp is a slope of approximately 10m in length, which allows entry of the loading tray and the animals.
- The sanitary pit itself is the deepest place, designed for the euthanization and later sanitary burial of the animals.

5.2.2 Dimensions of Health Trench itself:
It is a pit 3.5m to 4m deep by 3m wide and a length that is determined by the species and number of animals involved.
- Cattle:
To calculate its length it should be considered that for every adult animal, we need 1.5 m square (1.5 m2) of sanitary pit area.

Seeing that the width of the trench is known (3m) it is easy to establish the linear metres of trench needed for the burial of ONE (1) adult bovine.

Length x Width: area, length x 3m: 1.5 m2, length: 1.5 m2 + 3m: 0.5 m

For the burial of 20 cattle, therefore, in a ditch 3m wide will be required:
20 cows x 0.5 m: 10m, 10 linear meters of ditch + 10 linear meters of ramp: 20 linear meters.
• **Sheep and Swine:**
  Equivalence of Species: One (1) adult bovine is the equivalent of FIVE (5) sheep or adult pigs.
  In practice, for the calculation of the pit itself, the following values are used:
  Length of trench: number of adult cattle x 0.5
  Length of trench: number of adult sheep x 0.1
  Length of trench: number of adult pigs x 0.1

**5.3 SELECTION OF THE CONSTRUCTION SITE:**
The most suitable place is within the facility running the operation in the area where the sick animals and their contacts are housed. However, it is necessary that the site meet certain conditions.

- Away from populated areas (security and discretion)
- Away from the permanent facilities of the establishment (houses, corrals, sheds, wallows, entranceways, etc.).
- Easily accessible for vehicles and heavy machinery.
- Land could be excavated without much difficulty.
- Groundwater is located at a depth greater than 8 meters.
- Far from surface waters (rivers, lakes, streams, etc.).
- Subsoil without aqueducts, gas pipelines or oil pipelines,
- Possesses an area proportionate to the number of animals involved in the operation.

**5.4 IF BURIAL MUST BE DONE ELSEWHERE:**
If site conditions are not suitable for burial, the culling should be done in situ and the remains subsequently transferred to a place that meets the requirements for sanitary burial (with the adoption of strict bio-safety measures)
In these cases it is necessary to build a trench 1.5 m deep by 3m wide and 10m long, for the euthanistic elimination of the animals with firearms.
The bodies must be transported to the place of burial in a dump truck, with the box fitted to prevent the escape of fluids.

**5.5 ENVIRONMENTAL IMPACTS:**
It is advisable to consult local environmental health authorities with regard to the location of public lands that meet the conditions required for the sanitary burial.
5.6 CONSTRUCTION OF THE SANITARY PIT:

5.6.1 Instructions for the machinist:
The pit must be dug in a slope (sloped walls) to avoid possible landslides. The land shall be deposited at a distance of not less than 1.5 m from the edges of the pit, so as to facilitate the movement of the shooters.
The floor of the pit must be a slope that reaches the depth of 4m only in the final 10m.

5.6.2 Demarcation of the field to dig:
Demarcation stakes are stuck taking into account that, to obtain a pit 3m wide, dug on a slope, the surface width must be 5mm.
It is convenient to mark the point from which the pit floor should reach 4m deep.

5.6.3 Number of machines to use:
Depends on the following variables:
a) length of the pit
b) the urgency for its construction
c) Availability of equipment at the site.
Basic equipment comprising a 3 cubic meter loader and a 2 cubic meter backhoe, for construction of a trench 50 meters long, will need about fourteen hours of work (one and a half day), depending largely on soil characteristics.
Also, consider that, from the 50m long pit, the speed of progress of the excavation will be reduced by the time for the blade to retrace the stretch to fetch the earth away.

5.6.4 Buildings next to the sanitary pit:
These are those that allow the entry of animals into the sanitary pit.
• Ramp for the unloading of animals:
   It is built next to the access ramp to the sanitary pit.
   With a backhoe a straight well is dug (type front of pit) 1.5 m deep by 3m wide and 7m long. The floor should have a gentle slope since the trucks line up there.
   Finally, this ramp connects to the access ramp at the pit at the point where it reaches a depth of 1.5 m.
a) Offload of cattle: the sides of the route from the offloading ramp to the pit access, about 7m in length, should be protected on its sides by a fence installed for this purpose.
b) The sides are protected with sheeting fixed into the ground with 2 meter long construction iron rods, tied together at the top.

- Temporary pens:

  In the particular case of sheep, it can aid the process to have a holding pen. The latticework pen is the most adequate due to its easy installation.

### 5.7 HANDLING OF ANIMALS IN THE SANITARY PIT

#### 5.7.1 Adult Animals:

The animals must enter the sanitary pit in groups no larger than ten, in the case of adult cattle, and not more than twenty in the case of adult sheep and pigs.

The loader is located at the entrance of the trench in order to block the exit of the animals.

The slow movement of the loading bucket allows animals to move to the deep end of the pit. At all times, unnecessary squealing and noises should be avoided since these unnecessarily affect the tranquility of the animals.

#### 5.7.2 Suckling animals:

The euthanistic elimination of lambs and piglets is done in a holding pen installed inside the sanitary pit. For this reason, it is desirable to form special batches and proceed with them after completion of the elimination of all adults.

### ANNEX 6. SANITARY SLAUGHTER AND MEASURES)

#### 6.1 ACT OF EUTHANASIA

**6.1.1 Authorized Personnel:** For security reasons the area will be cleared of any person whose presence is not essential.

Consequently, the only personnel allowed to remain in place are:

- Official Veterinarian: 1 (one)
- Shooters: 2 (two)
- Staff for opening of cavities (holes): 2 (two)
6.1.2 Instructions for staff responsible for Sanitary Euthanasia:

The anatomical location where the bullet causes immediate destruction of brain tissue should be indicated to them.

- **Cattle:** the intersection of two imaginary lines extending from the base of the ear to the center of the eye on the opposite side.
- **Pigs:** in the center of a diamond located above an imaginary line joining the upper part of both eyes.
- **Sheep and goats:** same as with cattle.

6.2 SANITARY BURIAL

In order to take better advantage of the physical space of the pit, after opening of the cavities of the slaughtered animals (in the case of ruminants include the rumen), arrange the animal remains with the shovel.

- Obs.1 – After the slaughter, one should open the thoracic and abdominal cavities. Do not use lime as this slows the natural decomposition process which favors the inactivation of the virus.

  Later, the backhoe goes back a few meters and begins to cover the remains with dirt taken from the floor, so that the new front of the pit reaches a depth of 4 meters.

  Once this stage is completed, a new batch of animals is entered and the process is repeated.

  After the humane elimination of all animals, the burial is completed avoiding excessive compaction since this favors the formation of cracks through which gases which are the product of organic decomposition can emerge.

- Obs.2 – After covering the trenches where the dead animals are laid, it is recommended that the area be fenced off with wire mesh in order to prevent small animals from approaching and beginning to excavate the site.

- Obs.3 – It is recommended that the trenches and their fences be inspected at least weekly.

6.3 DOCUMENTATION OF ACTIONS

All activities undertaken by the staff must be formally documented.

The staff member in charge of the legal aspects of the operation is responsible for documenting the details of the humane culling and any other activity that warrants documentation (partial or total destruction of facilities, materials capable of spreading the Foot and Mouth Disease virus -etc.) There should be left a clear record of the owner, number, species and origin of the slaughtered animals.
6.4 ACTION OF THE APPRAISERS
This activity will be carried out by the Appraisal Team, invariably at the place (lot, pasture, site) in which animals are housed and before they are slaughtered.

6.5 CLEANING AND DISINFECTION OF HEAVY MACHINERY
This should be done as thoroughly as possible as these are machines that have been in direct contact with sick animals and can spread the virus.

Therefore, before leaving the place where the slaughter was done, the machines used should be properly sanitized and disinfected.

The official veterinarian must supervise the entire process.

6.6 CLEANING AND DISINFECTION OF MATERIALS USED
The same precautions that were expressed in the previous section should be taken.

Firearms are packed cleaned and oiled. Check the amount of bullets used and the amount remaining

Tools should be packed cleaned and disinfected and then arranged for future operations.

As for the clothing, if they are disposable they should be burnt on site and buried with the remains. The ones made of permanent fabric should be packed in double strength polyethylene bags for shipment to the place of washing, disinfection and sterilization.

Finally check the status of all equipment and materials in order to make repairs as appropriate.

6.7 CONTROLS AFTER THE SANITARY PIT
It is advisable to check, at least on a weekly basis, the health status of the sanitary pit after the passage of a reasonable period of time from the slaughter (not less than thirty days). If upon inspection, abnormalities (cracks, presence of rodents, dogs, etc.) are found, they must be addressed.

The rules relating to strict hygiene and disinfection of vehicles, equipment and personnel provided for in the relevant Annex must be strictly adhered to.
ANNEX 7. INSTRUCTIONS FOR CREMATING CARCASSES OF ANIMALS

7.1 MEASURES:

7.1.1 The site to carry out the cremation of animals slaughtered must be chosen carefully. Take into account various factors such as proximity to the outbreak source, security for installations, crops, etc., Prevailing winds and degree of seclusion, to avoid the presence of the curious.

7.1.2 Endeavour to avoid as far as possible the emanation of odors that bother the neighbors.

7.1.3 The bodies are burned over a ditch constructed, preferably, in the prevailing wind direction. This ditch will be between 0.50 m and 0.65 m deep, and 0.75 m to 0.90 m wide.

7.1.4 The length depends on the number of animals. It is necessary to be absolutely sure that all the bodies, placed side by side, fit into the trench so as to be burned all at the same time.

7.1.5 The width may depend on the type of body. Logically, less width is needed to burn pigs and sheep. It helps to put every 2m, a transverse drain, 0.70 m wide, starting at ground level and going down to reach the same depth of the incineration ditch:

- Place a bed of firewood or thick wood, across the ditch. If there is any on hand, it is advisable to put rail or pieces of iron rod in the same position, in order to strengthen it. The trench is filled with straw, wood powder or charcoal soaked in kerosene or diesel oil. Old tires help a great deal in the combustion and some should be kept in reserve to keep the fire going.
- The bodies of the animals are lined up on the bed, alternating head and legs. More wood or charcoal soaked in diesel or kerosene is placed on and around the bodies and then lit.
- Efforts should be made to keep the interrupting drains open in order to use them to feed firewood or charcoal and thus maintain a good fire.
- It is estimated that about 6 tons of coal, half tonne of firewood, 75 liters of diesel and 45 kg of straw or twigs are needed to burn 50 corpses of cattle. You can calculate, for these purposes, five sheep or five pigs equivalent to a cow. Pigs are much better at burning in their own fat and do not need as much combustible material.
- Of course, all these estimates vary depending on local conditions.
- Finally, burial is effected.
ANNEXE 8. DISINFECTANTS AND DISINFECTION PROCEDURES IN FOOT AND MOUTH DISEASE.

8.1 INDICATIONS
The chemical disinfectants recommended in foot and mouth disease are:

CITRIC ACID AT 2%
Preparation: two parts of citric acid to 98 parts water.
Indications: laboratory objects and the cabin of vehicles.
Comment: It is slightly corrosive to metal but has little penetration when the virus is contained in organic material.

SODIUM CARBONATE SOLUTION AT 4%
Preparation: Dissolve 440 g. sodium carbonate in 10 liters of water.
Contact time: 10 minutes.
Application Method: spraying, foot bath and immersion.
Precautions: when applying the disinfectant in closed environments, the use of boots, gloves and mask is recommended
Limitations: works only in solution.
Indications: facilities, people and animals, vehicles, protective clothing, utensils, hides, skins, bones, hay and straw.

FORMalin SOLUTION AT 10%
Formalin solution 10%
Preparation: Dissolve ½ gallon of commercial formalin (commercial formalin solution 40%) in 5 liters of water.
Contact time: 30 minutes to 3 hours.
Application Method: spraying, spraying and immersion.
Precautions: wear a mask.
Indications: Clothing, utensils, hides, skins, bones, hay and straw.

When using formaldehyde gas to fumigate a room or a building, the venue should be closed as much as possible. It takes 500 grams of potassium permanganate and 0.5 liters of formalin (40% solution of formaldehyde) for every 30 cubic feet of space. The permanganate is placed in an open container (like a can) and the formalin is added immediately before closing the premises. Do not place more than 1 litre of formalin into each container. This container must be metal (not glass or plastic, as it generates much heat) and should be put in another larger container, also of metal.
The gas must be allowed to act as long as possible and never less than 10 hours. We must warn of the dangers associated with formaldehyde gas fumigation. The reaction is sufficient to produce a fire. The outer metal container must be three times higher than the internal one and be at a distance of 0.50 m from any flammable material. On wooden floors the containers are placed on protective asbestos or metal bricks. Danger warnings are put on the doors of the premises.

**SODIUM HYDROXIDE (CAUSTIC SODA) SOLUTION AT 2%**
Preparation: Dissolve 200 g sodium hydroxide in 10 liters of water.
Contact time: 30 minutes.
Application Method: Spray.
Precautions: use of boots and gloves.
Limitations: very corrosive. Recommended for dunghill.
Indications: Facilities, dung and fences.

**IODOFORM BASED COMPOUND**
Preparation: Mix 1 liter of product in 200 liters of water.
Contact time: 10 minutes.
Application Method: spraying, foot bath and immersion.
Indications: people, animals, vehicles, protective clothing, utensils, hides, skins, bones, hay, straw and dung.

**ACETIC ACID AT 2%**
Preparation: 2 parts glacial acetic acid to 98 parts water.
Indications: laboratory objects and cabins of vehicles.
Comment: It is slightly corrosive to metal but has little penetration when the virus is contained in organic material.

**METASILICATE AT 4%**
Preparation: 4 parts of metasilicate to 96 parts water.
Uses: It acts to break down protein and its oxidation activity is lower than that of a comparable concentration of sodium hydroxide. In contrast, it is not corrosive and not irritating as is the case with sodium hydroxide. It is usually used in combination with other disinfectants.

**CALCIUM OXIDE (SLAKED LIME) SOLUTION AT 5%**
Preparation: Dissolve 500 g of calcium oxide in 10 liters of water.
Contact Time: 6 to 24 hours.
Method of application: spraying, liming.
Precautions: use of boots and gloves.
Limitations: recommended for use immediately after preparation. Indications: facilities, vehicles, dunghill, walls and posts. Recommended for use after the burial of the animals, above the pit and never inside it.

**COMMERCIAL CREOSOTE SOLUTION AT 10%**
Preparation: 9 liters of water mixed with 1 liter of 10% commercial creosote. Contact time: 2 hours. Application Method: spraying, spraying. Indications: facilities, vehicles and dung.

**TRIPLE POTASSIUM MONOPERSULFATE SALT SOLUTION**
Preparation: dilute the powder in running water, 1 part to 1,300 parts for the FMD virus. For the virus of swine vesicular disease (exotic) 1 part to 200 parts and for general use, 1 to 220. Contact time: 30 minutes. Application Method: spray, spray in fine droplets and immersion. Precautions: It is neither toxic nor irritating. Uses: disinfection of stalls, pens, industrial processing plants, animals, vehicles and farm equipment. Limitations of use: do not mix with alkaline substances, the product works as a pH of 2.5 for a 1% solution. Once prepared, the initial action of the solution takes about 7 days.

Didecyl dimethyl ammonium chloride solution (new generation quaternary ammonium), glutaraldehyde, formaldehyde and glyoxal (aldehydes) (DESPADAC)

**8.2 OBSERVATIONS:**
- The effectiveness of citric acid or sodium carbonate solutions is improved with the addition of a small amount of detergent. To 5 litres of water can be added one tablespoon of liquid household washing detergent. You can also add a half teaspoon and a half of a nonionic detergent, to 10 litres of citric acid solution.
- The virucidal action of acid or alkaline disinfectants depends on the recommended concentration of hydrogen ion (pH) in aqueous dilutions. The solutions of citric acid and sodium carbonate, prepared as mentioned, must have pH <4 and > 10 respectively.
- A simple method for determining the hydrogen ion concentration is to measure the pH with narrow range indicator paper. Wet a piece of paper tape indicator in the disinfectant and place it on a white non-absorbent surface. After 30 seconds, compare its color with that shown on the packaging. These pH checks should be randomly done during disinfection operations.
• It is recommended that officials working on the foot and mouth disease have four sets of pH tapes (two for the pH scale of 2-4 and two for the scale of 8-10).

• Because the effectiveness of acids and alkalis as virucides depends on their pH, it is important not to mix them. Surfaces treated with a type are not to be subjected to the action of another, unless there is an intervening wash with water. Never use washing soda and an acid to disinfect the article.

• Disinfectants recommended for foot and mouth disease are not effective against many pathogenic bacteria and viruses and may lose their specific efficacy when mixed or applied in conjunction with general purpose disinfectants.

8.3 PROCEDURES FOR DISINFECTION

• Since it is not possible to establish definitive rules to cover all points in the field of disinfection, which may occur during an outbreak, it is necessary to act judiciously in the attention of all problems that may arise.

• The disinfection procedure in each case depends on a variety of circumstances, for example, the structure of the stalls or pens, the places which have had access to sick or suspect animals and the amount of manure and dirt, the nature of the products that are considered contaminated, etc.

• The most important factor to ensure the inactivation of an agent in an infected farm is in the thorough cleaning and washing before applying a disinfectant.

• It must be kept in mind that almost all substances used in disinfection are toxic to a greater or lesser degree. Therefore, people working with these substances, or organizations for which they work should take appropriate measures to protect their health.

• The use of gloves, boots and special clothes, as well as gas masks when working with substances that produce vapors is recommended. At the end of the exercise, wash with soap and water, hands, face and body surfaces which were exposed to these substances. The clothes used in this work should be changed. It is important to keep an emergency kit with the disinfection equipment. The kit should always include some products such as boric acid, carbolic acid, ointments or lotions for treating burns and other items (gauze, cotton, iodine, etc.).

• Another precaution to keep in mind concerns the modus operandi. The disinfection should always be carried out downwind, that is, the operator should be positioned so that the wind blows from the direction of his back toward the direction he faces, in order to prevent the force of the wind driving the disinfection solutions toward him.
8.4 LIVESTOCK BUILDINGS AND FACILITIES (SLEEVES, SHACKLES, ETC.)

- As a preliminary step and before removing the manure and other material on the building or facility, there should be a blanket soaking of its contents, as well as neighboring lands, with an approved disinfectant.

- Remove manure, loose bedding, fodder party, etc. and, if the quantity is small, bury or put them in a pile and saturate them with a disinfectant. If the amount is too large, accumulate them in a place to which people or animals do not have access and spray the surface well. If this is not possible, they may be taken to arable land, conveniently located, where they must be buried immediately. For this purpose, the movement should not be done via public roads.

- All parts of buildings and facilities that might have had contact with animals or their excretions are scraped and brushed well, and the debris from that cleaning removed thereafter.

- When the floor of the buildings is dirt, clay or chalk, or is permeable to water, scarify and soak the surface thoroughly with a disinfectant.

- If it is impossible to disinfect hardwood floors, remove and burn them; the ground must also be removed to a depth of at least 25-30 cm and mixed with lime.

- When animals are housed in buildings, check from the outset the possibility that the disease is transmitted through drains that pass through or end up in pastures where are cattle. The pipes must be closed if there is a risk, and the retained material is disinfected before removal.

- Subsequently, any drainage or pit lower than the floor level must be opened and all contents that can be drawn are buried with lime. To the excreted or drained liquids add sodium carbonate until a 4% solution is obtained, stirring to ensure a good mix that will be removed after five hours, at least.

- Any wood structure capable of retaining material containing virus and which does not allow a sufficiently effective disinfection, must be removed and burned.

- When an inspector decides to destroy any part of the property or any wooden object, the operation does not start before agreeing in writing with the owner on the value of the property. Unnecessary destruction should be avoided.

- Finally, the building and facilities must receive a thorough spraying with an approved disinfectant.
Insects and rodents can serve as mechanical vectors. When cleaning and disinfection operations are initiated, rodents migrate to other buildings in search of food. There should be a preliminary examination to determine the need for control of insects and rodents.

### 8.5 YARDS AND OTHER PLACES

- The adjacent walls, fences, etc. are first sprayed with disinfectant, then scraped and brushed and sprayed again. The surface of manure in the yard is soaked thoroughly with a disinfectant which is effective in that situation.
- If the layer of manure is thick enough as to warm without being heaped up, it is acceptable to let it remain so. If, however, it is thin and therefore it is doubtful that it will heat up, then heap it up by removing manure from the sides toward the center of the yard. Then coat the surface with sodium carbonate solution at 4%.
- If sick animals have roamed in pastures, as far as reasonably practical, disinfection with sodium carbonate solution at 4% must be done, for example, troughs, cross bars, etc.
- When slaughter has been carried out in the pastures, all parts that may have been in contact with the slaughter operations must be thoroughly soaked with sodium carbonate solution at 4%.

### 8.6 BALES OF HAY AND STRAW

- These should be sprayed with 5% solution of formalin. The areas possibly exposed to contamination are cut or uprooted and destroyed.

### 8.7 TUBERS

- The store houses in which tubers are stored and surrounding floor are sprayed with 5% formalin and, if the storehouses are open, spray the exposed tubers also.
- Unharvested tubers must be removed from contaminated sites and cleaned of earth as far as practicable, placed in uncontaminated sites and sprayed with 5% formalin. It is not allowed to remove from the property the tubers that may have been in contact with animals. Recently picked or sprouting tubers must be chopped or destroyed during the current process of disinfection.
8.8 OTHER FOOD PRODUCTS

• Depending on the quantity, nature and the possibility of contamination these are sprayed or fumigated with formaldehyde. Small amounts of food can be eliminated by feeding them to non-susceptible animals (birds, horses) on the same property.

• When products such as cereals or cakes are disinfected or when they can be held for a considerable time on the infected properties, owners are warned to try to avoid deterioration by action of fungi, heat, etc. In this regard, the owners must be given all reasonable facilities for the protection of foodstuffs and grains, to avoid losses caused by these or other causes.

• When it is suspected that large quantities of fodder were exposed to infection and it is very difficult to submit them to spraying or fumigation, report this in detail to the central office and await instructions on whether they should be destroyed or whether there would be alternative methods adopted, for example, detention for a certain time or conveying them directly to a factory to be used as raw material. Special attention must be paid to the hay stored on the upper floors of stables.

8.9 UTENSILS

• Special Care should be taken to disinfect all utensils, troughs, milk containers, milking machine and other used items that were in contact with sick animals or in their proximity.

8.10 BONES

• The bones found on infected properties and which are intended for commercial purposes must be disinfected by spraying with a solution of 5% formalin or, as appropriate, by fumigation with formalin prior to sending them directly to the factories in closed and sealed in trucks.

8.11. HIDES AND SKINS

• Hides and skins can be removed from the properties previously infected if they are immersed in a hot solution of 4% sodium carbonate for 15 minutes or in a solution of sodium bifluoride 1 part per 10,000 for 24 hours.
8.12 WORKING ANIMALS

- The horses of the properties involved can work within them, or, if necessary, leave them after cleansing and disinfection of the legs.

8.13 CONTAINERS FOR MILK IN THE INFECTED AREA

- The current method used in milk plants and warehouses to sterilize the containers is to place them upside down and subject them to a steam jet for one minute. The lid is left in boiling water for the same time. With this system, temperatures at the outside and bottom of the containers are not sufficient to destroy the foot and mouth disease virus, so it is advisable for owners and managers of dairy farms and milk collecting storage facilities to sterilize their containers, by immersion in boiling water or alternatively subject the inside to steam and disinfect the outside. The most suitable method of sterilization is by immersion in boiling water tanks. The dairy companies must uplift their collection bins at the roadside to avoid the entry of vehicles into yards of properties located within infected areas.

8.14 CONTAMINATED WOOL

- Disinfection of wool can be done with formaldehyde solution 2.5% for 1 hour at 38–40 °C or for 3 hours at 20 °C. 18

8.15 LIVESTOCK MARKETS

- Should evidence that an animal market is contaminated be received, ensure it is effectively disinfected. If disinfection performed is not satisfactory it must be explained to the local authority what the deficiency is and, if there is a danger that it will be used by animals before a new satisfactory disinfection, report to headquarters, so that it could issue an order prohibiting the use of the premises until it has been treated properly.

8.16 TRANSPORT VEHICLES

- In order to disinfect trucks or other transport vehicle proceed as follows: spray the entire body with a disinfectant; remove all manure and trash stuck, scraping and brushing, paying close attention to the edges and angles. Then re-spray the entire structure of the body with the disinfectant. The wheels of vehicles should be thoroughly disinfected.
8.17 BOATS AND PLANES

- It is necessary to take precautions to avoid the corrosion of materials on boats and planes. A solution of sodium carbonate at 4% with sodium silicate at 0.05% is advised.

ANNEX 9. PERSISTENCE OF THE FOOT AND MOUTH DISEASE VIRUS

Tables 1-12 extracted from the work “Persistence of foot-and-mouth disease virus in animals, their products and the environment”, published by GE Cottral, from the Animal Disease Laboratory in Plum Island, Division of Animal Disease Research, Department of Agriculture, United States of America (USDA) (12).

**TABLE 1. Persistence of the foot and mouth disease virus, virus O CANEFA-9 in tissues of infected cattle**

<table>
<thead>
<tr>
<th>TISSUE</th>
<th>DAYS (DPI)*</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>4</td>
<td>Work done at Plum Island on steers.</td>
</tr>
<tr>
<td>Thyroid</td>
<td>8</td>
<td>Hereford 14 to 24 months of age.</td>
</tr>
<tr>
<td>Adrenal</td>
<td>8</td>
<td>virus was investigated in cultures</td>
</tr>
<tr>
<td>Pancreas</td>
<td>8</td>
<td>bovine kidney cells.</td>
</tr>
<tr>
<td>Kidney</td>
<td>6</td>
<td>All steers lesions of disease before 24 hours post-inoculation</td>
</tr>
<tr>
<td>Spleen</td>
<td>4</td>
<td>In all tissues examined virus was isolated in the first test, made 12 HPI</td>
</tr>
<tr>
<td>Liver</td>
<td>4</td>
<td>Steers were slaughtered from</td>
</tr>
<tr>
<td>Rumen</td>
<td>8</td>
<td>August 1912 and up to 8 DPI *</td>
</tr>
<tr>
<td>Bone marrow</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

*DPI: days post-inoculation; HPI: hours post-inoculation.

Source: Cottral, 1969.
### TABLE 2. Survival of the foot and mouth disease virus in infected bovine tissues, stored at temperatures of 1-4 °C.

<table>
<thead>
<tr>
<th>TISSUE</th>
<th>Virus</th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone marrow</td>
<td>A-119</td>
<td>7</td>
</tr>
<tr>
<td>Bone Marrow</td>
<td>SAT-1</td>
<td>7</td>
</tr>
<tr>
<td>Lymph node</td>
<td>A-119</td>
<td>4</td>
</tr>
<tr>
<td>Lymph node</td>
<td>SAT-1</td>
<td>4</td>
</tr>
<tr>
<td>Hematic Ganglion</td>
<td>A-119</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Cottral, 1969.

### TABLE 3. Time of onset and persistence of FMD virus in secretions and excretions of infected cattle

<table>
<thead>
<tr>
<th>SAMPLES</th>
<th>Appearance (HPI)*</th>
<th>Persistence (DPI) *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>2</td>
<td>5 **</td>
</tr>
<tr>
<td>Semen</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Urine</td>
<td>12</td>
<td>7 **</td>
</tr>
<tr>
<td>Milk</td>
<td>13</td>
<td>4,5</td>
</tr>
<tr>
<td>Saliva</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Synovial fluid</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Peritoneal fluid</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>Pleural fluid</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>Cerebrospinal fluid</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>Nasal discharge</td>
<td>24</td>
<td>7</td>
</tr>
<tr>
<td>Stool</td>
<td>5</td>
<td>4,5</td>
</tr>
<tr>
<td>Expiration (aerosol)</td>
<td>18</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Cottral, 1969.

* HPI: hours post-inoculation, DPI: days post-inoculation

** Waldmann et al, using different techniques, isolation of FMD virus from the blood of cattle up to 58 days and from urine 246 days after inoculation with virus.
### TABLE 4. Comparison of time elapsed between the first detection of the foot and mouth disease virus and the appearance of lesions among cattle infected by inoculation and by contact

<table>
<thead>
<tr>
<th>Samples</th>
<th>Inoculated (HPI)</th>
<th>Contacts (DPI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saliva</td>
<td>0 – 12</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Blood</td>
<td>8 – 40</td>
<td>1 – 6</td>
</tr>
<tr>
<td>Semen</td>
<td>2 – 12</td>
<td>1 – 4</td>
</tr>
<tr>
<td>Urine</td>
<td>2 – 12</td>
<td>-</td>
</tr>
<tr>
<td>Ganglia</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Pharynx</td>
<td>-</td>
<td>0 – 9</td>
</tr>
<tr>
<td>Milk</td>
<td>-</td>
<td>1 – 4</td>
</tr>
<tr>
<td>Vagina</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Rectum</td>
<td>-</td>
<td>1 – 6</td>
</tr>
<tr>
<td>Foreskin</td>
<td>-</td>
<td>2 – 4</td>
</tr>
</tbody>
</table>

*Source: Cottral, 1969.*
TABLE 5. Time of onset and persistence of the foot and mouth disease virus in tissues of infected animals

<table>
<thead>
<tr>
<th>TISSUES</th>
<th>Appearance (HPI)</th>
<th>Persistence (DPI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone marrow</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Pituitary</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Pineal</td>
<td>48</td>
<td>8</td>
</tr>
<tr>
<td>Thyroid</td>
<td>12</td>
<td>8*</td>
</tr>
<tr>
<td>Adrenal</td>
<td>12</td>
<td>8*</td>
</tr>
<tr>
<td>Pancreas</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Ganglia</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Liver</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Kidney</td>
<td>12</td>
<td>94</td>
</tr>
<tr>
<td>Spleen</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Spinal Cord</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Testes</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>Bladder</td>
<td>24</td>
<td>94</td>
</tr>
<tr>
<td>Rumen</td>
<td>12</td>
<td>8*</td>
</tr>
<tr>
<td>Skin</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Muscle**</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Heart**</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Tongue**</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Cottral, 1969
* The virus may persist for more than 8 DPI.
** In lesions in these tissues.
### TABLE 6. Persistence of the foot and mouth disease virus in tissues of convalescing and recovered bovines

<table>
<thead>
<tr>
<th>TISSUES</th>
<th>DAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tongue</td>
<td>23</td>
</tr>
<tr>
<td>Epiglottis</td>
<td>31</td>
</tr>
<tr>
<td>Pharynx</td>
<td>75</td>
</tr>
<tr>
<td>Soft palate</td>
<td>196</td>
</tr>
<tr>
<td>Tonsils</td>
<td>21</td>
</tr>
<tr>
<td>Esophagus</td>
<td>31</td>
</tr>
<tr>
<td>Trachea</td>
<td>23</td>
</tr>
<tr>
<td>Nose</td>
<td>8</td>
</tr>
<tr>
<td>Foot lesions, cattle</td>
<td>12</td>
</tr>
<tr>
<td>Foot lesions, pigs</td>
<td>10</td>
</tr>
<tr>
<td>Hoof, cattle</td>
<td>34</td>
</tr>
</tbody>
</table>

*Source: Cottral, 1969*

### TABLE 7. Duration of carrier state in several animal species, determined by isolation of virus in esophageal-pharyngeal material

<table>
<thead>
<tr>
<th>Species</th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bovines</td>
<td>24</td>
</tr>
<tr>
<td>Sheep</td>
<td>9</td>
</tr>
<tr>
<td>Goat</td>
<td>1 +</td>
</tr>
<tr>
<td>Swine</td>
<td>Negative</td>
</tr>
</tbody>
</table>

*Source: Cottral, 1969.*
### TABLE 8. Survival of the foot and mouth disease virus in tissues and fluids of infected animals, kept between 1-7 °C temperature

<table>
<thead>
<tr>
<th>Sample</th>
<th>Species</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>Swine</td>
<td>70</td>
</tr>
<tr>
<td>Blood</td>
<td>Cattle</td>
<td>60</td>
</tr>
<tr>
<td>Bone marrow</td>
<td>Cattle</td>
<td>210</td>
</tr>
<tr>
<td>Bone marrow</td>
<td>Swine</td>
<td>42</td>
</tr>
<tr>
<td>Lymph Nodes</td>
<td>Cattle</td>
<td>120</td>
</tr>
<tr>
<td>Lymph Nodes</td>
<td>Swine</td>
<td>70</td>
</tr>
<tr>
<td>Blood-borne nodules</td>
<td>Cattle</td>
<td>120</td>
</tr>
<tr>
<td>Synovial fluid</td>
<td>Cattle</td>
<td>19</td>
</tr>
<tr>
<td>Muscle</td>
<td>Cattle</td>
<td>3*</td>
</tr>
<tr>
<td>Muscle</td>
<td>Swine</td>
<td>1</td>
</tr>
<tr>
<td>Muscle (with lesions)</td>
<td>Cattle</td>
<td>3</td>
</tr>
<tr>
<td>Muscle (no bleeding)</td>
<td>Guinea pig</td>
<td>31</td>
</tr>
<tr>
<td>Tongue</td>
<td>Cattle</td>
<td>33</td>
</tr>
<tr>
<td>Tongue</td>
<td>Swine</td>
<td>10</td>
</tr>
<tr>
<td>Cheek</td>
<td>Cattle</td>
<td>33</td>
</tr>
<tr>
<td>Intestine</td>
<td>Cattle</td>
<td>6</td>
</tr>
<tr>
<td>Leather (dry)</td>
<td>Cattle</td>
<td>8</td>
</tr>
<tr>
<td>Pituitary (extract)</td>
<td>(Commercial)</td>
<td>30+</td>
</tr>
</tbody>
</table>

Source: Cottral, 1969.

*After 60 days, virus was found in muscle tissue possibly by contamination of bone fragments.
**TABLE 9. Survival of FMD virus in internal organs of infected animals, kept between 1-7 ° C temperature**

<table>
<thead>
<tr>
<th>Organ</th>
<th>Species</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>Swine</td>
<td>27</td>
</tr>
<tr>
<td>Parotid</td>
<td>Cattle</td>
<td>8</td>
</tr>
<tr>
<td>Lung</td>
<td>Swine</td>
<td>42</td>
</tr>
<tr>
<td>Lung</td>
<td>Cattle</td>
<td>8-9</td>
</tr>
<tr>
<td>Stomach</td>
<td>Swine</td>
<td>10</td>
</tr>
<tr>
<td>Rumen</td>
<td>Cattle</td>
<td>8-9</td>
</tr>
<tr>
<td>Kidney</td>
<td>Swine</td>
<td>42</td>
</tr>
<tr>
<td>Spleen</td>
<td>Swine</td>
<td>42</td>
</tr>
<tr>
<td>Uterus</td>
<td>Cattle</td>
<td>8</td>
</tr>
<tr>
<td>Fat</td>
<td>Cattle</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Cottral, 1969.

**TABLE 10. Survival of the foot and mouth disease virus in salted products and tissues of infected animals kept between 1-7 ° C temperature.**

<table>
<thead>
<tr>
<th>Products and tissues</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat (lymph nodes)</td>
<td>50</td>
</tr>
<tr>
<td>Bacon</td>
<td>10</td>
</tr>
<tr>
<td>Ham (bone marrow)</td>
<td>89</td>
</tr>
<tr>
<td>Ham (fat)</td>
<td>46</td>
</tr>
<tr>
<td>Sausages</td>
<td>4</td>
</tr>
<tr>
<td>Cow tongues</td>
<td>14</td>
</tr>
<tr>
<td>Cattle hides</td>
<td>352</td>
</tr>
<tr>
<td>Guinea pigs with FMD lesions</td>
<td>2 years</td>
</tr>
</tbody>
</table>

Source: Cottral, 1969.
### TABLE 11. Survival of the foot and mouth disease virus in milk products experimentally contaminated

<table>
<thead>
<tr>
<th>Products</th>
<th>Hours</th>
<th>Days</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camembert Cheese</td>
<td>8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Edam</td>
<td>22</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Limberger Cheese</td>
<td>14.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Quadrat and Tilsiter Cheese</td>
<td>5-6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Whey</td>
<td>20-23</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pre-sterilized milk (Maintained at 18°C)</td>
<td>-</td>
<td>35</td>
<td>-</td>
</tr>
<tr>
<td>Whole milk skimmed</td>
<td>-</td>
<td>9-12</td>
<td>-</td>
</tr>
<tr>
<td>Cream</td>
<td>-</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Salted butter</td>
<td>-</td>
<td>26-45</td>
<td>-</td>
</tr>
<tr>
<td>Fresh Cream</td>
<td>-</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>Dried milk</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>

*Source: Cottral, 1969*
### TABLE 12. Survival of foot and mouth disease virus in contaminated objects kept at room temperature

<table>
<thead>
<tr>
<th>Contaminated objects</th>
<th>Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Farm</td>
<td>49</td>
</tr>
<tr>
<td>Floor, V-I</td>
<td>1 – 21</td>
</tr>
<tr>
<td>Dirt barns, stables, sand</td>
<td>1 – 10</td>
</tr>
<tr>
<td>Road Sand, garden soil</td>
<td>1,5 – 4</td>
</tr>
<tr>
<td>Excrement, V-I</td>
<td>1 – 24</td>
</tr>
<tr>
<td>Liquid wastes (low ammonia)</td>
<td>3 – 15</td>
</tr>
<tr>
<td>Stables, V-I</td>
<td>2 – 11</td>
</tr>
<tr>
<td>Walls, bricks</td>
<td>2 – 4</td>
</tr>
<tr>
<td>Soil, water, lichen (Arctic)</td>
<td>4</td>
</tr>
<tr>
<td>Forage plants, V-I</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Bales of hay, V-I</td>
<td>4 – 29</td>
</tr>
<tr>
<td>Sacks of cement and bran</td>
<td>20</td>
</tr>
<tr>
<td>Flour</td>
<td>7</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1</td>
</tr>
<tr>
<td>Agua</td>
<td>3 – 14</td>
</tr>
<tr>
<td>Flies</td>
<td>10</td>
</tr>
<tr>
<td>Tick, tick heme</td>
<td>15 – 20</td>
</tr>
<tr>
<td>Sheep wool</td>
<td>2</td>
</tr>
<tr>
<td>Clothing and footwear * V-I</td>
<td>3- 9,14</td>
</tr>
<tr>
<td>Cow hair</td>
<td>4 – 6</td>
</tr>
<tr>
<td>Glass surface</td>
<td>2+</td>
</tr>
</tbody>
</table>

Source: Cottral, 1969

*Articles of cotton, leather boots, rubber boots VI Summer-Winter.
### TABLE 13. Survival of the foot and mouth disease virus

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>Terms</th>
<th>Survival period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior of barns</td>
<td>AT2, summer</td>
<td>15 – 28 days</td>
</tr>
<tr>
<td>On walls, etc.,</td>
<td>AT, Winter</td>
<td>35 – 68 days</td>
</tr>
<tr>
<td>Exterior buildings</td>
<td>AT, summer</td>
<td>9 – 15 days</td>
</tr>
<tr>
<td>Walls, AT mortar</td>
<td>AT, summer</td>
<td>27 days</td>
</tr>
<tr>
<td>Brick</td>
<td>AT, summer</td>
<td>14 days</td>
</tr>
<tr>
<td>Slaughterhouse waste</td>
<td>AT, 20 °C summer</td>
<td>3 days</td>
</tr>
<tr>
<td>Slaughterhouse drains</td>
<td>2 – 7 °C</td>
<td>&gt; 100 days</td>
</tr>
<tr>
<td>TA fresh water</td>
<td>AT, around 1 °C</td>
<td>100 days</td>
</tr>
<tr>
<td>Saltwater</td>
<td>AT, summer</td>
<td>4 days</td>
</tr>
<tr>
<td>Manure, liquid</td>
<td>4 °C</td>
<td>63 days</td>
</tr>
<tr>
<td>Manure, solid</td>
<td>AT, summer</td>
<td>29 – 33 days</td>
</tr>
<tr>
<td>AT, winter</td>
<td>156 – 168 days</td>
<td></td>
</tr>
<tr>
<td>Depth 30 cm in Hole</td>
<td></td>
<td>6 – 9 days</td>
</tr>
<tr>
<td>Garden fertilizer</td>
<td>AT, summer</td>
<td>25 – 30 days</td>
</tr>
<tr>
<td>Floor, surface</td>
<td>AT, summer</td>
<td>6 – 7 days</td>
</tr>
<tr>
<td>Pens</td>
<td>AT, an example (California)</td>
<td>345 days</td>
</tr>
<tr>
<td>Mud barn</td>
<td>AT, summer</td>
<td>70 days</td>
</tr>
<tr>
<td>Dry sand, deep surface</td>
<td>AT</td>
<td>11 days</td>
</tr>
<tr>
<td>AT</td>
<td>2 – 3 days</td>
<td></td>
</tr>
<tr>
<td>Hay (surface)</td>
<td>AT</td>
<td>105 days</td>
</tr>
<tr>
<td>Hay, TA beam interior</td>
<td>AT, summer</td>
<td>30 days</td>
</tr>
<tr>
<td>AT, winter</td>
<td>185 – 200 days</td>
<td></td>
</tr>
<tr>
<td>Hay, fodder</td>
<td>AT</td>
<td>56 – 105 days</td>
</tr>
<tr>
<td>Grain, fodder</td>
<td>AT</td>
<td>140 days</td>
</tr>
<tr>
<td>Straw, flour</td>
<td>AT</td>
<td>105 days</td>
</tr>
<tr>
<td>In pastures</td>
<td>AT, summer</td>
<td>1 – 7 days</td>
</tr>
<tr>
<td>AT, winter</td>
<td>52 days</td>
<td></td>
</tr>
<tr>
<td>Pastures (mountains)</td>
<td>AT, summer</td>
<td>26 days</td>
</tr>
<tr>
<td>AT, winter</td>
<td>258 days</td>
<td></td>
</tr>
</tbody>
</table>
## Table 13. Survival of the foot and mouth disease virus

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>Terms</th>
<th>Survival period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Animal products</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood, citrate 37 °C</td>
<td>AT</td>
<td>5 days</td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td>10 days</td>
</tr>
<tr>
<td><strong>Clothes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber boots AT</td>
<td></td>
<td>102 days</td>
</tr>
<tr>
<td>Cotton Clothing AT</td>
<td></td>
<td>63-68 days</td>
</tr>
<tr>
<td>Silk, linen AT</td>
<td></td>
<td>3-14 days</td>
</tr>
<tr>
<td>Leather (shoes) AT</td>
<td></td>
<td>30-35 days</td>
</tr>
<tr>
<td><strong>Dried blood</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass, brick, wood AT</td>
<td></td>
<td>2-3 days</td>
</tr>
<tr>
<td>In TA meat wrapper AT</td>
<td></td>
<td>45 days</td>
</tr>
<tr>
<td><strong>Leather</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green 15 °C</td>
<td>AT</td>
<td>90 days</td>
</tr>
<tr>
<td>4 °C</td>
<td></td>
<td>352 days</td>
</tr>
<tr>
<td>Dry 20 °C</td>
<td>AT</td>
<td>42 days</td>
</tr>
<tr>
<td>salted</td>
<td>AT</td>
<td>46 days</td>
</tr>
<tr>
<td>Cow Hair AT, winter</td>
<td></td>
<td>28-42 days</td>
</tr>
<tr>
<td><strong>Milk and milk products</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk, fresh untreated AT</td>
<td></td>
<td>25 hours</td>
</tr>
<tr>
<td>5 °C</td>
<td></td>
<td>12 days</td>
</tr>
<tr>
<td>Milk, skim AT</td>
<td></td>
<td>30 hours</td>
</tr>
<tr>
<td>Butter, unsalted AT, subsequently precooled 8 days</td>
<td>AT, without pre-cooling</td>
<td>26 hours</td>
</tr>
<tr>
<td>chilled butter AT, while rancid 4 °C + 45 days</td>
<td></td>
<td>45 days</td>
</tr>
<tr>
<td>Cream butter AT while rancid 4 °C + 45 days</td>
<td></td>
<td>45 days</td>
</tr>
<tr>
<td>Buttermilk, skimmed milk, etc. 4 °C + 45 days</td>
<td></td>
<td>45 days</td>
</tr>
<tr>
<td>Cheddar cheese (raw milk) 4 °C (pH 5,2) + 45 days</td>
<td></td>
<td>120 days</td>
</tr>
<tr>
<td>Cheddar (67 °C x 1’) 4 °C + 45 days</td>
<td></td>
<td>30 days</td>
</tr>
</tbody>
</table>
Table 13. Survival of the foot and mouth disease virus

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>Terms</th>
<th>Survival period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camembert (72 ºC x 0,25’)</td>
<td>4 ºC</td>
<td>21 days</td>
</tr>
<tr>
<td>Casein(dry)</td>
<td>AT</td>
<td>42 days</td>
</tr>
<tr>
<td><strong>Milk powder</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moisture &lt;6%</td>
<td>AT</td>
<td>2 years</td>
</tr>
<tr>
<td>Humidity &gt;7%</td>
<td>AT</td>
<td>1 – ½ years</td>
</tr>
<tr>
<td>Milk, dried on wood</td>
<td>AT</td>
<td>2 years</td>
</tr>
<tr>
<td><strong>Meat product</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pork</td>
<td>AT</td>
<td>4 -6 days</td>
</tr>
<tr>
<td>Kidney</td>
<td>AT</td>
<td>10 days</td>
</tr>
<tr>
<td>Cattle carcass</td>
<td>4 ºC</td>
<td>73 days</td>
</tr>
<tr>
<td></td>
<td>0 ºC</td>
<td>194 days</td>
</tr>
<tr>
<td>Saliva</td>
<td>37 ºC</td>
<td>1 (no 2) day</td>
</tr>
<tr>
<td></td>
<td>23 ºC</td>
<td>24 (no 35) day</td>
</tr>
<tr>
<td></td>
<td>5 ºC</td>
<td>35 days</td>
</tr>
<tr>
<td>Urine, Cattle</td>
<td>AT*, ph 6,8 – 7,6</td>
<td>5 hours</td>
</tr>
</tbody>
</table>

Source: Reprinted from the Guide to Emerging Disease Eradication, ARS / USDA, March 1971, revised by the Centre for Plum Island Animal Disease, March 1979.

* AT: ambient temperature
### TABLE 1

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>FMD</th>
<th>VS</th>
<th>EXVC</th>
<th>SVD</th>
<th>IBR</th>
<th>MCF</th>
<th>BVD</th>
<th>BPS</th>
<th>EC</th>
<th>BT</th>
<th>HMC</th>
<th>PB</th>
<th>PI</th>
<th>HORSE</th>
<th>SHEEP</th>
<th>GOAT</th>
<th>HUMAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATTLE</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>leve</td>
<td>leve</td>
<td>+</td>
<td>VESICULAR ULCERATIVE NECROSIS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIG</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>(+)</td>
<td>Exp.</td>
<td>(+)</td>
<td>(Ex.)</td>
<td>(+)</td>
<td>+</td>
<td>+</td>
<td>leve</td>
<td>leve</td>
<td>+</td>
<td>VESICULAR ULCER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHEEP</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>leve</td>
<td>leve</td>
<td>+</td>
<td>PAPULE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOAT</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>leve</td>
<td>leve</td>
<td>+</td>
<td>SCAB PUSTULE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUMAN</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>leve</td>
<td>leve</td>
<td>+</td>
<td>PAPULE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References: FMD: Foot and mouth disease; VS: Vesicular stomatitis; SVD: Swine Vesicular Disease; EXVC: Vesicular exanthema; BVD: Bovine Viral Diarrhea; MCF: malignant catarrhal fever (American type); IBR: Infectious Bovine Rhinotracheitis; BPS: Bovine Popular Stomatitis; EC: Ecthyma contagiosum; BT: Bluetongue; MHC: Herpetic mammillitis; PB: Rinderpest.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Morbidity***</th>
<th>Mortality</th>
<th>Transmission</th>
<th>Observations</th>
</tr>
</thead>
</table>
| Foot and Mouth Disease          | High (60-100%) | Low (but in young animals may be high) | - contact, aerosols?  
- meat products  
- carriers (?)  
- Wind (?) | Persistence in cattle  
But which carriers transmit?  
Virus in feces, urine, milk, esophageal-pharyngeal fluid, fumes and injuries ... Most contagious disease in veterinary medicine / human |
| Vesicular stomatitis            | Below the average (5-10%); in dairy herds up to 85% | Zero or low | - contact?  
- carriers (?)  
- vectores?  
- Periods of?...  
- Calf-milking machines | Calves are more resistant than adults.  
New Jersey Serotype more virulent than Indiana.  
Zoonosis  
Natural immunity <6 months  
The virus does not survive more than a few (1-2) weeks in the environment. Coarse food exacerbates the infection /  
Wildlife transmission? |
| Swine Vesicular Disease         | High (25-65%)  
Lower subclinical infections occur | Low | - touch  
- meat products (persists in refrigerated / frozen meat)  
- Through hoof injuries.  
- Oral & nasal secretions | Zoonosis- related to human coxsackievirus B5 in humans  
Very resistant to drugs / environment  
Elimination / Faeces – 3 weeks  
Contamination of fomites.  
No vertical transmission has been demonstrated |
| Bluetongue                      | Medium to high  
– depends on the presence of vectors (50-75%) | 20-50% Spain (80%) | - vector (Culicoides spp.)  
- Cattle as a carrier? | Bovine carriers (?)  
Reservoir (?)  
Vector periods.  
Fairly resistant to the environment. Differences in susceptibility by race and age (lambs being more resistant) |
<table>
<thead>
<tr>
<th>Disease</th>
<th>Morbidity***</th>
<th>Mortality</th>
<th>Transmission</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious Bovine Rhinotracheitis</td>
<td>8% (Milk))</td>
<td>0-3% (Milk)</td>
<td>-Carriers</td>
<td>Persistent infection – reactivation (with stress?) Wild animals may have an important role in Africa. Vaccination confers protection. Protection through colostrum ranges from 1 to 6 months</td>
</tr>
<tr>
<td></td>
<td>20-100% (Fattening)</td>
<td>1-10% (Fattening)</td>
<td>-Contact/Aerosoles/Semen</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Persistent infection – reactivation (with stress?) Wild animals may have an important role in Africa. Vaccination confers protection. Protection through colostrum ranges from 1 to 6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Carriers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact/Aerosoles/Semen</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact/Aerosoles/Semen</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact/Aerosoles/Semen</td>
<td></td>
</tr>
<tr>
<td>Bovine Viral Diarrhea</td>
<td>DVB - Low to Medium (80-100%)</td>
<td>DVB – low to medium (sporadic; 0-20%) mucosal disease (90-100%)</td>
<td>- Contact/Contacto/Aerosoles/Semen</td>
<td>Isolation in feces, urine, saliva, semen, milk. Congenital infection is important in the persistence of DVB</td>
</tr>
<tr>
<td></td>
<td>Mucosal disease (5-10%)</td>
<td></td>
<td>- Contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Cattle persistently infected</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Vertical Transmission</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-important</td>
<td></td>
</tr>
<tr>
<td>Malignant Catarrh Low</td>
<td>Low (Up to 50%??) 87of231 (USA) 166/1000 (USA)</td>
<td>high (~100%)</td>
<td>- Contact</td>
<td>Viremia up to 2.5 months in carriers with virus-associated white blood cells. Free Virus parturition seasons – in nasal/ocular secretions. It also affects deer, buffalo, bison. Destroyed by freezing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Blue Gnu, hartebeest and sheep (goats?) – Carriers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Vertical transmission</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-important</td>
<td></td>
</tr>
<tr>
<td>Rinderpest and pests of small ruminants</td>
<td>High (25-90%)</td>
<td></td>
<td>- Contact-inhalation</td>
<td>Virus very labile in the environment (hours to days) may persist in cool environments up to 1 month. Clinical differences observed in different species (including wildlife; B. indicus more resistant than B. Taurus). Possible immunity for life. Virus in blood, tissues, secretions/droppings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- The reservoir is unknown</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- The role of vectors as a source has been abandoned as a theory</td>
<td></td>
</tr>
</tbody>
</table>
## TABLE 2 – Cont’d

<table>
<thead>
<tr>
<th>Disease</th>
<th>Morbidity***</th>
<th>Mortality</th>
<th>Transmission</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contagious ecthema</td>
<td>High (50-90%)</td>
<td>Low-adults (1-2%)</td>
<td>- Contact</td>
<td>Zoonosis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High-young animals (15-75%)</td>
<td>- Fomites/management teams</td>
<td>Crusts c / virus remain infectious up to 15 years Immunity is long lasting (2-3 years)</td>
</tr>
<tr>
<td>Bovine Papular Stomatitis</td>
<td>entire range</td>
<td>Zero</td>
<td>- Environment / scabs</td>
<td>Young animals (two weeks to one year; and rarely up to two years ) often seen in conjunction with ostertagiasis</td>
</tr>
<tr>
<td>Vesicular exanthema in swine</td>
<td>High</td>
<td>Low (&lt;5%)</td>
<td>- contact-meat products (persiste en carnes Refrig./congeladas persists in chilled / refrigerated meat)</td>
<td>Persistence in chilled / frozen meat. Post-infection immunity – 20 months – but no cross-immunity to other serotypes. Mortality may be higher in young animals, females that do not allow piglets to nurse and those with abortions. – Fomites do not feature. There has been no evidence seen of vertical transmission.</td>
</tr>
</tbody>
</table>

*Obviously the immune status influences the disease – as there are vaccines for FMD, EV, LA, IBR, BVD, PB and PPR.

**The concentration of animals (ie type of operation) affects the development and spread of disease.

Compilation: Dr. Juan Lubroth (17)
### TABLA 3.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Necropsy</th>
<th>Histopathology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Swine Vesicular Disease</strong></td>
<td>Not usually done</td>
<td>EpiDerm – intercellular infection of the stratum spinosum / degeneration of the entire dermis – including basal lamina. Necrosis c / neutrophil infiltration. Spongiosis is lower than in EV. AMIG / pancreas / GL.SALV. – Degeneration of squamous epithelium, replaced by basophilic cells. SNC – nonsuppurative meningoencephalitis</td>
</tr>
<tr>
<td><strong>Vesicular exanthema in swine</strong></td>
<td>Not usually done</td>
<td>EPIDER – similar to FMD</td>
</tr>
<tr>
<td><strong>Bluetongue</strong></td>
<td>Eosinophilic intracytoplasmic inclusion bodies. Intense focal hyperemia with edema in the dermis. Intense hyperplasia and degenerative intracellular edema within the lesion.</td>
<td>Infarcts in the dermis – erosions in acute cases – subcutaneous and intermuscular edema. Widespread vascular thrombosis / vacuolation and necrosis of epithelial thrombi in the lamina propria.</td>
</tr>
<tr>
<td><strong>Infectious Bovine Rhinotracheitis RF—</strong></td>
<td>RF: Erosion of the nostrils, mouth, trachea, bronchi DF: similar to Rinderpest – thick exudate covering ruminal mucosa – gray. Focal areas of necrosis. IPV / BP – white pustular genital mucosa (pustular vulvovaginitis and balanitis)</td>
<td>EpiDerm – focal necrosis, erosions and ulcerations. Reaction leukocytes (mainly neutrophils) in areas of the lamina propria. Vacuolation of cytoplasm. Cowdry A and B inclusions can be found. TRAC.DIG – areas of ischemic necrosis in the rumen and abomasum crease. Necrosis of the glandular epithelial cells. Intestine (D and G) – focal necrosis of crypts and lamina propria. Coagulative necrosis of Peyer’s patches – and also in the kidney, liver, spleen, adrenals.</td>
</tr>
<tr>
<td>Disease</td>
<td>Necropsy</td>
<td>Histopathology</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Malignant Catarrh</td>
<td>Erosion of the palate, nose, pharynx, esophagus, intestine (D and G) marked hyperemia widespread respiratory lymphoendopathy. Dehydration; bloody enteritis lymphocytic infiltration in various organs (heart, kidney, liver, cornea)</td>
<td>GEN – lymphocyte infiltration in various organs. Lymphoproliferation. Fibrinous necrotizing vasculitis. Arteritis generalized c perivascular mononuclear cell infiltration. EpiDerm – necrotic spinous layer at the level of infiltration. RESP–hyperemia, petechiae, edema, erosions. Bronchopneumonia DIGEST – erosions or ulcerations SNC – Meningitis</td>
</tr>
<tr>
<td>Rinderpest and pest of small ruminants</td>
<td>Erosion of the palate, nose, pharynx, esophagus, intestine (D and G) Almost – or if not – identical to BVD general lymphosism; bloody enteritis Dehydration</td>
<td>EpiDerm – Necrosis in spinous layer at the base laminate, karyorrhexis, erosions with infiltration – syncytial cells – necrosis of lymphoid areas – Peyer’s patches, ileocecal junction – with erosions and diffuse bleeding.</td>
</tr>
<tr>
<td>Contagious Ecthyma</td>
<td>Not usually done</td>
<td>Inclusion bodies in the epithelium at the subdermal layer. EPB–like lesions (initially) being the most prolific of CD with more extensive exudations with pustules.</td>
</tr>
<tr>
<td>Bovine Papular Stomatitis</td>
<td>Not usually done</td>
<td>Eosinophilic intracytoplasmic inclusion bodies. Intense focal hyperemia with edema in the dermis. Intense hyperplasia and degenerative intracellular edema within the lesion.</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHICAL REFERENCE


14. Días LE. Differential Diagnosis in foot and mouth disease. (Personal communication).


