

12. CRISIS SCENARIOS

12.1 Introduction

- Whenever there is suspicion of an epidemic and/or notifiable disease affecting domestic animals, the Teaching Hospital (TH) and the FMV Laboratories must adhere to the procedures described in the following scenarios.
- These procedures remain in force until the official health authorities, e.g., DGAV and DGS, assume crisis management.
- The criteria for including diseases on this list are as follows:
 - **Severe Zoonotic Risk (Occupational Health):** Diseases that may cause death, severe chronic illness, or abortion in students and staff (e.g., Leptospirosis, Tuberculosis, Brucellosis, Q Fever).
 - **Economic/Legal Impact (Notifiable Diseases):** Diseases which, if detected, require facility closure, restriction of animal movements at national or international level, or immediate intervention by DGAV (e.g., African Swine Fever, Foot-and-Mouth Disease).
 - **High Nosocomial Risk:** Highly contagious diseases that may spread rapidly within the Teaching Hospitals, requiring ward closures or quarantine of multiple patients (e.g., Virulent Systemic Feline Calicivirus, Equine Herpesvirus).
 - **Critical Procedural Error (Necropsy Risk):** Diseases for which performing a necropsy may disseminate spores or aerosols, contaminating facilities (e.g., Anthrax).
- This document details the six contagious diseases (African Swine Fever, Virulent Systemic Feline Calicivirus, Rabies, Highly Pathogenic Avian Influenza, Leptospirosis, and Equine Rhinopneumonitis) of greatest concern within the scope of teaching, research, and service activities carried out at FMV, by animal species, epidemic and/or zoonotic in nature:
 - **Pigs:**
 - o **Economic/Legal Impact:** African Swine Fever (ASF).
 - **Companion animals:**
 - o **High Nosocomial Risk:** Virulent Systemic Feline Calicivirus (VS-FCV).
 - o **Severe Zoonotic Risk:** Rabies and Highly Pathogenic Avian Influenza (HPAI).
 - **Ruminants and Equines:**
 - o **Severe Zoonotic Risk:** Leptospirosis.
 - o **High Nosocomial Risk:** Equine Rhinopneumonitis.
- This list is dynamic and will be expanded whenever epidemiological scenarios justify it; for example, crisis management measures applicable to Foot-and-Mouth Disease and Equine Influenza are currently being drafted.



12.2 AFRICAN SWINE FEVER / FMV OPERATIONAL SCENARIO

12.2.1. The Virus and the Disease

- **Context:** Notifiable disease in Portugal and to the WOA. As of the present date (Dec 2025), Portugal is officially free from African Swine Fever (ASF), with the last case recorded on November 15, 1999. For more information on the current situation, consult the ASF-dedicated website of the DGAV⁶.
- **Host range:** Domestic pigs and wild boar.
- **Infectious material:** Blood (+++), tissues, urine, feces, secretions/excretions from infected animals (live patients and carcasses).
- **Transmission:** Highly contagious (+++).
- **Clinical Signs and Lesions:**
 - **Acute form** (most common): Subcutaneous hemorrhages (cyanosis and reddening of the skin, especially on ears and extremities); enlarged and hemorrhagic lymph nodes (particularly gastrohepatic and renal lymph nodes); splenomegaly; renal petechiae; hydrothorax / hydropericardium.
- **Environmental persistence:** The virus is highly resistant, especially in carcasses, blood, and contaminated soil (weeks to months, depending on ambient temperature).
- **African Swine Fever contingency plan (DGAV):**
- Available at <https://www.dgav.pt/animais/conteudo/animais-de-producao/suinos/saude-animal/doencas-dos-suinos/peste-suina-africana/plano-de-contingencia/>

12.2.2. Potential routes of introduction into FMV and associated risks

- Given FMV's characteristics (absence of resident pigs for teaching purposes and absence of an experimental pig unit), the associated risks are as follows:
 - **Introduction via a companion pig (e.g., Vietnamese pot-bellied pig / minipig)** presented at the Companion Animal Teaching Hospital:
 - **Scenario:** A client brings a Vietnamese pot-bellied pig with high fever and cutaneous hemorrhages to the Companion Animal Teaching Hospital.
 - **Risk:** Low, but not zero. These animals are privately owned. The risk increases if the animal has outdoor access in areas where wild boar may be present, or if the owner has had contact with infected pigs.
 - **Introduction via fomites (people/materials):**
 - **Scenario:** Students or staff participating in hunting activities or visiting infected pig farms enter FMV without complying with biosecurity measures, e.g., clothing hygiene/change.
 - **Fomites:** The virus may be carried on boots, clothing, and vehicle tires.
 - **Introduction into the Necropsy Room:**
 - **Wild boar risk:** Risk is managed at the source. RESTRICTIVE PROCEDURE: Wild boar necropsies are not accepted or performed at FMV facilities. All wild boar carcasses must be referred to INIAV.
 - **Domestic pigs (pet pigs) risk:** Low risk, unless there is a compatible clinical history. If there is clinical suspicion *ante mortem*, the animal must not enter the necropsy room and, after authorization from DGAV, must be referred to INIAV.

⁶ <https://www.dgav.pt/animais/conteudo/animais-de-producao/suinos/saude-animal/doencas-dos-suinos/peste-suina-africana/>



12.2.3. Immediate management and case definition

- **Suspect Case:** Animal with compatible clinical signs (high fever, anorexia, cutaneous hemorrhages, sudden death) or suggestive lesions at necropsy.
- **Confirmed Case:** Official laboratory confirmation (INIAV).

12.2.4. Immediate action plan (clinical suspicion in the Teaching Hospital)

- If a veterinarian, veterinary nurse, or student observes suspicious signs in a companion pig:
- **Immediate Notification:**
 - Inform the Clinical Director of the Companion Animal Teaching Hospital (aferreira@fmv.ulisboa.pt).
 - Notify the Biosecurity and Hygiene Committee (biosseguranca@fmv.ulisboa.pt).
 - Mandatory notification to DGAV (Lisbon and Tagus Valley Regional Directorate for Food and Veterinary Services) through the Animal Disease Control and Prevention System (SPC) (<https://spc.dgav.pt/>).
- Isolation and Restriction:
 - The animal must not circulate within the hospital. If still inside the vehicle, it must remain there until DGAV instructions are received.
 - **If already in the consultation room:** Immediate closure of the room. No one enters or leaves without appropriate disinfection.
 - Isolation *in situ* at the Companion Animal Teaching Hospital until DGAV inspectors arrive.
- Hygiene Measures:
 - Install a footbath with 1% Virkon™ S solution at the room entrance.
 - Use PPE, e.g., disposable coveralls, gloves, footwear protection.
 - No material leaves the room without disinfection.

12.2.5. Procedure for carcasses (necropsies)

- **WILD BOAR:** Total prohibition. If a wild boar carcass is inadvertently brought to FMV, it must not be removed from the vehicle or enter the facilities. The transporter must be instructed to proceed to INIAV.
- **DOMESTIC PIGS:** If suspicious lesions are detected during a routine necropsy of a companion pig:
 - Immediately stop the procedure.
 - Close the necropsy room. No one leaves without full disinfection of clothing, footwear, and equipment.
 - Notify DGAV and await instructions for official sample collection.
 - The carcass remains stored in a dedicated cold chamber until official orders are received.

Figure 24
Decision-support flowchart – African Swine Fever
African Swine Fever Operations Manual (DGAV, 2016)

INITIAL TRIAGE Pig (domestic / pet pig)?
CLINICAL / EPIDEMIOLOGICAL ASSESSMENT High fever, haemorrhages, sudden death OR risk factors (wild boar, hunting, fomites)
SUSPECT CASE OF ASF IMMEDIATE MEASURES Stop movements Isolate on site Do not transfer to the UICB-AC MANDATORY NOTIFICATION Clinical Director + Biosecurity Committee DGAV (SPC) BIOSECURITY Full PPE Footbath Virkon™ S 1% Access control
AWAIT OFFICIAL DECISION DGAV / INIAV
NECROPSY Wild boar: PROHIBITED Domestic pig: only if not suspected

12.3 VIRULENT SYSTEMIC FELINE CALICIVIRUS (VS-FCV) / FMV OPERATIONAL SCENARIO

12.3.1. The virus (VS-FCV)

- **Agent:** Hypervirulent variant of Feline Calicivirus (FCV).
- **Transmission:** Highly contagious (+++). Direct or indirect contact (e.g., environment, equipment, hands, clothing).
- **Environmental resistance:** The virus survives up to 1 month on dry surfaces. It is resistant to many common disinfectants, e.g., chlorhexidine and quaternary ammonium compounds.
- **Inactivation:** Bleach (5% sodium hypochlorite) or Virkon™ S / Virocid / Oxivir. Laundry at 60 °C.
- **Clinical Signs**
 - High fever, edema (swelling) of the head and limbs
 - Ulcerative lesions on the skin, limbs, muzzle, ears
 - Jaundice, respiratory distress, haemorrhages
 - High mortality rate (up to 67%)
 - Frequently affects vaccinated adult cats (feline calicivirus vaccines do not fully protect against the virulent systemic form).



12.3.2. Potential routes of introduction into FMV and associated risks

The introduction scenario considered consists of the presentation of an infected cat for consultation at the HE-AC.

12.3.3. Crisis management at FMV

- Management is divided into three phases: Surveillance, Pre-alert (Suspicion), and Alert (Confirmation).
- **Suspicion (Pre-alert):** If a cat presents compatible clinical signs, e.g., fever + edema of the face/limbs + cutaneous ulcers, or has a suggestive epidemiological context:
 - **Immediate Action:** The clinician/nurse/student informs the Duty Supervisor.
 - **Admission:** The cat must be directed straight to the UICB-AC via the designated external route, avoiding entry into the reception and cat waiting room. The owner must not bring other animals.
 - **Sampling:** Blood sample in EDTA tube and oropharyngeal swabs for PCR.
 - **Isolation in UICB-AC:**
 - Isolate the patient in a room with no other animals
 - Use PPE exclusive to the UICB-AC
 - Footbath mat at room entrance/exit
 - **Decontamination:**
 - Isolate and discard single-use materials as biohazard waste (Group III/IV)
 - Decontamination of potentially contaminated clothing:
 - Machine wash at 60 °C for at least 1 hour.
 - Use bleach for fabrics that cannot tolerate 60 °C.
 - Disinfect the cat carrier with Virkon™ S / Virocid / Oxivir or discard for incineration if made of fabric.
 - **Confirmation (Alert)**
 - If PCR is positive **and** clinical signs are compatible or if an outbreak is confirmed by sequencing:
 - **Communication:**
 - Inform the owner
 - Inform the HE-AC team (aferreira@fmv.ulisboa.pt) and the CHB (biosseguranca@fmv.ulisboa.pt)
 - **Contact Tracing:**
 - Request from HE-AC Reception the list of movements for that day
 - Identify all cats that were in the HE-AC or hospitalised in the same area since the arrival of “patient zero”
 - Contact the owners of exposed cats, instructing them to monitor for clinical signs and keep the animal in home isolation for 12 days
 - **Measures at HE-AC:**
 - Consider suspending non-urgent feline consultations if there is evidence of nosocomial transmission, unless the patient was admitted directly to the UICB-AC
 - Reinforce disinfection procedures with mandatory record-keeping
 - Exposed hospitalised cats must be kept isolated in the UICB-AC for 12 days
 - **End of Crisis**
 - The crisis is considered over when:
 - No infected animals remain in the HE-AC
 - Final disinfection, including aerial hydrogen peroxide disinfection, has been completed
 - The maximum incubation period (12–15 days) has elapsed since the last confirmed case.



12.4 RABIES VIRUS INFECTION / FMV OPERATIONAL SCENARIO

12.4.1. The virus and the disease

- **Context:** Fatal zoonosis requiring immediate mandatory notification. Portugal is officially disease-free, but surveillance is mandatory due to the risk of imported cases or wildlife introduction.
- **Agent:** *Lyssavirus*, family *Rhabdoviridae*.
- **Susceptible species:** All mammals. In clinical activity, focus is on dogs, cats, and ferrets.
- **Transmission:**
 - Direct contact with infected saliva (bite, scratch)
 - Contact of saliva with mucous membranes or open wounds
 - Important note: The virus does not cross intact skin
- **Incubation period:** Variable (2 weeks to several months). Dogs may excrete virus in saliva up to 10 days before clinical signs appear.
- **Epidemiological context:** In Portugal, systematic anti-rabies vaccination is mandatory in dogs to protect animals and, consequently, people. It began in 1925 and continues to this day. Rabies has been a notifiable disease in Portugal since 1953 and was officially eradicated in 1961. The last imported rabies case occurred in August 1984 in a puppy under two months of age from Mozambique that entered Portugal illegally. After the animal's death, rabies was laboratory confirmed. Although Portugal maintains officially free status, circulation of other *Lyssaviruses* in bats cannot be excluded.
- **Rabies Contingency Plan (DGAV):** Available at https://www.dgav.pt/wp-content/uploads/2024/08/Plano-de-contingencia-Raiva_2024.pdf
- **DGS guideline on pre- and post-exposure rabies prophylaxis:** Available at <https://www.dgs.pt/normas-orientacoes-e-informacoes/normas-e-circulares-normativas/norma-n-0012025.aspx>

12.4.2. Case definition (according to DGAV)

Clinical Suspicion: Animal presenting behavioural changes (sudden aggression or excessive shyness), progressive paralysis (jaw, hind limbs), vocalisation changes, excessive salivation, hydrophobia, or sudden death without apparent cause⁷.

- **Suspicion due to aggression:** Any rabies-susceptible animal (dog, cat, ferret) meeting all the following criteria: 1 - Has attacked people or other animals; 2 - Does not have valid anti-rabies vaccination; 3 - Shows clinical signs compatible with rabies; 4 - Has a lifestyle (e.g., hunting dog) or has stayed in the last 3 months in a country where rabies is endemic. Animals attacked by such animals are also considered suspects⁸.
- **Confirmed Case:** Positive diagnosis by the National Reference Laboratory for Animal Rabies (INIAV).

⁷ Artigo 17º da Portaria 264/2013 de 16 de agosto

⁸ Artigo 16º da Portaria 264/2013 de 16 de agosto



12.4.3. Immediate management of a suspected case at FMV

A. If an aggression (bite/scratch) to people occurs:

- Human health is the absolute priority:
- **A.1.1 - Immediate First Aid (on site):**
- Thorough washing of the wound with running water and soap/detergent for at least 15 minutes
- Followed by application of a virucidal disinfectant (e.g., povidone-iodine or 70% alcohol)
- **A.1.2 - Communication to FMV Occupational Health and Safety Unit (NSST)**
- Report via email to pmorgado@fmv.ulisboa.pt.
- **A.2 - Medical referral**

Considering clinical context:

- Behavioral changes or clinical signs compatible with rabies;
- Verified vaccination status;

Or the epidemiological context:

- Travel history within the last three months to countries where rabies is endemic;
- History of contact with animals of susceptible species that have traveled to rabies-endemic countries in the last three months;
- Contact with bats within the last three months.
- The injured person must go to a hospital emergency department, and notification must be made to the Public Health Unit (USP) of the Local Health Unit. The Clinical Director of the Companion Animal Teaching Hospital (HE-AC) must contact the USP in the victim's area of residence or in the FMV area to assess the need for Post-Exposure Prophylaxis (PEP) (rabies vaccine and/or rabies immunoglobulin).

B. Management of the Suspected Animal (Alive)

- If an animal presented for consultation or admitted to general hospitalization shows clinical signs compatible with rabies, the following measures must be taken:
 - Confinement in a cage and isolation;
 - The animal must NOT leave the HE-AC facilities;
 - If it is a dog or cat, it must be transferred to the Companion Animal Biological Isolation Unit (UICB-AC) in a secure individual cage labeled “**Biological Risk – Suspected Rabies**”;
 - Transport must be in a rigid carrier, sealed with adhesive tape after closing, and handled only by staff wearing full PPE;
 - Access to the UICB-AC room where the patient is housed must be restricted to strictly essential personnel (the responsible veterinarian), with mandatory use of full PPE, including eye protection and resistant gloves;
 - The animal must remain in the UICB-AC until it is collected by an Official Collection Center with quarantine and monitoring facilities approved by DGAV, where mandatory confinement will be carried out.
- **Mandatory Notification:**
 - Inform the Clinical Director of HE-AC (aferreira@fmv.ulisboa.pt) and the Biosafety Committee (biosseguranca@fmv.ulisboa.pt);
 - Immediately contact DGAV (Directorate of Food and Veterinary Services of the Lisbon and Tagus Valley Region) and the Municipal Veterinarian of Lisbon (casa.dos.animais@cm-lisboa.pt).
- **Sanitary Confinement (Quarantine):**
 - The animal must be kept under confinement for at least 15 days.



- **PROHIBITION OF EUTHANASIA:** The animal must NOT be euthanized during this period without explicit authorization from DGAV, as premature death may make laboratory diagnosis impossible (antigen detection in a brain sample).
- If the animal survives the 15 days without clinical signs, it is considered that it was not transmitting rabies at the time of the incident.

C. Carcass Management (if the animal dies or is euthanized by order of DGAV)

- **Preservation**

- The carcass, or the head in the case of livestock species, must be kept refrigerated between 2°C and 8°C.
- Freezing should be avoided if delivery to the laboratory is rapid (<24–48h), but if there is a delay, freezing may be carried out according to the DGAV Rabies Contingency Plan.

- **Necropsy**

- If there is a strong suspicion of rabies, a full necropsy must **not** be performed in the FMV Necropsy Room to avoid aerosol generation.
- The collection of biological samples (brain/head) must be performed by an experienced pathologist wearing a respiratory protection mask (FFP3), eye protection, and cut-resistant gloves. The use of electric saws is prohibited; a manual saw must be used.

- **Sample Submission**

- Preferably, contact INIAV before sending the material in order to arrange delivery details. Only veterinarians, or technicians properly trained by them, may collect biological samples from an animal suspected of rabies for submission to INIAV and, whenever possible, they should be vaccinated.
- The material must be sent urgently to INIAV, accompanied by the official submission form and clear identification of the biological risk⁹.

12.4.4. Additional biosecurity measures

PPE: When handling a suspected animal: waterproof suit, double nitrile gloves, leather/cut-resistant gloves worn over them if animal restraint is required, FFP2/FFP3 mask, and face shield or protective goggles (to protect the conjunctiva from saliva splashes).

- **Disinfection:** The virus is inactivated by:

- Sodium hypochlorite (bleach);
- 70% ethanol;
- VirkonTM S / Virocid / Oxivir.

12.4.5. Communication and tracing

- **Communication chain:**

- HE-AC Clinical Director → DGAV / Municipal Veterinary
- HE-AC Clinical Director → Public Health Unit.

- **Contact tracing:**

⁹ https://www.inia.pt/images/Servicos-Laboratoriais/saude-animal/Mod_GIC_015_FRA_Canideos_e_Felideos.pdf



- FMV must provide the health authorities with the complete list of all individuals (students, staff, owners) who had direct contact (bite, lick on broken skin or mucous membranes) with the suspected animal.

12.4.6. Rapid Action Flowchart (Summary)

- Suspect/Aggression → Isolate animal in UICB-AC (Do NOT euthanise)
- Injured person → Wash 15 min + Disinfect → Hospital → Public Health
- Notify → DGAV + Municipal Veterinary
- Await → Official instructions for quarantine (15 days) or sampling (INIAV).

12.45 HIGHLY PATHOGENIC AVIAN INFLUENZA (HPAI) / FMV OPERATIONAL SCENARIO

12.5.1. The virus and the disease

- **Context:** Disease subject to immediate mandatory notification. Zoonosis with pandemic potential.
- Agent: Influenza A virus, H5 and H7 subtypes (e.g., H5N1, H5N8).
- **Transmission**
 - **Direct:** Contact with respiratory secretions, faeces and feathers of infected birds.
 - **Indirect:** Fomites (clothing, footwear, vehicles, equipment).
 - **Zoonotic:** Risk of transmission to humans, especially in situations of close contact without protection (necropsies, clinical handling).
- **Resistance:** The virus survives for a long time in faeces and water at low temperatures. It is inactivated by common disinfectants (Sodium hypochlorite, Virkon™ S) and by heat (60 °C for min).
- **Avian Influenza Contingency Plan (DGAV):** Available at <https://www.dgav.pt/animais/conteudo/animais-de-producao/aves-de-capoeira/saude-animal/doencas-das-aves/gripe-aviaria/>
- **DGS Standard DGS-0004/2025, regarding vaccination against zoonotic influenza:** <https://www.dgs.pt/normas-orientacoes-e-informacoes/normas-e-circulares-normativas/norma-n-0042025-de-07032025-atualizada-a-21082025-vacinacao-contr-a-gripe-zoonotica--acesso-a-reserva-estrategica-nacional-de-vacina-contr-a-gripe-zoonotica.aspx>

12.5.2. Routes of introduction into FMV and specific risks

- Although FMV has no resident birds and no experimental poultry unit, there are three critical biological risk routes:
 - **Teaching Hospital (HE)**
 - **Wild and Exotic Birds:** Admission of birds collected by private individuals or authorities (e.g., gulls, raptors, anseriformes) or pet birds (pet chickens) with acute clinical signs.
 - **Domestic Mammals (Cats):** Admission of outdoor-access cats that may have preyed upon or been in contact with infected birds or dairy ruminant farms (see case definition below).
 - **Necropsy Room (Pathological Anatomy):** Reception of bird carcasses (domestic or wild) and cats with a clinical history of sudden/acute death for *post-mortem* diagnosis.
 - **Field Classes (Population Medicine / Veterinary Public Health):** Study visits to commercial poultry farms or egg grading/classification centres. Risk that students/teachers act as mechanical vectors of the virus out of or into the Faculty.



12.5.3. Definition of a suspect case (birds)

- Suspicion should be raised in the presence of clinical presentations compatible with HPAI associated with an epidemiological context.

- **Birds (Domestic or Wild):**

Any bird presenting:

- Sudden death (especially if in large numbers or in waterfowl).
- Severe depression and anorexia.
- Respiratory signs (dyspnoea, sneezing, nasal/ocular discharge).
- Head/neck oedema or cyanosis (combs/wattles).
- History of contact with wild birds or originating from Restriction Zones established by DGAV).

- **Cats**

- Given feline susceptibility to the H5N1 strain (clade 2.3.4.4b), any cat meeting the following Clinical **and** Epidemiological criteria should be considered a “Suspect Case”:

- **Clinical Criteria (Acute/Severe Signs)**

- Neurological: Seizures, ataxia, tremors, circling, sudden blindness.
- Respiratory: Severe respiratory distress, dyspnoea, pneumonia.
- General: High fever, severe lethargy, jaundice (less frequent).
- Sudden Death: Cats found dead or that die shortly after admission with the clinical signs described above.

- **Epidemiological Criteria (Risk Factors)**

- Cat with outdoor access.
- Known or suspected history of predation/ingestion of sick/dead wild or domestic birds in the last 2 weeks.
- Originating from a geographical area with active HPAI outbreaks confirmed by DGAV (in wild birds or farms).
- **IMPORTANT NOTE:** An indoor-only cat (no outdoor access and not fed raw poultry meat) presents a negligible risk and should not be considered suspected HPAI; other causes should be investigated.

12.5.4. Immediate management of a suspicion at FMV

At the Small Animal Teaching Hospital (HE-AC)

If a bird presents compatible clinical signs at triage or consultation:

- The bird or cat must **NOT** remain in the waiting room. Immediately refer to **Isolation: If bird:** designated exotic animal isolation room. **If cat:** UICB-AC.

- Only strictly necessary clinical staff may enter these isolation rooms.

- **Mandatory PPE (Zoonotic Level):** The clinician must use an FFP2/FFP3 mask, eye protection, nitrile gloves, and an impermeable gown/disposable coverall. Respiratory and eye protection are critical.

- **Notification:** Inform the HE-AC Clinical Director (aferreira@fmv.ulisboa.pt) and the CHB (biosseguranca@fmv.ulisboa.pt). Contact DGAV (DSAVRLVT) to report the suspicion.

- **Movement prohibition:** The bird does not leave FMV. The owner must be informed that the bird will be retained under sanitary order.

In the Necropsy Room (Carcasses)

- If carcasses arrive from birds with a history of sudden flock mortality or aquatic wild birds (ducks, geese, gulls) or cats meeting the clinical and epidemiological criteria:



- **DO NOT OPEN THE CARCASS:** If suspicion is strong (based on anamnesis), do not perform the necropsy in general facilities.
- **Safe handling:** Keep the carcass in double bagging, sealed and refrigerated.
- **Referral:** Contact DGAV. As a rule, these samples must be sent to INIAV to exclude HPAI, under biosecurity level 3 conditions, which FMV's necropsy room may not be able to guarantee for high viral-load aerosols.
- **Disinfection:** Immediately disinfect the reception area where the carcass was placed

12.5.5. Procedures for extramural practical classes (Farm Animal Clinical Practice and Population Medicine / Veterinary Public Health)

- Given the risk of mechanical transport of the virus via footwear and clothing (fomites) during visits to poultry farms or egg grading/classification centres:
 - **Pre-visit verification:** On the day before the visit, the responsible teacher must verify whether the destination site is in a Protection Zone or Active Surveillance Zone (consult DGAV notices¹⁰). If so, the visit must be cancelled or rescheduled.
 - **"Clean-in, Clean-out" policy:**
 - Mandatory use of PPE provided by the farm or disposable PPE, e.g., coverall, cap, boot covers.
 - Prohibition of bringing personal items that cannot be disinfected into the poultry houses.
 - **Sanitary Void (Personal quarantine):** Students and teachers who visit poultry farms are prohibited from contact with other birds (including in the HE-AC, Necropsy Room, or pet birds) for a minimum period of 48 to 72 hours after the visit.

12.5.6. Human health and vaccination

- Avian influenza is a zoonosis. Protection of students, teachers, and staff is a priority.
- **Accidental exposure:**
 - Any person who had contact without appropriate PPE with a bird strongly suspected of HPAI or with confirmed disease must contact **SNS 24 (808 24 24 24)** and the local Public Health Unit.
 - Active symptom monitoring (fever, cough) for 7 to 10 days and/or antiviral prophylaxis may be required.
- **Vaccination against Zoonotic Influenza (National Strategic Reserve):**
 - According to DGS Standard 004/2025¹¹, workers at increased risk are eligible for pre-exposure vaccination. At FMV, this group may include:
 - Pathologists and necropsy technicians who handle wild/suspect birds.
 - Exotic/wildlife clinicians with frequent contact with wildlife.
 - **Procedure:** The CHB, in coordination with FMV's NSST (pmorgado@fmv.ulisboa.pt), must identify eligible professionals and request access to the vaccine from the Local Health Authority, if justified by the volume of risk cases.
- **Seasonal vaccination:** Annual vaccination against seasonal human influenza is strongly recommended to the entire FMV community in contact with animals, to mitigate the risk of co-infection and viral genetic reassortment.

¹⁰ <https://www.dgav.pt/animais/conteudo/animais-de-producao/aves-de-capoeira/saude-animal/doencas-das-aves/gripe-aviaria/>

¹¹ <https://www.dgs.pt/normas-orientacoes-e-informacoes/orientacoes-e-circulares-informativas/orientacao-n-0042025-de-09092025-vacinacao-sazonal-contra-a-gripe-e-a-covid-19-procedimentos-especificos-pdf.aspx>



12.5.7. Crisis communication

- **FMV point of contact:** HE-AC Clinical Director (aferreira@fmv.ulisboa.pt) or Pathology Lead (jcorreia@fmv.ulisboa.pt).
- **External notification:** Mandatory to DGAV and to DGS if there is exposure.
- **Cleaning:** If an outbreak focus is confirmed (positive bird on the premises), the affected area must be closed and subjected to rigorous disinfection with an approved virucide, respecting contact times.

12.6 LEPTOSPIROSIS / FMV OPERATIONAL SCENARIO

12.6.1. The agent and the disease

- **Context:** Severe zoonosis caused by spirochetes of the genus *Leptospira*. Although not subject to mandatory notification to DGAV, it is a disease of mandatory notification to DGS when confirmed in humans.
- **Transmission**
 - Direct contact with urine from infected animals (main route of transmission).
 - Contact with tissues, blood or fluids during necropsies or parturition.
 - Indirect contact via contaminated water, soil, or bedding.
 - Entry routes: injured skin (cuts, abrasions), mucous membranes (eyes, nose, mouth), and inhalation of aerosols (contaminated urine/water).
- **Resistance:** The bacterium survives well in humid and warm environments, but is sensitive to desiccation, freezing, and most common disinfectants.

12.6.2. Risk management by scenario

- Management at FMV is divided into four critical scenarios with distinct procedures.

Scenario 1: Field necropsy (practical classes in Farm Animal Clinical Practice and Population Medicine)

- High risk due to uncontrolled environmental conditions.
- **Prior assessment:** If there is ante-mortem clinical suspicion of leptospirosis (e.g., severe jaundice, haemoglobinuria in calves), a field necropsy with students must not be performed.
- **Accidental discovery:** If, during a field necropsy, lesions suggestive of leptospirosis are observed, e.g., pale/mottled kidneys, generalized jaundice, friable liver:
 - Stop the procedure immediately.
 - Move students to a safe distance (minimum 2 metres).
 - The teacher/veterinarian evaluates whether to close the carcass or proceed only for collection of essential samples.
- **Biosecurity**
 - Mandatory use of latex/nitrile gloves, preferably double.
 - Use of eye protection (goggles/face shield) to prevent splashes of fluids.
 - Rigorous disinfection of boots and equipment before entering the FMV vehicle.



Scenario 2: Necropsy room (Companion animals, Production animals or Exotics)

- Controlled environment, but risk of aerosols during washing.
- **Signage:** Place a warning on the door and on the table: “BIOLOGICAL RISK – SUSPECT LEPTOSPIROSIS”.
- **Enhanced PPE**
 - FFP2 / FFP3 mask mandatory (protection against aerosols during cavity opening or bone sawing).
 - Face shield or full eye protection goggles.
 - Cut-resistant gloves + nitrile gloves.
 - Waterproof suit and rubber boots.
- **Procedures**
 - Avoid electric saws (generation of bone/blood aerosols). Use manual saws whenever possible.
 - Use of high-pressure hoses to wash the carcass or table while tissues are exposed is PROHIBITED. Water must run at low pressure to avoid aerosolization of contaminated fluids.
 - Limit the number of students present to the essential minimum.

Scenario 3: Clinical case at the Small Animal Teaching Hospital

- Focus on urine management and staff protection.
- **Admission:**
 - Animal com sinais de insuficiência renal aguda e/ou hepática, febre e história de vacinação
 - Animal with signs of acute renal and/or hepatic failure, fever, and incomplete vaccination history or contact with water/rodents;
 - Refer to the UICB-AC
- **Housing in the UICB-AC:**
 - Place a notice on the cage: “CAUTION: INFECTIOUS URINE – LEPTOSPIROSIS”;
 - The cage must have disposable absorbent lining. Avoid grates where urine splashes onto the common floor.
- **Urine management (critical point):**
 - Catheterize the animal in a closed system to avoid environmental contamination.
 - If the animal urinates on the floor/cage: DO NOT use a pressure hose. Cover urine with absorbent paper, soak with disinfectant, collect as biohazard waste (Group III) and only then wash the surface.
- **Walks:**
 - Suspected dogs must not be walked in common outdoor areas of FMV. They must eliminate in UICB-AC cages (pads) or via a closed collection system.

Scenario 4: Clinical case at the Equine Teaching Hospital

- Urine volume and bedding are the main challenge.
- **Isolation:** The horse must be housed in a stall in the Equine Biological Isolation and Containment Unit (UICB-EQ).
- **Footbath:** Mandatory at stall entry and exit, before the sanitary filter for that stall, with disinfectant solution renewed daily.
- **PPE:** Disposable coverall, rubber boots, gloves, and eye protection for anyone entering the stall. The coverall and gloves must be discarded.
- **Bedding and urine management:**
 - Urine-contaminated bedding is highly infectious.
 - Bedding removal must be carried out carefully to avoid raising dust (inhalation risk).



- Removed material must be considered infectious waste and must not be placed in the common manure heap if there is no guarantee of effective thermal composting. Ideally, bag and send for incineration or specific treatment;
- **Warnings:** Clear signage on the sanitary filter door that gives access to the stall and on the stall itself: “Restricted Access – Biosecurity Level 2”.

12.6.3. Disinfection and environmental control

- **Recommended disinfectants:**
 - Sodium hypochlorite (bleach) diluted 1:10;
 - Virkon™ S at 1%.
 - Iodine-based solutions or quaternary ammonium-based products.
- **Protocol:** Removal of organic matter (without water pressure) -> Application of disinfectant -> Contact time (minimum 10 minutes) -> Rinsing.
- **Rodents:** Reinforce the pest control plan in areas where the animal was housed, because urine may attract or infect local rodents, perpetuating the cycle at FMV.

12.6.4. Human health and contact traceability

- As leptospirosis is not a notifiable disease to DGAV, protection responsibility lies with the CHB and the Clinical Direction of HE-AC and HE-EQ.
- **Record of exposed persons:**
 - For each confirmed or strongly suspected case, a “Close Contacts List” must be created.
- **Who to include?**
 - Students who attended the necropsy/consultation, nurses, veterinarians, assistants and handlers who handled the animal or cleaned cages/stalls.
- **Risk communication:**
 - All persons on the list must be informed, by email or in person, about the exposure.
 - The information sheet must be provided: “Exposure Alert to a Zoonotic Agent – Leptospirosis”.
- **Health surveillance:**
 - Instruct exposed persons to monitor flu-like symptoms (fever, myalgia, headaches) in the two weeks following exposure.
 - If symptoms occur, they must seek medical care and explicitly state: “I am a veterinary student/professional and I was exposed to an animal with Leptospirosis”.
- **Occupational medicine:**
 - Exposed staff (academic and non-academic) must be flagged to the NSST (pmorgado@fmv.ulisboa.pt).

12.6.5. Laboratory diagnosis at FMV

- Confirmation must be rapid in order to adjust biosecurity measures.
- **Samples:** Urine and blood (EDTA and serum).
 - These samples are initially processed at FMV and forwarded to INIAV.
 - Appropriate biosecurity measures are used when handling the samples (use of gloves).



12.6.6. Action summary (simple flowchart)

- Suspect? -> Put on enhanced PPE (Gloves + Mask + Goggles).
- Isolation -> UICB-AC (Companion animals) or UICB-EQ (Equines).
- Signage -> Place “Biological Risk” warnings.
- Urine -> Treat as biosecurity level 2 biological risk material. Do not use water jets.
- Record -> List all people who had contact with the animal/carcass.
- Confirmation -> Inform exposed community for symptom monitoring.

12.7 EQUINE HERPESVIRUS (EHV) / FMV OPERATIONAL SCENARIO

12.7.1. The virus and the disease

- **Context:** Contagious disease with high economic and sanitary impact. Although it is not a zoonosis, an outbreak of EHV-1 (neurological or abortive form) may require confinement (lockdown) of the HE-EQ.
- **Agent:** *Equine alphaherpesvirus 1* (EHV-1) and 4 (EHV-4). EHV-1 is the main agent responsible for severe forms: myeloencephalopathy (neurological), abortion, and respiratory disease.
- **Transmission:**
 - **Aerosols:** Inhalation of respiratory droplets (coughing, sneezing) from infected horses.
 - **Direct contact:** Nasal secretions, aborted foetuses, placental fluids.
 - **Fomites (Critical):** Hands, clothing, halters, ropes, buckets, thermometers and shared equipment. The virus survives for weeks in the environment.
- **Latency:** The virus remains latent in asymptomatic carrier horses and can reactivate under stress (transport, hospitalization, surgery), leading to viral shedding.

12.7.2. Case definition and alert level

- **Suspect case:**
 - Horse with fever (rectal $> 38.5^{\circ}\text{C}$) associated with respiratory or neurological signs (ataxia, paresis, urinary incontinence, tail flaccidity).
 - Abortion in mares in the last third of gestation.
 - Horse exposed to a confirmed case.
- **Confirmed case:** Identification of viral DNA by PCR (nasal swab, blood) or viral isolation.

12.7.3. Introduction scenarios and immediate management

Scenario A: Admission of a suspect patient (External triage)

- The animal arrives at FMV with a history of fever and ataxia or coming from a stud farm with an active EHV-1 outbreak.
- **Do not unload:** The animal must be assessed in the truck or in the external unloading area, away from resident horse stalls.
- **Direct referral:** If admission is essential, the animal goes directly to the Isolation Unit (HEPA stall in the UICB-EQ) via the shortest external route (“Dirty Route”).
- **Prohibition:** It is strictly prohibited to take this animal through the regular hospitalization area.

**Scenario B: “Internal” case**

- A horse hospitalized for another reason, e.g., colic, surgery, that develops fever $> 38.5^{\circ}\text{C}$ and neurological signs.
- Immediate **“CODE RED”**.
- **Stop movements:** NO horse enters or leaves the hospitalization area.
- **Isolate the patient:** Immediately move the horse to the HEPA stall in the UICB-EQ.
- **Isolate the original stall:** The stall where the animal was must be sealed (no one enters until disinfection is carried out).
- **Quarantine of contacts:** All horses in the same barn are considered “contacts” and cannot be discharged.

12.7.4. UICB-EQ protocol (HEPA stall)

- FMV has a critical infrastructure: a stall with negative pressure and HEPA filtration. Its use is a priority for suspect respiratory/neurological cases.
- **System activation:**
 - Verify that the ventilation/negative pressure system is switched on and functional before bringing the horse in.
 - The stall door must remain closed at all times to ensure the pressure gradient and the effectiveness of air filtration, preventing viral aerosol escape into the corridor.
- **Sanitary filter (Transition Zone):** This is the only area where staff don/doff PPE. It must contain:
 - Footbath with Virkon™ S (renewed daily), stock of disposable PPE, Group III waste container.
- **Mandatory PPE:**
 - Full disposable coverall (with hood).
 - Dedicated rubber boots (kept in the antechamber) or impermeable boot covers.
 - Nitrile gloves (double).
 - Note: Although Equine Herpesvirus is not zoonotic, a mask (FFP2) and cap are recommended to prevent the virus from settling on the operator’s mucous membranes/hair and being mechanically carried to other horses.
- **Dedicated materials:**
 - Everything that enters the HEPA stall stays in the HEPA stall (thermometer, stethoscope, buckets, hay, cleaning material). Nothing leaves without chemical disinfection or in a sealed waste bag.

12.7.5. HE-EQ confinement measures (Lockdown)

- **If there is a confirmed case or strong suspicion of EHV-1 (Neurological):**
- **Closure of the HE-EQ:** The HE-EQ Clinical Director orders the suspension of admissions and discharges.
- **Zoning (Traffic-light system):**
 - **Red Zone (HEPA isolation):** Access restricted to the Senior Veterinarian and 1 dedicated nurse. Students are prohibited.
 - **Yellow Zone (Contacts/General hospitalization):** Exposed horses. Use of PPE (gown/gloves) and footbaths between stalls. Temperature monitoring 2×/day.
 - **Green Zone (Clean):** Administrative areas and zones where horses have not circulated.
- **Segregation of students and staff:** Anyone working in the Red Zone must **NOT** enter the other zones on the same day.



- **Students:** Must be prevented from accessing the Red and Yellow Zones. The risk of transporting virus on clothing to external stud farms is high.

12.7.6. Diagnosis and sampling

- **Collection:** Must be carried out at the onset of fever.
- **Nasopharyngeal swab: (For PCR):** Must be deep.
- **Blood (EDTA):** (For PCR – detection of viraemia).
- **Submission:** INIAV Virology Laboratory. Label the sample as “SUSPECT HERPESVIRUS – HIGH CONTAGION RISK.”

12.7.7. Cleaning and disinfection

- Herpesvirus is sensitive to disinfectants, but viral load may be massive.
- **Disinfectants:** Virkon™ S at 1%, Bleach (Hypochlorite) 1:10, or quaternary ammonium compounds.
- **HEPA stall (Post-discharge):**
 - Store bedding in black bioboxes for incineration;
 - Wash with detergent to remove organic matter;
 - Disinfect by spraying all surfaces (walls, ceiling, feeders).
- **Filters:** Check the need for maintenance/replacement of HEPA filters after a positive case, according to the ventilation system manufacturer’s instructions.

12.7.8. Communication and notification

- **Internal:** Inform all clinicians, nurses and students about confinement (lockdown) and zone restrictions.
- **External:** Equine rhinopneumonitis is a disease subject to mandatory notification to DGAV. The HE-EQ Clinical Director must notify DGAV-LVT immediately to coordinate official movement restrictions (seizure/quarantine).
- **Clients:** Inform owners of hospitalized horses (contacts) about the situation, the risk, and the impossibility of immediate discharge.

12.7.9. Action summary (Flowchart)

- Fever + Neurological signs -> DO NOT MOVE (if in stall) or HEPA STALL (if admission).
- Lockdown -> No one enters/leaves the barn. Footbaths at the doors.
- Sampling -> Nasal swab + EDTA blood.
- Isolation -> Transfer to HEPA stall with maximum PPE.
- Notify -> Directorate + DGAV.
- Tracing -> Measure temperature of all horses 2×/day.

12.8 EQUINE SALMONELLOSIS / FMV OPERATIONAL SCENARIO

12.8.1. The agent and the disease

- **Context:** Salmonellosis is one of the main causes of contagious diarrhoea and nosocomial outbreaks in veterinary hospitals. It is an important zoonosis (risk to students and staff) and the agent is highly resistant in the environment.
- **Agent:** Several serotypes of *Salmonella enterica*, e.g., Typhimurium, Newport, Anatum.
- **Transmission:** Faecal–oral.
- **Direct:** Ingestion of faeces, nose-to-nose contact.
- **Indirect (Critical):** Fomites (boots, buckets, nasogastric tubes, thermometers, hands, contaminated floors).
- **Risk factors:** Stress (transport, surgery), antibiotic therapy (dysbiosis), colic, prolonged hospitalization.
- **Clinical signs:** Fever, leukopenia/neutropenia, acute diarrhoea (foul-smelling, profuse), colitis, endotoxaemia (congested mucous membranes, toxic line).
- Asymptomatic carriers exist that may shed bacteria under stress (shedders).

12.8.2. Triage and risk definition

- Triage must be performed at admission or as soon as clinical signs arise during hospitalization.
- **Risk classification (Traffic-light system):**
 - **High Risk (Red) – Immediate Isolation:**
 - Acute diarrhoea + Fever ($>38.5^{\circ}\text{C}$) and/or Leukopenia ($<4000/\mu\text{L}$).
 - Acute diarrhoea in a horse with recent history of prolonged transport or antibiotic use.
 - Foals with diarrhoea/sepsis.
 - **Moderate Risk (Yellow) – Barrier Precautions:**
 - Fever of unknown origin (no diarrhoea).
 - Soft faeces without fever or leukocyte changes.
 - **Low Risk (Green):**
 - No gastrointestinal or systemic signs.

12.8.3. Immediate management of a suspect/confirmed case

A. Admission (External case)

- **Do not unload:** Assess the animal in the truck if there is a history of liquid diarrhoea.
- **Transport:** If admission is necessary, use the “Dirty Route” directly to the UICB-EQ. If the horse defecates along the way, the area must be isolated, collected and immediately disinfected with bleach.

B. Internal case (Hospitalized patient that develops diarrhoea)

- If a horse hospitalized in the general area develops explosive diarrhoea:
 - **"CODE BROWN"** (Biological Alert):
- **Block movements:** No one enters or leaves the stall without authorization.



- **In situ isolation (Barrier):** If it is not possible to move the animal immediately, set up an isolation barrier at the stall door (warning tape, footbath, PPE).
- **Transfer:** Move the animal to the UICB-EQ via the shortest and least trafficked route.
- **Closure of original stall:** The contaminated stall remains closed with a sign “BIOLOGICAL RISK – DO NOT ENTER” until disinfection.

C. Measures in the UICB-EQ

- **Housing:** Dedicated stall in the UICB-EQ.
- **Mandatory PPE (Zoonosis level):**
 - Nitrile gloves (changed between dirty/clean procedures),
 - Waterproof coverall or disposable isolation gown;
 - Dedicated rubber boots (kept in the footbath) or high-boot covers (heavy-duty plastic),
 - Cap and mask (to avoid splashes to the face/mouth during diarrhoea handling or washing).
- **Dedicated equipment:**
 - Everything that enters does not leave (thermometers, stethoscopes, buckets, halters and ropes).
 - Nasogastric tubes must be exclusive or autoclaved after use.
 - Footbath: Disinfectant solution (Virkon™ S at 1% or bleach 1:10) renewed every 24h or whenever there is visible organic matter.

12.8.4. Laboratory diagnosis

- Due to intermittent shedding, a single negative test does not exclude the possibility of disease.
- **Sampling protocol:**
 - Collect at least 5 consecutive faecal samples (12h to 24h interval) for bacteriology or one sample for PCR (IDEXX, Spain);
 - **Volume:** Minimum 10 g of faeces (not just a swab);
 - **Submission:** FMV Bacteriology Laboratory. Clearly state on the request form: “SUSPECT *SALMONELLA*”.

12.8.5. Cleaning and disinfection (Critical point)

- *Salmonella* forms biofilms and persists for months in the environment. Mechanical cleaning is 90% of success.
- **During hospitalization:**
 - Frequent faeces removal;
 - Do not use high-pressure hoses (risk of aerosolizing bacteria to neighbouring stalls or to the operator’s face). Use scrapers and plastic shovels that can be disinfected
- **Terminal disinfection (Post-discharge):**
 - Remove all bedding (incineration or controlled composting away from watercourses);
 - Wash with enzymatic/degreasing detergent to remove biofilm and organic matter. Scrub walls and floor. Rinse and allow to dry;
 - Apply disinfectant: Virkon™ S at 1% or Sodium hypochlorite (bleach) at 10%. Leave for 10–30 minutes;
 - Environmental bacteriological culture: The stall is only released for a new patient after negative environmental swabs (floor, feeder, drinker, walls).



12.8.6. Human health and tracing

- Transmission to people is a real risk.
- **Risk groups:** Students, handlers and clinicians who handled the horse or bedding. Immunocompromised persons and pregnant women must not enter the stall.
- **Monitoring:** Inform all contacts to monitor gastrointestinal symptoms (diarrhoea, fever, abdominal cramps) for 7 days.
- **Hygiene:** Vigorous handwashing with water and soap after leaving the UICB-EQ, followed by disinfection. Eating/drinking in clinical areas is prohibited.

12.8.7. Criteria for discharge or lifting isolation

- The animal can only leave the UICB-EQ (home or general stabling) if:
 - Resolution of clinical signs (normal faeces, no fever).
- and**
- 3 to 5 consecutive negative faecal cultures (collected at 24h intervals) or 1 negative PCR result.
 - NOTE: If the animal goes home while still shedding the agent, the owner must sign a Responsibility Term and receive the leaflet “Home Care for a Salmonella-positive Horse” (Table 12).

Table 13
Home Care for a *Salmonella*-positive Horse

Title: HOME CARE FOR A HORSE RECOVERING FROM SALMONELLOSIS

Key message: Your horse is clinically better, but may still shed the bacterium in the faeces, posing a risk to other horses and people.

Home measures (for 30 days):

- Isolation: Keep the horse in a paddock or stall separated from other animals.
- Personal hygiene: Use dedicated boots and gloves to care for this horse. Always wash hands after handling. Do not allow children to touch the animal.
- Faeces: Do not spread this horse’s manure on pastures. Compost in an isolated location away from watercourses.
- Cleaning: Disinfect buckets, feeders and cleaning equipment with diluted bleach after the isolation period.

12.8.9. Final provisions and communication

- **Point of contact:** In a crisis, communication must be centralized in the Clinical Directors of the Teaching Hospitals (Companion Animals, Equines and Farm Animal Species) and in the Coordinator of the Hygiene and Biosecurity Committee.
- **Students:** Must be immediately informed of access restrictions to isolated areas (UICB-AC, UICB-EQ or closed areas).
- **Dissemination procedure:** This SOP must be available at the hospitals’ reception areas, in the UICB-AC, in the UICB-EQ, and in the necropsy room