



MINISTRY OF AGRICULTURE AND LIVESTOCK  
DEVELOPMENT  
STATE DEPARTMENT FOR LIVESTOCK DEVELOPMENT  
DIRECTORATE OF VETERINARY SERVICES

# NATIONAL BIOLOGICAL RISK MANAGEMENT GUIDELINES FOR FIELD ANIMAL HEALTH SERVICE PROVIDERS IN KENYA



2025

**NATIONAL BIOLOGICAL RISK MANAGEMENT  
GUIDELINES FOR FIELD ANIMAL HEALTH SERVICE  
PROVIDERS IN KENYA**

# Foreword

In Kenya, the livestock sector contributes to food security, the national economy and supports livelihoods. Field animal health service providers (AHSPs) are at the frontline of preventing, detecting, and responding to biological risks, including emerging and re-emerging animal diseases including zoonoses and trade-sensitive animal diseases. Field biological Risk Management (BRM) is critical in safeguarding the health of humans, animals and the environment.

The development of the National Biological Risk Management (BRM) Guideline for Field AHSPs fills a gap and provides a harmonized approach for all animals including wildlife and aquatic life. The BRM guidelines are aligned with both National legislation and International Standards such as the World Organization for Animal Health (WOAH) guidelines, International Health Regulations (IHR, 2005), and the Biological Weapons Conventions (BWC).

The guideline helps AHSPs and other stakeholders to conduct field risk assessments, mitigate biological threats, and implement effective biosafety and biosecurity measures. The guideline also outlines emergency preparedness and response, clear roles and responsibilities, monitoring & evaluation mechanisms and risk communication. Kenya faces rising threats from emerging infectious diseases, antimicrobial resistance, and the increasing risk of intentional release of infectious pathogens. Strengthening BRM practices in the field will not only reduce the risk of outbreaks but also enhance our national animal disease surveillance and response. Adherence to the guidelines will ensure safe handling of biological materials and effectively respond to threats, which is an essential step towards safeguarding the health of people, animals and the environment.

***Dr Allan Azegele***  
**Director of Veterinary Services**

# Acknowledgement

The Kenya National Biological Risk Management Guidelines for Field Animal Health Service Providers were developed through a participatory and consultative process involving a wide range of individuals, institutions, and organizations. This document is the result of the collective efforts of many dedicated professionals who contributed their time, expertise, and support.

We would like to acknowledge with deep appreciation the Government of Kenya, particularly the Directorate of Veterinary Services under the Ministry of Agriculture and Livestock Development, for their leadership of the process. We would also like to recognise the contributions by various Kenyan institutions and organisations including County Directors of Veterinary Services, Kenya Agricultural and Livestock Research Organisation (KALRO), Kenya Veterinary Vaccines Production Institute (KEVEVAPI), Kenya Veterinary Board, Kenya Wildlife Service, Kenya Medical Laboratory Technicians and Technologists Board, Kenya Fisheries Service, Kenya Marine and Fisheries Research Institute, Egerton University, University of Nairobi, Masinde Muliro University of Science and Technology, Technical University of Kenya, the Biorisk Management Association of Kenya (BMAK), the National Disaster Management Unit, the National Drought Management Authority, the National Disaster Operations Centre and Kenya Defence Forces.

We also recognize the valuable contributions from international partners and collaborators including Namibia's Directorate of Veterinary Services, Zimbabwe's Department of Veterinary Services, International Livestock Research Institute (ILRI), UK Department for Environment, Food & Rural Affairs (DEFRA), Centre National de Veille Zoosanitaire (CNVZ), Tunisia (WOAH Collaborating Centre for Field Epidemiology), Animal Health Research Institute, Egypt (Agriculture Research Centre), the Africa Centres for Disease Control and Prevention (Africa CDC) Subject Matter Experts, Sokoine University of Agriculture (Tanzania), and the National Biotechnology Development Agency (Nigeria), International Federation of Biosafety Associations.

The development of these guidelines was made possible by the technical support of the World Organisation for Animal Health (WOAH) through the Fortifying Institutional Resilience Against Biological Threats (FIRABioT) project, and funding from Global Affairs Canada through the Weapons Threat Reduction Program in support of the Global Partnership's Signature Initiative to Mitigate Biological Threats in Africa.

# Executive Summary

Field Biological Risk Management (Field BRM) refers to the systematic identification, assessment, mitigation, and monitoring of biological risks encountered in the field. It encompasses biosafety and biosecurity practices aimed at preventing the unintentional or intentional exposure to, or release of, infectious agents and biological materials in the field. Kenya has developed the National Biological Risk Management (BRM) Guideline for Field Animal Health Service Providers (AHSPs) to strengthen biosafety and biosecurity practices for field settings. The guidelines respond to the increasing risks posed by zoonotic diseases, emerging pathogens, and the potential for both unintentional and intentional biological incidents. They offer a standardized and practical framework for managing biological risks in diverse field settings.

The frontline AHSPs in Kenya often work in resource-deficient and complex environments and are frequently exposed to biological threats. While notable progress has been made in laboratory biosafety and biosecurity in compliance with international requirements as espoused by the Biological Weapons Convention and the International Health Regulations, a critical gap has remained in field-specific BRM protocols. This document addresses that gap by providing context-appropriate and scalable BRM guidelines for use in the field.

The guidelines provide a structured and repeatable risk assessment framework, which enables AHSPs to identify, evaluate, and prioritize biological hazards and implement targeted mitigation measures. It outlines processes for assessing both biosafety and biosecurity threats across a range of field activities, from animal handling, disease surveillance, sample collection, transportation, waste management, decontamination and outbreak response.

The guidelines clearly define the roles and responsibilities of AHSPs, farmers, National government, County governments, security agents, regulatory authorities, public health officials, and other stakeholders. Each actor contributes to a coordinated and accountable system that promotes safe practice, ensures compliance, and protects the health of humans, animals and the environment.

The guidelines have a robust monitoring and evaluation (M&E) framework to support the implementation and continuous improvement of the BRM. The M&E framework has outlined tools for performance tracking, field audits, and reporting mechanisms to assess compliance and identify gaps for capacity strengthening. Risk communication is also emphasized as a critical element in the guidelines to ensure timely, clear, and coordinated information sharing among AHSPs, National and county governments, regulatory authorities, communities, and other relevant stakeholders.

The guideline is intended for AHSPs and all other stakeholders working with animals including wildlife and aquatic life. Standardizing BRM practices across public and private sectors will enhance preparedness, protect frontline personnel, and reduce biological risks to humans, animals and the environment.

# Table of Content

|  |             |
|--|-------------|
| <b>Foreword</b>  | <b>iii</b>  |
| <b>Acknowledgement</b>   | <b>iv</b>   |
| <b>Executive Summary</b>   | <b>v</b>    |
| <b>Acronyms</b>  | <b>xi</b>   |
| <b>Definition of Terms</b>   | <b>xiii</b> |
| <br>   |             |
| <b>1. Introduction</b>   | <b>1</b>    |
| 1.1. <i>Background</i>   | 1           |
| 1.2. <i>Scope and target audience</i>  | 3           |
| 1.3. <i>Situational analysis</i>   | 4           |
| 1.4. <i>Relevant legal and policy frameworks</i>   | 5           |
| 1.4.1. <i>International regulatory frameworks</i>  | 5           |
| 1.4.2. <i>National frameworks</i>  | 5           |
| 1.5. <i>Objectives</i>   | 6           |
| <br>   |             |
| <b>2. Guidance to Field Biological Risk Assessment</b>                                   | <b>7</b>    |
| 2.1 <i>Understanding Biological risks in Kenya</i>                                       | 7           |
| 2.1.1 <i>Biosafety risks</i>   | 7           |
| 2.1.2 <i>Biosecurity Risks</i>   | 7           |
| 2.2 <i>Biological risk assessment framework</i>  | 7           |
| 2.3 <i>Field Biological Risk Assessment Approach</i>                                     | 8           |
| 2.3.1 <i>Biosafety Risk Assessment</i>   | 8           |
| 2.3.2 <i>Biosecurity Risk Assessment</i>   | 9           |
| 2.4 <i>Prioritisation of biological risks</i>  | 10          |
| 2.4.1 <i>Biological Risk Matrix</i>  | 11          |
| 2.4.2 <i>Steps to prioritisation of biological risk using the risk assessment matrix</i> | 11          |
| <br>   |             |
| <b>3. Field Biological Risk Mitigation Measures</b>                                      | <b>13</b>   |
| 3.1 <i>Biosafety Mitigation Measures</i>   | 13          |
| 3.1.1 <i>Pathogens and toxins</i>  | 13          |
| 3.1.2 <i>Classification of Pathogen Risks in the field</i>                               | 14          |
| 3.1.3 <i>Adherence to Standard Operating Procedures (SOPs)</i>                           | 15          |
| 3.1.4 <i>Safe handling and storage of biological materials</i>                           | 15          |
| 3.1.5 <i>Guidelines on the use Personal Protective Equipment (PPE)</i>                   | 17          |
| 3.1.6 <i>Occupational Safety and Health</i>  | 18          |
| 3.2 <i>Field biosecurity mitigation measures</i>   | 19          |
| 3.2.1 <i>Documentation</i>   | 21          |
| 3.2.2 <i>Storage, transportation and transfer of biological materials in the field.</i>  | 23          |

|            |   |           |
|------------|---|-----------|
| 3.2.3      | <i>Emergency Procedures</i>   | 24        |
| 3.2.4      | <i>Field-level biosecurity protocols</i>                                | 24        |
| <b>3.3</b> | <b><i>Waste Management</i></b>  | <b>25</b> |
| 3.3.1      | <i>Waste Minimization</i>   | 26        |
| 3.3.2      | <i>Waste identification, classification, segregation, and packaging</i> | 26        |
| 3.3.3      | <i>Waste storage</i>  | 27        |
| 3.3.4      | <i>Transportation of Waste</i>  | 28        |
| 3.3.5      | <i>Treatment of Waste</i>   | 29        |
| 3.3.6      | <i>Disposal of Waste</i>  | 29        |
| 3.3.7      | <i>Roles and responsibilities of waste producers.</i>                   | 29        |
| 3.3.8      | <i>Disposal of Veterinary Drugs, Vaccines, Chemicals, and Reagents</i>  | 29        |
| <b>3.4</b> | <b><i>Decontamination</i></b>   | <b>30</b> |
| 3.4.1      | <i>Methods of Decontamination</i>                                       | 30        |
| 3.4.2      | <i>Chemicals used for Decontamination</i>                               | 32        |
| 3.4.3      | <i>Characteristics of selected disinfectants</i>                        | 32        |
| 3.4.4      | <i>Bleach Dilution</i>  | 32        |
| 3.4.5      | <i>Field Decontamination Procedures</i>                                 | 32        |
| <b>4.</b>  | <b><i>Emergency Preparedness and Incident Response</i></b>              | <b>35</b> |
| 4.1        | <i>Introduction</i>   | 35        |
| 4.2        | <i>Objectives</i>   | 36        |
| 4.3        | <i>Phases of Emergency Response in Biological Incidents</i>             | 36        |
| 4.3.1      | <i>Preparedness</i>   | 36        |
| 4.3.2      | <i>Detection</i>  | 36        |
| 4.3.3      | <i>Response</i>   | 37        |
| 4.3.4      | <i>Recovery</i>   | 37        |
| 4.4        | <i>Integration with National Incident Command System (ICS)</i>          | 37        |
| 4.6        | <i>Biological risk Communication and Community Engagement</i>           | 39        |
| 4.7        | <i>Monitoring, Evaluation, and Incident Debriefing</i>                  | 39        |
| <b>5.</b>  | <b><i>Stakeholder Roles and Responsibilities</i></b>                    | <b>40</b> |
| 5.1        | <i>The National Government</i>  | 40        |
| 5.2        | <i>County Governments</i>   | 41        |
| 5.3        | <i>Regulators</i>   | 41        |
| 5.4        | <i>Private AHSPs</i>  | 42        |
| 5.5        | <i>Research and Training Institutions</i>                               | 42        |
| 5.6        | <i>Farmers/Communities</i>  | 43        |
| 5.7        | <i>Security Agencies</i>  | 43        |
| 5.8        | <i>Non-Governmental Organizations and Civil Societies</i>               | 44        |
| 5.9        | <i>Animal Health and Production Input Suppliers</i>                     | 44        |

|           |   |           |
|-----------|---|-----------|
| 5.10      | <i>Non-Technical Service Providers</i>  | 44        |
| <b>6.</b> | <b>Training, Capacity Building and Competency Assessment</b>  | <b>45</b> |
| 6.1       | <i>Objectives for Training, Capacity Building and Competency Assessment</i>   | 45        |
| 6.2       | <i>Training Needs Assessment (TNA)</i>  | 46        |
| 6.3       | <i>Training Content and Curriculum</i>  | 46        |
| 6.4       | <i>Training Methodologies</i>   | 46        |
| 6.5       | <i>Certification and Continuous Professional Development (CPD)</i>  | 47        |
| 6.5.1     | <i>Certification of Biological risk Management Training</i>   | 47        |
| 6.5.2     | <i>Continuous Professional Development (CPD) in BRM</i>   | 47        |
| 6.5.3     | <i>Sustainability of Certification and CPD Programs</i>   | 47        |
| 6.5.4     | <i>Monitoring, Evaluation, and Continuous Improvement</i>   | 47        |
| <b>7.</b> | <b>Risk Communication</b>   | <b>49</b> |
| 7.1       | <i>Definition and Importance of Risk Communication in Biological risk Management</i>  | 49        |
| 7.2       | <i>Objectives of Risk Communication</i>   | 49        |
| 7.3       | <i>Key Principles of Effective Risk Communication (FAO, 2013)</i>   | 49        |
| 7.4       | <i>Communication Strategies for Different Audiences</i>   | 50        |
| 7.5       | <i>Establishing a Biological risk Emergency Communication Plan (BCEP)</i>   | 51        |
| 7.6       | <i>Managing Misinformation and disinformation</i>   | 52        |
| 7.7       | <i>Public communication</i>   | 53        |
| <b>8.</b> | <b>Monitoring &amp; Evaluation of Biological Risk Management Guidelines</b>   | <b>54</b> |
| 8.1       | <i>Introduction</i>   | 54        |
| 8.2       | <i>Data Collection &amp; Feedback Systems</i>   | 55        |
|           | <b>References</b>   | <b>56</b> |
|           | <b>Appendices</b>   | <b>59</b> |
|           | <i>Appendix 1: Characteristics of selected disinfectants</i>  | 59        |
|           | <i>Appendix 2: Summary of examples of Field incidents and action to be taken</i>  | 60        |
|           | <i>Appendix 3: Summary of Facility or temporary setup specific requirements for biosafety and biosecurity during operations in the field/farm</i> | 62        |
|           | <i>Appendix 4: SOP for transportation of samples from the field to the laboratory</i>   | 66        |
|           | <i>Appendix 5. SOP for the collection and handling of test items</i>  | 68        |
|           | <i>Appendix 6. SOP on collection of samples</i>   | 69        |
|           | <i>Appendix 7. SOP for packaging and handling of diagnostic samples for shipment</i>  | 76        |
|           | <i>Appendix 8. SOP for transportation of samples from the field to the laboratory</i>   | 77        |
|           | <i>Appendix 9. SOP for use of PPE</i>   | 79        |
|           | <i>Appendix 10. SOP for spillage management</i>   | 82        |

|   |           |
|---|-----------|
| <i>Appendix 11. SOP for waste management</i>  | 84        |
| <i>Appendix 12. SOP for incident response</i> | 89        |
| <b>List of Contributors</b>                   | <b>91</b> |

## List of Figures

|   |    |
|---|----|
| Figure 1: Illustration of Plan-Do-Check-Act Cycle aligned with AMP Model for biological risk management | 2  |
| Figure 2: Pillars of Biosecurity  | 20 |
| Figure 3: Hierarchy of Waste management   | 26 |

## List of Tables

|  |    |
|--|----|
| Table 1: Outlines biosafety and biosecurity risk assessment frameworks   | 8  |
| Table 2: Key considerations in the risk assessment framework   | 8  |
| Table 3: Biosecurity risk assessment process   | 10 |
| Table 4: Biological risk assessment matrix   | 11 |
| Table 5: Risk rating (level) and action plan timelines   | 12 |
| Table 6: Common animal Diseases and their causes   | 13 |
| Table 7: Pathogen risk levels  | 15 |
| Table 8: Commonly used disinfectants /chemicals for decontamination in the field   | 32 |
| Table 9: Biological risk emergency Levels  | 35 |
| Table 10: ICS Levels for biological risk events  | 38 |
| Table 11: Stakeholders and the targeted communication strategies   | 50 |
| Table 12: Suggested Reporting Schedule for Biological risk Communication   | 53 |
| Table 13: Indicators, Definition of terms & Metrics, and Means of Verification for Monitoring and Evaluation                             | 54 |
| Table 14: Quantitative and qualitative data collection methods   | 55 |
| Table 15: Characteristics of selected disinfectants  | 59 |
| Table 16: Summary of examples of Field incidents and action to be taken  | 60 |
| Table 17: Summary of Facility or temporary setup specific requirements for biosafety and biosecurity during operations in the field/farm | 62 |
| Table 18: Different disinfectants, concentrations and contact time for various pathogens   | 85 |
| Table 19: Dilution Instruction of a mixture of Peroxigenic acid (e.g. Virkon)  | 85 |
| Table 20: Personal Protective Equipment requirements for waste disposal  | 87 |

# Acronyms

|          |  |
|----------|--|
| AAR      | After-Action-Review  |
| AHSPs    | Animal Health Service Providers  |
| AMP      | Assessment, Mitigation and Performance   |
| BECP     | Biological risk Emergency Communication Plan                                       |
| BRM      | Biological Risk management   |
| BSBS     | Biosafety and Biosecurity  |
| BWC      | Biological Weapons Convention  |
| CBPP     | Contagious Bovine Pleuropneumonia  |
| CCPP     | Contagious Caprine Pleuropneumonia   |
| CCTV     | Closed Circuit Television  |
| CDRMC    | County Disease Risk Committee  |
| CDVS     | County Director of Veterinary Services   |
| CITES    | Convention on International Trade in Endangered species of Wild<br>Fauna and Flora |
| CPD      | Continuous Professional Development  |
| CPR      | Cardiopulmonary resuscitation  |
| DVS      | Directorate of Veterinary Services   |
| EMCA     | Environmental Management and Coordination Act                                      |
| FAO      | Food and Agriculture Organization of the United Nations                            |
| FMD      | Foot and Mouth Disease   |
| HPAI     | Highly Pathogenic Avian Influenza  |
| ICS      | Incident Command Systems   |
| IFBA     | International Federation of Biosafety Associations                                 |
| IHN      | Infectious Haemopoietic Necrosis   |
| IHR      | International Health Regulations   |
| ILRI     | International Livestock Research Institute   |
| ISO      | International Organization for Standardization                                     |
| KALRO    | Kenya Agricultural and Livestock Research Organization                             |
| KEBS     | Kenya Bureau of Standards  |
| KIPRE    | Kenya Institute of Primate Research  |
| KLBRMC   | Kenya Laboratory Biorisk Management Curriculum                                     |
| KMFRI    | Kenya Marine and Fisheries Research Institute                                      |
| KPIs     | Key Performance Indicators   |
| KVB      | Kenya Veterinary Board   |
| LEGS     | Livestock Emergency Guidelines and Standards                                       |
| LSD      | Lumpy Skin Disease   |
| M&E      | Monitoring and Evaluation  |
| MERS-COV | Middle East Respiratory Syndrome coronavirus                                       |



|         |  |
|---------|--|
| MTA     | Material Transfer Agreement                              |
| NACOSTI | National Council for Science, Technology, and Innovation |
| NBA     | National Biosafety Authority                             |
| NDRMC   | National Disease Risk Management Committee               |
| NEMA    | National Environmental Management Authority              |
| NGO     | Non-Governmental Organization                            |
| NSC     | National Steering Committee                              |
| OSHA    | Occupational Safety and Health Act                       |
| PDCA    | Plan- Do-Check-Act                                       |
| PPE     | Personal Protective Equipment                            |
| PPR     | Peste des Petits Ruminants                               |
| RVF     | Rift Valley Fever  |
| SCDRMC  | sub-County Disease Risk Management                       |
| SOP     | Standard Operating Procedure                             |
| TNA     | Training Needs Assessment                                |
| ToTs    | Training of Trainers                                     |
| TWG     | Technical Working Group                                  |
| UV      | Ultraviolet  |
| VBM     | Valuable Biological Materials                            |
| VHF     | Viral Haemorrhagic Fever                                 |
| VHS     | Viral Haemorrhagic Septicemia                            |
| VMD     | Veterinary Medicines Directorate                         |
| VSVP    | Veterinary Surgeons and Veterinary Paraprofessional      |
| WHO     | World Health Organization                                |
| WIBA    | Work Injury Benefits Act                                 |
| WOAH    | World Organisation for Animal Health                     |
| WRTI    | Wildlife Research and Training Institute                 |

# Definition of Terms

**Acceptable risk:** The risk that is considered tolerable and allows work to proceed bearing in mind the expected benefit of the planned activities.

**Accident:** An inadvertent occurrence that results in actual harm such as infection, illness, injury in humans or contamination of the environment.

**Aerosol/airborne transmission:** The spread of infection caused by the inhalation of aerosols.

**Aerosol:** Liquid or solid particles suspended in air and of a size that may allow inhalation into the lower respiratory tract (usually less than 10 micrometres in diameter).

**Animal:** any member of the animal kingdom and includes mammals, birds, reptiles, amphibians, fish, and invertebrates, whether domestic or wild, and whether live or dead, and includes the carcass, semen, ova, embryos, and other parts or products of the animal.

**Antisepsis:** The use of antimicrobial substances on living tissues (like skin or wounds) to reduce the risk of infection. Prevents infection during medical procedures or wound care.

**Bioethics:** The study of the ethical and moral implications of new biological discoveries and biomedical advances, as in the fields of genetic engineering, drug research, medicine, agriculture. Ideally, for an activity to be considered “ethical”, it must respect all four of these principles: autonomy, justice, beneficence, and non-maleficence.

**Biological agent:** A microorganism, virus, biological toxin, particle or otherwise infectious material, either naturally occurring or genetically modified, which may have the potential to cause infection, allergy, toxicity or otherwise create a hazard to humans, animals, or plants.

**Biological material:** includes all potential sources of biological risk for which field animal health practitioner is responsible and may be exposed to.

**Biological risk management:** A systematic approach to identifying, assessing, controlling and communicating biological risks to minimize harm to humans, animals, and the environment.



**Biological risk:** Refers to both biological agent risks and biological security risks combined.

**Biosafety:** Containment principles, technologies and practices that are implemented to prevent unintentional exposure to biological agents or their inadvertent release.

**Biosecurity:** These are Principles technologies and practices that are implemented for the protection, control and accountability of the biological materials and or the equipment, skills and data related to their handling and prevention of their unauthorized access, loss, theft, misuse, diversion or release (Protecting pathogen from bad people).

**Certification:** A third-party testimony based on a structured assessment and formal documentation confirming that a system, person or piece of equipment conforms to specified requirements, for example, to a certain standard.

**Cleaning:** The physical removal of dirt, organic matter, and microbes from surfaces using water, soap, or detergents.

**Consequence of an incident:** The outcome of an incident (exposure to and/ or release of a biological agent) of varying severity of harm, occurring in the course of actions. Consequences may include infection, physical injury, environmental contamination, or asymptomatic carriage of a biological agent.

**Containment:** The combination of physical design parameters and operational practices that protect personnel, the immediate work environment and the community from exposure to biological agents. The term “biocontainment” is also used in this context.

**Contamination:** The introduction of undesired biological agents into tissues and specimens or onto surfaces.

**Corrective action:** Action to eliminate the cause of a nonconformity and to prevent recurrence

**Decontamination:** Reduction of viable biological agents or other hazardous materials on a surface or object(s) to a pre-defined level by chemical and/or physical means.

**Disinfectants:** Agents capable of eliminating viable biological agents on surfaces or in liquid waste. These will have varying effectiveness depending on the properties of the chemical, its concentration, shelf life and contact time with the agent.

**Disinfection:** A process to eliminate viable biological agents from items or surfaces for further safe handling or use.

**Emergency/incident response:** An outline of the behaviours, processes and procedures to be followed when handling sudden or unexpected situations, including exposure to or release of biological agents.

**Engineering controls:** Risk control measures that are built into the design of a facility or an equipment to contain the hazards.

**Ergonomics:** Refers to the application of scientific principles to design tools, tasks, and environments that match human abilities, aiming to reduce strain and injury while improving safety, efficiency, and comfort during field activities.

**Event:** A significant occurrence involving biological agents that has the potential to affect human or animal health, the environment, or public confidence.

**Exposure:** An event during which an individual comes in contact with, or is in close proximity to, biological agents with the potential for infection or harm to occur.

**Farm Biosecurity:** A set of management and physical measures at the farm level designed to reduce the risk of introduction, establishment and spread of animal diseases, infections or infestations to, from and within an animal population.

**Farm:** Any land, premises, or facility where animals are bred, kept, reared, fed, treated, or managed for commercial, subsistence, research, educational, or recreational purposes, and includes associated infrastructure such as barns, paddocks, kraals, shelters, and feedlots.

**Field:** Any location outside a registered veterinary laboratory where animal health activities occur, including farms, markets, dips, abattoirs, quarantine sites, transport routes, and mobile or temporary animal facilities. It includes all related activities such as diagnosis, treatment, vaccination, surveillance, vector control, animal welfare, and extension services.

**Field Biosafety:** The practical measures and protocols implemented at the site of animal production, handling, or research to prevent unintentional exposure to or release of biological agents that could harm animals, humans, or the environment.



**Field Biosecurity:** A set of management and physical measures in field settings designed to reduce the risk of introduction, establishment and spread of animal diseases, infections or infestations to, from and within an animal population.

**This refers to the measures for protection,** control and accountability of viable biological material/data within the field to prevent unauthorized access, theft, intentional misuse or release.

**Hazard:** Any biological, chemical, physical, or environmental agent or condition that has the potential to cause harm, injury, disease, or adverse effects to people, animals, or the environment during field activities.

**Inactivation:** Removal of the activity of biological agents by destroying or inhibiting reproductive or enzyme activity.

**Incident Response:** The systematic procedures and processes used to address and manage unexpected events or emergencies that can compromise safety, product quality, data integrity, or regulatory compliance.

**Incident:** An occurrence that has the potential to, or results in, the exposure of laboratory personnel to biological agents and/or their release into the environment that may or may not lead to actual harm.

**Infectious substances:** This refers to any material, solid or liquid, which contains biological agents capable of causing infection in either humans, animals or both.

**Initial risk:** Risk associated with laboratory activities or procedures that are conducted in the absence of risk control measures.

**Likelihood (of a laboratory incident):** The probability of an incident (that is exposure to and/or a release of a biological agent) occurring in the course of laboratory work.

**One Health:** One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of humans, animals, plants and ecosystems

**Outbreak:** Increased frequency of a disease above the usual rate in a given population or geographic area. An outbreak is when an illness happens in unexpected high numbers.

**Pandemic:** refers to simultaneous epidemics occurring in multiple locations across the globe.

**Pathogen:** A biological agent capable of causing disease in humans, animals or plants.

**Personal protective equipment (PPE):** Equipment and/or clothing worn by personnel to provide a barrier against biological agents, thereby minimizing the likelihood of exposure.

**Prophylaxis:** Treatment given to prevent infection or to mitigate the severity of the disease if infection were to occur.

**Risk acceptance:** The risk that is considered acceptable, typically after risk control measures have been applied and allows laboratory work to proceed.

**Risk assessment:** A systematic process of gathering information and evaluating the likelihood and consequences of exposure to or release of workplace hazard(s) and determining the appropriate risk control measures to reduce the risk to an acceptable risk.

**Risk communication:** An interactive and systematic process to exchange information and opinion on risk(s) that inclusively engages all relevant personnel of various categories as well as community leaders and officials where appropriate.

**Risk control measure:** Use of a combination of tools, which include communication, assessment, training, and physical and operational controls, to reduce the risk of an incident/event to an acceptable risk.

**Risk:** A combination of the likelihood of an incident and the severity of the harm (consequences) if that incident were to occur.

**Safety culture:** A set of values, beliefs and patterns of behaviour instilled and facilitated in an open and trusting atmosphere by individuals and organizations working together to support or enhance best practice for biosafety, irrespective of whether it is stipulated in applicable codes of practice and/or regulations.

**Sharps:** Any device or object that is a puncture or wound hazard because of its pointed ends or edges.

**Stakeholders:** Individuals, groups, or organizations that are directly or indirectly involved in the management of biological risks associated with animals, animal products, and veterinary practices.



**Standard operating procedures (SOPs):** A set of well-documented and validated stepwise instructions outlining how to perform laboratory practices and procedures in a safe, timely and reliable manner, in line with institutional policies, best practice and applicable national or international regulations

**Sterilization:** A process that kills and/or removes all biological agents including spores.

**Transmission:** The transfer of biological agent(s) from objects to living things, or between living things, either directly or indirectly via aerosols, droplets, body fluids, vectors, food/water or other contaminated objects.

**Validation:** Systematic and documented confirmation that the specified requirements are adequate to ensure the intended outcome or results.

**Verification:** Confirmation that a given item (product, process or system) satisfies the specified requirements.

**Zoonotic disease (zoonosis):** Infectious disease that is naturally transmitted from animals to humans and vice versa.

# 1. Introduction

## 1.1. Background

Biological risk management (BRM), is a systematic approach to identifying, assessing, controlling and communicating biological risks to minimize harm to humans, animals, and the environment. It combines biosafety and biosecurity measures to manage risks associated with handling, storage, and disposal of biological agents and toxins, World Organisation for Animal Health (WOAH), 2018.

BRM in the field has become an all-important aspect for the practice of biosafety and biosecurity in the country. Field biosafety and biosecurity cover BRM protocols, procedures, processes and safety equipment required in the field settings to protect workers, the community, and the environment from unintentional exposure or their intentional release (KLBRMC, 2019).

The fundamental principles of BRM include the implementation of appropriate practices, use of safety equipment, and maintenance of secure facilities. The primary objective of these principles is to protect field workers, the environment, and public from exposure to infectious pathogens that are handled in the field.

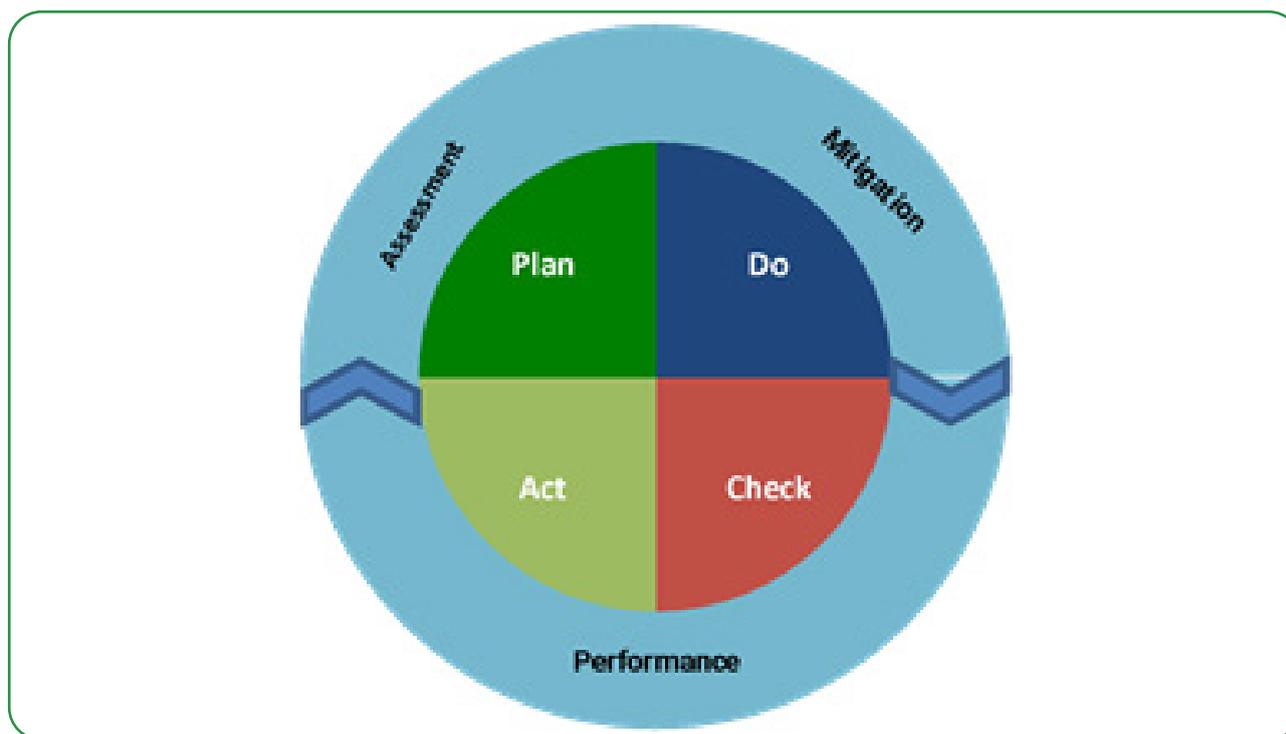
BRM entails risk assessment, risk mitigation, and performance

**Assessment:** Process of identifying the hazards and evaluating the associated risks, taking into account the adequacy of any existing controls, and deciding whether or not the risks are acceptable.

**Mitigation:** Actions and control measures that are put into place to reduce or eliminate the risks associated with biological agents.

**Performance:** improve biological risk management by recording, measuring, and evaluating organizational actions and outcomes to reduce biological risk.

The BRM approach enables the Animal health service providers (AHSPs) to effectively identify, monitor and control field biosafety and biosecurity aspects of its activities. An effective BRM system should be built on the concept of continual improvement through a cycle of planning, implementing, reviewing and improving the processes and actions that an organization undertakes to meet the objectives. This is known as the PDCA (Plan-Do-Check-Act) principle, which also compliments the AMP (Assessment-Mitigation-Performance) model approach of biological risk management (Figure 1)



**Figure 1:** Illustration of Plan-Do-Check-Act Cycle aligned with AMP Model for biological risk management

|              |  |
|--------------|--|
| <b>Plan</b>  | Planning, identification of hazard and risk and establishing objectives, programmes or projects  |
| <b>Do</b>    | Implementing the process and operational issues as planned   |
| <b>Check</b> | Checking, monitoring and measure the activities with regards to biological risk management objectives and report results                                     |
| <b>Act</b>   | Reviewing, process innovation and acting to make needed changes to the management system for continual improvement of biological risk management performance |

Risk assessment is recommended before commencement of field activity. The risk assessment process enables the selection of appropriate practices, safety equipment, and facility safeguards that can help prevent field associated exposure to infectious materials. The uncertainty and changes regarding the identification of emerging biological agents, the requirements for field animal health activities, containment and safe storage of biological materials, continue to accelerate.

Work with infectious agents in public and private research, public health, clinical and diagnostic laboratories, plants and animal care facilities has expanded (WOAH), 2018 & WHO Risk Assessment Monograph, 2020).

Recent global occurrences brought to light the novel threat of bioterrorism in addition to the emergence of infectious agents and diseases such as Avian Influenza (AI) and Middle East Respiratory Syndrome coronavirus (MERS-CoV) (Kern, 2016). Consequently, organizations and field practitioners are compelled to evaluate and ensure the effectiveness of their

biosafety and biosecurity programs, the proficiency of their workers, as well as the capability of equipment, facilities, and management practices to provide containment and security of biological agents. Risk assessment whether biological or general should be repeated when any change is introduced into the activity or process.

Similarly, it is imperative that field AHSPs including those in the wildlife and aquatic sectors who handle biological materials possess a comprehensive understanding of the containment measures under which infectious agents can be safely and securely handled. The fundamental principles to ensure biosecurity and biosafety in the field entail, physical security, personnel management, material control and accountability, transport security, information security, containment, personal protective equipment and waste management (KLBRMC, 2019).

Understanding the principles of biosafety, biosecurity, the implementation of rigorous risk assessments, and adherence to the field biological practices, containment measures, and facility safeguards described in this guideline will contribute to a safer and healthier working environment for field staff, animals, the environment and the community.

Field AHSPs play a critical role in managing animal health emergencies through effective emergency preparedness, contingency planning, and incident response. Preparedness involves ongoing surveillance, risk assessment, adequate supplies (e.g., PPE, disinfectants), and continuous training. Contingency planning requires familiarity with biosecurity protocols, participation in simulations, and coordination with public health, wildlife, and environmental sectors under a One Health approach. During incidents, the Incident Command System (ICS) guides organized responses, emphasizing biosafety, biosecurity, sample handling, and clear communication. This approach supports Kenya's efforts to strengthen resilient animal health systems and ensures timely, coordinated actions to protect animals, public health, and the environment.

## **1.2. Scope and target audience**

Field AHSPs in Kenya frequently handle high-risk biological materials and zoonotic disease cases, often in resource-limited settings. The absence of standardised BRM practices has been demonstrated to increase the risk of pathogen spill over, thus posing threats to human, animal and the environment. The guidelines aim to address these gaps by providing practical and context-specific biosafety and biosecurity recommendations.

This guideline is applicable to all field, wildlife and aquatic animal health service providers in Kenya. Such service providers include AHSPs operating under field conditions (in both the public service and the private sectors). Other actors include public health officials, dip

attendants, livestock production personnel, slaughterhouse operators and animal product handlers involved in field veterinary activities, institutions and organisations conducting field-based veterinary research and interventions, relevant regulatory authorities and any other personnel and stakeholders involved in the handling, sampling, diagnosis, treatment, and management of animal health in various field settings. This guideline provides comprehensive guidance on BRM, addressing potential biological, physical, chemical, and environmental hazards encountered in field operations.

The guideline covers all activities related to the handling of animals and animal products, veterinary biologicals, sample collection and transportation, and the management of biological materials in field settings. It also encompasses occupational safety and health, biosecurity, bioethics, and risk mitigation strategies relevant to field animal health operations.

### **1.3. *Situational analysis***

Globally, Kenya is a signatory to the Biological Weapons Convention (BWC) and is therefore obligated to submit an annual report on confidence-building measures. This commitment aligns the country with international expectations on biosafety and biosecurity and forms the basis for its global engagement in Biological Risk Management (BRM). The 2023 Kenya Joint External Evaluation, a component of the International Health Regulations (IHR) Monitoring and Evaluation Framework, highlighted several priority actions to strengthen BRM in Kenya. Key among them is the urgent need to pass a Biosafety and Biosecurity (BSBS) law to promote harmonization and underscore the importance of biosafety and biosecurity in a One Health context. Additionally, it recommended the implementation of a National Framework for the storage, access, and control of High Consequence Pathogens, including electronic inventory systems, and the development of a Monitoring & Evaluation mechanism with trained personnel for oversight and capacity building. Regionally, collaborations, training programs, and policy harmonization have been essential to achieving collective biosecurity goals and effective cross-border disease management.

Kenya has made significant investments in BRM through the implementation of policies and guidelines, development of infrastructure and systems, and capacity building of personnel, especially in animal health. The country has developed and disseminated biosafety and biosecurity policy guidelines, which have informed the creation of laboratory-specific safety manuals and supported the implementation of ISO 17025:2017 standards in animal health laboratories. In addition, Kenya has developed the Kenya Laboratory BRM Curriculum (KLBRMC, 2019) which has been used for Training of Trainers (ToTs) across the country. Similarly, the country has a pool of International Federation of Biosafety Associations (IFBA) certified BRM experts.

Despite this progress, there are no existing BRM guideline for field AHSPs in Kenya, to facilitate implementation of biosafety/biosecurity measures. To address these challenges, there is a compelling need to develop multi-sectoral, coordinated, and monitored BRM systems and response mechanisms, particularly at the subnational level, to effectively prevent harm to humans, animals, and the environment in line with the One Health approach.

## **1.4. Relevant legal and policy frameworks**

### **1.4.1. International regulatory frameworks**

- a. World Organisation of Animal Health Terrestrial and Aquatic Animal Health Manuals and Codes
- b. International Health Regulations 2005
- c. Biological weapons convention (BWC) [1975]
- d. ISO 35001-2019 Information on BRM
- e. United Nations Security Council Resolution 1540 [2004]
- f. Livestock Emergency Guidelines and Standards (LEGS) 3rd Edition 2023
- g. WHO LBM4 Risk Assessment Monograph
- h. The World Health Assembly (WHA) resolution, WHA77.17
- i. The Sendai Framework for Disaster Risk Reduction 2015-2030

### **1.4.2. National frameworks**

- a. Occupational Safety and Health Act (OSHA) 2007, Revised 2010
- b. The Environmental Management and Coordination Act (EMCA) 1999, revised 2012
- c. Veterinary Surgeons and Veterinary Paraprofessionals (VSVP) Act 2011
- d. Public Health Act Cap 242, [2017]
- e. Foods, Drugs and Chemical substances Act 254 [Rev. 2012]
- f. Kenya Health Act 2017
- g. Biosafety Act 2009
- h. Animal Diseases Act, CAP 364, Revised Edition 2012 [1989]
- i. Environmental Management and Coordination (Waste Management) Regulation, 2006
- j. NEMA (National Environmental Management Authority) Waste Management Regulations of 2024
- k. Kenya Meat Control Act CAP 356 [Rev. 2012].
- l. The VSVP (The Veterinary Medicines Directorate) Regulations, 2015
- m. Fisheries Management and Development Act 2016
- n. National Guidelines for Safe Management of Health Care Waste (2024)
- o. Fisheries Management and Development (Safety and Quality) Regulations, 2024, Legal Notice 120
- p. Guidelines on Veterinary Medicinal Products Waste Management of the Veterinary Medicines Directorate (VMD)

- q. Kenya National Sustainable Waste Management Policy, 2021
- r. Kenya Fisheries Policy, 2023
- s. Kenya Laboratory Biorisk Management Curriculum (KLBRMC), 2019

### **1.5. Objectives**

Achieving enhanced livestock productivity and trade is possible through the implementation of systems that protect the health of animals, humans, and the environment. It is evident that the BRM systems that are dynamic with continuous assessment and flexible strategies help to ensure ongoing and sustained improvement. To achieve this goal, the objectives of the guidelines are to provide guidance for;

1. Field biological risk assessment even in climate-induced stock mobility
2. Field biological risk mitigation
3. Biological risk communication
4. Performance, monitoring and evaluation

## 2. Guidance to Field Biological Risk Assessment

### 2.1 *Understanding Biological risks in Kenya*

#### 2.1.1 *Biosafety risks*

Biosafety risks are a critical aspect of biological risk assessment in Kenya's field animal health service provision, affecting AHSPs, farmers, and the broader public. In the Kenyan context, field biosafety risks extend to farms, live animal markets, mobile veterinary clinics, abattoirs, aquatics, wildlife and wildlife-livestock-human interfaces. Field animal health workers face significant biosafety risks when handling animals, field postmortem examinations, field animal research trials, collecting, processing and transporting diagnostic samples, conducting disease surveillance, vaccination campaigns and/or administering treatments. These field activities may unknowingly expose animal health workers, animals, or the broader community and environment to biological hazards.

The public also faces biosafety risks if pathogens are unintentionally released into the environment due to improper handling, disposal, or transportation of infectious materials. The severity of biological risks in field animal health service provision and research in Kenya depends on properties of the biological agent, properties of the host, work practices and procedures.

#### 2.1.2 *Biosecurity Risks*

Biosecurity risks in field animal health service provision arise from neglect, theft, misuse, diversion, sabotage, unauthorized access, or intentional release of biological agents, contaminated veterinary equipment and or sensitive information. Biosecurity risks may depend on the intent of the individual(s) involved in acquiring and misusing valuable assets. Key biosecurity risks in the field include theft or diversion of veterinary drugs and vaccines, misuse or unauthorized handling of infectious agents, sabotage of disease control efforts, theft of diagnostic tools and equipment, and disease surveillance data.

### 2.2 *Biological risk assessment framework*

Biological risk assessment involves a systematic approach to identifying hazards, characterizing the risks and evaluating the risks in field veterinary practice. The process begins with defining the scope of activities and recognizing potential hazards such as disease agents, toxins or contaminants. Hazards are assessed for their likelihood and consequences, guiding the prioritization and implementation of biosafety mitigation measures (e.g., PPE, disinfection) and biosecurity protocols (e.g., restricted access, quarantine). Biosafety evaluates an agent's biological properties while biosecurity addresses its potential for

misuse. Steps of biosafety and biosecurity assessment frameworks (Table 1).

**Table 1:** Outlines biosafety and biosecurity risk assessment frameworks

| Biosafety   | Biosecurity  |
|---|--|
| <b>Review fundamental agent properties</b>                                | <b>Review fundamental agent properties</b>                     |
| - What is known about the agent?  | - What is the potential for malicious use?                     |
| - Is it associated with infections, toxicity, oncogenicity, or allergies? | - What are the potential consequences of malicious use?        |
| <b>Assess activity-related risks</b>                                      | <b>Assess activity-related risks</b>                           |
| - Does the planned field activity change the risk?                        | - Does the planned field or research activity change the risk? |
| <b>Determine appropriate biosafety measures</b>                           | <b>Determine appropriate biosecurity measures</b>              |
| - Define the field operating environment                                  | - Define the field operating environment                       |

## 2.3 Field Biological Risk Assessment Approach

### 2.3.1 Biosafety Risk Assessment

A biosafety risk assessment in Kenyan field animal health services should adhere to a structured and repeatable process following the four-step technical approach described in Table 2

**Table 2:** Key considerations in the risk assessment framework

| STEP  | KEY CONSIDERATIONS  |
|---|---|
| 1. Gather information (hazard identification) | <ul style="list-style-type: none"> <li>- What biological agents will be handled and what are their pathogenic characteristics?</li> <li>- What type of field work and/or procedures will be conducted?</li> <li>- What type(s) of equipment will be used?</li> <li>- What type of field facility is available?</li> <li>- What human factors exist (for example, what is the level of competency of personnel)?</li> <li>- What other factors exist that might affect the field operations (for example, legal, cultural, socioeconomic, public perception)?</li> </ul>   |
| 2. Evaluate the risks                         | <ul style="list-style-type: none"> <li>- How could an exposure and/or release occur?</li> <li>- What is the likelihood of an exposure and/or release?</li> <li>- What information gathered influences the likelihood the most?</li> <li>- What are the consequences of an exposure and/or release?</li> <li>- Which information gathered influences the consequences the most?</li> <li>- What is the overall initial risk of the activities?</li> <li>- What is the acceptable risk?</li> <li>- Which risks are unacceptable?</li> <li>- Can the unacceptable risks be controlled, or should the work not proceed at all?</li> </ul> |

| STEP  | KEY CONSIDERATIONS  |
|---|---|
| 3. Develop a risk strategy                    | <ul style="list-style-type: none"> <li>- What resources are available for risk control measures?</li> <li>- What risk control strategies are most applicable for the resources available?</li> <li>- Are resources sufficient to obtain and maintain those risk control measures?</li> <li>- Are proposed control strategies effective, sustainable and achievable in the local context?</li> </ul>   |
| 4. Select and implement risk control measures | <ul style="list-style-type: none"> <li>- Are there any national/international regulations requiring prescribed risk control measures?</li> <li>- What risk control measures are locally available and sustainable?</li> <li>- Are available risk control measures adequately efficient, or should multiple risk control measures be used in combination to enhance efficacy?</li> <li>- Do selected risk control measures align with the risk control strategy?</li> <li>- What is the level of residual risk after risk control measures have been applied and is it now acceptable?</li> <li>- Are additional resources required and available for the implementation of risk control measures?</li> <li>- Are the selected risk control measures compliant with national/international regulations?</li> <li>- Has approval to conduct the work been granted?</li> <li>- Have the risk control strategies been communicated to relevant personnel?</li> <li>- Have necessary items been included in the budget and purchased?</li> <li>- Are operational and maintenance procedures in place?</li> <li>- Have personnel been appropriately trained?</li> </ul> |

**Source:** *Laboratory biosafety manual, fourth edition. Geneva: World Health Organization; 2020 (Laboratory biosafety manual, fourth edition and associated monographs). Licence: CC BY-NC-SA 3.0 IGO.*

### **2.3.2 Biosecurity Risk Assessment**

Biosecurity risk assessment in field animal health practice focuses on intentional threats. It involves identifying critical assets in the field, assessing potential threats, evaluating vulnerabilities, and determining the effectiveness of existing biosecurity measures. In Kenya, this includes protecting animals, securing veterinary equipment, biological materials (diagnostic samples), research data, and disease surveillance information from theft, misuse, or deliberate release of harmful biological agents. The process follows key steps as detailed in Table 3.

**Table 3: Biosecurity risk assessment process**

| Step   | Action                               | Description (Field context in Kenya)   |
|--|--------------------------------------|--|
| <b>1. Define the situation</b>                         | 1a. Identify the assets              | Identify key assets such as pathogens, veterinary drugs, diagnostic equipment, research data, and livestock.   |
|  | 1b. Identify the threats             | Assess potential adversaries, including insiders (e.g., corrupt officials, farm workers) and outsiders (e.g., smugglers, livestock thieves), and analyse their motives and capabilities. |
|  | 1c. Assess the field vulnerabilities | Examine weak security at quarantine stations, inadequate vaccine storage, and gaps in livestock movement control.  |
| <b>2. Define the threats</b>                           | 2.a Construct threats scenarios      | Consider different ways assets could be compromised (e.g., theft of veterinary drugs, unauthorized livestock movement, illegal cross-border trade of diseased animals).                  |
| <b>3. Characterize the threats</b>                     | 3a. Asset assessment                 | Determine the likelihood of an asset being targeted and the consequences of its loss or diversion.   |
|  | 3b. Adversary assessment             | Assess the likelihood of an adversary successfully acquiring or misusing the asset.  |
|  | 3c. Field vulnerability assessment   | Identify weaknesses in veterinary supply chains, quarantine stations, and security protocols for research and diagnostic samples.  |
| <b>4. Determine if the risks are acceptable or not</b> | 4a. Engage stakeholders              | Discuss risk findings with veterinary authorities, security and law enforcement agencies, researchers, policymakers, and field service providers to evaluate risk acceptability.         |
| <b>5. Implement mitigation measures</b>                | 5a. Enhance security protocols       | Improve storage and transport security for veterinary supplies and biological materials.   |
|  | 5b. Training and awareness           | Train field AHSPs and relevant stakeholders on biosecurity risks.  |
|  | Strengthen disease control measures  | Improve surveillance, quarantine enforcement, and community engagement in disease reporting.   |

## 2.4 Prioritisation of biological risks

Biological risks are prioritized based on their potential likelihood of occurrence and impact/consequence to determine their acceptability and prioritize mitigation. A risk matrix is one of the tools used in risk prioritization.

### 2.4.1 Biological Risk Matrix

A biological risk matrix is a visual tool used to evaluate and categorize biological risks based on their likelihood and severity of consequences (Table 4). It helps to visually represent and prioritize biological risks so that appropriate mitigation measures can be applied.

**Table 4:** Biological risk assessment matrix

|                |             | Impact/ Consequence            |                           |                               |                       |                                |
|----------------|-------------|--------------------------------|---------------------------|-------------------------------|-----------------------|--------------------------------|
| Likelihood     |             | Insignificant (Minimal impact) | Minor (Manageable impact) | Moderate (Significant impact) | Major (Severe impact) | Catastrophic (Critical impact) |
|                | Rare        | Low Risk                       | Low Risk                  | Low Risk                      | Medium Risk           | Medium Risk                    |
| Unlikely       | Low Risk    | Low Risk                       | Medium Risk               | Medium Risk                   | High Risk             |                                |
| Possible       | Low Risk    | Medium Risk                    | Medium Risk               | High Risk                     | High Risk             |                                |
| Likely         | Medium Risk | Medium Risk                    | High Risk                 | High Risk                     | Extreme Risk          |                                |
| Almost Certain | Medium Risk | High Risk                      | High Risk                 | Extreme Risk                  | Extreme Risk          |                                |

### 2.4.2 Steps to prioritisation of biological risk using the risk assessment matrix

Field animal health practitioners can use the biological risk assessment matrix to systematically assess and prioritize biological risks in animal disease management. The following steps should be used:

#### a. Identify the potential biological risk

- o Determine the biological hazard (e.g., Foot-and-Mouth Disease virus, Rift Valley Fever virus, *Brucella* spp, *Aeromonas* spp.).
- o Consider how the risk may arise (e.g., handling animals and animal products, handling samples, administering vaccinations, aquatic ecosystems and handling waste among others).
- o Determine the transmissibility, pathogenicity and virulence of the hazard in the host.

#### b. Determine the likelihood of occurrence

- o Assess how often the identified risk is expected to occur:
  - Rare: Unlikely to happen under normal conditions.
  - Unlikely: Possible but not expected.
  - Possible: May occur occasionally.
  - Likely: Expected to happen regularly.
  - Almost Certain: Has happened before and will likely happen again.

#### c. Assess the impact/consequences

- o Evaluate the impact/consequence if the risk materializes:
  - Insignificant: Minimal or no harm.
  - Minor: Limited effect on health, environment, or operations.
  - Moderate: Localized impact requiring intervention.
  - Major: Widespread effects on animal and human health.

- Catastrophic: Critical impact, including high mortality and economic losses.

**d. Determine the risk level**

Cross-reference the Likelihood and Consequence values in the matrix to find the overall Risk Level (Low, Medium, High, Critical) as captured in Table 4 above. The risk rating (level) and action timelines are summarized in Table 5 below.

**Table 5: Risk rating (level) and action plan timelines**

| Low risk  | Medium risk   | High risk   | Critical risk   |
|---|---|---|---|
| Minimal action may be required to be executed by the concerned stakeholders | Action within 6-8 months and execution will rest with the concerned stakeholders. | Action within 3–6 months and execution will rest with the concerned stakeholders. | Immediate action to remove/ reduce risks. Action to be taken on recommendations/ further controls within 8 weeks maximum and execution will rest with the concerned stakeholders. |

**e. Implement control measures based on risk rating (level)**

- Low Risk: Maintain standard biosecurity and biosafety measures and monitoring.
- Medium Risk: Apply additional safety controls (e.g., PPE, disinfection).
- High Risk: Strengthen biosecurity measures (e.g., quarantine, restricted access, notification of veterinary authorities).
- Critical Risk: Take urgent action (e.g., emergency response, movement restrictions, notification of veterinary authorities)

**f. Monitor, review and report** - Regularly assess risks and update control measures as needed.

Document risk assessments and communicate findings to relevant stakeholders (e.g., veterinary teams, farmers, policymakers). **Detailed information on monitoring and evaluation is found in chapter seven of these guidelines.**

## 3. Field Biological Risk Mitigation Measures

This chapter covers essential field biological risk mitigation measures to prevent exposure and contamination, highlights the importance of biosecurity in safeguarding valuable biological materials (VBM), and proposes waste management and decontamination protocols to maintain a safe and compliant workspace.

### 3.1 Biosafety Mitigation Measures

The term “biosafety” refers to the set of protocols, practices, procedures, and measures implemented to prevent the unintentional introduction, exposure, and spread of infectious agents during fieldwork involving animals and humans.

#### 3.1.1 Pathogens and toxins

Pathogens and toxins affecting animals include various viral, bacterial, parasitic, and fungal agents that can lead to diseases in animals and humans. The following are examples of common diseases associated with the pathogens and toxins (WOAH, Terrestrial and Aquatic Animal Health Code) as shown in Table 6.

**Table 6:** Common animal Diseases and their causes

| Disease                                 | Description   |
|---|---|
| <b>Viral Diseases</b>                   |   |
| Foot and Mouth Disease (FMD)            | Highly contagious disease affecting cloven-hoofed animals like cattle, pigs, sheep, and goats   |
| Viral Haemorrhagic Fevers (VHFs)        | A group of viral illnesses (Ebola, Marburg, Crimean Congo, Dengue) which are life threatening and are characterized by fever and bleeding |
| Rift Valley Fever (RVF)                 | Zoonotic viral disease affecting ruminants and humans, transmitted by mosquitoes  |
| <i>Peste des petits ruminants</i> (PPR) | Affects sheep and goats, leading to high mortality rates  |
| Rabies                                  | A deadly zoonotic disease affecting humans, domestic and wild animals   |
| Lumpy Skin Disease (LSD)                | Affects cattle, causing skin nodules and economic losses  |
| Newcastle Disease (NCD)                 | Affects poultry, causing respiratory and neurological sign  |
| Tilapia Lake Virus (TiLV)               | A serious threat to tilapia aquaculture, causing significant mortalities in both wild and farmed populations                              |
| Infectious Hematopoietic Necrosis (IHN) | A highly contagious viral disease affecting salmonids, potentially leading to 100% mortality  |
| Viral Haemorrhagic Septicemia (VHS)     | A highly contagious and often fatal viral disease of both freshwater and saltwater fish   |

| Disease  | Description   |
|--|---|
| <b>Bacterial Disease</b>                           |   |
| Anthrax ( <i>Bacillus anthracis</i> )              | A zoonotic disease that affects livestock causing sudden death  |
| Brucellosis ( <i>Brucella spp.</i> )               | A zoonotic disease affecting cattle, sheep, and goats, leading to reproductive losses   |
| Bovine tuberculosis ( <i>Mycobacterium bovis</i> ) | Chronic disease in cattle, it is zoonotic   |
| Contagious Bovine Pleuropneumonia (CBPP)           | A severe respiratory disease in cattle  |
| Contagious Caprine Pleuropneumonia (CCPP)          | Affects goats, causing severe pneumonia   |
| Salmonellosis ( <i>Salmonella spp.</i> )           | Affects multiple species, including domestic and wild animals, pigs, fish, poultry and humans   |
| Clostridial Diseases (Tetanus, Blackleg, Botulism) | Cause severe infections in livestock  |
| Fish Bacterial Infections                          | Common bacterial infections include those caused by <i>Aeromonas hydrophila</i> , <i>Pseudomonas fluorescens</i> , <i>Edwardsiella</i> trade, and others  |
| <b>Parasitic Diseases</b>                          |   |
| Trypanosomiasis (Nagana/ Sleeping sickness)        | Trypanosomes which cause nagana in cattle and sleeping sickness in humans is transmitted by tsetse flies and causes severe economic losses  |
| Theileriosis                                       | A group of tick-borne diseases affecting cattle, sheep and even horses caused by the <i>Theileria</i> spp. the cause of East coast fever in cattle  |
| Aphanomyces <i>invadans</i> infection              | Causes epizootic ulcerative syndrome (EUS), a disease affecting various fish species  |
| <b>Fungal and Mycotoxin-related issues</b>         |   |
| Mycotoxicosis                                      | These are caused by fungi such as <i>Aspergillus</i> spp. and <i>Fumosins</i> contaminating livestock feed such as maize, maize germ and in some cases dairy meal. These toxins end up in milk, eggs and meat which is a food safety threat |

### 3.1.2 Classification of Pathogen Risks in the field

Field animal health service providers (AHSPs) should classify pathogens into four risk levels as presented in Table 7, arranged from lethal to low risk levels with specific pathogens.

Some examples include: -

**Table 7:** Pathogen risk levels

| Agent Risk assessment level | Pathogenicity  | Endemic status  | Transmission   | Symptoms   | Examples                               |
|-----------------------------|--|---|--|--|--|
| Extremely high              | Lethal; no effective treatment, highly transmissible | RVF: Sporadic in some regions during floods           | Direct contact with infected animals or their fluids<br>vector-borne     | Haemorrhages, high mortality and abortion storms | Rift Valley Fever                      |
| High                        | High; can cause severe illness                       | Endemic in some regions, spores are found in the soil | Contact with infected animal & animal products, inhalation and ingestion | Cutaneous, GIT, respiratory symptoms             | Anthrax                                |
| Medium                      | Moderate to severe disease;                          | Endemic   | Direct contact with fluids-urine, blood, placenta<br>Oral/Dog bites      | Fever, abortions neurological signs (rabies)     | Brucellosis<br>Rabies<br>Leptospirosis |
| Low                         | Minimal  | Mildly endemic  | Direct contact or environmental exposure                                 | Minor GIT upset                                  | Non-pathogenic Escherichia coli        |

### 3.1.3 Adherence to Standard Operating Procedures (SOPs)

Animal health service providers (AHSPs) should adhere to customized SOPs to minimize risk of exposure to biological materials (see Appendices for templates of the SOPs).

### 3.1.4 Safe handling and storage of biological materials

Proper handling and storage of biological materials in animal health are essential to prevent contamination, ensure biosafety, and maintain the viability/efficacy of such materials. In the field situations, AHSPs are exposed to biological materials, including but not limited to pathogens, vaccines, blood samples, fluids/tissues, from live animals and carcasses.

### General Safety measures in handling of Biological Materials

Here is the rewritten section on safety measures, clearly distinguishing between field and slaughterhouse contexts:

#### General Safety Measures for Handling Biological Materials

##### *In the Field*

- Conduct a thorough risk assessment before handling animals or materials.
- Wear appropriate personal protective equipment (PPE) including boots, gloves, lab coats, masks, and eye protection.
- Take a detailed history of animals showing clinical signs of transmissible diseases such

- as rabies or anthrax before clinical examination.
- d. Limit the number of personnel involved to only those actively assisting. Ensure animals are properly restrained to prevent injuries.
  - e. Reduce aerosol generation during procedures such as postmortems by avoiding excessive force when cutting and moistening tissues.
  - f. Clearly label all biological materials with date, type of material, and source information.
  - g. Store vaccines and other field materials at recommended temperatures.
  - h. Dispose of biological waste safely by burying, burning, chemical disinfection, or incineration as appropriate.
  - i. Transport field samples in sterile, leak-proof containers under recommended temperature and conditions to the laboratory.
  - j. Use dedicated sharps containers to minimize risk from sharp objects.
  - k. Treat all biological materials as potentially infectious sources.
  - l. Decontaminate work sites that potentially harbor biological agents.
  - m. Demarcate clean and dirty zones clearly while working to prevent cross-contamination.
  - n. Dispose properly of expired or unused drugs, vaccines, and biological materials.

### ***In Slaughterhouses***

- a. Follow risk assessments specific to slaughterhouse environments considering higher exposure levels.
- b. Utilize PPE rigorously, including waterproof boots, gloves, protective aprons, masks, and eye protection.
- c. Handle condemned meat with strict care to prevent infection of personnel.
- d. Minimize personnel exposure by limiting access to only essential workers.
- e. Ensure safe restraint of animals during slaughter to prevent injuries.
- f. Minimize aerosol generation by applying gentle cutting techniques and moistening tissues.
- g. Ensure all biological waste, including condemned meat, is disposed of following strict protocols such as incineration or rendering as appropriate.
- h. Maintain strict hygiene to prevent contamination of surfaces and equipment.
- i. Establish and maintain clear separation between clean processing areas and waste or contaminated zones.
- j. Follow appropriate storage and transport procedures for samples taken during slaughterhouse inspection.
- k. Use designated sharps disposal systems and avoid recapping needles to mitigate injury risk.
- l. Treat all carcass materials as potentially infectious and implement thorough decontamination procedures for all affected areas.

### **3.1.5 Guidelines on the use Personal Protective Equipment (PPE)**

#### **a. Considerations when selecting PPE**

The choice of PPE will be determined by the risk assessment

- i. Who will be exposed and to what?
- ii. How long will the PPE be worn?
- iii. What type of biological material is protection needed against?
- iv. Are there any contraindications for the use of a certain type of PPE (e.g. allergies, asthma, and dermatitis)?

#### **b. Considerations for specific PPE**

- i. Size, shape, fit, suitability, and mobility to ensure protection of the exposed persons during and for the duration of activities.
- ii. Competence of users.
- iii. Requirement for cleaning, disinfection and maintenance.
- iv. Disposable versus reusable equipment.
- v. Compatibility with other equipment.
- vi. Robustness (resistance to abrasion, cutting, tearing, and puncture),
- vii. Weather conditions, consider extreme conditions of temperature, etc.
- viii. Respiratory fit testing should be done for face masks and respirators.

#### **c. Key principles/ Best practices for PPE use include the following.**

- i. Choose products that are fit for purpose in accordance with local and national regulations or adopted international standards – suppliers can advise.name the regulations
- ii. If more than one item of PPE is worn at the same time, ensure they can be used together; for example, wearing safety glasses may disturb the seal of a respirator, causing air leaks.
- iii. Instruct and train personnel on how to use PPE, why it is needed, when to use it and what its limitations are.
- iv. Appropriate training is required in PPE use for high-risk work, particularly in relation to correctly putting on and removing when contaminated.
- v. Never allow exemptions from wearing PPE for those jobs that “only take a few minutes”.
- vi. Where possible, check with manufacturers on what PPE would be most appropriate. Explaining the type of work to be carried out can help manufacturers advise on the most suitable PPE to be used.
- vii. If in doubt, seek further advice from a specialist adviser, such as a supplier or biosafety expert.

#### **d. Sequence for Donning and doffing Personal Protective Equipment**

Please refer to Appendix 9. SOP for use of PPE.

#### **3.1.6 Occupational Safety and Health**

Occupational Safety and Health (OSH) involve the ability to anticipate, recognize, evaluate, and control potential hazards the field animal health workers are likely to be exposed to which can impair their health and well-being. Field AHSPs should prioritize occupational safety and health practices in line with the OSH Act, 2007 to enhance their own safety and well-being and that of the animals they care for. Key considerations and best practices to ensure OSH include:

##### **a. Personal Protective Equipment (PPE) as described under 3.1.5**

- i. Use appropriate PPE such as gloves, face masks, goggles, and protective clothing depending on the procedure and the type of animals being handled.
- ii. Ensure that PPE is correctly fitted and maintained to provide adequate protection.

##### **b. Training and Education**

- i. Thorough training on safety protocols, recognizing hazards, and the proper use of equipment and PPE.
- ii. Regular refresher training on topics such as zoonotic diseases, potential hazards, emergency response, and handling aggressive animals.
- iii. Awareness on the legal and regulatory framework, policies, regulations, and guidelines on OSH.

##### **c. Risk Assessment and Mitigation**

- i. Regular risk assessments prior to field activities to identify potential hazards such as equipment use, animal handling, and environmental conditions.
- ii. Develop strategies to mitigate identified risks, such as using safer equipment or improving handling techniques.

##### **d. Ergonomics (fitting the worker to the workspace)**

- i. Ensure comfortable workspace
- ii. Ensure training on proper lifting techniques and ergonomic practices to prevent musculoskeletal injuries.
- iii. Use tools and equipment designed to reduce physical strain, such as lifting aids and proper restraint methods for animals.

##### **e. Animal Handling Techniques**

- i. Ensure low-stress handling techniques are used to minimize risk to both staff and animals.
- ii. Use appropriate restraint methods and equipment to safely manage animals during examinations or treatments.

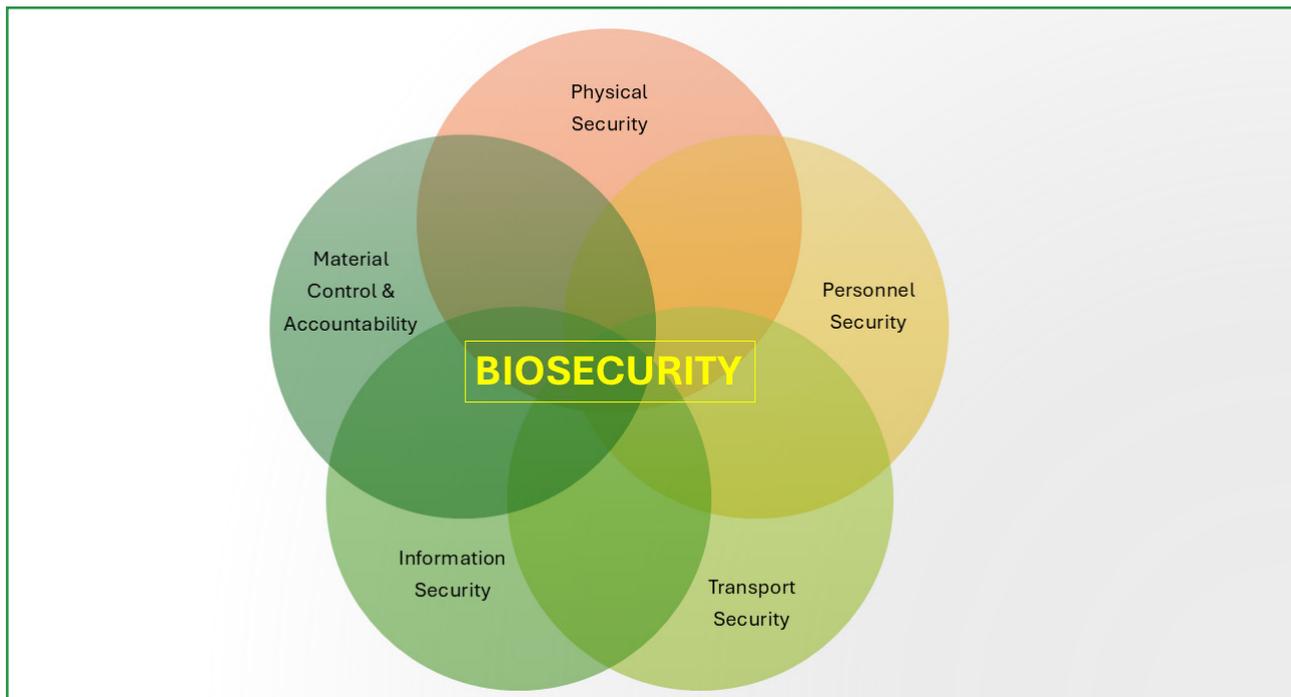
##### **f. First Aid and Emergency Preparedness**

- i. Have knowledge and skills in first aid and Cardiopulmonary resuscitation (CPR) specific to both human and animal emergencies.

- ii. Have a clearly defined emergency response plan and readily accessible first aid kits tailored for fieldwork.
- g. Hygiene and Disease Prevention**
- i. Establish strict hygiene protocols, including hand washing and sanitization of equipment before and after handling animals.
- h. Mental Health Support**
- i. Acknowledge the emotional and psychological stress that can occur in animal health practice, providing access to mental health resources and support.
  - ii. Encourage open communication about mental well-being and establish a supportive workplace culture.
- i. Vehicle Safety**
- i. Ensure that vehicles used for transporting animals or equipment are maintained and equipped with safety features.
  - ii. Have knowledge and skills on safe driving practices, especially when transporting animals in varying conditions.
- j. Legal and Regulatory Compliance**
- i. Stay informed about relevant occupational health and safety regulations and veterinary practice standards.
  - ii. Ensure that animal health field practice complies with both local and national guidelines for safety in animal health.
- k. Vaccination**
- i. Ensure vaccination against common zoonoses e.g. Rabies, and Hepatitis B.
- l. Insurance**
- i. Take relevant insurance while working with high-risk pathogens and equipment
  - ii. Awareness on existing group insurance enshrined in the Work Injury Benefits Act (WIBA) which provides compensation to employees who suffer work-related injuries, illnesses, or death as espoused in the OSH Act, 2007.
- m. Medical surveillance for personnel**
- i. Perform regular surveillance on personnel involved in high-risk field operations

### **3.2 Field biosecurity mitigation measures**

Field biosecurity is an integral component of biological risk management for field animal health workers, as it aims to prevent the intentional release or exposure of biological agents and toxins to animals and the environment. Field biosecurity mitigation measures are actions taken to prevent, reduce or eliminate biological threats and are essential in minimising the introduction, spread and impact of disease in animals and environment. Biosecurity mitigation measures are guided by the five pillars of biosecurity (Figure 2).



**Figure 2: Pillars of Biosecurity**

The pillars of biosecurity are fundamental to preventing the introduction and spread of infectious diseases, safeguarding biological materials, and ensuring the health of both the public and the environment. The pillars are:

**a. Physical Security**

Physical security is designed to delay, deny, and deter unauthorised access to the facility. This is implemented as follows:

- Limit entry to authorized personnel and vehicles only.
- Use of fencing, manned gates, locked doors, and surveillance systems (CCTV).

**b. Personnel Security**

Personnel security is intended to ensure adequate background checks on the human resources. This is implemented as follows:

- Ensure that personnel handling biohazards are appropriately vetted and trained.
- Define clear duties for each staff member to maintain security and compliance.
- Monitor for suspicious activity that may indicate intentional misuse.

**c. Transport Security**

Transport security is intended to secure the biological materials during transportation. This is implemented as follows:

- Ensure biological materials from the field are properly packaged to prevent leaks and contamination.
- Maintain chain-of-custody records for sample movements from one point to the other.
- Properly disinfect transport vehicles before and after use.

#### **d. Information Security**

Information security is designed to protect the data and information associated with biological materials. This is implemented as follows:

- Use of logs
- Protect sensitive data related to biological materials and security protocols.
- Secure electronic records and laboratory information systems.
- Limit the sharing of sensitive information to authorized individuals only.

#### **e. Biological Material Control and Accountability**

This is done to ensure the security and accountability of biological material. This is implemented as follows:

- Maintain updated records of all biological agents and hazardous materials.
- Implement locking systems and controlled access to biohazardous materials.
- Conduct regular inspections to ensure compliance with biosecurity policies.

### **3.2.1 Documentation**

Proper documentation is a critical aspect of biosecurity for field animal health service providers in Kenya. It ensures traceability, accountability, and compliance with national and international standards. Proper documentation should have a system that maintains structured records of all biosecurity-related activities, utilizing both paper-based and digital systems to ensure accessibility and long-term storage, and maintains backup copies of important biosecurity documentation to prevent data loss. The documents include:

#### **a. Animal health records**

- Maintain individual animal health records, including:
  - Identification details (ear tags, branding, microchips).
  - Vaccination records.
  - Disease history and treatment records.
- Record disease surveillance and outbreak response measures.
- Ensure confidentiality and proper handling of sensitive data.

#### **b. Biosecurity logbooks**

- Keep records of all individuals and vehicles entering/exiting the premises.
- Document movements logs of AHSPs, farm workers, and external visitors.
- Track disinfection and sterilization of reusable equipment before and after farm visits.

#### **c. Sample collection and transport records**

- Sample Collection Forms will capture the following information:
  - Animal identification and location.

- Date and time of collection.
- Sample type and condition.
- Chain of Custody Forms:
  - Ensure the integrity of samples by tracking handling and transportation.
  - Require authorized personnel to sign off at each stage.

**d. Biosecurity Compliance and Incident Reporting**

- Standard Operating Procedures (SOPs): Maintain up-to-date procedures for:
  - Handling infectious diseases.
  - PPE usage and decontamination.
  - Emergency Response.
- Incident Reports:
  - Record and investigate any breaches in biosecurity.
  - Document corrective measures taken.

**e. Waste Disposal and Carcass Management Records**

- Keep logs of biohazardous waste disposal, including:
  - Type of waste.
  - Disposal method (e.g., incineration, burial).
  - Date and responsible personnel.
- Document carcass disposal procedures to prevent contamination and disease spread.

**f. Training and competency records**

- Maintain records of biosecurity training for all personnel.
  - Training dates.
  - Topics covered.
  - Trainer details.
  - Employee competency assessments.

**g. Regulatory and compliance requirements**

- Legal permits and certifications:
  - Ensure compliance with Kenya's laws and international instruments on biosecurity regulations.
  - Export/import permits, movements permit,
- Audit and Inspection Reports:
  - Maintain records of inspections conducted by regulatory agencies.
  - Track corrective actions taken.

**h. Digitalization and Security Measures**

- Use secure databases for electronic record keeping.
- Implement access control measures to prevent unauthorized data manipulation.

- Utilize cloud storage for secure backup and easy retrieval.

### **3.2.2 Storage, transportation and transfer of biological materials in the field.**

#### **Principles of Storage of biological material in the field**

- Ensure that biological materials are stored at an appropriate temperature (e.g. refrigerated, frozen, or ambient) as specified by the manufacturer or regulatory guidelines.
- Use leak-proof and improvised sift-proof containers to prevent spillage or contamination.
- Clearly label all containers to identify the contents, storage conditions, and hazard symbols (if applicable).
- Store hazardous materials (e.g., infectious substances) separately from non-hazardous materials to avoid cross-contamination.
- Store infectious substances in secure, temperature-controlled environments with restricted access.

#### **Emergency response for samples under storage**

- Establish emergency contacts for emergency responders a. The contacts should be accessible by personnel.
- Have contingency plans for power outages or equipment failures (e.g. backup generators, dry ice).
- Regularly inspect storage equipment and replace faulty units immediately. **Refer to Annexed SOP on Packaging and Handling of Diagnostic Samples for Shipment**

#### **Transportation of Biological Materials**

All biological materials should be packaged and transported in accordance with local, national and international regulations.

##### **a. Packaging and Labelling**

- Triple packaging system is mandatory:
  - Primary Receptacle – Leak-proof, watertight, and securely closed.
  - Secondary Packaging – Durable, watertight, and enclosing the primary receptacle with absorbent material.
  - Outer Packaging – Rigid, cushioned, and resistant to external forces.

##### **b. Cold Chain and Transport Conditions**

- Refrigeration: Use ice packs or dry ice (must allow gas release).
- Transport Route: Use the most direct and fastest route to minimize exposure risks.
- Carrier Responsibility: Ensure trained personnel handle transportation of samples. **Refer to Annexed SOP on Procedure for Transport of Samples**

## **Transfer of Biological Materials**

### *a. Legal and Ethical Considerations*

- Material Transfer Agreements (MTAs): Required for sharing materials between research institutions, farms, and diagnostic labs. This helps to protect intellectual property, biosafety, and legal responsibilities.
- Nagoya Protocol Compliance: Ensure benefit-sharing agreements if genetic resources are involved. This compliance is obtained prior informed consent from the source country before transfer.
- CITES Regulations: If transporting endangered animal samples, obtain CITES export/import permits.

### *b. Risk Management in Transfer*

- Field set-up should have protocols for spills, leaks, or theft during transport.
- Ensure that required permits, airway bills, and tracking records are in place before dispatch.
- Import/Export permits should follow national and international veterinary transport laws for compliance.

## **3.2.3 Emergency Procedures**

### **Spills**

- Immediately contain the spill, clean up the spill and decontaminate the area using appropriate methods that are provided in the SOP for spill management.
- Wear appropriate personal protective equipment (PPE) during cleanup.
- Report the incident to the relevant authorities and follow local biosafety protocols.

### **Theft and loss**

- Notify the immediate supervisor and local authorities immediately
- Provide detailed information about the lost or stolen material, including its classification and potential hazards.

### **Cold chain management**

- Monitor temperature log (for items that require cold chain) during transport.
- If a temperature excursion occurs, assess the integrity of the material and consult the manufacturer or regulatory authority for guidance.
- Ensure all personnel involved in the storage, transportation, and transfer of biological materials are trained in accordance with national and international regulations.

## **3.2.4 Field-level biosecurity protocols**

### **General Field Biosecurity guidelines**

- Implement management practices to prevent the spread of infectious agents between animal groups and to prevent infectious agents from leaving the field.

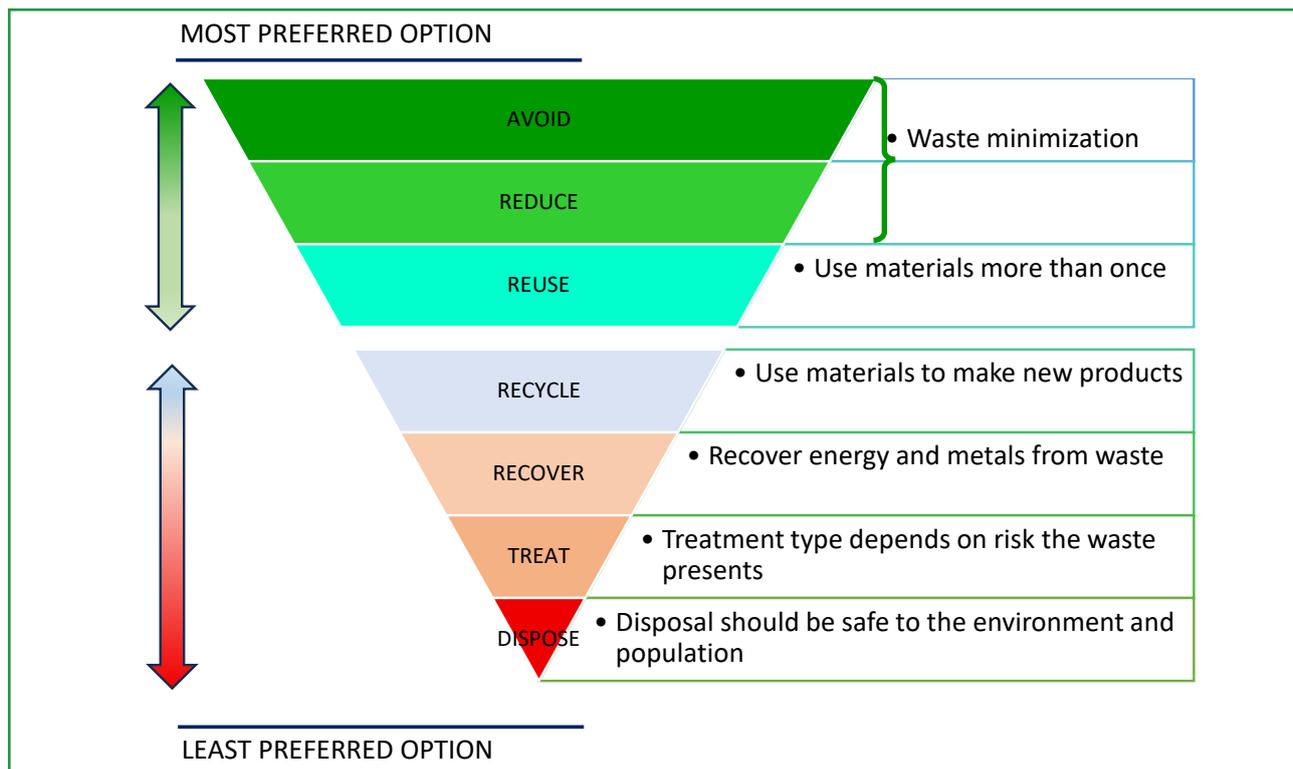
- Prevent contact between animals from different field facilities to reduce disease entry risks.
- Only essential persons should access controlled animal areas.
- Provide appropriate PPE (e.g., boots, gloves, overalls) for visitors.
- Implement shower-in/shower-out procedures where applicable.
- AHSPs providers should disinfect boots, coveralls, and hands before entering and leaving a field facility.
- Have proper cleaning and disinfection of premises, including buildings, machinery, equipment, water tanks, and animal food storage areas.
- Provide hands-free wash basins and sanitizers in animal handling areas.
- Remove and dispose of dead animals via burning, burial, or composting to prevent pathogen survival and access by scavengers.
- Maintain cleanliness in the animal environment and perform routine disinfection to prevent disease spread.
- Implement an integrated surveillance program to detect and prevent disease outbreaks.
- Administer vaccinations to animals against common infectious diseases.
- Obtain movement permits from the veterinary and other relevant authority before relocating animals
- Have a safe water source to prevent contamination.
- Prevent feeding uncooked animal products or swill that may carry pathogens.
- Place disinfectant baths at farm entrances and near animal areas.
- Use one needle per animal and dispose of it in a sharps container.

For more details on farm biosecurity, refer to Farm Biosecurity Guidelines for Dairy, Pig, Poultry Production.

### **3.3 Waste Management**

The waste management hierarchy below illustrates the order of preference for waste management. Ideally, the best practice is to avoid waste generation, but this is not always possible. Therefore, control methods at the top of the hierarchy are the most effective at minimizing the risks.





**Figure 3: Hierarchy of Waste management**

The following guidelines are involved in waste management for animal health (details are contained in Appendix 11. SOP for waste management):

### 3.3.1 Waste Minimization

Minimize the amount of waste generated by composting biodegradable waste, minimizing use of disposable equipment, not stocking or using excessive materials, and sensitizing people involved on the importance of waste reduction.

### 3.3.2 Waste identification, classification, segregation, and packaging

- a. Identify the waste generated by source, for example
  - i. Field waste: General waste, carcasses, foetuses, apiary waste, hatchery waste, contaminated used items, gloves, expired disinfectants, expired acaricides, used needles, used blades, used PPE
  - ii. Animal processing facilities: Slaughterhouse, general waste, condemned carcasses, organs, foetuses, blood, ingester.
  - iii. Veterinary Clinic, agroveter waste: General waste, expired drugs, small carcasses, tissues, contaminated swabs, used needles, used blades, used PPE
  - iv. Temporarily established sites: General waste, used needles, used blades, used swabs, used PPE
  - v. Fish rearing facilities (hatcheries, ponds, recirculatory aquaculture systems, and cages, etc.), wastewater effluents, and solid and chemical wastes.

- b. Segregate the waste into different categories.
  - i. Non-hazardous waste e.g., General waste, and foodstuff leftovers. Poses minimum risk to humans, animals, and environment.
  - ii. Hazardous waste e.g., sharps such as needles, anatomical wastes such as dead animals, aborted fetuses, organs, body fluids; materials containing infectious agents that pose a risk of disease transmission. Expired or disused drugs, disinfectants and chemicals.
  - iii. Segregate the waste as close as possible to the point of generation, and it should be maintained throughout the process of waste collection, storage, treatment, and disposal.
- c. Use the recommended colour coding for waste segregation; for instance, use;
  - i. Black containers or packages for general non-hazardous waste.
  - ii. Yellow containers or packages for infectious waste
  - iii. Red containers or packages for pathological waste
  - iv. Yellow puncture-proof containers for sharp objects such as needles, surgical blades, etc.
  - v. Where coloured containers or waste bags are not available, coloured markings can be improvised using available means and identified accordingly.
- d. Use leak-proof and sturdy containers
- e. Avoid mixing different types of waste in one container, e.g., general waste with needles or organs with needles.
- f. Label the packaged waste to provide the following information;
  - i. Details of the source of waste - where waste was generated.
  - ii. Type of waste in container
  - iii. Date of closure of the package
  - iv. The person who filled out the label - will be useful in case clarification is required or harmful contents have leaked.

### **3.3.3 Waste storage**

#### **a. Interim storage**

- i. Store the waste close to the point of generation prior to transportation to central storage area
- ii. The interim storage area should have adequate ventilation and lighting
- iii. The interim storage areas should be easy to clean and be able to contain any spillage

#### **b. Central storage**

- i. Separate hazardous and non-hazardous waste in the central storage area.
- ii. The area should be easily accessible to transporters or collectors.
- iii. The central storage should be protected from the elements and pests.
- iv. The central storage area should have cleaning and handwashing facilities.

- v. The area should be easily cleaned and have any spillage contained.

### **c. Storage area documentation**

Always keep clear records of the waste stored. Customize documents to include the following;

- i. SOPs or work instructions for the operations of the storage area, which may be customized as per your requirements and conditions.
  - ii. Contingency plans for unforeseen events such as unanticipated volume surges due to failure in collection of increase in generated waste amounts, spillages, broken containers, or other events;
  - iii. Consider having a separate temporary site and provision for extra containers. Some spillages may require immediate decontamination of the spillage, containment, and decontamination of affected areas. You may also request for emergency transportation of the waste.
  - iv. Waste tracking forms
  - v. Waste collection records
- d. Avoid storage of wastes that will generate gas
  - e. If in a slaughter facility, immediately dispose of waste once the required documentation is completed.

### **3.3.4 Transportation of Waste**

Ensure all legal requirements are met prior to transportation of waste as per the NEMA Waste Management Regulations of 2024, and the Kenya National Sustainable Waste Management Policy 2021.

Onsite waste transportation from interim to central storage area

- i. Transport during times of minimum activities
- ii. Set fixed and regular transportation schedules
- iii. Ensure people involved have adequate PPE.

Offsite waste transport; from central storage to outside waste treatment or disposal facility

- i. Have back-up plan in case waste collection is delayed
- ii. Ensure documentations to identify the vehicle and its driver, type of waste, place of origin, route and destination.
- iii. Ensure documentation are in place to track waste between
  - The waste generator
  - The transporter
  - The treatment/disposal facility

### **3.3.5 Treatment of Waste**

Whenever possible, always ensure waste is treated prior to disposal to render it safe. You may use the following:

**Thermal treatment processes:** In a small facility, you can collaborate with a health facility by using the facility's incinerator or autoclave.

**Chemical processes:** You can use sodium hypochlorite (bleach) to disinfect some waste, especially those with small quantities and possibly containing infectious agents.

### **3.3.6 Disposal of Waste**

1. Always ensure safe disposal of waste.
2. Where possible, use authorized waste-disposal contractors, e.g., the municipal authorities
3. You may use the following methods for disposal depending on type of waste;
  - a. Heat treatment, e.g., closed burning, incineration, autoclaving, etc.
  - b. Do not use explosive materials, rubber, and plastics.
4. Hydrolysis (Digester pits)
5. Condemnation pits (at animal slaughter sites)
6. Burial/disposal pit
  - a. Have appropriate approvals are in place both from NEMA and the local authorities as per the Waste Management Regulations 2024
  - b. A pit trench should be about 2 meters deep. It should be filled with waste and then covered with lime within 50 cm of the surface before filling the rest of the pit with soil.
  - c. The burial must be under close and dedicated supervision.
  - d. The pits should be a minimum of 30m from habitation, no contamination should occur to any surface or underground water. The area should not be prone to erosion.

### **3.3.7 Roles and responsibilities of waste producers.**

Polluter pays principle - The waste generator is responsible for the waste from point of generation to disposal. The waste generator should ensure that;

- a. Waste is not disposed of in any public area except in a designated waste receptacle.
- b. Collection, segregation and proper waste disposal.
- c. Ensure that waste is transferred to a person who is licensed to transport and dispose of such waste in a designated waste disposal facility

### **3.3.8 Disposal of Veterinary Drugs, Vaccines, Chemicals, and Reagents**

Dispose of veterinary drugs, vaccines, chemicals and reagents as per the Guidelines on Veterinary Medicinal Products, Waste Management of the Veterinary Medicines Directorate, and the material safety data sheets. The recommended methods include:

- Return to the manufacturer for in-country manufactured products

- Dilution/Neutralize
- Recycling
- Incineration
- Encapsulation
- Inertization
- Land disposal

### 3.4 Decontamination

This general term refers to the process of removing, reducing, or neutralizing harmful contaminants (e.g., pathogens, chemicals, or radioactive materials) to make an object or environment safe. Broadly, decontamination encompasses cleaning, disinfection, and sterilization.

Any surface or material known to be, or suspected to be potentially contaminated by biological agents during field operations should be decontaminated to minimize biological risks by:

- Cleaning surfaces with water and soap
- Ensuring antiseptis - application of liquid antimicrobial chemicals on skin or living tissue
- Disinfecting the working surface of equipment using liquid chemicals.
- Sterilizing by physical and chemical methods.

#### 3.4.1 Methods of Decontamination

- Physical Decontamination** - Use of physical methods to remove, inactivate or destroy hazardous contaminants e.g. scrubbing, washing, or filtration to an inanimate surface or material to inactivate viable biological agents or reduce their number to a safe level.
- Chemical Decontamination** - is a method of decontamination that involves the application of a chemical, or mixture of chemicals, to an inanimate surface or material to inactivate viable biological agents or reduce their number to a safe level.
  - Disinfectants are the preferred method for decontamination of surfaces.
  - Use disinfectants after a spill, or where contamination is known or suspected to have occurred.
  - Disinfect surfaces (and materials where applicable) after activity has been completed on the work site.
  - Use disinfectants for decontamination of potentially contaminated fluids.

Factors to consider while choosing a disinfectant:

- Spectrum of field activity (with high specificity for the biological agents to be disinfected)

- Field of application (for example, application in liquids or on surfaces)
- Application conditions (contact time, concentration of the disinfectant, temperature of the application and other important influencing factors such as the presence of an organic load, for example, serum or blood).

### iii. Thermal Decontamination - Uses heat to eliminate contaminants.

#### a. Autoclaving

- In the field carry a portable autoclave or seek assistance from the nearest health facility/ veterinary laboratory.
- When used correctly, autoclaving is the most effective and reliable means to sterilize field equipment and decontaminate waste materials by destroying or inactivating biological agents.
- Autoclaving uses high temperatures (for example, 121 °C for 30 minutes) applied as moist heat (steam) under pressure to destroy microorganisms.
- Achieving a sufficiently high temperature is required because, although most infectious biological agents are destroyed by heating at 100 °C, some are heat-resistant (such as spores) that cannot be destroyed at this temperature.

#### b. Incineration

- Incineration is the process of burning waste materials at high temperatures to convert them into ash, fluid gas, and heat.
- It is commonly used for the disposal of hazardous, medical, or solid waste, effectively reducing waste volume and destroying harmful pathogens or toxic substances.
- Use incineration in case of large size or increased bioburden of the contaminated materials.
- It is one of the preferred disposal mechanisms for animal waste.
- Use of incineration must meet the approval of local public health and air pollution regulatory authorities such as NEMA.
- Incinerators must be appropriate for use with the material being incinerated.

### iv. Radiation Decontamination - Utilizes ultraviolet (UV) light or ionizing radiation to destroy microorganisms.



### 3.4.2 Chemicals used for Decontamination

Table 8: Commonly used disinfectants /chemicals for decontamination in the field

| Disinfectant (Active Chemical content)                                | Working Concentration | Contact Time        | Shelf life (Duration after reconstitution)          |
|---|-----------------------|---------------------|---|
| Ethanol   | 70%                   | 1 minutes           | 60 days   |
| Sodium chloride +Potassium Peroxymonosulfate                          | 2%                    | 24 hrs              | 1 day   |
| Sodium Hypochlorite   | 0.5%                  | 30 minutes          | 1 day   |
| Gluteraldehyde  |                       |                     |   |
| Ethanol/SD p-chloro-o-benzylphenol, phenylphenol, potassium hydroxide | 10%                   | 30 minutes          | 1 day   |
| Sodium Bicarbonate  | Not diluted           | 30 minutes          | Before expiry date as indicated by the manufacturer |
| *Formaldehyde   | 5%                    | 10 hours            | 3 Months  |
| Hydrogen peroxide   | 2 %                   | 20 minutes -10hours | 1 day   |

\* This should be done in a closed area

### 3.4.3 Characteristics of selected disinfectants

(Refer to Appendix 1: Characteristics of selected disinfectants)

### 3.4.4 Bleach Dilution

In Kenya, household bleach (typically containing 3.5% chlorine) is commonly used for decontamination. To prepare a solution of 0.5% available chlorine from a 3.5% bleach solution:

% chlorine liquid bleach-1 part of water per part of bleach

% chlorine desired

$$\frac{3.5\%}{0.5\%} - 1 = [7] - 1 = 6 \text{ parts water for each part bleach}$$

Therefore, mix 1 part bleach with 6 parts water to make a 0.5% chlorine solution

### 3.4.5 Field Decontamination Procedures

#### 1. Preparation

- i. Ensure all field personnel involved in field activities are trained in biosafety and decontamination procedures.
- ii. Carry sufficient decontamination supplies, including:
  - **Personal protective equipment (PPE):** gloves, masks, goggles, coveralls, boots.

- **Appropriate disinfectants** (e.g., 70% alcohol, sodium hypochlorite, or quaternary ammonium compounds) as appropriate for target pathogens.
- **Cleaning tools:** Brushes, sponges, and detergent.
- **Waste disposal containers:** biohazard bags, sharps containers, spray bottles, and portable handwashing kits.

## 2. Personal precautionary measures

- Wash hands with soap and water or use alcohol-based hand sanitizer before and after handling samples or contaminated materials.
- Wear appropriate PPE before entering the field.
- Change PPE immediately if visibly soiled or damaged.
- Avoid touching the face or unprotected areas during work.

## 3. Decontamination of Equipment

- Remove visible dirt or organic material using soap and water before applying disinfectants. Organic material reduces the effectiveness of disinfectants.
- Apply disinfectants to all equipment, ensuring proper contact time as per manufacturer's instructions.

## 4. Decontamination of work area

- Disinfect all work surfaces, including tables, benches, and transport vehicles.
- Collect all waste (PPE, used disinfectant wipes, sharps) in appropriate biohazard bags for proper disposal.
- Transport the waste for incineration or disposal in designated facilities.

## 5. Decontamination of infected environment

Disinfect the infected area as per pathogen for example in anthrax cases using sodium hypochlorite, chlorine-based disinfectants and formalin. Use triple packaging and ensure you wipe down the exterior of transport containers with disinfectant before leaving the field. For more information, refer to the SOP on sample transportation in Appendix 4.

## 6. Personnel Decontamination

- Set up a decontamination station at the exit point
- Remove PPE in the correct order to avoid contamination (e.g., gloves last).
- Dispose of used PPE in designated biohazard bags.
- Wash hands, arms, and face thoroughly with soap and water.
- Shower as soon as possible after fieldwork.

## **7. Monitoring and Review (cross reference to M&E Chapter)**

Maintain records of decontamination procedures, including the type and concentration of disinfectants used. For more details refer to Chapter 8 Monitoring & Evaluation of Biological Risk Management Guidelines.

## **8. Spillage Management**

The types of spills encountered include blood and blood components, urine, faecal material, body fluids, chemicals, among others. In case of spillage, clean spills immediately using absorbent materials and disinfectant.

- a. Wear appropriate PPE.
- b. Clear the spill area of all people and animals
- c. Cover spill with absorbent material containing disinfectants.
- d. Encircle the spill with disinfectant (if feasible and necessary).
- e. Allow the disinfectant to be in contact with the spillage for times as recommended for the disinfectant.
- f. Remove and decontaminate all items within the spill area.
- g. Remove the soaked absorbent material and dispose in a biohazard or available leak-proof bag or container for disposal.
- h. Wipe off any residual spilled material and reapply disinfectant before final clean up.
- i. Reopen area to general use only after spill clean-up and decontamination is completed.
- j. Avoid aerosolization during cleanup.
- k. If a person is exposed to potentially infectious material, immediately wash the affected area and report the incident.

For more information, refer to Appendix 10. SOP for spillage management.

# 4. Emergency Preparedness and Incident Response

## 4.1 Introduction

This chapter seeks to guide contingency planning, incident response, and integration with the National Incident Command System (ICS) to manage biological risks including zoonotic disease outbreaks, laboratory incidents, and bioterrorism threats.

Understanding the distinctions between an incident, event, emergency, and crisis is essential for appropriately triggering responses and scaling interventions (Table 9). These terms are used to define escalating levels of severity in biological risk management:

- a. Incident: A biological incident refers to any occurrence involving biological materials that deviates from normal procedures but does not necessarily pose an immediate threat to health, safety, or the environment. Example: Accidental spillage of a biological sample in the field.
- b. Event: A significant occurrence involving biological agents that has the potential to affect human or animal health, the environment, or public confidence. Example: Detection of a notifiable zoonotic disease in animals.
- c. Emergency: A situation where a biological event has escalated, posing a serious and imminent threat and requiring immediate, coordinated action. Example: An outbreak of Rift Valley Fever affecting livestock and humans.
- d. Crisis: A large-scale emergency that overwhelms existing response capacities and may cause national or international concern, social unrest, or loss of institutional trust. Example: A pandemic or widespread bioterror attack.

**Table 9:** Biological risk emergency Levels

| Level     | Scale              | Threat Level                   | Response Level           | Example                                  |
|-----------|--------------------|--------------------------------|--------------------------|--|
| Incident  | Local              | Low, procedural breach         | Individual/Facility      | Spilled blood sample                     |
| Event     | Local/ Regional    | Moderate, potential escalation | Local + Sectoral         | Detection of brucellosis, FMD, CBPP      |
| Emergency | Regional/ National | High, immediate threat         | County/ National ICS     | RVF, HPAI outbreak                       |
| Crisis    | National/ Global   | Extreme, systemic impact       | National + International | Pandemic or bioterror attack, agrocrime- |

## 4.2 Objectives

The objectives are to:

- Establish clear emergency protocols for biological incidents.
- Ensure readiness and rapid response capacity at all levels (field, county, and national).
- Integrate field-level biosafety and biosecurity protocols with national ICS.
- Support One Health coordination and risk communication.
- Ensure protection of personnel, animals, environment, and public health.

## 4.3 Phases of Emergency Response in Biological Incidents

To ensure an effective and coordinated response to biological incidents, emergency management should follow a structured approach comprising four key phases. These phases provide a framework for preparedness, early detection, rapid intervention, and recovery, with the goal of minimizing harm to public health, animal populations, and the environment.

### 4.3.1 Preparedness

This phase involves proactive planning and capacity building to ensure readiness for biological emergencies. Key activities include:

- Risk assessment: Identifying and analysing potential biological threats and vulnerabilities.
- Training and simulation exercises: Building skills and testing emergency response capacity among frontline personnel, including veterinary, medical, and laboratory teams. Conduct regular tabletop exercises and full-scale simulation drills involving human, animal, and environmental health sectors. Include NGOs, county governments, and security agencies.
- Stockpiling supplies: Ensuring availability of essential materials such as PPE, disinfectants, diagnostics kits, and vaccines. Pre-position emergency stockpiles (PPE, vaccines, transport coolers) in high-risk counties. Activate national and county stockpiles as per emergency level.
- Developing protocols: Establishing standard operating procedures (SOPs) for biosafety, biosecurity, and coordination with national emergency systems like the Incident Command System (ICS).

### 4.3.2 Detection

Timely detection of biological threats is critical to limit their spread and impact. This phase includes:

- Surveillance and early warning systems: Active and passive disease surveillance, including syndromic surveillance at community and field levels.
- Reporting mechanisms: Ensuring clear, timely, and mandatory disease reporting pathways from local to national authorities and partners.

- **Diagnostics:** Rapid sample collection, laboratory testing, and confirmation of biological agents to inform decision-making.

### **4.3.3 Response**

This phase is focused on swift containment and mitigation of the incident (Refer to Appendix 11). Response actions may include:

- **Isolation and movement control:** Restricting movement of affected animals, people, or goods to prevent further spread.
- **Containment and culling (if necessary):** Implementing appropriate control measures based on the nature of the agent (e.g., quarantine, destruction of contaminated materials).
- **Treatment and care:** Providing appropriate medical or veterinary intervention, including vaccination, antibiotics, or supportive care.
- **Decontamination and disinfection:** Safely cleaning affected areas and equipment to eliminate the biological threat.

### **4.3.4 Recovery**

The recovery phase focuses on returning to normalcy and building resilience for future responses. It includes:

- **Restocking and rebuilding:** Supporting affected communities or institutions to restock animals, replace equipment, and resume livelihoods.
- **Mental health and psychosocial support:** Addressing trauma, stress, and mental health impacts among responders and affected populations.
- **After-action review and lessons learned:** Conducting debriefs and evaluations to identify what worked, what did not, and how future responses can be improved.

## **4.4 Integration with National Incident Command System (ICS)**

Kenya's ICS framework supports emergency response through a tiered structure from local to national levels. This guideline aligns field biological incident management with ICS Levels 0-4 as shown in Table 10. Field responders operate at Level 0–2, escalating to county and national levels as needed. Unified Command structures support coordinated multi-agency responses.

**Table 10: ICS Levels for biological risk events**

| Emergency Level       | Definition  | Role of National Government   | Role of County Government  |
|-----------------------|---|---|--|
| No Formal Declaration | Localized, minor biological events that requires routine intervention and can be managed by community/ village or animal health service providers | None  | None   |
| Level 1               | Localized biological risk event requiring sub-county support (e.g., sudden zoonotic outbreak, lab incident).                                      | Monitor and prepare for escalation. Support technical advisory teams.   | Activate the Sub-County Disease Risk Management Committee (SCDRMC). Deploy biological risk management teams. Begin contact tracing, quarantine if necessary. |
| Level 2               | Outbreak overwhelms sub-county but manageable at county level (e.g., regional spread of a disease or agroterrorism event).                        | Provide specialized technical teams, resources, and advisory support.   | Activate County Disease Risk Management Committee (CDRMC). Coordinate surveillance, response logistics, and animal/human health services.                    |
| Level 3               | National-level biological risk event (e.g., pandemic outbreak, cross-border threat, bioterror attack).  | Lead response through National Disaster Risk Management Committee (NDRMC). Deploy national labs, stockpiles, coordinate multi-sectoral teams. | Full mobilization of health and livestock personnel. Coordinate inter-county response. Liaise with the national task force.                                  |
| Level 4               | Global-scale biological incident (e.g., pandemic with international implications or cross-border bioterror threat).                               | Coordinate international support, deploy national and international emergency response. Oversight through NSC.                                | Implement actions with international teams, humanitarian actors. Coordinate logistics and communications on ground.  |

#### 4.5 Key Response Components in Field Settings

Effective field-level response to biological incidents requires a coordinated, well-resourced approach to ensure the safety of personnel, accuracy of information, and containment of the threat. The following components are critical for operationalizing emergency response protocols in field settings, enabling timely action, minimizing exposure to risks, and maintaining clear communication and documentation throughout the incident:

- Designated field biosafety officers and trained response teams.
- Rapid deployment kits with PPE, disinfectants, and sampling tools.

- Mobile communication for real-time reporting and alerts.
- Zoning (clean, intermediate and infected zones), PPE donning/doffing protocols.
- Safe handling, packaging, and transport of specimens.
- Incident logbooks and case documentation for traceability.

#### **4.6 *Biological risk Communication and Community Engagement***

Timely, accurate communication builds public trust and ensures adherence to control measures throughout the response phases. Field officers must use approved messaging templates, local languages, and trusted community leaders as detailed in chapter 7 on Risk Communication.

#### **4.7 *Monitoring, Evaluation, and Incident Debriefing***

Monitoring of biological risks should be a continuous and integrated process to ensure sustained preparedness and effective response. Periodic evaluations are essential to determine whether the response plan is achieving its intended objectives and to allow for timely adjustments. After every biological incident, an After-Action Review (AAR) should be conducted to identify gaps, lessons learned, and best practices. Findings from AARs should inform the regular updating of standard operating procedures (SOPs) and response protocols to enhance future readiness and resilience



## 5. Stakeholder Roles and Responsibilities

The Constitution of Kenya (2010) delineates the functions of veterinary service provision between the national and county governments, as outlined in the Fourth Schedule. The guidelines for delivery of veterinary services in Kenya (2014) further unbundles these provisions in the constitution and clearly outlines these functions.

A collaborative partnership among all stakeholders at various levels is essential for achieving the objectives of the field biological risk guidelines. The commitment and active participation of all stakeholders are crucial to providing the resources and motivation necessary for implementing effective field biological risk management (USDA2023 manual). To successfully execute these guidelines, several key actors are involved, including:

### 5.1 The National Government

The National government through the Ministry of Agriculture and Livestock Development as the lead will champion biological risk activities in the country. The implementation will be through the national technical working group (TWG) on biosafety and biosecurity under the Directorate of Veterinary Services and the roles will include;

- Developing guidance documents that institutions can use to conduct specific training needs assessments (TNA) in their areas of operation. The TWG will also oversee the implementation of the baseline TNA to identify skill gaps, training priorities, and capacity-building needs across sectors.
- Organizing awareness campaigns, workshops, and capacity-building programs to promote a shared understanding of BRM principles among stakeholders while fostering collaboration between sectors.
- Facilitating collaboration among government agencies, private sector players (such as drug and vaccine manufacturers, animal genetics sector, and feed producers), NGOs, academic institutions, and other stakeholders to ensure a multisectoral approach to BRM.
- Overseeing the implementation of BRM programs across various sectors, monitoring progress against set objectives, and evaluating their effectiveness to ensure continuous improvement in managing biological risks.
- Proposing and reviewing legislation related to biosafety and biosecurity, including drafting laws, regulations, and standards to address biological risks effectively. This includes ensuring compliance with existing national and international legal frameworks.
- Developing and maintain a national list of pathogens and biological toxins of concern, including criteria for their classification based on risk levels. This helps prioritize efforts in managing high-risk biological threats.
- Providing technical advice and guidance to institutions on implementing biosecurity measures, conducting risk assessments, and developing mitigation strategies tailored to

their operational needs.

- Establishing protocols for responding to biological emergencies or outbreaks, ensuring rapid containment of risks through effective coordination among relevant stakeholders.
- Promoting cooperation with international organizations on biosafety and biosecurity to adopt best practices and strengthen national capacity for managing biological risks.
- Mobilizing financial and technical resources needed for effective national BRM and ensure sustainable funding for long-term implementation.
- Facilitating BRM communication mechanisms to targeted audience in collaboration with communication experts.

## 5.2 County Governments

The County government through the department responsible for Veterinary Services as the lead should;

- Ensuring compliance with relevant national veterinary policies while formulating county-specific policies and legislation that align with these guidelines. Both sets of policies should integrate BRM principles to enhance public and animal health safety.
- Overseeing the operation of county abattoirs with a focus on BRM to prevent contamination and ensure food safety.
- Delivering animal healthcare services, including animal vaccination, herd health services and oversee veterinary clinical services while mainstreaming BRM principles.
- Regulating animal and animal products movement (intra-and inter-county) with a focus on minimizing the spread of diseases and biological hazards.
- Coordinating the collection, packaging, storage, transportation of biological material and proper waste disposal.
- Organizing awareness campaigns and capacity-building programs to promote a shared understanding of BRM principles among stakeholders while fostering collaboration between sectors at the county level.
- Facilitating BRM communication mechanisms in the county to targeted audience in collaboration with communication experts.

## 5.3 Regulators

The Kenya Veterinary Board (KVB) is mandated to exercise general supervision and control over veterinary training, business, practices and employment of veterinary surgeons and veterinary paraprofessionals in Kenya as per the provisions of the VSVP Act (2011). Adherence to these guidelines aligns to compliance with the VSVP Act (2011). The Board is involved in promoting and overseeing training programs for veterinary personnel on BSBS including integrating BSBS content in CPDs and veterinary education curricula to ensure all practitioners are competent in managing biological risks.

The Veterinary Medicines Directorate (VMD) ensures that all registered entities involved in the manufacture, import, export, distribution, prescription, and dispensing of veterinary medicines and other animal health products in Kenya do not pose biological risks to animals or humans while carrying out their activities. Additionally, the VMD also advises the KVB on all aspects related to veterinary medicines and devices, ensuring compliance with safety, efficacy, and quality standards to protect animal health, public health, and the environment. This includes adherence to standards set by regulatory bodies such as the NBA and the KEBS, which are crucial for maintaining biosafety and biosecurity in the veterinary sector.

#### **5.4 Private AHSPs**

Private animal health service providers shall adhere to the Veterinary Surgeons and Veterinary Paraprofessionals (Code of Ethics) Regulations (2015) and the Veterinary Surgeons and Veterinary Paraprofessionals (VMD) Regulations, (2015) as outlined in the VSVP Act (2011) in the performance of their professional duties. which include; -

- Establishing clear working commitments with farmers to effectively manage animal diseases, improve herd health, and reduce disease incidence.
- Conducting biological risk assessments to identify potential hazards associated with animal health practices and implement biosecurity measures designed to prevent the spread of infectious agents between animals, farms, and the environment.
- Sensitizing farmers on disease prevention and control strategies such as vaccination programs, proper use of veterinary medicines and safe handling of animals and animal products to minimize risks.
- Maintaining accurate records of all disease management activities and interventions to facilitate ongoing risk assessment and ensure compliance with national guidelines.
- Promptly reporting all animal disease incidences and biological risk incidents to the veterinary authorities in their jurisdiction.
- Managing biological risks in their operations to contribute to safeguarding public health and the environment from biological threats and improve animal health

#### **5.5 Research and Training Institutions**

Research and training institutions such as KALRO, ILRI, KIPRE, WRTI, KMFRI, universities among others, play an important role in the implementation of field BRM. In this regard, the institutional leadership and field teams share the responsibility of ensuring that these guidelines are effectively followed within their institutions.

The institutional leadership roles include;

- Reading, understanding, and endorsing these BRM guidelines while leading its operationalization at the institutional level.

- Ensuring that these BRM guidelines are part of staff induction for all personnel working with animals in the field.
- Allocating a dedicated budget to support field BRM activities effectively.
- Customizing these field BRM guidelines to suit their institutional setup.
- Developing and implementing a mitigation plan to address potential biological risk exposures for all field stakeholders during activities, aligning with the Directorate of Occupational Safety and Health (DOSH) under the Ministry of Labour.
- Rolling out a standardized biological risk assessment tool in line with these guidelines.
- Incorporating these BRM guidelines in the training curricula.
- Regularly conducting competency assessment of field personnel on BRM.

Field team leads within research and training institutions should;

- Conduct comprehensive biological risk assessments before initiating any field activities, incorporating all elements detailed in these guidelines. These must be reviewed and approved by the institutional committee responsible for BRM oversight.
- Establish and maintain a biological risk register at the institutional level to document risk identification, mitigation strategies, and performance outcomes for all field activities.
- Execute mitigation plans during field operations to effectively minimize biological risks.
- Submit an annual report to the DVS detailing the institutional status of field BRM activities.

## **5.6 Farmers/Communities**

- Implementing animal health management plans, preventive and control measures in consultation with the AHSPs Isolate sick animals and dispose dead animals promptly under conditions approved by the veterinary authority
- Observing biosafety measures while handling sick and dead animals. Observe proper management of animal wastes in the environment.
- Regularly providing information to veterinary professionals on disease occurrences;
- Implementing biosecurity measures to prevent introduction or spread of pathogens in and out of the farm.
- Maintaining records of all disease prevention and control activities in the farm.

## **5.7 Security Agencies**

These include National Government Administrative officers, National Police, county administration officers, and Kenya Defence Forces. Their primary responsibility is to enforce policies and laws related to field BRM guidelines, ensuring that all stakeholders adhere to established protocols for managing biological risks effectively. They play a crucial role in monitoring compliance, addressing violations, and promoting best practices in BRM within their jurisdictions.

## **5.8 Non-Governmental Organizations and Civil Societies**

Non-governmental organizations (NGOs) and civil societies play a vital role in managing field biological risk in their areas of operation. Their responsibilities include:

- Providing support to implement activities aligned with the field BRM guidelines, following the government's development agenda.
- Collaborating with relevant stakeholders to effectively implement field BRM guidelines, ensuring that all initiatives address biological risks and promote the health and safety of both animals and humans.
- Facilitating training and capacity-building programs for stakeholders to enhance understanding of BRM practices.
- Monitoring and evaluating the effectiveness of implemented BRM activities, providing feedback for continuous improvement.
- Engaging in advocacy efforts to raise awareness about BRM and its importance to public health and safety.
- Assisting in the development of policies and frameworks that support sustainable BRM practices at local, national, regional and international levels.
- Promoting community involvement in disease surveillance and reporting, empowering local populations to take an active role in managing biological risks.
- Supporting research initiatives that focus on identifying emerging biological threats and developing innovative solutions for effective BRM.

## **5.9 Animal Health and Production Input Suppliers**

These include drug and vaccine manufacturers, animal genetics sector, feed producers, diagnostic tool developers, and other related stakeholders in the animal health sector. They contribute significantly to BRM by ensuring their products are safe, effective, and compliant with regulatory standards to prevent the spread of infectious agents. They conduct biological risk assessments to identify potential hazards, implement biosafety and biosecurity measures in product development and distribution, and provide training for animal health service providers and farmers on safe practices.

## **5.10 Non-Technical Service Providers**

Non-technical service providers contribute towards the successful implementation of BRM activities. They include couriers, drivers, security guards, cleaners, herders among others. They are charged with a variety of roles that support the technical teams to implement BRM activities.

## 6. Training, Capacity Building and Competency Assessment

Effective training and capacity building are essential for animal health service providers (AHSPs) laboratory personnel and other relevant actors to implement a strong BRM system. A well-trained workforce enhances safety, occupational health, and environmental protection and minimizes risks associated with pathogens and biological materials. Structured training helps personnel identify, assess and mitigate biological risks related to infectious agents and zoonotic diseases.

Training and capacity building should be systematic and tailored to the specific challenges in animal health services regarding biological risks, including disease surveillance and emergency response. Strengthening competencies fosters a culture of biosafety and biosecurity, supporting local, national and global disease prevention efforts. Competency assessment will be critical especially when handling high-risk pathogens and procedures.

### 6.1 Objectives for Training, Capacity Building and Competency Assessment

- To enhance the knowledge and skills of field personnel by equipping them with comprehensive training in BRM, enabling them to effectively identify, assess, and mitigate biological risks during field operations.
- To foster a culture of biosafety and biosecurity by encouraging field personnel to adopt proactive safety measures and best practices in handling biological materials and managing animal health risks.
- To ensure compliance with national and international biosafety regulations by providing training that emphasizes the importance of adhering to established standards, thereby safeguarding public health and the environment.
- To minimize biological risks by implementing strategies such as safe handling protocols of biological materials, proper use of personal protective equipment (PPE) and effective incident response plans to reduce hazards associated with handling biological materials in field settings.
- To promote continuous learning by encouraging professional development that keeps field personnel updated on emerging threats and advancements in BRM.
- To strengthen collaboration among stakeholders by facilitating knowledge sharing and cooperation between AHSPs, laboratory personnel, and other relevant parties to enhance the overall effectiveness of BRM efforts.
- To assess the competencies acquired through field BRM training and other capacity building initiatives.

## **6.2 Training Needs Assessment (TNA)**

A thorough needs assessment is the foundation of an effective, multi-sectoral training and capacity-building program for field BRM. This process identifies skill gaps, evaluates current competencies, and determines specific training needs across animal health, public health, environmental, and other relevant sectors.

At the national level, the training needs assessment (TNA) will be led by the national technical working group (TWG) on biosafety and biosecurity under the DVS. The TWG will develop a guidance document for institutions to conduct tailored training needs assessments. This standardized framework promotes cross-sector collaboration and ensures effective identification and management of biological risks.

## **6.3 Training Content and Curriculum**

The content of the training will be informed by TNA findings for each of the stakeholders based on their roles. This content will be majorly derived from the Kenya Laboratory Biorisk Management Curriculum (KLBRMC). The KLBRMC curriculum has three tracks addressing three target audiences: Management and Leadership (Track I); Technical staff (Track II) and Non-technical staff (Track III). Regarding field BRM, Module Four (Field Biosafety and Biosecurity) on each of the aforementioned tracks provides a comprehensive framework designed to build capacity in field biosafety and biosecurity.

## **6.4 Training Methodologies**

To effectively train personnel in field BRM, use of a variety of methodologies is recommended to accommodate diverse learning styles, schedules and audience. It is recommended that training be continuous to keep the personnel updated with skills and address emerging BRM issues.

The training methodologies include, but are not limited to the following:

- Webinars, seminars, workshops, and E-learning modules,
- Use of case studies and scenario-based training
- Simulation drills or exercises
- Mentorship, role modelling and coaching
- Apprenticeship, internships and attachments

Finally, incorporate feedback and evaluation mechanisms after training sessions to assess effectiveness and identify areas for improvement, ensuring the continuous enhancement of training programs. Facilitate field visits or practical exposure opportunities to allow personnel to observe best practices in action and learn from real-world applications of BRM.

## **6.5 Certification and Continuous Professional Development (CPD)**

### **6.5.1 Certification of Biological Risk Management Training**

To promote BRM compliance, establishment of a certification program that recognizes individuals who complete biological risk management training is recommended. The competency-based certification should evaluate both theoretical knowledge and practical skills. Training should only be conducted by certified trainers approved by a body recognized by the DVS. Field staff should be required to renew their certifications every five years or as recommended by the DVS. Refresher training, necessary to maintain certification validity, to be conducted based on risk assessments.

### **6.5.2 Continuous Professional Development (CPD) in BRM**

To promote the widespread adoption of BRM guidelines, it is recommended that CPD providers through KVB include biological risk management training as part of the CPD for AHSPs. Additionally, establishing mentorship programs and facilitating peer learning will reinforce the practical application of BRM principles.

To address evolving risks, the DVS and other partners can offer structured CPD courses focusing on emerging biosafety and biosecurity threats, innovative diagnostic techniques, and best practices. This initiative should include the development of e-learning modules and workshops to support continuous learning and skill enhancement.

### **6.5.3 Sustainability of Certification and CPD Programs**

The DVS with support from its partners should establish a national coordination body to oversee the certification, and CPD implementation. It is necessary that the DVS secures funding and partnerships with training institutions, international organizations, and other CPD providers to develop affordable and accessible training options to ensure broad participation and to monitor and evaluate the effectiveness of training programs through feedback and performance assessments. This will encourage public-private partnerships to support ongoing capacity-building efforts.

### **6.5.4 Monitoring, Evaluation, and Continuous Improvement**

Clear objectives and key performance indicators (KPIs) should be established for each training session. These will include measurable outcomes such as improved compliance with biosafety and biosecurity protocols, enhanced competency levels, and a reduction in biological risk incidents.

Standardized assessment tools should be created to evaluate training effectiveness, including pre- and post-training evaluations, knowledge tests, and practical assessments. The DVS should conduct periodic audits and inspections to evaluate adherence to biosafety

and biosecurity guidelines. The feedback from M&E findings will be used to update training materials and incorporate new case studies, emerging pathogens, and innovative risk mitigation strategies.

## 7. Risk Communication

### 7.1 *Definition and Importance of Risk Communication in Biological risk Management*

Risk communication is the process of gathering and sharing information and opinions about animal health hazards and risks, including communicating risk assessment results and management measures to decision-makers and stakeholders.

Effective risk communication should be designed to establish a common understanding among the key stakeholders of the biological risks, biological risk control measures as well as the benefits of working with the identified biohazard. This common understanding builds trust and is critical for effectively responding to potential incidents. It should be provided in a format and language that is tailored to the intended audience, whether policymakers, disease control authorities, animal care providers, or the public, to provide the information in a clear and understandable way (WOAH, 2018).

### 7.2 *Objectives of Risk Communication*

1. Create awareness to stakeholders about emerging and existing animal diseases, their symptoms, transmission routes, prevention and control methods to help identify risks early and take appropriate mitigation actions
2. Mitigate and manage risks by promoting adoption of safe practices to mitigate risks associated with animal diseases in the field e.g. use of personal protective equipment, proper handling of suspected animals, proper handling of potentially infectious materials and equipment, and adherence to animal movement regulations
3. Trigger resource allocation and tools such as job aids, guidelines, technical support and updates on disease outbreaks
4. Coordinate actions during outbreaks or incidents between field animal health service providers, veterinary authorities and other stakeholders including farmers, regulatory bodies, and the general public to enable a coordinated response to public health threats.
5. Counter misinformation/dis-information and reduce fear, stigma or panic related to biological threats by providing factual information.

### 7.3 *Key Principles of Effective Risk Communication (FAO, 2013)*

- i. **Transparency:** Share clear, honest, and timely risk information without withholding critical data.
- ii. **Know the Audience:** Tailor messages to stakeholders' capacity, education level, language, and risk perception.

- iii. **Expertise in Communication:** Use experts to convey understandable and actionable information.
- iv. **Inclusivity & Engagement:** Involve government, veterinarians, farmers, and local leaders in risk communication.
- v. **Science-Based Communication:** Ensure risk messages are grounded in scientific evidence, avoiding speculation.
- vi. **Timeliness & Responsiveness:** Deliver risk information early enough and provide frequent updates.
- vii. **Trust & Credibility:** Use trusted sources like DVS, CDVS, PH, FAO, and WOAHA to enhance public confidence.
- viii. **Two-Way Communication:** Allow stakeholder input, concerns, and feedback for effective implementation.
- ix. **Addressing Uncertainty & Misinformation:** Clarify known and unknown aspects while countering misinformation.
- x. **Shared Responsibility:** Encourage collaboration among vets, farmers, policymakers, and vaccine manufacturers.

## 7.4 Communication Strategies for Different Audiences

Effective and impactful biological risk communication must be tailored to different audiences, including policymakers, scientists, animal health practitioners, healthcare workers, and the public.

Key Steps in Communicating and Reporting Risks (Sentinel Africa, 2025)

- Develop a clear risk communication plan.
- Ensure transparency in risk reporting to all stakeholders.
- Engage stakeholders in risk management discussions as shown in Table 11 below.
- Provide regular updates on risk status and management actions.

**Table 11:** Stakeholders and the targeted communication strategies

| Stakeholder Group  | Communication Strategies for Biosafety & Biosecurity  |
|--|---|
| <b>Animal Health Service Providers, health care workers &amp; Scientists</b> | <ul style="list-style-type: none"> <li>• Implement Standard Operating Procedures (SOPs) for BSBS covering risk assessment, PPE use, sample collection, handling, storage and transportation, contact tracing, securing biological agents and toxins, proper packaging practices, decontamination, and waste disposal for field biocontainment.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>• Ensure regular communication on emerging risks, zoonotic diseases, and best practices through training, simulations, and case studies.</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>• Utilize digital platforms (SMS alerts, emails, mobile apps) for real-time updates on biosafety threats and emergency response.</li> </ul>  |

| Stakeholder Group                           | Communication Strategies for Biosafety & Biosecurity   |
|---|--|
| <b>Policymakers &amp; Regulatory Bodies</b> | • Develop policy briefs & reports highlighting zoonotic disease trends, AMR threats, and BSBS risks with actionable recommendations.   |
|   | • Organize stakeholder engagement forums to align policies with field realities and promote multi-sectoral collaboration.  |
|   | • Present evidence-based recommendations using structured reports and high-level policy dialogues.   |
| <b>Local Communities &amp; Farmers</b>      | • Conduct community meetings, radio broadcasts, and local language messaging to reach a broad audience.  |
|   | • Use culturally appropriate messaging to promote awareness of zoonotic disease risks, proper carcass disposal, and importance of disease control/prevention measures such as vaccination. |
|   | • Engage community animal disease reporters, veterinary surgeons and paraprofessionals as trusted sources for biosafety risk communication.  |
| <b>Media champions and influencers</b>      | • Develop clear, factual, and non-alarming messages on biosafety risks and mitigation measures.  |
|   | • Use infographics, social media, and press releases for effective public education on biosafety.  |
|   | • Train journalists on responsible reporting of biological risks to prevent misinformation and ensure credibility.   |
| <b>General Public</b>                       | • Need risk communication and myth-busting. Best engaged through social media, press releases, TV, and community meetings.   |
| <b>NGOs and development partners</b>        | • Regular communication on plans and strategies before, during and after biological risk incidences  |

## 7.5 Establishing a Biological risk Emergency Communication Plan (BECP)

The Biological risk Emergency Communication Plan (BECP) (CDC 2024) ensures effective crisis communication by defining stakeholder roles, establishing messaging protocols, and coordinating a multi-stakeholder One Health team under the primary/lead ministry as defined by the Incident Command System

Key Elements:

- **Defined Roles & Responsibilities:** Clear assignment to policymakers, health officials, emergency responders, and media for a coordinated response.
- **Standardized Message Templates:** Pre-approved templates ensure quick, consistent, and adaptable public communication.
- **Incident Command Structure (ICS):** Setting up a centralized coordination team prevents conflicting messages.

Effective risk communication requires continuous monitoring, feedback collection, and evaluation to ensure messages are clear, misinformation is addressed, and public trust is maintained.

## **7.6 Managing Misinformation and disinformation**

Misinformation (unintentional inaccuracies) and disinformation (deliberate falsehoods or intentional lies) can rapidly spread, undermining emergency response efforts, increasing health risks, and causing economic damage. Effective communication strategies, based on “Prepare – Detect – Respond,” are critical for maintaining public trust and ensuring compliance.

Key Strategies for managing misinformation and disinformation

### **1. Proactive Communication**

- Pre-Bunking: Educate stakeholders early with factual information.
- Transparency: Provide timely updates from credible sources.
- Consistent Messaging: Ensure uniform information across all stakeholders.
- Preparedness: Integrate misinformation/disinformation response plans into emergency protocols.

### **2. Identifying and Addressing Misinformation/disinformation**

- Monitoring: Use media tracking tools to detect false narratives.
- Rapid Response: Assign teams to fact-check and counter misinformation/disinformation.
- Source Credibility: Direct audiences to trusted organizations (WOAH, FAO, CDC).

### **3. Engaging the Right Messengers**

- Veterinarians, para veterinarians & Scientists: Leverage their authority.
- Community Leaders & Influencers: Amplify messages.
- Local Networks: Use grassroots channels (extension officers, local media).

### **4. Tailored Messaging & Multi-Channel Approach**

- Audience-Specific Communication: Adapt messages for farmers, policymakers, and the public.
- Digital Media: Use infographics, videos, and FAQs.
- Traditional Media: Engage radio, TV, and newspapers.
- Simulation & Training: Conduct exercises to build misinformation resilience.

### **5. Crisis Communication & Public Trust**

- Two-Way Engagement: Provide hotlines, Q&A sessions, and town halls.

- Community Leaders: Utilize trusted local figures to relay accurate information.
- Youth Involvement: Promote participation through essays and infographics.

## 6. Monitoring & Response Mechanisms

- Misinformation Tracking: Use media tools to detect false claims, evaluate and adapt communication strategy in real time.
- Rapid Response Teams: Designate spokespersons for timely corrections.
- Public Feedback: Gather concerns via surveys, social media, and hotlines.

## 7. Ethical Considerations

- Privacy & Confidentiality: Protect sensitive health data.
- Inclusivity: Avoid stigma and discrimination in messaging.
- Honesty & Transparency: Provide accurate, timely updates while preventing panic.
- Beneficence: Balance information with actionable guidance to empower informed decisions.

### 7.7 Public communication

During public health emergencies, individuals and organizations seek reliable information on the impact of the crisis. Formal risk reporting should cover risk control measures, management responsibilities, emerging risks, and real-time information transmission. A risk management toolkit can support this process (<https://rct-1.itrcweb.org/appendix-a-risk-communication-plan-description-and-template/>).

Kenyan veterinary and public health authorities have previously jointly issued reports on outbreaks such as Rift Valley Fever, and anthrax, with reporting schedules adapted to each event's risk profile. Reporting channels, strategies and frequency are summarized in Table 12 below:

**Table 12:** Suggested Reporting Schedule for Biological risk Communication

| Channel              | Strategy  | Frequency      |
|----------------------|---|----------------|
| Social media         | Myth-busting infographics, live Q&A sessions                        | As need arises |
| Radio & TV           | Expert interviews, public service announcements                     | As need arises |
| Press & Print Media  | Outbreak updates, response measures                                 | As needed      |
| Webinars & Training  | Briefings for veterinarians, regulations, post-disease surveillance | As need arises |
| Community Engagement | Town hall meetings, local vet consultations                         | As need arises |

Source: Austin, L. L., & Jin, Y. (2016)

# 8. Monitoring & Evaluation of Biological Risk Management Guidelines

## 8.1 Introduction

Monitoring and Evaluation, an integral part of all biological risk Management activities, shall be undertaken using the Assessment Mitigation and Performance (AMP) model and PDCA principle. It will support accountability, learning, and improvement by systematically collecting and analysing data on the implementation and impact of biosafety and biosecurity measures. The Monitoring and evaluation plan highlights key processes and indicators that will aid in collecting data, collating, analysing, and reporting for dissemination. Table 13 below identifies indicators and highlights specific objectives of the BRM as follows:

1. Provide guidance for field biological risk assessment
2. Provide guidance for field biological risk mitigation
3. Provide guidance on biological risk communication
4. Provide guidance for performance, monitoring and evaluation

**Table 13:** Indicators, Definition of terms & Metrics, and Means of Verification for Monitoring and Evaluation

| Specific Objectives   | Key Indicators   | Means of Verification   | Frequency   | Responsible Institution   |
|---|--|---|-------------|---|
| <b>Outcome:</b> Strengthen national biological risk management in field animal health services                          |  |   |             |   |
| <b>Overall Objective:</b> Enhance capacity of field practitioners to assess, mitigate, and communicate biological risks |  |   |             |   |
| Provide guidance for field biological risk assessment   | <ul style="list-style-type: none"> <li>• % of field sites where biological risk assessments have been conducted using standard tools.</li> <li>• No. of trained field staff conducting assessments</li> </ul>  | <ul style="list-style-type: none"> <li>• Completed risk assessment forms.</li> <li>• Training attendance sheets.</li> <li>• Field activity reports</li> </ul> | Quarterly   | National and County Veterinary Authorities<br>NGO/development partner organizations       |
| Provide guidance for field biological risk mitigation   | <ul style="list-style-type: none"> <li>• % of identified risks with mitigation actions implemented.</li> <li>• % of facilities applying mitigation protocols (e.g., PPE, disinfection, quarantine).</li> <li>• Number of community awareness sessions conducted</li> </ul> | <ul style="list-style-type: none"> <li>• Risk mitigation plans.</li> <li>• Inspection/audit reports.</li> <li>• Community outreach reports</li> </ul>         | Bi-annually | National and County Veterinary Officers<br>Public Health Officers<br>development Partners |

| Specific Objectives  | Key Indicators   | Means of Verification   | Frequency | Responsible Institution   |
|--|--|---|-----------|---|
| Provide guidance on biological risk communication          | <ul style="list-style-type: none"> <li>No of stakeholders reached with BRM messages.</li> <li>% of field practitioners trained on biological risk communication</li> <li>No of misinformation incidents documented and corrected</li> </ul>  | <ul style="list-style-type: none"> <li>Communication materials.</li> <li>Social media/ feedback monitoring logs.</li> <li>Post-training evaluations</li> </ul>    | Monthly   | National BRM Communication committee<br>NGOs and development partners       |
| Provide guidance for performance monitoring and evaluation | <ul style="list-style-type: none"> <li>Existence of a functional M&amp;E framework for BRM.</li> <li>Percentage of implementing counties submitting BRM performance reports.</li> <li>Number of M&amp;E review meetings conducted</li> </ul> | <ul style="list-style-type: none"> <li>M&amp;E framework and tools.</li> <li>County-level quarterly reports.</li> <li>Meeting minutes and action plans</li> </ul> | Annually  | National Animal health Biorisk Coordination Committee<br>County Governments |

## 8.2 Data Collection & Feedback Systems

Rapid and simple systems and tools should be put in place to collect this data. Table 14 below shows some methods and tools for collecting quantitative and qualitative data.

**Table 14:** Quantitative and qualitative data collection methods

| Quantitative Data Collection Methods  | Qualitative Data Collection Methods  |
|---|--|
| <p>Quantitative Data (i.e., numbers and percentages) is often used to answer “what,” “to what extent,” or “how many/much” questions. Collected through:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Forms completed by community mobilizers</li> <li><input type="checkbox"/> Surveys (door-to-door and phone SMS)</li> <li><input type="checkbox"/> Logs of phone calls to the hotline</li> <li><input type="checkbox"/> Participants list</li> <li><input type="checkbox"/> Materials distribution lists</li> </ul> | <p>Qualitative data (i.e., types of questions received, reactions in the community and behaviours) is often used to answer “how” or “why” questions. Collected through:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Observation</li> <li><input type="checkbox"/> In-depth interviews</li> <li><input type="checkbox"/> Open-ended questions embedded in door-to-door surveys</li> <li><input type="checkbox"/> Focus group discussions</li> <li><input type="checkbox"/> Log of questions received by hotline</li> <li><input type="checkbox"/> Case studies</li> </ul> |

The data collection systems must be incorporated into regular communication between (field teams, M&E teams and communication teams. Communication needs to be ongoing, especially in the initial phase, when people’s reactions are likely to be unpredictable. Throughout the emergency response, this essential feedback loop can inform activities for improved success.

## 9. References

1. **World Organisation for Animal Health (WOAH). (2023).** Biorisk Management Manual (2nd ed.). WOA. <https://www.woah.org/en/document/biorisk-management-manual/>
2. **World Organisation for Animal Health (WOAH). (2023).** Biosafety and Biosecurity Guidelines. WOA. <https://www.woah.org/en/document/biosafety-and-biosecurity-guidelines/>
3. **Government of Kenya, 2018.** Kenya Laboratory Biorisk Management Curriculum. [online]
4. **APHIS, n.d. Biorisk Management Manual.** Animal and Plant Health Inspection Service.
5. **Brooke Agrovot, n.d. Mentoring Framework.** [online]
6. **CITES, n.d. Guidelines on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).** [online] Available at: <https://www.cites.org>
7. **Nagoya Protocol, n.d. Access and Benefit-Sharing Guidelines.** [online] Available at: <https://www.cbd.int/abs/>
8. **FAO, 2013.** Technical Training on Risk Analysis for SAARC Countries. Rome: Food and Agriculture Organization.
9. **FAO, 2015.** Biosecurity Guide for Live Poultry Markets. FAO Animal Production and Health Guidelines No. 17. Rome: Food and Agriculture Organization.
10. **Government of Kenya, 1985.** Animal Diseases (Hatchery) Rules. Nairobi: Government Printer.
11. **Government of Kenya, 2006.** Environmental Management and Coordination (Waste Management) Regulation. Nairobi: Government Printer.
12. **Government of Kenya, 2007.** Work Injury Benefits Act 2007. Nairobi: Government Printer.
13. **Government of Kenya, 2010.** The Constitution of Kenya. Nairobi: Government Printer.
14. **Government of Kenya, 2021.** Kenya National Sustainable Waste Management Policy. Nairobi: Government Printer.
15. **Government of Kenya, n.d. Animal Disease Act Cap 364.** Nairobi: Government Printer.
16. **Government of Kenya, n.d. Meat Control Act, Cap 356.** Nairobi: Government Printer.
17. **International Air Transport Association (IATA), n.d. Dangerous Goods Regulations (DGR).** [online] Available at: <https://www.iata.org/en/publications/dgr/International>
18. **Biological Threat Reduction et al., n.d.** Laboratory Biosafety and Biosecurity Risk Assessment Technical Guidance Document. [online] Available at: <URL if known>
19. **International Biological Threat Reduction, Sandia National Laboratories and International Federation of Biosafety Associations, n.d.** Laboratory Biosafety and Biosecurity Risk Assessment Technical Guidance Document. [online]
20. **International Labour Organization (ILO), 1992.** Code of Practice on Safety in the Use of Chemicals at Work. Geneva: ILO.

21. **ISO, 2019. Biorisk Management for Laboratories and Other Related Organisations ISO 35001:2019.** Geneva: International Organization for Standardization.
22. **ISO, 2019. ISO 35001:2019 Biorisk Management.** Geneva: International Organization for Standardization.
23. **Kenya Bureau of Standards, 2016. KS 927:2016 – Disinfecting General Purpose Liquid Synthetic Detergents – Specification.** Nairobi: Kenya Bureau of Standards.
24. **Kenya Laboratory Biorisk Management Curriculum (KLBRMC), 2019.**
25. **Kenya National Council for Science, Technology and Innovation (NACOSTI), 2017.** Research Ethics and Safety Guidelines. Nairobi: NACOSTI.
26. **Kenya, 2019. Kenya Poultry Hatchery and Breeding Farms Inspection Protocol.** Nairobi: Government Printer.
27. **Ministry of Agriculture and Livestock Development, Kenya, 2022.** Farm Biosecurity Guidelines for Dairy Production. Nairobi: Government Printer.
28. **Ministry of Agriculture and Livestock Development, Kenya, 2022.** Farm Biosecurity Guidelines for Pig Production. Nairobi: Government Printer.
29. **Ministry of Agriculture and Livestock Development, Kenya, 2022.** Farm Biosecurity Guidelines for Poultry Production. Nairobi: Government Printer.
30. **Ministry of Agriculture, Livestock, Fisheries and Cooperatives, Kenya, n.d.** Guidelines for Delivery of Veterinary Services in Kenya. Nairobi: Government Printer.
31. **Ministry of Health, Kenya, 2015.** National Infection Prevention and Control Policy for Health Care Services in Kenya. Nairobi: Ministry of Health.
32. **National Environmental Management Authority (NEMA), 2024.** Waste Management Regulations. Nairobi: Government Printer.
33. **Occupational Safety and Health Administration (OSHA), n.d.** Anthrax Guidelines. Washington, DC: OSHA.
34. **University of Minnesota, n.d. Veterinary Biosecurity Guidelines.** Available at: <https://pressbooks.umn.edu/vetprevmed/chapter/chapter-13-biosecurity/>
35. **Veterinary Medicines Directorate (VMD), n.d.** Guidelines on Veterinary Medicinal Products Waste Management. Nairobi: Government Printer.
36. **WHO, 2020. Outbreak Preparedness and Resilience.** Geneva: World Health Organization. Licence: CC BY-NC-SA 3.0 IGO.
37. **WHO, 2020. Risk Assessment. Geneva: World Health Organization.** Licence: CC BY-NC-SA 3.0 IGO.
38. **WHO, n.d. Decontamination and Waste Management Monographs.** Geneva: WHO.
39. **WHO, n.d. Guidance on Transport of Infectious Substances.** [online] Available at: <https://www.who.int>
40. **WOAH, 2018.** Terrestrial Manual: Chapter 1.1.3 – Transport of Biological Materials. [online] Available at: <https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-manual-online-access/>

41. **WOAH, 2019. Veterinary Emergency Response.** [online] Available at: <https://www.woah.org>
42. **WOAH, n.d. Disposal of Dead Animals: Chapter 4.13 of Terrestrial Animal Health Code.** [online] Available at: <https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/>
43. **WOAH, n.d. Guidelines for Responsible Conduct in Veterinary Research.** [online] Available at: <https://www.woah.org>
44. **WOAH, n.d. Terrestrial Animal Health Code for International Standards.** [online] Available at: <https://www.woah.org/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/>
45. **World Health Organization (WHO), 2009. Guidelines on Hand Hygiene in Health Care.** Geneva: WHO.

# Appendices

## Appendix 1: Characteristics of selected disinfectants

This table provides general microbial spectrums for disinfectant chemical classes. Antimicrobial activity and characteristics vary with formulation and concentration.

### Characteristics of Select Disinfectant Classes

Always read and follow directions on the product label.

| Disinfectant Class                               | Acids  | Alcohols  | Aldehydes  | Alkalis  | Chlorine Compounds  | Peroxygen Compounds  | Phenols  | Quaternary Ammonium Compounds  |
|--|--|---|--|--|---|--|--|--|
| <b>Example Active Ingredients</b>                | citric acid, acetic acid   | ethanol, isopropanol  | formaldehyde, glutaraldehyde,  | sodium hydroxide, ammonium hydroxide   | sodium hypochlorite, chlorine dioxide   | hydrogen peroxide, peracetic acid, peroxymonosulfates  | orthophenylphenol  | alkyl dimethyl benzyl ammonium chloride (ADBAC)  |
| <b>Mechanism of Action</b>                       | <ul style="list-style-type: none"> <li>Slow acting</li> <li>Alters pH</li> </ul>   | <ul style="list-style-type: none"> <li>Fast acting</li> <li>Precipitates proteins</li> <li>Denatures lipids</li> </ul>                                      | <ul style="list-style-type: none"> <li>Slow acting</li> <li>Denatures proteins</li> <li>Alkylates nucleic acids</li> </ul>                         | <ul style="list-style-type: none"> <li>Slow acting</li> <li>Alters pH</li> <li>Fat saponification</li> </ul>   | <ul style="list-style-type: none"> <li>Fast acting</li> <li>Denatures proteins</li> </ul>   | <ul style="list-style-type: none"> <li>Fast acting</li> <li>Denature proteins and lipids</li> </ul>                                      | <ul style="list-style-type: none"> <li>Denatures proteins</li> <li>Disrupts cell wall</li> </ul>   | <ul style="list-style-type: none"> <li>Denatures proteins</li> <li>Binds phospholipids of cell membrane</li> </ul>   |
| <b>Characteristics</b>                           | <ul style="list-style-type: none"> <li>Characteristics depend on acid type</li> <li>Corrosive at high concentrations to metals and concrete</li> </ul> | <ul style="list-style-type: none"> <li>Rapid evaporation</li> <li>No residue or residual action</li> <li>Can swell or harden rubber and plastics</li> </ul> | <ul style="list-style-type: none"> <li>Pungent odor</li> <li>Noncorrosive</li> </ul>   | <ul style="list-style-type: none"> <li>Corrosive to metals</li> </ul>  | <ul style="list-style-type: none"> <li>Strong oxidizer</li> <li>Degrades rapidly once prepared</li> <li>May damage metals, rubber, concrete</li> </ul>          | <ul style="list-style-type: none"> <li>Strong oxidizer</li> <li>May damage some metals (aluminum, copper, brass, zinc, steel)</li> </ul> | <ul style="list-style-type: none"> <li>Strong odor</li> <li>Residual film</li> <li>Can damage rubber, plastic</li> <li>Non-corrosive</li> </ul>                      | <ul style="list-style-type: none"> <li>Stable in storage</li> <li>High concentrations corrosive to metals</li> </ul>   |
| <b>Factors Affecting Effectiveness</b>           | <ul style="list-style-type: none"> <li>Affected by pH, organic matter, water hardness</li> </ul>   | <ul style="list-style-type: none"> <li>Inactivated by organic matter</li> </ul>   | <ul style="list-style-type: none"> <li>Affected by organic matter, hard water, soaps/detergents, pH, temperature, and relative humidity</li> </ul> | <ul style="list-style-type: none"> <li>Effective in presence of organic matter</li> <li>Affected by pH, soaps/detergents, hard water, temperature</li> </ul> | <ul style="list-style-type: none"> <li>Rapidly inactivated by organic matter, UV light, heat</li> <li>Affected by pH, temperature, cationic products</li> </ul> | <ul style="list-style-type: none"> <li>Some have efficacy in presence of organic matter, hard water, soaps/detergents</li> </ul>         | <ul style="list-style-type: none"> <li>Affected by cationic cleaners and temperature</li> <li>May be effective in presence of organic matter, hard water,</li> </ul> | <ul style="list-style-type: none"> <li>Inactivated by organic matter, hard water, anionic cleaners</li> <li>Affected by pH; best at neutral or alkaline</li> </ul> |
| <b>Health Hazards</b>                            | <ul style="list-style-type: none"> <li>Severe skin burns</li> </ul>  | <ul style="list-style-type: none"> <li>Irritation to skin</li> </ul>  | <ul style="list-style-type: none"> <li>Highly irritating to skin, mucous membranes</li> <li>Only use in well ventilated areas</li> </ul>           | <ul style="list-style-type: none"> <li>Severe skin burns</li> <li>Mucous membrane irritation</li> </ul>  | <ul style="list-style-type: none"> <li>Irritation to mucous membranes, skin, eyes</li> </ul>  | <ul style="list-style-type: none"> <li>Powder can irritate mucous membranes</li> <li>Low toxicity at lower concentrations</li> </ul>     | <ul style="list-style-type: none"> <li>Irritation to skin, eyes, respiratory tract</li> <li>High conc can cause burns</li> </ul>                                     | <ul style="list-style-type: none"> <li>Irritation to skin, eyes, respiratory tract</li> </ul>  |
| <b>Precautions</b>                               |  | <ul style="list-style-type: none"> <li>Flammable</li> </ul>   | <ul style="list-style-type: none"> <li>Formaldehyde is carcinogenic</li> </ul>   | <ul style="list-style-type: none"> <li>Very caustic</li> </ul>   | <ul style="list-style-type: none"> <li>Toxic gas if mixed with acids or ammonia</li> </ul>  |  | <ul style="list-style-type: none"> <li>Toxic to animals, especially cats, pigs</li> </ul>  | <ul style="list-style-type: none"> <li>Can accumulate in environment</li> </ul>  |
| <b>General Chemical Class Microbial Spectrum</b> |  |   |  |  |   |  |  |  |
| <b>Bactericidal</b>                              | +  | +   | +  | +  | +   | +  | +  | + Gram positive<br>+/- Gram negative   |
| <b>Virucidal</b>                                 | +/-  | +/-   | +/-  | +/-  | +   | +/-  | +/-  | +/-  |
| <b>Fungicidal</b>                                | +/-  | +   | +  | +  | +   | +/-  | +  | +/-  |
| <b>Tuberculocidal</b>                            | -  | +   | +  | +/-  | +   | +/-  | +  | -  |
| <b>Sporicidal</b>                                | +/- <sup>A</sup>   | -   | +  | +  | + <sup>A</sup>  | +/- <sup>A</sup>   | -  | -  |

Microbial spectrum legend: + effective; +/- variable or limited effectiveness; - not effective

A-requires high concentrations

Data compiled from: Maillard JY. 2013. Factors Affecting the Activities of Microbiocides. IN: Fraise AP et al. (eds). *Russell, Hugo & Ayiliffe's Principles and Practice of Disinfection, Preservation and Sterilization*, 5th ed. 2013; McDonnell G. 2020. Microorganisms and resistance. IN: *Block's Disinfection, Sterilization, and Preservation*, 6th edition; Quinn PJ et al. Disinfection and biosecurity in the prevention and control of disease in veterinary medicine. IN: *Block's Disinfection, Sterilization, and Preservation*.



IOWA STATE UNIVERSITY®

© CFSPH 2008-2023

For more information read *Disinfection 101* on the [CFSPH disinfection website](#).

## Appendix 2: Summary of examples of Field incidents and action to be taken

**Table 16:** Summary of examples of Field incidents and action to be taken

| Incident Type     | Incident   | What to Do   |
|-------------------|--|--|
| Natural Disasters | Floods, Mudslides  | For livestock and livestock related assets, <i>Refer to the Livestock emergency guidelines (LEGS)</i> , for guidance on intervention<br><i>Seek guidelines on fisheries</i>  |
| Biological        | Exposure to infectious disease (e.g. B. anthracis)           | <ol style="list-style-type: none"> <li>1. Wear appropriate PPE (Personal Protective Equipment)</li> <li>2. Isolate the affected individual from the area of exposure.</li> <li>3. Immediately contact emergency services and healthcare authorities and seek medical attention</li> <li>4. If spores are suspected to be on clothing or skin, remove contaminated clothing and wash skin thoroughly with soap and water.</li> <li>5. Follow containment and decontamination procedures; Close off the area of exposure and ensure proper ventilation to prevent further airborne contamination. Professional decontamination services should be called for thorough cleaning.</li> </ol> |
| Biological        | Biological spill (e.g., blood, bodily fluids)                | <ol style="list-style-type: none"> <li>1. Secure the area and prevent further contamination.</li> <li>2. Wear gloves and other PPE.</li> <li>3. Use an appropriate disinfectant to clean the spill. (Risk based selection of disinfectants)</li> <li>4. Dispose of contaminated materials in biohazard bags. (<i>Refer to chapter on Waste disposal</i>)</li> </ol>  |
| Chemical          | Chemical spill (e.g., acid, flammable liquid, Acaricide)     | <ol style="list-style-type: none"> <li>1. Evacuate the area immediately.</li> <li>2. Alert others of the hazard.</li> <li>3. Wear chemical-resistant gloves, goggles, and other PPE.</li> <li>4. Contain the spill using absorbent materials if safe to do so.</li> <li>5. Notify emergency services and follow safety protocol (<i>Refer SOP spill management</i>)</li> </ol>   |
| Chemical          | Chemical exposure (e.g., inhalation, skin contact)           | <ol style="list-style-type: none"> <li>1. Remove the affected person from the exposure area.</li> <li>2. Flush the skin or eyes with water for at least 15 minutes (if applicable).</li> <li>3. Seek medical attention immediately.</li> <li>4. Provide information about the chemical to responders.</li> </ol>   |
| Physical          | Work-related injury (e.g., crush injury, cuts, Animal bites) | <ol style="list-style-type: none"> <li>1. Assess the injury and call emergency services if needed.</li> <li>2. Provide first aid as appropriate (e.g., stop bleeding, immobilize injury).</li> <li>3. Report the injury to workplace safety personnel.</li> <li>4. Follow accident investigation procedures.</li> </ol>  |

| Incident Type   | Incident   | What to Do  |
|---|--|---|
| Physical  | Fire from mechanical equipment (e.g., electrical fire)                     | <ol style="list-style-type: none"> <li>1. Evacuate the area immediately.</li> <li>2. Use a class C fire extinguisher (for electrical fires) if trained.</li> <li>3. Turn off power to the equipment if possible and safe.</li> <li>4. Notify emergency responders and follow evacuation protocols.</li> </ol> |
| Unauthorized access   | Loss of VBMs, potential hazards  | <p>Evacuate unauthorized individuals.</p> <ul style="list-style-type: none"> <li>• Re-secure quarantine zones.</li> <li>• Conduct a full assessment of potential contamination.</li> <li>• Update security and access protocols.</li> </ul>   |
| Introduction of Contaminated Supplies (e.g., food, equipment) | The introduction of contaminated or unsafe supplies into the affected area | <p>Quarantine the contaminated supplies. Dispose of or decontaminate as needed.</p> <p>Conduct further inspection of all incoming supplies.</p> <ul style="list-style-type: none"> <li>• Update logistics procedures to prevent recurrence</li> </ul>   |
| Animal Disease Outbreak (e.g., Foot-and-Mouth Disease)        | A disease affecting livestock, potentially spreading rapidly.              | <p>Isolate affected animals.</p> <ul style="list-style-type: none"> <li>• Implement quarantine measures (<i>Refer chapter on Biosecurity -containment measures</i>)</li> <li>• Notify authorities and veterinary teams. (<i>Refer chapter on communication during outbreak</i>)</li> </ul>                    |

Source; WOA, 2019

### Appendix 3: Summary of Facility or temporary setup specific requirements for biosafety and biosecurity during operations in the field/farm

**Table 17:** Summary of Facility or temporary setup specific requirements for biosafety and biosecurity during operations in the field/farm

| Facility                        | Facility-Specific Requirements   | Biosafety Considerations  | Biosecurity Considerations   | References   |
|---------------------------------|--|---|--|--|
| <b>Slaughter-houses</b>         | <ul style="list-style-type: none"> <li>Location: Free from smoke, odours, and dust; separate from non-related buildings.</li> <li>Structure: Includes lairage, isolation pens, waste disposal units, and pest-proof measures.</li> </ul> | <ul style="list-style-type: none"> <li>Regular sanitation and proper waste disposal to prevent contamination.</li> <li>Proper hygiene practices, including washing facilities and well-drained floors.</li> </ul> | <ul style="list-style-type: none"> <li>Isolation pens and ante-mortem inspection to prevent disease spread.</li> <li>Compliance with NEMA guidelines for environmental safety and waste management.</li> </ul> | <p>Meat Control Act Cap 356</p> <p>NEMA Regulation 2006,</p>   |
| <b>Agro-Vet Facilities</b>      | <ul style="list-style-type: none"> <li>Compliance: Adherence to VMD</li> <li>Storage: Proper segregation and secured storage for prescription drugs.</li> </ul>  | <ul style="list-style-type: none"> <li>Regular disinfection of surfaces and equipment.</li> <li>Proper disposal of expired products following WHO guidelines.</li> </ul>  | <ul style="list-style-type: none"> <li>Segregation of drugs; prescription or controlled drugs kept under lock.</li> <li>Ensuring restricted access to prevent unauthorized handling.</li> </ul>                | <p>i. The Veterinary Surgeons and Veterinary Paraprofessionals Regulations 2013</p> <p>ii. The Veterinary Medicines Directorate) Regulations, 2015.</p> <p>iii. Guidelines on Veterinary Medicinal Products Waste Management</p> |
| <b>Live Bird Markets (LBMs)</b> | <ul style="list-style-type: none"> <li>Daily cleaning and weekly disinfection; increased during disease outbreaks.</li> <li>Quarantine and isolation areas for sick birds.</li> </ul>  | <ul style="list-style-type: none"> <li>Waste separation and daily supervised disposal.</li> <li>Surveillance measures for early detection of infections.</li> </ul>   | <ul style="list-style-type: none"> <li>Foot baths and wheel dips at entry/exit points.</li> <li>Movement control to minimize disease spread.</li> </ul>  | <p>FAO. 2015 Biosecurity guide for live poultry markets.</p> <p>FAO. 2015 Animal Production and Health Guidelines No. 17. Rome, Italy.</p> <p>WOAH Terrestrial Animal Health code 2018</p>                                       |

| Facility  | Facility-Specific Requirements   | Biosafety Considerations  | Biosecurity Considerations  | References   |
|---|--|---|---|--|
| <b>Hatcheries</b>   | <ul style="list-style-type: none"> <li>Isolated location to minimize disease risks.</li> <li>Security fencing with restricted access.</li> </ul>                                     | <ul style="list-style-type: none"> <li>Adequate drainage and pest-proofing measures.</li> <li>Routine disinfection of equipment and personnel hygiene enforcement.</li> </ul>       | <ul style="list-style-type: none"> <li>Structured workflow with separate areas for eggs, hatching, and sanitation.</li> <li>Controlled movement of personnel and materials to prevent cross-contamination.</li> </ul> | <ul style="list-style-type: none"> <li>i. Kenya Poultry Hatchery and Breeding Farms Inspection Protocol 2019</li> <li>ii. Animal Disease Hatcheries rules, 1985</li> </ul> |
| <b>Livestock Farms</b>                                    | <ul style="list-style-type: none"> <li>Movement control to prevent disease transmission.</li> <li>Farm fencing to prevent unauthorized access.</li> </ul>                            | <ul style="list-style-type: none"> <li>Farm sanitation: Footbaths, wheel dips, and hand washing stations.</li> <li>Proper waste disposal of manure and deceased animals.</li> </ul> | <ul style="list-style-type: none"> <li>Disease surveillance and quarantine protocols for new animals.</li> <li>Compliance with health certification for incoming and outgoing animals.</li> </ul>                     | Disease Control Act Cap 364<br>Farm Biosecurity guidelines for Dairy and pig Production  |
| <b>Poultry Farms</b>                                      | <ul style="list-style-type: none"> <li>Location: Away from wild birds and human settlements.</li> <li>Traffic control: Limited access with mandatory sanitation measures.</li> </ul> | <ul style="list-style-type: none"> <li>Regular cleaning and disinfection of poultry houses.</li> <li>Proper waste disposal of litter and dead birds.</li> </ul>                     | <ul style="list-style-type: none"> <li>Vaccination, regular health inspections, and biosecurity practices.</li> <li>Use of protective clothing to limit pathogen introduction.</li> </ul>                             | Farm Biosecurity guidelines for Poultry Production<br>Kenya Poultry Hatchery and Breeding Farms Inspection Protocol 2018   |
| <b>Dips and Crushes</b>                                   | <ul style="list-style-type: none"> <li>PPE use for workers.</li> </ul>   | <ul style="list-style-type: none"> <li>Regular disinfection of equipment and sprayers.</li> </ul>   | <ul style="list-style-type: none"> <li>Proper disposal of used dip chemicals to avoid environmental hazards.</li> </ul>   | Animal Diseases Act, CAP 364; Cattle Cleansing Act, CAP 358  |
| <b>Livestock Transport Vessels</b>                        | <ul style="list-style-type: none"> <li>Adequate ventilation and hydration for animals.</li> </ul>  | <ul style="list-style-type: none"> <li>Disinfection of vehicles before and after transport.</li> </ul>  | <ul style="list-style-type: none"> <li>Trained handlers to minimize stress and injuries.</li> </ul>   | Animal Diseases Act, CAP 364   |
| <b>Holding Grounds, Feedlots, and Quarantine Stations</b> | <ul style="list-style-type: none"> <li>Strict access control and secure perimeter fencing.</li> </ul>  | <ul style="list-style-type: none"> <li>Cleaning of equipment, footwear, and vehicles.</li> </ul>  | <ul style="list-style-type: none"> <li>Proper waste management of manure and deceased animals.</li> </ul>   | Animal Diseases Act, CAP 364   |

| Facility  | Facility-Specific Requirements  | Biosafety Considerations   | Biosecurity Considerations   | References  |
|---|---|--|--|---|
| <b>Sale Yards</b>                                 | <ul style="list-style-type: none"> <li>Fencing and controlled entry/exit points.</li> </ul>   | <ul style="list-style-type: none"> <li>Disinfection of facilities and provision of footbaths.</li> </ul>   | <ul style="list-style-type: none"> <li>Health certification and on-site veterinary inspections for incoming livestock.</li> </ul>  | Animal Diseases Act, CAP 364  |
| <b>Research Stations (Efficacy Trial Centres)</b> | <ul style="list-style-type: none"> <li>Compliance with NACOSTI guidelines.</li> <li>Strict risk assessment and inventory management of biological materials.</li> </ul> | <ul style="list-style-type: none"> <li>Proper PPE use, training, and waste disposal protocols.</li> <li>Routine monitoring of research samples to prevent contamination.</li> </ul>  | <ul style="list-style-type: none"> <li>Controlled access and containment measures for high-risk agents.</li> <li>Secure storage and disposal of hazardous biological agents.</li> </ul>  | <ul style="list-style-type: none"> <li>i. Animal Diseases Act, CAP 364</li> <li>ii. Kenya National Council for Science, Technology, and Innovation (NACOSTI). (2017).</li> <li>iii. WOHG Guidelines for Responsible conduct in Veterinary Research</li> </ul> |
| <b>Aquatic</b>                                    | <ul style="list-style-type: none"> <li><b>Field Work and Aquatic Monitoring</b></li> </ul>  | <ul style="list-style-type: none"> <li>Proper handling of aquatic animals to avoid injury or stress.</li> <li>Use of PPE to prevent disease transmission.</li> <li>Clean water supply and filtration systems to avoid contamination with proper waste management and disposal.</li> <li>Health checks for aquatic species before stocking and harvesting.</li> </ul> | <ul style="list-style-type: none"> <li>Mobile monitoring units for aquatic species. Temporary aquatic handling systems for sampling.</li> <li>Guidelines for aquatic species transport and disease control. National and international disease management protocols</li> </ul> | WOHG Aquatic animal health code 2024 (chapter on biosafety and biosecurity)<br>Kenya Fisheries Act, 2012<br>Manual of Standard Operating Procedures for Fish Inspection and Quality Assurance in Kenya- June 2015   |

| Facility               | Facility-Specific Requirements   | Biosafety Considerations   | Biosecurity Considerations  | References  |
|------------------------|--|--|---|---|
| <b>Points of entry</b> | Border control and quarantine facilities, port and airport veterinary units, animal transport and transit points and Marine and coastal entry points for aquatic units | <ul style="list-style-type: none"> <li>Disinfection of vehicles and equipment entering facilities by use of disinfectant mats, hand spray and footbaths.</li> <li>PPE for staff handling animals and materials from external sources.</li> <li>Surveillance of veterinary cargo for potential pathogens.</li> <li>Strict sanitation for containers used to transport live aquatic species with disinfection protocols for vessels used.</li> </ul> | <ul style="list-style-type: none"> <li>Controlled entry points for animals. Isolation areas for new arrivals.</li> <li>Screening facilities for disease monitoring.</li> <li>Quarantine facilities for imported animals' Physical barriers to prevent animal contact during inspection.</li> <li>Vehicle cleaning and disinfection zones.</li> <li>Tracking of animal movement across borders.</li> <li>Segregation of aquatic species based on health status and inspection for diseases.</li> </ul> | WOAH Standard on Biosafety and Biosecurity Fisheries Act (2012) |
| <b>Wildlife</b>        | Wildlife Veterinary and Research Facilities, field work and wildlife monitoring, containment infrastructure.   | <ul style="list-style-type: none"> <li>Safe animal handling techniques, proper PPE use, and sanitization to protect both wildlife and humans.</li> <li>Implementation of health checks for newly captured animals before release in the wild.</li> <li>Preventing wildlife-human interaction through barriers, limiting contact with high-risk species.</li> </ul>   | <ul style="list-style-type: none"> <li>Mobile field labs, temporary handling structures, and disease screening to prevent pathogen spread.</li> <li>Fences and wildlife corridors, and temporary handling structures to control movement and limit disease outbreaks.</li> <li>Wildlife management and transport guidelines.</li> </ul>   | Wildlife Conservation and Management Act, 2013,                 |

## **Appendix 4: SOP for transportation of samples from the field to the laboratory**

### **i. Sample delivery to the laboratory**

- a. Ensure that specimens arrive in the laboratory in a timeframe appropriate to the nature of the requested examinations.
- b. Ensure that the specimen is protected from deterioration using preservative methods relevant to the specimen type and appropriate to the requested tests.
- c. Ensure that the sample is transported within the temperature interval specified for that sample.
- d. Ensure that the responsible person in the field sending samples notifies the recipient laboratory so that they expect delivery of the specimens upon arrival.
- e. Ensure that all required documentation, such as valid permits and necessary forms, is available (where applicable).
- f. Ensure that all diagnostic materials are triple packaged as described in the SOP for the packaging and handling of diagnostic materials for shipment

### **ii. Transportation of samples by private vehicles**

- a. Carry samples in closed, sealed plastic bags with the laboratory submission form.
- b. Observe safe working practices at all times.
- c. Never carry diagnostic samples in your pocket, handbag or other personal item.
- d. Ensure decontamination materials are available to contain small spillages. In the event of any contamination, the responsible officer must be contacted before any material is touched.
- e. In the event of a vehicle breakdown, do not allow persons other than trained personnel to handle specimens.
- f. Ensure the receiving laboratory acknowledges receipt of samples.
- g. Always wash your hands thoroughly immediately after delivering samples.
- h. Report and document any loss or breakage of the sample to the responsible officer immediately.

### **iii. Transportation of samples using the postal system/courier**

- a. Correctly classify and package samples for transport by this method as either “Diagnostic specimens” or “Infectious substances” using SOP on packaging and handling.
- b. Contact the courier service to inform them of the intended delivery
- c. Ensure the courier company carrying biological materials has the necessary capacity and knowledge to handle them safely.
- d. Ensure all the required documentation is available.
- e. Ensure the receiving laboratory acknowledges receipt of samples.

#### **iv. Transportation of “High Risk” and “Infectious” samples.**

- Classify Samples from the following categories as “Infectious”;
  - a. Carcasses suspected to contain anthrax organisms.
  - b. Carcasses suspected of highly pathogenic avian influenza (HPAI)
  - c. Suspected cases of Brucellosis
  - d. Viral haemorrhagic fevers, including RVF.
  - e. Rabies
  - f. Any other sample labelled as such by AHSPs
- Apply “Infectious material” stickers to samples, plastic bags and request forms. Package all samples appropriately according to the SOP for packaging.
- Do not mix infectious/high-risk samples with routine samples – they should be marked and segregated.
- Contact the receiving laboratory to notify them of potential arrivals so that the packages are treated correctly upon reception.
- Ensure the receiving laboratory acknowledges receipt of samples.

#### **v. Spillage of diagnostic samples during transportation**

- a. Report any spillage immediately to a designated officer in the field and follow the SOP in spill management.
- b. Guide the containment of spills reported by any driver.



## **Appendix 5. SOP for the collection and handling of test items**

### **i. Considerations during the collection of samples include;**

- a. Quality of the sample
- b. Sampling plan including sample selection and sample size calculation, where applicable
- c. Any tissues collected must be representative of the condition under investigation.
- d. Collect aseptically and avoid cross-contamination between samples.
- e. Integrity of the sample
  - Put Specimens from different animals in separate containers
  - Label samples clearly and package using the triple packaging principle for transport.

### **ii. Safety of the AHSP**

- a. Wear appropriate PPE
- b. Restrain the animal appropriately to minimise the risk of injuring the personnel collecting samples from live animals.
- c. Refer to the Procedure for Ensuring Compliance with Donning And Doffing of PPE.

### **iii. Safety of the Animal**

- a. Avoid causing undue stress and/or injury to the animal
- b. Properly restrain animals during sample collection

### **iv. Environmental safety**

- a. Avoid contamination of the environment
- b. Dispose of all waste emanating from the exercise according to the Procedure for laboratory waste management.

### **v. Transportation/sending to the laboratory**

- a. Transmit samples to the laboratory expeditiously
- b. Consider specific requirements for each sample
- c. Consider the safety precautions during transit
- d. Consider the appropriate temperature requirement
- e. Consider the proper duration of viability

**Note:** Contact the laboratory that will receive and carry out the test and include all documentation related to the sample that would assist in the sample analysis

## Appendix 6. SOP on collection of samples

### a) Precautions before sampling

- i. Consider the purpose of sample collection to determine the type and number of samples needed to provide valid results. Such considerations would inform:
  - a. Sample size determination
  - b. Specimen to be collected
  - c. Cold chain requirement
  - d. Samples collection requirements (equipment, transport media and PPE)
  - e. Availability of diagnostic tests
- ii. Collect samples from necropsy examinations from clean to dirty areas under aseptic conditions.
- iii. Take care to avoid environmental contamination, or risk of spread of disease through insects or fomites.
- iv. Plan for appropriate safe disposal of animals and tissues.
- v. Always contact the laboratory that is going to perform the assay(s) for specific enquiries concerning the type, quantity of sample and the capability of performing the test.

**NB-** Follow the instructions below on the collection of different types of samples

### b) Collection of test samples

Sample collection from Live animals

#### i. Blood smears

- Obtain small quantities of blood by pricking with a triangular, solid-pointed needle. Where necessary, prepare thick and thin smears of fresh blood on a microscope slide.

#### ii. Whole blood

- Collect whole blood samples for haematology, culture and/or direct examination for bacteria, viruses, or protozoa.
- Use anticoagulants such as ethylenediamine tetraacetic acid (EDTA) or heparin.
- In large mammals, collect whole blood from the jugular, caudal, brachial, mammary and vena cava veins in pigs.
- In birds, select a wing vein (brachial vein), pluck and swab the skin at the site.
- Blood collection from fish, samples are collected based on FAO guidelines <https://www.fao.org/fishery/docs/CDrom/aquaculture/a0845t/volume2/docrep/field/003/ac160e/AC160E09.htm>.
- Locate the vein, shave (if necessary), and swab the area with 70% alcohol. Allow it to dry for 30 to 60 seconds.
- Collect whole blood by making a clean venipuncture using a syringe and needle or by needle and vacuum tube (if collecting by syringe and needle, remove the needle

from the plunger before transferring the blood into the sample container so that you do not break the red blood cell).

- Thoroughly mix the blood by gentle inversion immediately after sample collection.
- Store at 4°C for a maximum of 5 days (lower temperatures than this will haemolyse the red blood cells, which may render it not fit for the test)

### iii. Buffy coat

- Collect blood using a capillary tube by putting one end of the capillary tube holding the other end.
- The blood moves up the tube using capillary action.
- Seal one end with plastacin or petroleum jelly
- Centrifuge the capillary using haematocrit centrifuge
- Three layers are formed after centrifugation
- Break at the middle layer using a diamond pencil so to release the buffy coat layer on a glass slide
- Prepare a wet mount and cover with a cover slip and examine using a compound microscope to observe motile trypanosomes.

### iv. Blood plasma

- The instructions for collection are as in whole blood above.
- To get plasma, centrifuge the blood in a centrifuge at 1500rpm for 10 minutes
- Collect the supernatant using a pipette without disturbing the clot
- Store at 4 degrees centigrade for a maximum of 5 days or -20 degrees for longer storage

### v. Blood for serum

- Follow steps 1 to 3 for collection of blood in mammals
- Samples for serology require clotted blood that may be collected by use of plain or vacutainer tubes with clot activator.
- Leave blood to stand at ambient temperature (protected from excessive heat or cold) for 4–6 hours, 37 degrees for 1-2 hours or until the clot is fully formed and begins to contract.
- Centrifuge at 1000rpm for 10–15 minutes then decant or harvest the serum with a pipette. (Skip this step if the serum is clear).
- For disease investigations, collect paired serum samples 7–14 days apart. vi. For vaccine monitoring, collect blood samples at the point which antibodies are expected to be at maximum concentration.
- Alternatively, collect and transport blood to be used for serology by placing a drop of blood on to filter paper, allow the blood to dry at room temperature and then ship unrefrigerated.

- Store at 4 degrees centigrade for a maximum of 5 days or -20 degrees for longer

#### **vi. Faeces**

- Faecal samples may be collected from the rectum or freshly voided faecal material
- Collect at least 10 g of freshly voided faeces or swabs from the rectum (or cloaca), ensuring that the mucosal surface is also swabbed (The swabs should be visibly coated with faecal material.
- Note: swab samples are inadequate for parasitology but can be used for other tests. iv. For parasitology, fill the faecal pot and send to the laboratory within 24 hours. If transport times are likely to be longer than 24 hours, the sample should be on ice or refrigerated to prevent the hatching of parasite eggs.
- Put the faecal pots in screw top containers or sterile plastic bags for shipment. Transport swabs in appropriate transport medium. Faeces are best stored and transported at 4°C.

#### **vii. Skin**

- Collect 2 g of affected epithelial tissue as aseptically as possible and place it in 5 ml phosphate buffered glycerine or Tris-buffered tryptose broth virus transport medium at pH 7.6. In diseases producing vesicular lesions, collect,
- Alternatively, sample the vesicular fluid where unruptured vesicles are present; where possible, aspirate vesicular fluid with a syringe and place in a separate sterile tube.
- Pluck hair or wool samples for surface-feeding mites, lice and fungal infections.
- Using the edge of a scalpel blade, take deep skin scrapings which are useful for burrowing mites.
- In birds, take feather tips for detection of viral antigen in suspected Marek's disease.

#### **viii. Genital tract and semen**

- Collect samples by vaginal or preputial washing, or by using suitable swabs.
- The cervix or urethra may be sampled by swabbing.
- Obtain semen samples by using an artificial vagina or by extrusion of the penis and artificial stimulation. The sperm-rich fraction is present in the sample. Avoid contamination by antiseptic washing solutions.
- Contact the laboratory manual for specific transport media and conditions.

#### **ix. Eye samples**

- Gently swab the conjunctiva surface by holding the palpebra apart
- Put the swab into transport medium.
- Scrapings may also be taken onto a microscope slide.

***NB: Mucopurulent nasal and lacrimal discharges are rarely useful.***

#### **x. Nasal discharge (saliva, tears)**

- Collect samples using Dacron, cotton or gauze swabs, preferably on wire handles as wood is inflexible and may snap.
- Moisten the swab first with transport medium. iii. Allow the swab to remain in contact with the secretions for up to 1 minute, then place it in transport medium and send to the laboratory without delay at 4°C.
- Use long-protected nasopharyngeal swabs to collect samples for suspected viral infections.

#### **xi. Milk**

- Collect milk samples after cleansing and drying the tip of the teat – avoid use of antiseptics.
- Discard the initial stream of milk and fill the tube/container with the next stream(s) (a sample of bulk tank milk can be used for some tests.)
- For serological tests, do not freeze, heat or violently shake the milk sample.
- If there is going to be a delay in submitting the samples to the laboratory, add preservatives to the milk samples collected for serological testing.
- If necessary, milk for bacterial examination may be frozen.

#### **xii. Sample collection at post-mortem**

- Samples of tissue from various organs can be taken at post-mortem.
- If rabies or transmissible spongiform encephalopathies (TSEs) are suspected, detach the animal's head and send it to the laboratory.
- Collect tissues for microbiological culture, parasitology, biochemistry, histopathology and/or immunohistochemistry, and detection of proteins or nucleic acids.
- Collect buccal, oropharyngeal or rectal (cloacal) swabs
- Place each piece of tissue in a fully labelled, separate plastic bag or sterile screw-capped jar.
- Always collect and place swabs in appropriate transport media.
- Use sterile instruments for collecting specimens for microbiological culture and take care not to contaminate tissues with intestinal contents.
- Do not use disinfectants on or near tissues to be sampled for bacterial culture or virus isolation.
- Send the tissues to the laboratory either dry or in bacterial or virus transport medium, depending on the type of specimen and the required examinations; swabs should be sent in transport medium.
- After collection, refrigerate the samples for microbiological examination until shipped.
- If shipment cannot be made within 48 hours, store the samples in a freezer.
- For histopathology samples, place blocks of tissue not more than 0.5 cm thick and 1–2 cm long in neutral buffered 4–10% formalin, which should be at least ten times

the volume of the tissue sample. Do not freeze formalin-fixed tissues.

- Once fixed, tissues can be removed from formalin and, as long as they are kept moist and protected (e.g. by wrapping in formalin-soaked paper towels, then sealed in screw-capped jars), they can be forwarded to the laboratory without formalin.

#### xiii. **Environmental sampling**

- Collect environmental samples from litter or bedding, as well as voided faeces or urine. In an aquatic environment, collect water and sediments.
- Collect swabs from the surface of ventilation ducts, feed troughs and drains (especially important in hatcheries, artificial insemination centres and slaughterhouses where specialised equipment is maintained.)
- Consider collecting samples of the animal feeds, in troughs or bulk containers.
- Water may be sampled in troughs, drinkers, header tanks or from the natural or artificial supply.

#### xiv. **Feed sampling**

- Bulk Feeds: Collect and combine into a single (i.e. composite) sample aliquots from different areas of the bin, bunk, bags, etc. The total quantity of the composited sample should be approximately 500g.
- Baled Hay: Collect and combine into a composite core sample from 10% of the total number of bales.
- Forages: Collect and combine 10 to 15 plants or small samples (i.e., handfuls) from throughout the field or pasture to create a composite sample.

#### xv. **Honeybees sampling**

Samples are collected of dead or weak adult bees at the entrance of the hive, and brood combs containing diseased or suspected diseased brood from the brood chamber.

- Live bees should be killed by freezing. Hive debris may be collected for examination, preferably on a sticky board to trap mobile parasites.
- Collect 30 sick or freshly dead bees from the ground near the hive entrance, or foragers at the hive entrance or from the top bars of the frames inside the hives.
- Spores of *Nosema* are found on older bees.
- Comb samples are collected from the brood chamber inside the hive
- Cut out a 5x10 cm piece of brood comb containing diseased or suspect diseased larvae. The comb must not contain any honey
- Wrap the comb in an absorbent paper towel; avoid using plastic wrap or an airtight container to prevent the growth of fungi.
- Use a strong cardboard box to ship the comb samples.
- If the comb samples are not to be transported immediately, chill in a refrigerator
- Thoroughly clean the knife used for cutting the comb to avoid the possible spread of

disease to other areas.

- Collect any pests and parasites observed in the colony using a pair of forceps and place them in cryovials, then preserve them appropriately depending on the tests to be performed.
- Collect samples of pollen pellets from the legs of foragers using a pollen trap and store in a fine meshed grid.
- Collect honey and wax samples in cryovials and preserve them dry for use in the analysis of brood infections
- Label all samples collected (indicate the date of sample collection and the GPS coordinates)
- Ensure the cold chain is maintained when transporting samples

#### xvi. **Arthropod vectors sampling**

- Arthropods of animal importance include mosquitoes, culicoides (or biting midges), sand flies, tsetse flies, biting flies, mites, and fleas.
- Adult mosquitoes are collected using BG-Sentinel and Biogents Mosquitaire traps, or CDC light traps that utilise light, CO<sub>2</sub>, or animal attractants.
- CDC light traps are battery-operated light-suction traps that can be used during late hours of the day until sunset to catch day biters and overnight for night biters.
- Collect culicoides samples using BG-light traps, OVI traps, or miniature CDC light traps overnight in the animal sheds.
- Collect adult sand flies from their resting or breeding sites, which include tree holes, buttress roots, rock crevices, houses, animal shelters and burrows, using CDC miniature light traps.
- Samples of collected arthropods are put in cryovials in 75% alcohol or preserved appropriately according to the tests to be performed.
- Female sandflies are dissected under a dissecting microscope on a sterilised slide using a sterile needle.
- The abdomen and the thorax of each female specimen is transferred to sterile 1.5 mL Eppendorf tubes with a lysis buffer for the detection of *Leishmania* and *Trypanosoma* species by the polymerase chain reaction (PCR).
- When moving samples of mosquitoes and culicoides, the cold chain must be maintained.
- Tsetse flies are collected using appropriate tsetse traps for 24 hours and 48 hours.
- Collected tsetse flies that are not processed in the field should be transported in cages and must be processed alive within 3–4 hours.
- Dissect and process the samples of tsetse flies in the field using a dissecting microscope to observe motile trypanosomes.
- All samples collected of arthropods should be well labelled (indicate date of sample collection and GPS coordinates).

## **xvii. Ticks sampling**

Collect tick samples either by dragging or flagging

### **a. Dragging**

- Drag the flannel cloth with the short rod and extension string along low grass, lawns, tall grass and very low shrubs. Allow the flag to contact the surface fully.
- Cover the pre-measured distance of the sample plot in a single pass, 1meter wide.

### **b. Flagging**

- Flag a flannel cloth on a pole, wave and insert the flag 1meter deep through low branches, tall grass, shrubs, and low tree branches.
- Flag all levels of the low-level plant canopy (up to shoulder height) one meter deep over the length of the sample plot.
- Removal of ticks from Flag/Drag Samples
- At the end of sampling, place the flannel on a flat surface and carefully remove all ticks from both sides of the flannel.
- Use a hand magnifier to assist in viewing larva and nymph stages.
- Place the captured ticks into a plastic bag or vial containing Boardman's solution.



## **Appendix 7. SOP for packaging and handling of diagnostic samples for shipment**

### **i. Packing the specimen:**

- Determine the specimens to be transported.
- Pack all specimens according to categories specified in triple packaging principle.
- Carefully pack microscope slides together with animal identification number. Sufficiently wrap and pad inside their shipping container to prevent breakage.
- Complete the laboratory submission form.

### **ii. Labelling diagnostic samples**

- Include an itemised list of contents between the secondary container and the outer box.
- Label the box properly.
- Mark the proper shipping name
- Add the name, address, and telephone number of the shipper and the consignee.
- Add the lab submission form to the shipping box

### **iii. Contingency and Emergency Plan**

If spills or damage to containers are encountered during storage, handling or transporting of specimens, the following will be done.

- Put on gloves, goggles and protective outer garments
- Use a copious amount of disinfectant to clean up the spill(s)
- Place waste in new biohazard bags or containers and seal properly
- Contact the Supervisor and file an incident report
- For the courier, they should contact the sender of the specimen by calling the phone numbers in the mailing address
- Follow the facility exposure program (refer to SOP on spill management)
- Contact the receiving laboratory for more information

## **Appendix 8. SOP for transportation of samples from the field to the laboratory**

### **i. For the timely delivery of samples to the laboratory:**

- Ensure that specimens arrive in the laboratory in a time frame appropriate to the nature of the requested examinations.
- Ensure that the specimen is protected from deterioration using preservative methods relevant to the specimen type and appropriate to the requested tests.
- Ensure that the sample is transported within the temperature interval specified for that sample.
- Ensure that the responsible person in the field sending samples notifies the recipient laboratory so that they expect delivery of the specimens upon arrival.
- Ensure that all required documentation, such as valid permits and necessary forms, is available (where applicable).
- Ensure that all diagnostic materials are triple packaged as described in the SOP for the packaging and handling of diagnostic materials for shipment.

### **ii. For transportation of samples by private vehicles**

- Carry samples in closed, sealed plastic bags with the laboratory submission form.
- Observe safe working practices at all times.
- Never carry diagnostic samples in your pocket, handbag or other personal item.
- Ensure decontamination materials are available to contain small spillages. In the event of any contamination, the responsible officer must be contacted before any material is touched.
- In the event of a vehicle breakdown, do not allow persons other than trained personnel to handle specimens.
- Ensure the receiving laboratory acknowledges receipt of samples.
- Always wash your hands thoroughly immediately after delivering samples.
- Report and document any loss or breakage of the sample to the responsible officer without delay.

### **iii. For transportation of samples using the postal system/courier**

- Correctly classify and package samples for transport by this method as either “Diagnostic specimens” or “Infectious substances” using SOP on packaging and handling.
- Contact the courier service to inform them of the intended delivery
- Ensure the courier company carrying biological materials has the necessary capacity and knowledge to handle them safely.
- Ensure all the required documentation is available.
- Ensure the receiving laboratory acknowledges receipt of samples.

**iv. For transportation of “High Risk” and “Infectious” samples.**

- a). Classify Samples from the following categories as “Infectious”;
  - Carcasses suspected to contain anthrax organisms.
  - Carcasses suspected of highly pathogenic avian influenza (HPAI)
  - Suspected cases of Brucellosis
  - Viral haemorrhagic fevers, including RVF.
  - Rabies
  - Any other sample labelled as such by AHSPs
- b). Apply “Infectious material” stickers to samples, plastic bags and request forms. Package all samples appropriately according to the SOP for packaging.
- c). Do not mix infectious/high-risk samples with routine samples – they should be marked and segregated.
- d). Contact the receiving laboratory to notify them of potential arrivals so that the packages are treated correctly upon reception.
- e). Ensure the receiving laboratory acknowledges receipt of samples.

**v. For spillage of diagnostic samples during transportation.**

- Report any spillage immediately to a designated officer in the field and follow the SOP in spill management.
- Guide the containment of spills reported by any driver.

## Appendix 9. SOP for use of PPE

### a). SEQUENCE OF DONNING OF PPE

Before Perform hand hygiene by thoroughly washing your hands with soap and water or sanitize your hands

#### i. Wearing protective Coat

- First insert one arm into the sleeve.
- Insert the other arm into the other sleeve.
- Adjust the shoulders and sleeves until you are comfortable.
- Lastly, close all the front buttons of the coat.

#### ii. Wearing Gown

- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.
- Visually inspect the gown and check for any damage.
- First insert one arm into the sleeve.
- Next insert the other arm into the other sleeve.
- Adjust the shoulders and sleeves until you are comfortable.
- Lastly tie or snap the upper and lower straps.

#### iii. Mask

##### Surgical Mask

- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.
- Determine the top of the mask from the bottom by feeling along the edges of the mask. The area that contains the nose piece is the top of the mask that will be moulded over the bridge of the nose.
- When using a face mask with ear loops, secure an ear loop over the ear, then place the other ear loop over the other ear.
- Grasp the nosepiece of the mask and bring it to cover the bridge of the nose.
- Mold the nosepiece of the face mask with the fingertips of both hands by starting at the bridge of the nose and work outward towards the cheekbones.
- Then grasp the nosepiece of the face mask.
- Lastly pull the bottom of the mask under the chin.

##### N95 Respirator Mask

- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.
- Remove the respirator from its packaging and hold it with straps facing upward. Place the bottom strap under the centre flaps next to the “ATTENTION”

- Fully open the top and bottom panels, bending the nosepiece around your thumb at the centre of the foam. Straps should separate when panels are opened. Make certain the bottom panel is unfolded and completely opened.
- Place the respirator on your face so that the foam rests on your nose and the bottom panel are securely under your chin.
- Pull the top strap over your head and position it high on the back of the head. Then, pull the bottom strap over your head and position it around your neck and below your ears.
- Place your fingertips from both hands at the top of the metal nosepiece. Using two hands, mould the nose area to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece.

### **Note**

- Always use two hands when moulding the nosepiece.
- Pinching the nosepiece with one hand may result in improper fit and less effective respirator performance.
- Perform a user seal check.

### **iv. Goggles/Face shield**

- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.
- Bend slowly forward slightly.
- Expand the elastic band and place it behind your head.
- Tighten by adjusting the straps until you are comfortable
- Note: Do not touch the face shield or the goggles.

### **v. Donning of Hand gloves**

- Remove one glove from the package and inspect it to be sure no pin holes or tears are present.
- If gloves are ambidextrous, they can be worn on either hand. If not, align the glove's fingers and thumb with the proper hand before donning
- Insert five fingers into the cuff and pull the cuff over the wrist.
- Check for a secure fit around the fingers and palm. The cuff should fit snugly around the wrist.

## **b). SEQUENCE OF DOFFING PPE**

### **i. Hand Gloves**

- Grasp the outside of one glove at the wrist. Do not touch your bare skin.
- Peel the glove away from your body, pulling it inside out.
- Hold the glove you just removed in your gloved hand.
- Peel off the second glove by putting your fingers inside the glove at the top of your wrist.

- Turn the second glove inside out while pulling it away from your body, leaving the first glove inside the second.
- Dispose of the gloves safely. Do not reuse the gloves.

## **ii. Protective coat/gown**

- Release the front of the coat/gown closer and open the front buttons.
- Slide the fingers of one hand under the coat/gown of the opposite sleeve pulling the arm from the sleeve.
- Remove the arm completely from the sleeve.
- Slide the other fingers of the free hand under the coat/gown of the remaining sleeve and pull the arm from the sleeve.
- Hook it back to its proper location.
- If the coat/gown is contaminated at removal, turn it inside out, roll and fold it, place it in the contaminated hamper for laundry.
- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.

## **iii. Goggles/Face shield**

- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.
- Bend slowly forward slightly.
- Expand the elastic band and remove it from behind your head.

## **iv. Surgical Face Mask**

- To remove the surgical face mask, take the index finger of each hand and grasp the ear loops from behind the ear.
- Please take note not to touch the front of the face mask because it is considered contaminated.
- Pull the face mask forward off the face to remove the surgical face mask.
- Dispose it off in the waste bin.
- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.

## **v. N95 Mask**

- Without touching the respirator face piece, slowly lift the bottom strap from around your neck up over your head.
- Lift off the top strap. Do not touch the respirator.
- Discard in the red waste bin
- Perform hand hygiene by thoroughly washing your hands with soap and water or sanitizing your hands.

## **Appendix 10. SOP for spillage management**

The type of biological and chemical spills includes cultures, whole blood and blood components (serum, plasma etc.), urine, faecal material, body fluids and larval spills, acids, alkaline etc. Areas where spillage is expected include work surfaces and floors, during transport.

### **a. Spill inside a Centrifuge**

- Have a complete biological spill kit ready to go before you start the clean-up.
- Wear appropriate PPE
- Clear area of all personnel. Wait 30 minutes for the aerosol to settle before opening it and cleaning up the spill.
- Deactivate/inactivate the spill with appropriate disinfectant.
- Remove rotors and buckets to the nearest biological safety cabinet.
- Thoroughly disinfect inside of the centrifuge using appropriate disinfectant.
- Remove contaminated debris after disinfection, place in appropriate biohazardous waste container(s) and autoclave before disposal.

### **b. Spill outside during transport**

- Always transport hazardous materials in an unbreakable, well-sealed primary container placed inside a leak-proof, closed and unbreakable secondary container, labelled with the biohazard symbol (plastic cooler, bio-specimen pack, etc.).
- Should a spill of highly infectious material occur in the public area, report to the immediate supervisor
- Contain the spill area
- Should the spill occur inside a car, leave the vehicle, close all doors and windows,

### **c. Spill on self**

- Stop work immediately and assess the extent of danger
- Alert other workers in the vicinity
- Remove gloves and replace with clean ones
- Immediately decontaminate all body areas that may have been exposed to infectious material. Ask for the help of a co-worker if necessary.
- Initially, soak clothing or exposed body areas with 70% alcohol.
- Wash thoroughly with soap and warm water - a minimum of three minutes. Do not abrade skin during the washing process.
- Use the eyewash if your eyes are exposed.
- Notify immediate supervisor and follow available post exposure preventive guidelines

#### **d. Chemical Spill Response Procedure**

- Leave and Control Spill Area
- Evacuate personnel from the immediate spill area.
- Cordon off the spill area
- Eliminate any fire hazard, especially if the spill is flammable or combustible- turn off burners, electrical equipment, etc.
- Post sign, "Spill Area – Keep Out".
- Alert other personnel in adjacent areas of a chemical spill.
- Help Injured Personnel
- Take care of injured personnel - move from spill, remove contaminated clothing, flush skin with water, use eyewash and/or safety shower, etc.
- If there is a chemical splash to the eyes and/or there are burns or respiratory problems, seek medical attention.

#### **Evaluate Hazard**

Make preliminary evaluation of hazard and identification of risks and decide whether you should call your supervisor

#### **Clean Up Spill (if safe to do so)**

- Contain the spill using absorbent to stop spill from spreading under refrigerators, cabinets, equipment, drains, or corridors.
- Spread absorbent around the perimeter, damming the spill.
- Absorb the rest of the liquid.
- Scoop the absorbed chemical mixture into a plastic pail lined with a plastic bag.
- Seal a plastic bag and place it in a sealed container for disposal.
- Wash and deactivate the spill surfaces of trace amounts of the spilled chemical.
- Contact supervisor/team leader for disposal instructions.
- Replace used materials in the chemical spill kit.

#### **Notify the team leader in case of any chemical spill**



## Appendix 11. SOP for waste management

### a. General Considerations

- Minimise waste and do not accumulate large amounts in the field.
- Segregate waste - have a separate residue container if you are generating a large amount of any particular type of waste. Ensure the waste bins and bin liners are compatible with the waste generated.
- Label the waste bins with the appropriate waste label and biohazard sign where applicable.
- Store waste in a suitable designated area prior to collection.
- Ensure the container is not leaking and no spillage on the exterior of the container. Primary containers should be placed in a suitable bundle.
- Handle waste only if you are aware of the hazards associated with the waste and appropriate risk controls are used.
- If you are generating a large amount of one particular type of waste, separate the waste into manageable quantities and handle it (segregate, label, store, transport and treat) as frequently as necessary.
- Ensure that storage and transport containers are leak-proof and there is no spillage on the exterior of the containers.
- Untrained staff and students are not allowed to handle hazardous wastes.
- Personal Protective Equipment should always be worn when handling waste

### b. Waste segregation

- Bio-hazardous waste must not be mixed with chemical or other waste
- Segregate the waste in the following categories using colour coded bins or labelled bio-hazard bags:

#### Liquid

- Aspirates, rinses, washes, sera, body fluids, spill clean-up waste held in containers (preferably white/grey).

#### Solid

- Biological waste: Tissues/organs, blood (to be autoclaved bins (red) with red biohazard bags)
- Contaminated waste: used gloves, disposable gowns, used paper towels, vials (yellow bins)
- Non-contaminated waste e.g. Office paper (black bins)
- Sharps: - Needles, syringes, scalpel blades, Pasteur pipettes, broken glass-in designated sharps containers
- Carcass, tissues, and organs (biohazard bags –double bagged)

### c. Liquid waste management

#### Management of biohazardous liquid waste – method 1

- Prepare appropriate concentration of broad-spectrum disinfectant depending on available disinfectant.
- Refer to table below for the final concentration and contact times for peroxigenic acid (e.g. Virkon®), hypochlorite (12% and 3.8%), and benzalkonium chloride (e.g. Lysol).
- Consider the contact time for each type of disinfectant as shown in Table 11 below.

**Table 18:** Different disinfectants, concentrations and contact time for various pathogens

| Disinfectants                      | Working Concentration | Pathogen          | Contact Time |
|------------------------------------|-----------------------|-------------------|--------------|
| Peroxigenic acid (Virkon®)         | 2%                    | Bacteria, Viruses | Overnight    |
| Hypochlorite (12%)                 | 0.5%                  | Bacteria, Viruses | 30 minutes   |
| Hypochlorite (3.8%)                | 0.5%                  | Bacteria, Viruses | 30 minutes   |
| Benzalkonium chloride (e.g. Lysol) | 10%                   | Bacteria, Viruses | 30 minutes   |

- At the end of the workday, use the table 12 below to calculate the volume of peroxigenic acid needed for final concentration of 2% peroxigenic acid to milk.

**Table 19:** Dilution Instruction of a mixture of Peroxigenic acid (e.g. Virkon)

| DILUTION RATE REQUIRED (w/v) |      |      |      |      |                   |
|------------------------------|------|------|------|------|-------------------|
| 3.0%                         | 2.0% | 1.0% | 0.5% | 0.2% |                   |
| QUANTITY OF VIRKON REQUIRED  |      |      |      |      | QUANTITY REQUIRED |
| 30g                          | 20g  | 10g  | 5g   | 2g   | 1 Liter           |
| 150g                         | 100g | 50g  | 25g  | 10g  | 5 Liters          |
| 300g                         | 200g | 100g | 50g  | 20g  | 10 Liters         |
| 750g                         | 500g | 250g | 125g | 50g  | 50 Liters         |

- Soak the liquid waste container in the same disinfectant solution overnight based on the recommended contact time for peroxigenic acid (24hrs) in a bucket.
- For small quantities, carry them back to the lab and
- Drain the mixture in the normal sewer system the following day.
- Flush with sufficient clean water to purge the drain immediately after disposal of all liquids.
- For large quantities, dig a pit, pour the contaminated liquid and add relevant disinfectant like sodium hypochloride and fill it up with soil (burying)

#### Management of hazardous liquid waste – method 2

- Label container of biohazardous liquid as a biohazard
- Apply autoclave tape to the container
- Place this container into a secondary, autoclavable, high-walled, leak proof container to avoid overflow of biohazardous materials into autoclave

- Transport to the nearest disposal facility

#### **d. Solid waste management**

##### **Wear appropriate PPE**

- Use clearly labelled, preferably red waste bins (closable, leak-proof container) with a biohazard symbol.
- Use biohazard bags as liners.
- Fill biohazard bags in the containers no greater than 3/4 of the volume of the bag. Do not pack down waste.
- Remove biohazard waste when it is 3/4 full and place in another bag to ensure biological waste is double bagged.
- Transport autoclaved waste in leak-proof containers to the designated storage area
- Transport to the nearest disposal facility.

##### **Papers, non-reusable packaging materials**

- Wear appropriate PPE
- Disinfect packaging material (cardboard, autoclavable bags, cushioning materials, carton boxes) by thoroughly spraying inside and outside using 2% peroxigenic acid (e.g. Virkon™) or any other approved disinfectant
- Place in labelled biohazard bags in the labelled.
- Seal the bags and transport in leak proof containers.
- Transport to the nearest facility for incineration.

##### **Management of sharps**

- Wear appropriate PPE
- Place all sharps in a rigid puncture proof sharps container, which is puncture resistant, leak resistant, closable, clearly marked with biohazard symbol and clearly marked to show fill line.
- Fill up to the fill line or up to two-thirds full of the container.
- Pack in rigid cardboard boxes, seal, label and transport to waste storage point.
- Store for not more than a week.
- Transport to the nearest facility for incineration.

##### **Carcasses, Tissues, Worms and Ticks**

- Wear appropriate PPE
- Place small animal carcasses, tissues, and helminths (worms) in a red biohazard waste bag, seal, and properly label.
- Store bags in a cold room (where applicable) prior to disposal to minimize decay.
- For large carcasses immediately incinerate and dispose in an ash pit or bio-pit.
- Place both alive, dead ticks and other vectors in hot water for 10 minutes, remove, put in

a biohazard waste bag, seal and transport to the nearest facility for incineration.

- For all anthrax positive carcasses, dispose immediately without opening the carcass by incineration or in bio pit and cover the carcass with Sodium hydroxide (avoid Calcium based decontaminants)

**Table 20: Personal Protective Equipment requirements for waste disposal**

| Activity  | Personal Protective Equipment   |
|---|---|
| <b>Incineration</b>   | Heat resistant leather gloves<br>Gloves<br>Overall<br>Gumboots<br>Goggles<br>Canvass apron<br>Respirator            |
| <b>Autoclaving</b>  | Heat resistant leather gloves<br>Latex Gloves<br>Protective Coat<br>Protective shoes<br>Nose masks (surgical masks) |
| <b>Storage of potentially infectious waste (before treatment)</b> | Gloves<br>Protective Coat<br>Protective shoes<br>Nose masks (surgical masks)<br>Waterproof Canvas apron<br>Gumboots |
| <b>Disposing of incinerated waste to the Ash Pit</b>              | Industrial gloves<br>Gloves<br>Overall<br>Gumboots<br>Goggles<br>Waterproof Canvass apron<br>N95 mask               |
| <b>Disposing waste to the Bio Pit</b>                             | Industrial gloves<br>Gloves<br>Overall<br>Gumboots<br>Goggles<br>Waterproof Canvass apron<br>N95                    |
| <b>Disinfection and sterilization</b>                             | Industrial gloves<br>Gloves<br>Protective coats<br>Waterproof Canvass apron<br>Gumboots<br>Face mask                |

| Activity                 | Personal Protective Equipment  |
|--------------------------|--|
| Transportation of wastes | Industrial gloves<br>Gloves<br>Protective coats<br>Waterproof Canvass apron<br>Gumboots<br>Face mask |

## **Appendix 12. SOP for incident response**

### **i. Preparedness**

- Undergo regular training on biosafety and biological emergency response.
- Ensure field kits are stocked with PPE, disinfectants, sampling equipment, and SOPs.
- Maintain updated contact lists for county and national emergency response teams.
- Participate in simulations or table-top exercises.

### **ii. Detection and Notification**

- Observe for unusual clinical signs, mortality, or patterns suggestive of a biological event.
- Isolate suspect animals and notify the County Director of Veterinary Services (CDVS) immediately.
- Record all initial observations in the field incident logbook.
- Initiate disease reporting through the official national system (Kenya Animal Bio-surveillance System).

### **iii. Field Investigation and Sample Collection**

- Wear appropriate PPE before entering affected premises.
- Establish zoning: clean zone, intermediate zone, infected zone.
- Collect specimens following national protocols. Label and secure samples in triple packaging.
- Decontaminate all sampling equipment and exit the site through proper PPE doffing and disinfection.

### **iv. Response Actions**

- Implement temporary quarantine and movement control measures in collaboration with local authorities depending on the biological risk level.
- Disinfect affected premises using approved disinfectants.
- Provide guidance to animal owners on isolation and biosecurity.
- Monitor health of responders for post-exposure symptoms where zoonotic pathogens are suspected.

### **v. Communication**

- Report findings and updates regularly to the CDVS.
- Use mobile platforms for real-time alerts to the response coordination team.
- Support risk communication to the community using simplified messages in local languages through the relevant authorities.

#### **vi. Documentation**

- Maintain a detailed incident logbook: date, location, case number, species affected, herd size, number affected, deaths, number at risk, contact details of persons exposed (zoonotic), case history, actions taken, samples collected,
- Submit completed field investigation forms/report and specimen tracking sheets to the County and National Laboratories.

#### **vii. Recovery and Follow-Up**

- Support affected farms in cleaning, disinfection, and animal restocking (if applicable).
- Coordinate with public health teams for One Health interventions.
- Participate in After-Action Reviews (AARs) to evaluate response effectiveness.
- Provide feedback to update field protocols and SOPs.

#### **viii. Biosafety Measures**

- Always wear and correctly dispose of PPE.
- Follow donning and doffing protocols as per training.
- Disinfect tools and equipment before and after use.
- Never eat, drink, or smoke in or near infected zones.

# List of Contributors

## Facilitating Team

Ray Kayaga, International Federation of Biosafety Associations, Tanzania  
James Sakwa, Masinde Muliro University of Science and Technology, Kenya  
Erick Mungube, Kenya Agricultural and Livestock Research Organisation (KALRO)  
Sandra Matinyi, Nuo Bioscience, Uganda  
Alice Manyola, National Veterinary Reference Laboratories Kabete, Kenya

## Editorial Team

Wilson Gachugia, Directorate of Veterinary Services  
Peter Kimeli, University of Nairobi  
Moses Olum, Kenya Agricultural and Livestock Research Organisation (KALRO)  
Peninah Wamboi, National Veterinary Laboratory Mariakani  
Hector Kusiru, National Veterinary Laboratory Kericho  
Bridgit Muasa, Directorate of Veterinary Services

## Drafters

Timothy Lesuuda, National Veterinary Reference Laboratories Kabete  
Kelita Ogol, National Veterinary Laboratory Nakuru  
Evans Muthuma, Directorate of Veterinary Services  
Khaoma Barasa, National Veterinary Reference Laboratories Kabete  
Jones Mutua, Kenya Veterinary Vaccines Production Institute  
Kenneth Ketter, Foot and Mouth Disease Laboratories Embakasi  
Esther Kamau, National Veterinary Laboratory Karatina  
Nauline Chepngeno, National Veterinary Laboratory Eldoret  
Ephy Khaemba, International Livestock Research Institute (ILRI), WOAHA Collaborating Centre for One Health  
Nyamweya Japhet, National Veterinary Laboratory Garissa  
Josephat Mbai, Makueni County Directorate of Veterinary Services  
Victor Toroitich, County Government of Laikipia  
Nehemiah Birgen, Veterinary Medicines Directorate  
Darlington Kadenge, Vihiga County Directorate of Veterinary Services  
Kelvin Osore, Kenya Veterinary Association  
Nazaria Nyaga, Kajiado County Directorate of Veterinary Services  
Mathew Muturi, Directorate of Veterinary Services



### **Validation workshop participants**

Thomas SHAMALLA, National Disaster Management Unit  
Bernard Rono, Kenya Wildlife Service  
Marion Amulyoto, Kenya Defence Forces  
Patrick Okanya, The Biorisk Management Association of Kenya (BMAK) / Technical University of Kenya  
Kevin Obiero, Kenya Marine and Fisheries Research Institute  
Evalyn Mwihia, Egerton University  
Auleria Apopo, Kenya Fisheries Service  
Damaris Mwololo, Directorate of Veterinary Services  
Cornel Malenga, Kilifi County Directorate of Veterinary Services  
Renson Owuor, Migori County Referral Hospital  
Nancy Mulwa, Directorate of Veterinary Services  
Sabenzia Wekesa, Directorate of Veterinary Services  
Michael Maina, Directorate of Veterinary Services  
David Nanyende, National Disaster Operations Centre  
Philemon Kosgei, Directorate of Veterinary Services  
Jaquinvidah Gila, Kenya Veterinary Board

### **Reviewers**

Helen Roberts, UK Department for Environment, Food & Rural Affairs  
Caroline Zindoga, Department of Veterinary Services, Zimbabwe  
Innocent Chabanga, Department of Veterinary Services, Zimbabwe  
Henry Wamwayi, WOAHPVS Expert  
Mohamed Naceur BACCAR, Centre National de Veille Zoosanitaire CNVZ (WOAH Collaborating Centre for Field Epidemiology), Tunisia  
Eunice Omondi, Directorate of Veterinary Services, Kenya  
Amos Nyakeyo, National Drought Management Authority, Kenya  
Simson Ekandjo, Directorate of Veterinary Services, Namibia  
Ali Asy, Animal Health Research Institute, Agriculture Research Center (ARC), Egypt  
Sana Kalthoum, Centre National de Veille Zoosanitaire CNVZ (WOAH Collaborating Centre for Field Epidemiology), Tunisia  
James Ngoci, Kenya Medical Laboratory Technicians and Technologists Board  
Abubakar Hoza, Sokoine University of Agriculture, Tanzania  
Judith Chukwuebinim Okolo, Environmental Biotechnology and Bioconservation Department, National Biotechnology Development Agency, Nigeria  
Monicah Maichomo, Kenya Agricultural and Livestock Research Organisation (KALRO)  
Geoffrey Jagero, Biorisk Management Association of Kenya (BMAK)  
Keith Hamilton, World Organisation for Animal Health (WOAH), France

## **Project Management**

Ian Peter Busuulwa, World Organisation for Animal Health (WOAH), Kenya

Ann Loko, World Organisation for Animal Health (WOAH), Kenya

Emma Wijers, World Organisation for Animal Health (WOAH), Kenya

Neo Mapitse, World Organisation for Animal Health (WOAH), Kenya

Romona Ndanyi, Directorate of Veterinary Services, Kenya





REPUBLIC OF KENYA

**MINISTRY OF AGRICULTURE AND LIVESTOCK  
DEVELOPMENT**

STATE DEPARTMENT FOR LIVESTOCK DEVELOPMENT

*DIRECTORATE OF VETERINARY SERVICES*

Directorate of Veterinary Services  
State Department for Livestock Development  
Ministry of Agriculture and Livestock Development  
Kabete Veterinary Research Laboratories,  
P.O.Box 29114-00625 Kangemi, Nairobi

