



MINISTRY OF AGRICULTURE AND LIVESTOCK  
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*DIRECTORATE OF VETERINARY SERVICES*

# KENYA ANIMAL HEALTH INTEGRATED DISEASES SURVEILLANCE AND RESPONSE (AH-IDSR)

Technical Guidelines

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# Table of Contents

Executive Summary	5
<b>Chapter 1: Introduction</b>	<b>6 - 8</b>
1.1 Background	6
1.2 Animal Health Surveillance Systems in Kenya	7
1.3 Problem Statement	7
1.4 Animal Health-Integrated Disease Surveillance and Response (AH-IDSR)	8
1.5 Purpose of the Animal Health IDSR Strategy	9
<b>Chapter 2: Situation Analysis</b>	<b>10 - 25</b>
2.1 Introduction	10
2.2 Animal Population Distribution and Disease Risk	10 - 15
2.3 Animal health situation in Kenya: Priority animal diseases and Events	15 - 19
2.4 Disease surveillance policy and legal framework	20
2.5 Stakeholder mapping	22 - 23
2.6 Current Animal Health Surveillance in Kenya	24 - 25
<b>Chapter 3: Core Animal Health IDSRs Functions</b>	<b>26 - 65</b>
3.1 Surveillance	26
3.2 Types and Approaches of Surveillance Used in Kenya	26 - 49
3.3 Data collection, entry, and reporting	50 - 58
3.4 Data cleaning, Analysis & Interpretation	58 - 61
3.5 Response-Animal health Emergency Operations Center (AH EOC)	61 - 63
3.6 Feedback	63 - 65

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<b>Chapter 4: Important Diseases, Conditions &amp; Events</b>	66 - 96
4.1 Standard Case Definitions	66 - 67
4.2 Lay case definitions	67
4.3 Categorization of important diseases and events	68 - 96
4.3.1 Multiple species (cattle, sheep, goats)	68 - 85
4.3.2 Suidae (swine)	85 - 87
4.3.3 Aves (poultry)	87 - 91
4.3.4 Equidae (Horse and Donkey)	91
4.3.5 Camelidae (Camel)	91 - 92
4.3.6 Aquatic diseases	92 - 93
4.3.7 Bees diseases	94 - 96
<b>Chapter 5: Laboratory networks</b>	98 - 103
5.1 Introduction	98
5.2 Laboratory Network and Functions Tiers	98 - 103
<b>Annexes</b>	104 - 136
Annex 1 - Line List Templates	104
Annex 2 - Outbreak Investigation Tools	105
Annex 3 - Laboratory Request Form	106
Annex 4 - SpotRep Template	106
Annex 5 - Animal Health SitRep Template	109
Annex 6 - Disease Condition and Type of Sample to be Collected	126 - 133
Annex 7 - Roles and Responsibilities of CEBS Workforce	134 - 136

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# List of Abbreviations

AU	African Union
AI	Artificial Intelligence
CEBS	Community Event Based Surveillance
DHIS2	District Health Information Software
DVS	Division of Veterinary Services
EAC	East African Community
EBS	Event-Based Surveillance
FAO	Food Agriculture Organization
IDSR	Integrated Disease Surveillance and Response
AH-IDSR	Animal health Integrated Disease Surveillance and Response
IHR	International Health Regulations
ILRI	International Livestock Research Institute
KABS	Kenya Animal Bio-surveillance System
KARLO	Kenya Agricultural and Livestock Research Organization
KHIS	Kenya Health Information System
KII	Key informant interview
KNPHI	Kenya National Public Health Institute
KWS	Kenya Wildlife Service
M&E	monitoring and evaluation
MoALD	Ministry of Agriculture and Livestock Development
MoE	Ministry of Environment
MoH	Ministry of Health
NDMA	National Drought Management Authority
SOPs	standard operating procedure
TADs	Transboundary Animal Diseases
UNEP	United Nations Environment Program
WHO	World Health Organization
WOAH	World Organization for Animal Health

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# Executive Summary

Kenya faces increasing threats from zoonotic diseases, transboundary animal diseases (TADs), food-borne pathogens, and diseases emerging at the wildlife–livestock–human interface. These challenges undermine livestock productivity, food security, biodiversity, public health, and safe international trade. To address these risks, the Animal Health Integrated Disease Surveillance and Response (AH-IDSR) technical guideline establishes a unified, coordinated, and risk-based framework under the Directorate of Veterinary Services (DVS) to support early detection, rapid verification, timely reporting, and effective multisectoral response to priority animal health threats. The framework promotes a One Health approach by strengthening collaboration between animal, human, and environmental health sectors. The AH-IDSR strategy is aligned with key national and international frameworks, including the World Organisation for Animal Health standards, the International Health Regulations, Kenya’s Animal Disease Act and related legislation, and the national One Health Strategic Plan for the Prevention and Control of Zoonotic Diseases (2021–2025).

The strategy strengthens an integrated surveillance system covering livestock, wildlife, vectors, and aquatic animals through both indicator-based and event-based surveillance approaches. It incorporates digital reporting platforms such as the Kenya Animal Biosurveillance System (KABS) to enable real-time data reporting, analysis, and information sharing. Standardized case definitions, reporting thresholds, and harmonized notifiable disease lists improve consistency in detection and reporting of priority diseases across the country. Key components of the AH-IDSR framework include strengthened laboratory networks for diagnostics and confirmation, integrated surveillance for zoonotic and emerging diseases, enhanced wildlife, vector, port of entry and aquatic animal health surveillance, and strengthened emergency preparedness and response mechanisms. Rapid response teams, outbreak investigation protocols, vaccination campaigns, and cross-border collaboration support timely containment of disease events.

By integrating surveillance systems and strengthening multisectoral coordination through the Zoonotic Disease Unit (ZDU), the AH-IDSR technical guideline improves the sensitivity, timeliness, and efficiency of disease detection and response. Ultimately, the framework supports evidence-based decision-making, enhances Kenya’s capacity to prevent zoonotic spillover and control endemic and transboundary diseases, safeguards livestock production and food security, and strengthens compliance with international animal health standards to support safe trade and global health security.

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# Chapter 1: Introduction

## 1.1 Background

Animal health surveillance is the systematic and continuous collection, analysis, interpretation, and dissemination of data on animal diseases and health events to guide prevention, control, and policy decisions. It provides the evidence needed for early detection of outbreaks, monitoring of endemic and emerging diseases, and demonstration of disease status for trade and regulatory purposes (Table 1). The World Organisation for Animal Health (WOAH) emphasizes surveillance as a fundamental obligation of veterinary authorities to safeguard animal health, public health, and livelihoods.

Effective surveillance systems integrate passive and active approaches, combining routine reporting from the field with targeted investigations, laboratory diagnostics, and increasingly, digital reporting platforms. Globally, more than 60% of emerging infectious diseases affecting humans originate from animals, and approximately 75% of newly emerging pathogens are zoonotic. Increasing risks from transboundary animal diseases (TADs), zoonotic infections, antimicrobial resistance (AMR), and emerging pathogens at the wildlife–livestock–human interface demand an integrated One Health approach. Early detection of diseases in animal populations is therefore one of the most cost-effective strategies for preventing zoonotic spillover and mitigating public health emergencies. In addition, strengthening the link between disaster risk management and disease surveillance enhances preparedness by integrating early warning systems for climate hazards with disease forecasting mechanisms. Effective early warning requires combining meteorological data, environmental indicators, animal movement information, and syndromic surveillance resulting in improved predictive capacity, ensures timely alerts, and ultimately reduces morbidity, mortality, and economic losses. Ultimately, robust animal health surveillance supports timely decision-making, resource allocation, and national and global health security.

Table 1: Components of disease surveillance and system interoperability

Component	Global (WOAH)	Regional (IGAD/EAC)	Kenyan Implementation
Early Detection	Systematic data collection for trends	Cross-border event reporting	KABS syndromic surveillance
Response	Risk assessments and control measures	One Health frameworks for zoonoses	mDharura for rapid verification
Interoperability	Data sharing across sectors	Health Data Sharing Policy	Integration with human IDSR

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## 1.2 Animal Health Surveillance Systems in Kenya

Animal health surveillance is a cornerstone for the prevention, early detection, rapid response, and control of transboundary, zoonotic, endemic, and emerging animal diseases in Kenya. It safeguards livestock productivity, wildlife conservation, food security, public health through zoonotic disease mitigation, and international trade. Animal health surveillance in Kenya is nationally coordinated by the Directorate of Veterinary Services (DVS) through the Veterinary Epidemiology and Economic Section (VEES). It has evolved since 1895, with major milestones including the Veterinary Epidemiology and Economics Unit (1981), devolution (2010), and nationwide implementation of the Kenya Animal Biosurveillance System (KABS) by 2017. Legally grounded within the country's animal health legal framework, regulations, policies, and guidelines, the system integrates predominantly passive surveillance with active and community event-based approaches. KABS, the flagship mobile platform (evolving from Kenya Livestock Wildlife Syndromic Surveillance (KLWSS)), enables real-time syndromic reporting, data analysis, mapping, alerts, and feedback (bulletins), integrating wildlife data from the Kenya Wildlife Service (KWS). Diagnostic support is provided by both public and private veterinary laboratories. Integration with human health surveillance systems, including Integrated Disease Surveillance and Response (IDSR) / District Health Information Software 2 (DHIS2) and Electronic Community Health Information System (e-CHIS)/mDharura, is coordinated through the Zoonotic Disease Unit (ZDU), operationalizing the One Health approach for joint preparedness and response. Priority diseases under surveillance include transboundary and zoonotic infections such as Foot and Mouth Disease (FMD), Rift Valley fever (RVF), rabies, high pathogenic avian influenza (HPAI), brucellosis, anthrax, rinderpest, African swine fever (ASF), Peste des petits ruminants (PPR) and other notifiable conditions of economic and public health significance. International reporting occurs via World Animal Health Information System (WAHIS) and Animal Resources Information System (ARIS).

## 1.3 Problem Statement

Kenya faces persistent and emerging threats from transboundary, endemic, and zoonotic animal diseases that undermine livestock productivity, food security, public health, biodiversity, and trade. Although the country has made progress in digital reporting and One Health coordination, the current animal health surveillance and response system remains fragmented, predominantly passive, and unevenly implemented across counties. Gaps in standardized case definitions, underutilized diagnostic services, underreporting, and fragmented surveillance systems (aquatic, vector, apiculture and wildlife) weaknesses delay outbreak detection and response, resulting in preventable livestock losses, trade restrictions, food insecurity, and heightened risk of zoonotic spillover.

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## 1.4 Animal Health- Integrated Disease Surveillance and Response (AH-IDSR)

AH-IDSR provides a unified framework for consolidating animal health disease surveillance functions (detection, reporting, analysis, interpretation, feedback, and response). It strengthens the integration of indicator-based and event-based surveillance across livestock, wildlife, aquatic animals, and apiculture sectors. By leveraging shared systems, workforce, laboratories, and digital platforms, AH-IDSR is designed to strengthen early warning, verification, and coordinated response to animal health threats. Aligned with international standards, including the World Organisation for Animal Health Terrestrial and Aquatic Codes and the International Health Regulations (IHR 2005), and operationalized through Kenya's multisectoral One Health framework, AH-IDSR directly addresses systemic weaknesses in the current surveillance landscape.

Specifically, AH-IDSR will address gaps in standardized case definitions, limited laboratory–surveillance integration, underutilized diagnostic capacity, stakeholder involvement, and inadequate wildlife, aquatic, vector, and border surveillance. It will enhance county-level analytics and response capacity, and cross-sectoral data-sharing mechanisms. By expanding digital integration through platforms such as KABS and event-verification tools, the system will enable timely risk assessment and data-driven decision-making at both national and county levels. Future improvements may incorporate advanced technologies, such as artificial intelligence, to enhance risk-based surveillance and system efficiency.

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## 1.5 Purpose of the Animal Health IDSR Strategy

To guide surveillance operations and procedures to detect, control, and ultimately eradicate transboundary and priority zoonotic diseases, thereby improving livestock productivity and safeguarding human health in Kenya.

### **Goal:**

To ensure early detection and global risk monitoring of emerging and re-emerging diseases; strengthen surveillance systems for ongoing disease control and eradication programs; and track disease trends and threats affecting animal and public health.

### **Strategic Intent:**

This plan provides a framework for setting priorities and establishing a roadmap to transform existing surveillance systems and develop future capabilities. It aims to deliver stronger protection against endemic, emerging, and foreign animal diseases and enhance the resilience of Kenya's animal populations.

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# Chapter 2: Situation Analysis

## 2.1 Introduction

Kenya's animal health surveillance system encompasses diverse animal populations; livestock, wildlife, aquaculture, fisheries, apiculture, and companion animals, that are central to national animal health security, zoonotic disease risk management, and operationalization of the One Health approach. This situational analysis examines the current state of animal health surveillance, identifies critical gaps in the existing system, and establishes the epidemiological context necessary for effective integrated disease surveillance and response. Recent assessments, including the Performance of Veterinary Services (PVS) and the Joint External Evaluation (JEE), have identified significant weaknesses in Kenya's animal health surveillance system. These include:

- Limited community-level disease detection capacity
- Inadequate access to and utilization of laboratory diagnostic services
- Fragmented and poorly integrated animal health data systems across veterinary and wildlife sectors
- Sub-optimal multisectoral coordination mechanisms
- Inconsistent linkages between field-level reporting and data analysis with feedback loops

These surveillance system weaknesses result in delayed outbreak detection, limited early warning capacity, and reduced effectiveness of disease control interventions. Addressing these gaps is essential for strengthening Kenya's animal health surveillance system and enhancing preparedness for emerging and re-emerging disease threats.

## 2.2. Animal Population Distribution and Disease Risk

### 2.2.1. Livestock Population and Geographic Distribution

The livestock sector is a key driver of national development, contributing approximately 12% of national GDP, about 40% of agricultural GDP, and supporting over half of the agricultural labour force. Kenya's livestock sector comprises an estimated 100 million population (22 million cattle, 26 million sheep, 38 million goats, 415,000 pigs and 900,000 camels), distributed across the country's diverse agroecological zones. Notably, 60% of the national livestock population is concentrated in the Arid and Semi-Arid Lands (ASALs), where livestock production is the main source of livelihood. Livestock production systems within the country include; pastoral and agro-pastoral (extensive), mixed-crop livestock system, intensive, and ranching. Pastoral and agro-pastoral and ranching systems are predominantly in ASALs (Figure 1). Understanding these systems is critical for animal health surveillance, as disease risks, transmission dynamics, and intervention strategies vary across production types. For instance, pastoral systems may be prone to transboundary diseases due to mobility, while intensive systems face higher risks from production-related infections and antimicrobial resistance.

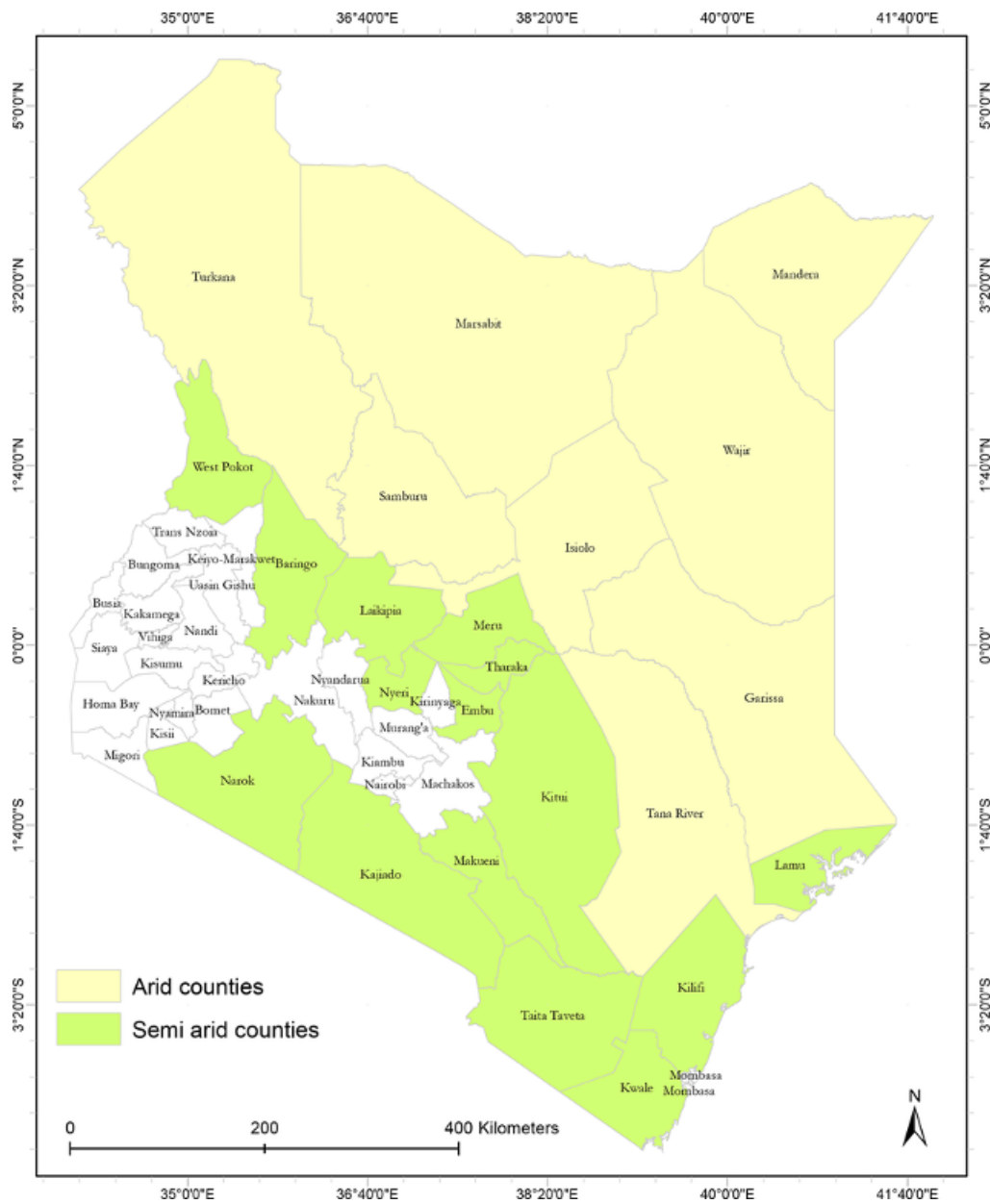


Figure 1: Arid and Semi-Arid Counties in Kenya

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## **Poultry distribution:**

Poultry production systems in Kenya are varied and rely on different bird species and different sets of resources, in a wide spectrum of social and social economic conditions. The population of domesticated birds is estimated at 72 million. Indigenous chickens dominate the industry constituting about 82% of the total poultry population. The commercial flock comprises 16% of the total poultry population. Other poultry species such as ducks, geese, turkeys, pigeons, guinea fowls, quails and ostrich constitute the remaining (2%) of poultry population in the country. The commercial poultry sector produces over 1 million chicks per week. Commercial Broilers, layers, parent stock and hatcheries are reared in the urban and peri-urban areas with very high concentration in areas surrounding big towns and cities like Nairobi, Kisumu, Nakuru and Mombasa. Poultry are susceptible to a range of bacterial, viral and parasitic infections such as Infectious Bursal Disease (Gumboro), Newcastle Disease (NCD), Highly Pathogenic Avian Influenza (HPA1), among others.

### **2.2.2. Aquaculture and Fisheries**

Kenya's aquaculture and fisheries sector is a key pillar of the Blue Economy and is recognized in national development frameworks, including Vision 2030, as a driver of food security, employment, poverty reduction, and economic growth. The sector directly employs over 500,000 people and indirectly supports more than 2 million livelihoods. Aquaculture is categorized into freshwater and mariculture systems, with freshwater production dominated by Nile tilapia (*Oreochromis niloticus*) and African catfish (*Clarias gariepinus*), while mariculture includes milkfish, mullet, mud crabs, prawns, and seaweeds. Fish production exceeded 168,424 metric tonnes in 2024, with inland capture fisheries contributing the largest share, followed by marine fisheries and aquaculture ((Fisheries Statistical Bulletin 2025). Increased demand for fish and declining capture fisheries have driven intensification of aquaculture, particularly semi-intensive pond systems and emerging intensive systems such as cage culture and recirculating aquaculture systems. Kenya possesses extensive aquatic resources, including numerous freshwater lakes, rivers, and dams, as well as a vast Indian Ocean coastline that supports diverse fish production (Figure 2).

Aquatic animal health in Kenya remains under-prioritized in national surveillance despite rapid sector growth, increasing production intensity, and expanded trade that elevate disease risks. Surveillance data are fragmented and largely research-driven, with no consolidated national database, yet available evidence shows the presence or risk of multiple viral, bacterial, parasitic, fungal, and environmentally driven conditions affecting aquatic species. Reported threats include viruses such as Lymphocystis, IHN, and IPN linked to imported stocks, regional risk of Tilapia Lake Virus within the Lake Victoria basin, numerous bacterial and parasitic pathogens of zoonotic and trade significance, and emerging non-infectious challenges such as feed toxins, pollutants, and water quality stressors, with periodic fish kill events highlighting the increasing influence of environmental drivers on aquatic animal health.

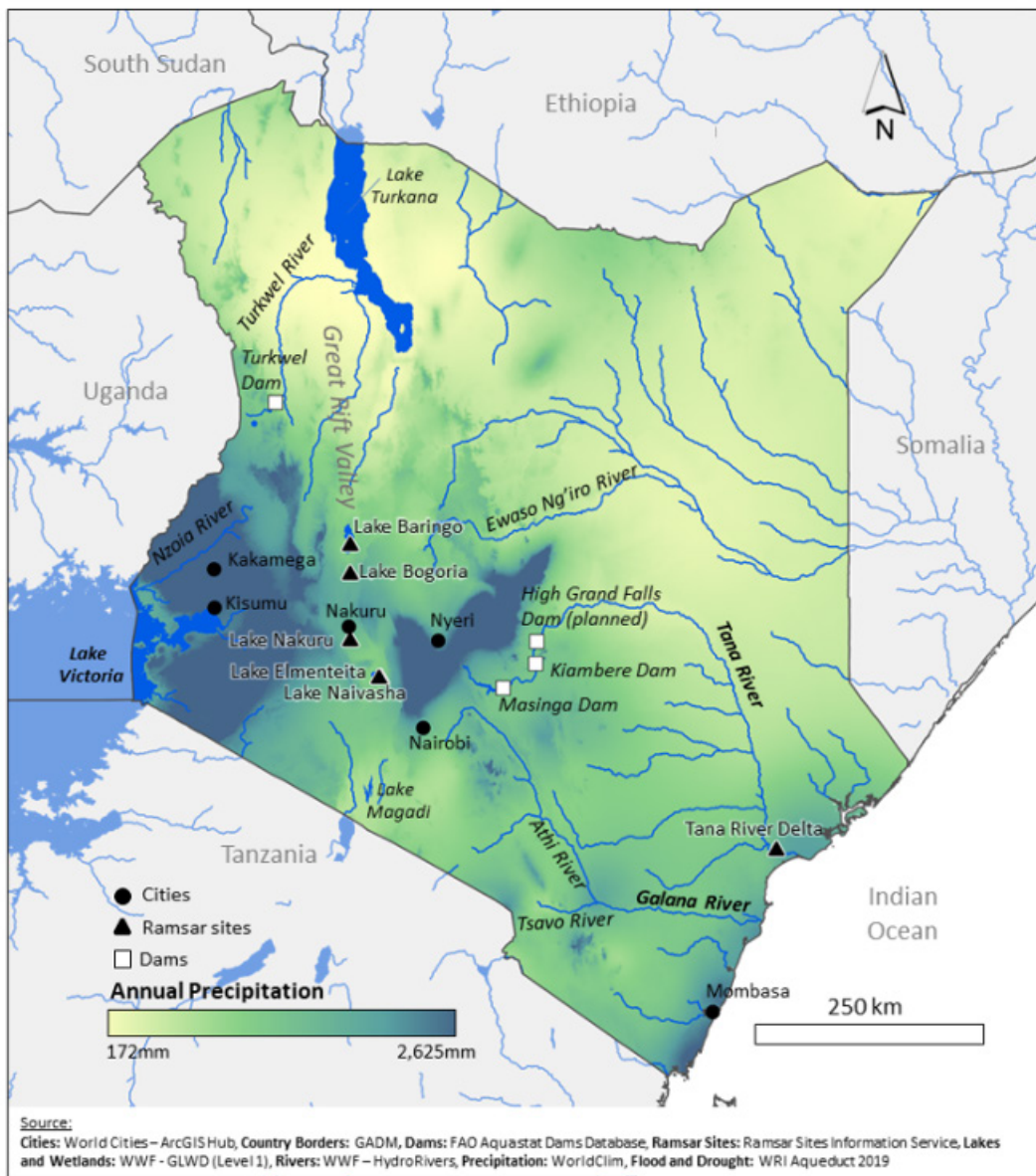


Figure 2: Water Resources in Kenya

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### 2.2.3. Apiculture

Apiculture (beekeeping), is a strategically important livestock sub-sector in Kenya. Beekeeping contributes to household livelihoods, nutrition, pollination services, biodiversity conservation, and climate resilience, particularly in arid and semi-arid lands (ASALs). Beekeeping is widely practiced by smallholder farmers and pastoral communities, where the major production methods include the use of the Langstroth or top-bar hives and traditional methods such as the use of log hives, and is increasingly commercialized through organized cooperatives and value chains. The main species reared in Kenya are the African honeybees (*Apis mellifera* of the races *scutellata*, *monticola*, *litorea* and *nubica*) and stingless bees (*Hypotrigona gribodoi*, *Meliponula ferruginea*). Currently, the apiculture subsector in Kenya only meets about 20% of its estimated potential of over 100,000 tonnes of honey and 10,000 tonnes of beeswax annually. Apiculture requires systematic monitoring of priority bee diseases and pests, chemical residues, beekeeping practices, and climate-related stressors that affect colony health and productivity. Integrating apiculture into national surveillance systems strengthens early warning for ecosystem and environmental health risks. It also supports One Health objectives, and enhances food security, livelihoods, and agricultural resilience through evidence-based prevention, preparedness, and response mechanisms.

### 2.2.4. Companion Animals

Companion animal populations are increasing across urban and peri-urban areas. There is limited information about the number of these animals. Nevertheless, companion animals and more so dogs play a crucial role in the transmission of rabies, a disease of great zoonotic concern.

Furthermore, stray dogs and cats exist in peri-urban and rural areas contributing to high risk of disease transmission. There are dog markets across the country that can act as disease transmission foci and need to be targeted in surveillance systems.

### 2.2.5. Wildlife

Wildlife-based tourism is a major economic pillar, contributing approximately 10% of national GDP, over 18% of foreign exchange earnings, and supporting thousands of jobs and rural livelihoods. Kenya supports a wide range of wildlife species found across savannas, forests, rangelands, wetlands, and coastal and marine areas. Wildlife is managed within a national system of protected areas that includes 23 national parks, 28 national reserves, and 4 national sanctuaries managed by the Kenya Wildlife Service, covering about 8% of the country's land area. In addition, more than 200 community and private conservancies play an important role in wildlife conservation and together cover an estimated 16% of Kenya's land. Approximately 70% of this wildlife occurs outside formally protected areas, mainly on community and private lands that serve as important grazing areas, migration routes, and seasonal habitats. This highlights the need for conservation and wildlife health efforts that extend beyond protected area boundaries. Kenya's wildlife populations play a critical role in disease ecology and zoonotic disease emergence. The country hosts diverse wildlife populations, including millions of animals across a wide range of species, with tens of thousands comprising large mammals such as elephants, giraffes, zebras, antelopes, and carnivores.

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Several wildlife species serve as reservoirs or maintenance hosts for important animal diseases. African buffalo (*Syncerus caffer*), with an estimated population of 27,389 (National Wildlife Census 2025 Technical Report), are key reservoirs for Foot and Mouth Disease and selected vector-borne pathogens, posing a persistent risk to cattle in areas adjacent to conservation zones. Wildebeest (*Connochaetes taurinus*), numbering approximately 1.3–1.5 million within the Mara–Serengeti ecosystem, are the primary maintenance hosts of Malignant Catarrhal Fever, resulting in substantial cattle losses during seasonal calving and migration periods. Warthogs (*Phacochoerus africanus*), widely distributed across the country, maintain the sylvatic cycle of African Swine Fever, presenting a continual threat to domestic pig production.

Non-human primates (including olive baboons, vervet monkeys, and colobus monkeys) occur across multiple habitats and frequently interface with humans and livestock, presenting zoonotic disease risks. These include susceptibility to tuberculosis, involvement in sylvatic transmission cycles of yellow fever, incidental infection with rabies, and potential involvement in spillover events of monkeypox.

Rodents and other wild ungulates support tick populations and contribute to the persistence and spread of pathogens such as *Theileria*, *Anaplasma*, *Brucella*, and *Leptospira*.

### **2.3 Animal health situation in Kenya: Priority animal diseases and Events**

The AH-IDSR guideline document is designed to detect, report, analyze, and respond to animal health threats, including zoonotic diseases with public health implications, in alignment with World Health Organization (WHO) and World Organisation for Animal Health (WOAH) standards. The strategy employs a combination of active and passive surveillance, indicator-based and event-based surveillance, and syndromic reporting to enable early detection of priority animal diseases and unusual health events across production systems. Priority animal diseases are categorized to guide surveillance approaches, reporting requirements, and response actions, including transboundary animal diseases, zoonotic diseases, epidemic-prone conditions, and emerging transboundary animal diseases (TADs). These categorizations ensure risk-based surveillance, timely notification, and effective coordination between veterinary, wildlife, environmental, and public health sectors under the One Health approach.

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The key Priority diseases are categorized as follows;

### **2.3.1 Transboundary Animal Diseases**

Transboundary animal diseases (TADs) are highly contagious epidemic diseases capable of spreading rapidly across national borders, causing significant socio-economic losses, trade disruptions, and adverse public health outcomes. They include emerging, re-emerging, and trade-sensitive infections that require coordinated regional and international collaboration for effective prevention and control. Kenya continues to face several priority TADs based on their economic impact and epidemic potential, including African swine fever (ASF), contagious bovine pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP), lumpy skin disease (LSD), Rift Valley fever (RVF), PPR, anthrax, rabies, Newcastle disease (NCD), high pathogenic avian influenza, and FMD. Some of these diseases occur at the livestock–wildlife interface, where wildlife may contribute to maintenance and transmission, complicating control efforts and increasing the risk of cross-border spread.

Key drivers of TADs in Kenya include pastoral mobility, informal cross-border livestock trade with neighboring countries, interaction at the wildlife–livestock interface, and climatic variability that influences animal movement and vector dynamics. Socio-economic constraints such as limited access to veterinary services, low vaccination coverage, weak surveillance systems, and inadequate laboratory capacity further hinder early detection and response. Effective control requires a coordinated and integrated approach encompassing strengthened surveillance and early warning systems, improved laboratory capacity, regulation of livestock movement and quarantine, preventive vaccination, harmonized cross-border collaboration, enhanced biosecurity, wildlife–livestock interface management, and sustained community engagement in disease reporting and prevention.

### **2.3.2 Zoonotic Priority Diseases**

Zoonotic diseases remain a significant public health and socio-economic threat in Kenya, as demonstrated by the persistent presence and recurrent outbreaks of anthrax, Rift Valley fever (RVF), rabies, brucellosis, non-typhoidal salmonellosis, and bovine tuberculosis. These diseases disproportionately affect poor and livestock-dependent communities, leading to increased household health-care costs, reduced labour productivity, loss of income from animal resources, and heightened food insecurity and malnutrition. They also threaten the country's rare and endangered wildlife species. The economic burden is substantial: brucellosis, bovine tuberculosis, and non-typhoidal salmonellosis alone are estimated to cost over Ksh 600 billion (USD 6 billion PPP), approximately 3.9% of the national GDP. RVF outbreaks have incurred control costs of nearly Ksh 3 billion, with a public health burden estimated at 3.4 Disability Adjusted Live Years (DALYs) per 1,000 people and household costs averaging Ksh 11,800 per reported human case. Rabies is estimated to cause about 2,000 human deaths annually (likely underreported) with post-exposure prophylaxis costing approximately USD 85 per patient, excluding broader social and psychological impacts. Frequent anthrax outbreaks further cause high mortality in livestock, humans, and wildlife.

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Recognizing these risks, Kenya has prioritized zoonotic diseases within its surveillance and response strategies using criteria such as severity in humans, epidemic potential, socio-economic impact, disease burden, and feasibility of effective interventions. Priority zoonoses include anthrax, rabies, brucellosis, Rift Valley fever, and influenza pandemics (HPAI). Addressing these threats requires a strengthened One Health approach that integrates animal, human, and environmental surveillance; enhances laboratory capacity; improves outbreak preparedness and response; supports vaccination and preventive programs; and promotes community awareness and early reporting to reduce morbidity, mortality, and economic losses.

### 2.3.3. Wildlife Diseases and Events

Many infectious diseases that affect livestock also impact wildlife and are considered priority diseases in Kenya under the One Health framework. These diseases pose risks at the wildlife–livestock–human interfaces, contributing to spillover events, economic losses, biodiversity threats, and public health burdens. Key priority diseases, as identified in national strategies (e.g., One Health Strategic Plan for the Prevention and Control of Zoonotic Diseases 2021–2025), prioritization exercises (e.g., 2015 ranking), and recent updates (e.g., RVF contingency plan 2025, brucellosis guidelines), include:

- Anthrax
- Brucellosis
- Trypanosomosis (trypanosomiasis)
- Rabies
- Peste des petits ruminants (PPR)
- Rift Valley fever (RVF)
- Bovine tuberculosis (BTB)
- Foot-and-mouth disease (FMD)
- Viral haemorrhagic fevers (e.g., Marburg, Ebola, Crimean-Congo haemorrhagic fever [CCHF])
- Q fever

These diseases are frequently highlighted due to their zoonotic potential, endemicity in Kenya, climate sensitivity (e.g., RVF linked to flooding cycles), and impacts on trade, livelihoods, and endangered wildlife.

Additionally, health events affecting International Union for Conservation of Nature (IUCN) Red List species; such as the Black Rhinoceros (*Diceros bicornis*, Critically Endangered), the Grevy's Zebra (*Equus grevyi*, Endangered), and the African Wild Dog (*Lycaon pictus*, Endangered), receive prompt veterinary and conservation intervention. These efforts, often coordinated by the Kenya Wildlife Service (KWS) Veterinary Department, conservation NGOs, community conservancies, and research institutions, aim to safeguard vulnerable populations, prevent disease-related declines, and support biodiversity conservation. Interventions include surveillance, diagnostics, vaccination (where applicable), habitat management, and rapid response to outbreaks.

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Surveillance under AH-IDSR also prioritizes wildlife-specific or interface-related health events, including:

- Rickettsial diseases
- Rabies in carnivores
- Avian influenza in waterfowl
- Canine distemper virus
- Trypanosomiasis in wild ungulates
- Mass mortalities (e.g., due to drought, poisoning, or infectious outbreaks)
- Migration-related mortalities (e.g., linked to climate variability, forage scarcity, or blocked corridors)
- Poaching-related contamination events (e.g., carcass poisoning or lead exposure)
- Spillover threats (e.g., from livestock to wildlife or vice versa at interfaces)

These events are monitored to help mitigate broader ecological risks, reduce human-wildlife conflict, and prevent pathogen amplification across sectors.

#### **2.3.4. Aquatic Animal Diseases**

Kenya's rapidly expanding aquaculture sector, particularly intensive systems such as cage culture in Lake Victoria, faces increasing risks from infectious and environmental aquatic diseases that threaten food security, livelihoods, trade, biodiversity, and public health. Priority diseases include emerging and transboundary viral infections such as Tilapia Lake Virus (TiLV), Infectious Haematopoietic Necrosis (IHNV), Infectious Pancreatic Necrosis (IPNV), Koi Herpesvirus Disease, Infectious Spleen and Kidney Necrosis (ISKNV), and White Spot Syndrome, alongside the high-risk exotic disease Epizootic Ulcerative Syndrome. Endemic bacterial infections such as *Streptococcus*, *Aeromonas*, and *Edwardsiella* species, as well as parasitic infections like Ichthyophthiriasis, further contribute to production losses, antimicrobial resistance risks, and zoonotic concerns. In addition, environmental stressors, including hypoxia, harmful algal blooms, chemical contamination, and climate variability can trigger mass fish mortalities and weaken aquatic animal health. Addressing these threats requires a comprehensive approach that strengthens surveillance systems, enhances laboratory diagnostic capacity aligned with WOAHS standards, enforces biosecurity and movement controls, conducts import risk assessments and quarantine, promotes prudent antimicrobial use, monitors environmental conditions, and supports farmer training and multi-sectoral One Health collaboration.

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### 2.3.5. Apiculture

Apiculture is an essential component of the Animal Health Integrated Disease Surveillance and Response (AH-IDSR) framework. Honey bees are affected by a range of diseases including bacterial, viral, fungal, protozoal, parasites and predators. These have significant impacts on colony survival, productivity, and trade. The World Organisation for Animal Health (WOAH) recognizes six notifiable honey bee diseases and infestations of international importance:

- Acarapisosis (*Acarapi woodi*) (Tracheal mite infestation)
- American Foulbrood (*Paenibacillus larvae*) (AFB)
- European Foulbrood (*Melissococcus plutonius*) (EFB)
- Small Hive Beetle infestation (*Aethina tumida*)
- *Tropilaelaps* mite infestation (*Tropilaelaps* spp.)
- Varroosis (infestation of honey bees with *Varroa* mites and associated viruses)

Among the notifiable bee diseases, the American Foul Brood (AFB) has the highest economic impact as it is highly contagious, however, it has not been reported in Kenya. The European Foul Brood (EFB) has been reported in a number of regions, however it is less contagious.

In addition to the WOAH-listed conditions, several non-notifiable but locally significant pests and diseases contributing to substantial losses in Kenyan honeybee colonies and include:

- Small hive beetle infestations
- Wax moth infestations
- *Nosema* spp.,

In Kenya, Greater wax moth (*Galleria mellonella*) and the Lesser Wax moth (*Achroia grisella*) are the most devastating pests of honey bee colonies in the country since they chew the combs, contaminate hive products and destroy the hives. Other pests such as *Varroa* mites are ubiquitous, often linked to colony weakening and transmission of viruses within the colonies. Small Hive Beetles (*Aethina tumida*) and Large Hive Beetles (*Oplostomus* spp.) have been reported in the country with varied distribution in different Agro-ecological zones. *Tropilaelaps* mites and tracheal mites remain undetected but still pose an exotic risk. These diseases require mandatory notification, prompt investigation, and appropriate control measures due to their potential for rapid spread, transboundary impact, and economic consequences. Therefore, they should be incorporated into routine surveillance activities (which are the control measures).

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## 2.4. Disease surveillance policy and legal framework

Kenya's animal health surveillance is guided by a combination of legislation, national strategic plans, and international commitments that provide the legal mandate, technical guidance, and policy direction for disease detection, reporting, and response. Key policies, strategies, and laws supporting animal health surveillance include:

### 2.4.1. International Frameworks

Kenya is a member of the World Organisation for Animal Health (WOAH) and operates under International Health Regulations (IHR 2005), requiring disease detection, notification, and response capabilities.

### 2.4.2. Regional Frameworks

Regional frameworks include the African Union (AU-IBAR) and East African Community (EAC) protocols supporting transboundary disease surveillance and coordination.

### 2.4.3. National Legal Framework

The following national legislation directly supports animal health surveillance activities:

- Constitution of Kenya (2010): Establishes the right to health (Article 43) and outlines national and county government functions (Fourth Schedule), including animal disease control and veterinary services. It provides the legal foundation for coordinated disease surveillance and response systems.
- The Animal Diseases Act (Cap 364): Provides the legal framework for reporting, investigation, and control of infectious and transboundary animal diseases, often by giving the government authority to set regulations, disease notification, and enforce measures to prevent the introduction and spread of animal diseases
- The Public Health Act (Cap 242): Guides surveillance of diseases with human health implications, such as Rift Valley Fever, rabies, and anthrax
- Meat Control Act (CAP 356): Ensures safe handling, processing, and marketing of meat, supporting foodborne disease surveillance
- The Veterinary Surgeons and Veterinary Paraprofessionals Act (Cap 366): Regulates veterinary practice, including disease reporting, control, and surveillance responsibilities for government and private veterinary officers
- Wildlife Conservation and Management Act (2013): In Section 51(c), the Act gives Wildlife Research and Training Institute (WRTI) established under the same Act, the function of undertaking wildlife disease surveillance and control. The WRTI implements this function in collaboration with Kenya Wildlife Service, the wildlife management authority in disease surveillance and reporting. Establishes the Kenya Wildlife Service (KWS) mandate to provide for the protection, conservation, sustainable use, and management of wildlife in Kenya
- Fish Production and Management Act (2016) and Aquaculture Guidelines (National Aquatic Animal Health Strategy, 2024): Sets standards and guidelines to ensure the quality and safety of fish products for market access

- Environmental Management and Coordination Act (EMCA) CAP 387 & Environmental Management Act: Guides environmental protection, pollution control, and ecosystem health.
- Kenya Biosafety Act: Establishes standards for biosafety, waste, and water management to prevent land and water pollution and protect public and animal health.
- County Governments: Provides the legal framework for devolution, assigning counties responsibility for veterinary services, livestock disease control, surveillance, and outbreak response at the local level. It enables counties to establish reporting systems, enforce animal health regulations, and allocate resources for disease control.
- Rabies Act (cap 365): Provides the legal basis for rabies control, including compulsory vaccination of dogs, movement control, and destruction of infected animals. It supports surveillance through mandatory reporting and enforcement measures to prevent and control rabies outbreaks.

### **National Policies and Strategic Plans**

- DVS Strategic Plan 2023 - 2027: Operationalizes animal disease surveillance systems, strengthens laboratory diagnostic networks, enhances reporting systems, and improves preparedness and rapid outbreak response mechanisms.
- Agricultural Sector Development Strategy (ASDS 2010–2020) and National Livestock Development Policy (NLDP): Aligns agricultural growth with livestock productivity and health interventions.
- The Kenya Vision 2030 MTP4 (Medium Term IV) and sustainable development goals (SDGs): Sets national development goals, including food security, livestock health, and One Health integration
- One health strategic plan for the prevention and control of zoonotic diseases : Promotes collaboration between animal health, human health, and environmental sectors. It strengthens integrated surveillance systems, joint outbreak investigations, data sharing, and coordinated responses to zoonotic diseases.
- National strategies for control PPR, RVF, Rabies, FMD, CBPP, Brucellosis, HPAI, ASF: Provide disease-specific surveillance guidelines, vaccination strategies, outbreak response protocols, laboratory diagnostics, and movement control measures. They standardize early detection and rapid response mechanisms across the country.
- Wildlife policy (sessional paper no 1 of 2020): Supports surveillance of wildlife diseases and zoonoses, promoting collaboration between wildlife and veterinary authorities. It helps monitor disease spillover risks between wildlife and livestock.
- County Integrated Development Plans: Provide county-level planning frameworks that allocate funding and set priorities for livestock health services, vaccination programs, surveillance activities, and emergency response systems.
- Livestock policy (sessional paper no. 3 of 2020): Promotes sustainable livestock production through strengthened disease prevention, biosecurity measures, surveillance systems, and veterinary service delivery.

## 2.5. Stakeholder mapping

Stakeholder mapping in animal health surveillance is crucial for strengthening coordination, collaboration, and communication among the various actors involved in disease detection, reporting, and response in animal populations. The purpose and objectives of stakeholder mapping and engagement in animal health surveillance include;

- To clarify the roles, mandates, and linkages amongst stakeholders; this creates synergy and minimizes duplication of efforts, making animal health surveillance effective and efficient
- To enhance community ownership and participation, which improves early detection, reporting compliance, and trust
- Sustainable use of resources through identification of existing capacities, infrastructure, and funding streams across stakeholders, leveraging synergies and prioritizing investments

The various stakeholders in animal health surveillance include;

- National and county government ministries, departments, and agencies – MALD, DVS, MOH, KNPHI, MOTW, KWS, MIBEMA, MOECCF, NEMA
- Research Institutions – KALRO, KEMRI, KMFRI, ICIPE, KIPRE, ILRI
- Private veterinary surgeons and veterinary paraprofessionals
- Professional associations – KVA, KVPA, AHTTAK, UVPK
- Professional regulatory bodies – KVB, VMD
- International partner organisations – WOA, WHO, FAO, UNEP, CDC
- Continental and Regional organisations – AU-IBAR, Africa CDC, EAC, IGAD
- National NGOs, CSOs – AMREF, VSF-G, VSF-S, Kenya Redcross,
- Animal resource industry players – Producers of Livestock and livestock products, Agribusinesses in veterinary supplies and inputs

### 2.5.1. Roles of the stakeholders in animal health surveillance

Table 2: Summary of Roles for Kenyan Stakeholders

Stakeholder Category	Description & Role
Ministry of Agriculture and Livestock Development	<ul style="list-style-type: none"><li>• Is the line ministry on matters of surveillance of animal diseases, zoonoses, food safety issues, and AMR</li><li>• National leadership, Coordination, Oversight, Policy &amp; legal framework development, resource mobilization</li></ul>
Directorate of Veterinary Services	<ul style="list-style-type: none"><li>• Is the lead technical authority in matters of animal health as recognized by World Organization for Animal Health (WOAH)</li><li>• Technical leadership, coordination, and oversight for effective animal health surveillance</li><li>• Design, develop, and implement animal health surveillance systems</li><li>• Implement policies, laws, and strategies on animal health surveillance, capacity building, and quality assurance in animal health surveillance</li></ul>
Kenya Wildlife Service	<ul style="list-style-type: none"><li>• Is mandated with the conservation, management and protection of wildlife, including wildlife health</li><li>• Responsible for reporting of diseases and events in wildlife and thus contribute to animal health surveillance</li></ul>

Stakeholder Category	Description & Role
Kenya Meteorological Department	<ul style="list-style-type: none"> <li>Mandated with provision of weather and climate services, monitoring of weather patterns and issuance of advisories</li> <li>Supports animal health surveillance by providing climatic information that is key in early warning and predictive surveillance systems</li> </ul>
Ministry of Health, Kenya National Public Health Institute	<ul style="list-style-type: none"> <li>Responsible with the detection and response to public health threats</li> <li>Collaboration in animal health surveillance especially in zoonotic diseases, food safety concerns, AMR and joint risk assessment and capacity building</li> </ul>
Council of governors	<ul style="list-style-type: none"> <li>Serves as the liaison between county governments and national government institutions (e.g. MALD, DVS) on animal health surveillance matters</li> <li>Responsible for Coordination, advocacy, policy harmonization, resource mobilization, collaboration and information sharing in matters of animal health surveillance</li> </ul>
County department of veterinary services	<ul style="list-style-type: none"> <li>Mandated with the provision of animal health and veterinary public health services at the county level including disease control and surveillance in animals</li> <li>Coordination and implementation of animal health surveillance activities at the county level</li> </ul>
Research institutions	<ul style="list-style-type: none"> <li>Mandated with undertaking research to inform policy, generation of technologies and innovations, technological transfer and capacity building</li> <li>Support in animal disease research to inform surveillance, development of diagnostic tools, risk assessment and capacity building of the workforce in surveillance and diagnostics</li> </ul>
Private animal health services providers	<ul style="list-style-type: none"> <li>Include registered veterinary surgeons and veterinary paraprofessionals who are self-employed or employed by non-governmental institutions</li> <li>Support the timely detection and reporting of diseases and contribute data on animal diseases and events to national surveillance systems</li> </ul>
Agribusinesses in livestock, livestock products and inputs	<ul style="list-style-type: none"> <li>Are frontline actors and contribute to animal health surveillance directly and indirectly</li> <li>Support animal health surveillance directly through reporting of events and diseases in relevant agribusiness value chains</li> <li>Support surveillance indirectly through monitoring or reporting of proxy indicators in disease trends and generate valuable surveillance intelligence</li> </ul>
Community	<ul style="list-style-type: none"> <li>This includes community health promoters and disease reporters and farmers and farmer organisations</li> <li>Responsible in supporting syndromic and community-based surveillance through reporting of events and syndromes for early warning surveillance systems</li> </ul>
Continental and Regional Institutions	<ul style="list-style-type: none"> <li>Include institutions such as AU-IBAR, IGAD, EAC and other institutions where Kenya is a member state</li> <li>Facilitate cross-border surveillance, policy harmonisation, technical support, capacity building and resource mobilization in animal health surveillance</li> </ul>
International Organizations	<ul style="list-style-type: none"> <li>Include organisations such as WOAHA, FAO, WHO and other agencies</li> <li>Sets global standards in animal health surveillance, provide technical assistance, training and resources for animal health surveillance</li> </ul>

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## 2.6 Current Animal Health Surveillance in Kenya

Animal health surveillance in Kenya has evolved significantly from manual, paper-based reporting in the post-independence era to a modern, integrated electronic system anchored on the Kenya Animal Biosurveillance System (KABS). KABS, a national mobile-based platform launched in 2017, supports standardized, near-real-time data collection, syndromic surveillance, analysis, feedback, and secure management by the Directorate of Veterinary Services (DVS). It achieved nationwide adoption across all 47 counties by 2021, resulting in a substantial increase in reporting volume (e.g., 10-fold in early evaluations) and enabling inclusive participation from technical veterinarians, private practitioners, community reporters, and wildlife personnel, even in remote and underserved areas.

KABS covers livestock, wildlife, and aquaculture, facilitating early detection of priority diseases, zoonoses, and AMR trends. Complementary to KABS is the mDharura platform, a One Health event-based surveillance (EBS) system jointly developed in 2017 by human and animal health sectors. It enables community- and facility-level reporting of unusual events/signals, with progressive rollout across counties and mechanisms for cross-sectoral verification and response (e.g., routing zoonotic signals to KABS or KHIS).

Ongoing progress includes strengthened laboratory integration via systems like SILAB/LIMS (for sample tracking and results) and wildlife tools such as EarthRanger (used in conservancies for syndromic data) (Table.). Policy priorities, as outlined in the State Department for Livestock Development Strategic Plan 2023–2027 and One Health frameworks, emphasize full interoperability among KABS, mDharura, SILAB, and EarthRanger to improve data sharing, governance, real-time alerts, and coordinated epidemic preparedness/response under AH-IDSR.

Despite these advancements, several challenges remain, including variable data quality and analytical capacity at the county level, incomplete reporting, limited integration across surveillance systems, and resource constraints for wildlife and environmental surveillance. Strengthening the AH-IDSR framework aims to address these gaps by improving data interoperability, enhancing system coordination, and institutionalizing a One Health approach to enable more efficient detection and response to zoonotic diseases.

Table 3: Animal health reporting platform

Platform	Type	Launch/Rollout	Key Features	Sectors Covered	Integration Focus
KABS	Indicator/syndromic	2017; nationwide 2021	Mobile reporting, real-time analysis, feedback	Livestock, wildlife, aquaculture	Primary DVS anchor; links to labs
mDharura	Event-based (EBS)	2017; progressive	Community signals, cross-sector sharing	Human-animal One Health	With KHIS/KABS for zoonoses
SILAB/LIMS	Laboratory	Ongoing	Sample/info management	Veterinary diagnostics	Data flow to KABS
EarthRanger	Wildlife/conservancy	Varies (e.g., conservancies)	Syndromic/event tracking	Wildlife	Potential harmonization with KABS

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# Chapter 3: Core Animal Health IDSRs Functions

## 3.1 Surveillance

Animal health surveillance is defined as the ongoing, systematic collection, collation, analysis, interpretation, and timely dissemination of animal health data for use in decision-making and action. It has the following objectives.

1. To safeguard public health – monitoring and detection of public health threats such as zoonotic pathogens and AMR to reduce the risk of infection for human populations. Data generated also supports One Health interventions in the event of outbreaks.
2. Early detection of diseases - A surveillance system should be sensitive enough to pick up outbreaks before they can spread and cause socioeconomic losses.
3. To monitor trends of disease occurrence – should track diseases to be able to detect patterns of diseases in the population over time.
4. To guide disease prevention and control measures - the surveillance system should generate epidemiological data that is used to inform effective prevention and control measures.
5. To evaluate disease prevention, control, and eradication measures – assess whether interventions (e.g., biosecurity measures, vaccination campaigns) are effective, and if not, where adjustments are required.
6. To support risk assessment and preparedness- data is used to identify high-risk populations, regions, and seasons which is crucial for contingency planning, resource allocation and outbreak preparedness.
7. To support policy formulation and research – generate evidence for the improvement of the surveillance system and disease control strategies, prioritization of diseases and policy development.
8. To meet national and international reporting requirements – Kenya is part of international treaties that require her to submit disease data to international platforms such as the WAHIS, and regional platforms such as ARIS. These platforms are used to track animal diseases both regionally and globally.

## 3.2 Types and Approaches of Surveillance Used in Kenya

### 3.2.1 Active surveillance

This is a proactive, time-limited investigation involving the targeted collection of data to detect and measure the presence or absence of specific diseases (infections) in animal populations or individuals. It is implemented through outbreak investigations, post-vaccination coverage surveys, disease prevalence studies, or verification of early signals from passive surveillance. Activities include field surveys, structured data collection, examinations, and sampling, coordinated by national and county authorities. Commonly applied to priority animal diseases, it improves data accuracy and early detection but is resource-intensive and often donor-dependent.

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Data for active surveillance is generated through:

a. **Surveys**

A survey is a detailed study conducted to detect and measure the presence or absence of specific diseases or infections in animal populations or individual animals, while also assessing associated risk factors by systematically sampling a defined section of the population.

b. **Disease outbreak investigations**

These are studies designed to generate information about diseases that occur in animal populations. This occurs when an emerging and re-emerging disease is detected or an unusually high number of cases of endemic disease is detected in a population.

c. **Syndromic Surveillance**

It involves the collection of clinical signs and symptoms suggestive of the likely presence of a health event among the animal population. Syndromic surveillance provides an early warning for human and animal health threats, allowing preliminary response pending laboratory confirmation.

d. **Participatory disease search (PDS)**

Participatory Disease Search (PDS) is a community-engaged, field-based surveillance approach that systematically involves livestock keepers, Community Disease Reporters, local leaders, and other community actors in the identification, reporting, and validation of animal health events and disease patterns using participatory epidemiology tools and methods. PDS leverages local knowledge, indigenous disease recognition, seasonal calendars, risk mapping, and community narratives. These assist to detect outbreaks, emerging threats, and unusual disease events, particularly in remote, pastoral, and underserved areas where conventional surveillance coverage is limited.

e. **Sentinel surveillance**

This denotes the systematic monitoring of health events at selected representative sites, where the risk factors of the disease of interest are highest. These include designated facilities, key livestock markets, border points, wildlife conservancies or purpose-selected sentinel individuals, farms, or animal groups. They are maintained for routine health monitoring through periodic clinical examination, laboratory testing to detect trends and early signs of priority diseases. The laboratory testing includes serological testing to detect seroconversion, molecular diagnostics such as PCR for pathogen detection, parasitological examination, or pathogen isolation.

f. **Targeted surveillance**

Targeted surveillance describes surveillance that is focused on a specific disease or pathogen. For example, a serological survey for brucellosis may use the Rose Bengal test (RBT). Blood from each sampled animal is tested, and the result of the test is classified as RBT positive or RBT negative. An animal that has tuberculosis or foot-and-mouth disease (FMD), but not brucellosis, would be simply classified as RBT negative, as these other diseases are not of interest in the surveillance activity.

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### 3.2.2 Passive surveillance

Passive surveillance is the routine and continuous collection of animal health and disease information from established and designated service points, including veterinary clinics, diagnostic laboratories, animal health practitioners, government animal health posts, slaughterhouses, quarantine stations, and apiaries, without active field searching by surveillance personnel. Data is generated through routine clinical services, inspections, and diagnostic activities, and implemented through consistent reporting and analysis, and forms part of the national early warning system. It is not restricted to specific diseases but allows for the identification of diseases present in the country and their distribution. It is a continuous core function of Veterinary Services and a fundamental requirement under the standards of the World Organisation for Animal Health (WOAH).

The forms of passive surveillance include;

#### a. **Abattoir Surveillance**

This employs ante and post-mortem inspection methods to pick up disease incidences at the abattoir level thereby triggering active disease search through trace-back of the animals. It is suitable for detecting non-fatal chronic diseases that are difficult to detect in live animals e.g. CBPP, CCPP, TB and Parasites such as Cysticercosis and Hydatidosis. Animal welfare issues can also be detected at ante-mortem inspection. Weaknesses of abattoir surveillance include under-reporting especially during high-speed slaughter where conditions may be missed by meat inspectors.

#### b. **Rumour registers**

A rumour register is a passive, event-based surveillance tool used to systematically capture unverified reports, community alerts, media signals, and informal information on unusual animal health events. It relies on unsolicited inputs from farmers, pastoralists, traders, local leaders, field officers, and other community networks, serving as an early warning mechanism for potential disease outbreaks or emerging risks. Information recorded in the rumour register is subjected to verification and risk assessment, and credible signals trigger active surveillance actions such as field investigations, sampling, and outbreak response, thereby strengthening early detection and preparedness within integrated animal health surveillance systems.

#### c. **Market surveillance**

This is a targeted surveillance approach conducted within markets, livestock holding grounds, slaughter points, and trade corridors to detect, monitor, and assess animal health risks associated with animal and animal products movement, trade, and aggregation. It involves routine observation, clinical screening, documentation review, and reporting of suspected diseases, abnormal mortalities, and high-risk animal conditions, serving as a critical early warning mechanism for priority animal health events. Market surveillance strengthens outbreak prevention, traceability, and risk-based control by linking animal movement systems with integrated animal health surveillance and rapid response frameworks.

#### d. **Ports of Entry (PoE) Veterinary Surveillance**

Animal disease surveillance at Kenya's ports of entry serves as the first line of defense in the country's biosecurity strategy. It involves the systematic monitoring and inspection of animals, animal products, by-products, and

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biological materials at international borders including airports, seaports, and land crossings to prevent the introduction, establishment, or spread of disease pathogens. These activities are coordinated by the DVS in accordance with sanitary and phytosanitary standards of WOAHA.

## **Border Surveillance Framework**

Effective surveillance at ports of entry is based on three main pillars: documentary checks, physical and clinical inspection, and sampling and laboratory testing.

### **a. Documentary Checks**

Before arrival, importers submit shipment documentation through the national Single Window Trade Facilitation Platform (TFP), allowing veterinary authorities to conduct a pre-arrival risk assessment. At the port of entry, officers verify key documents to ensure compliance with import regulations and sanitary requirements. These include; i. International veterinary health certificates confirming that animals or animal products originate from disease-free areas and meet the conditions of the import permit; ii. import permits issued by veterinary authorities specifying health requirements; and iii. transit permits to confirm that consignments did not pass through areas affected by disease outbreaks.

### **b. Physical and Clinical Inspection**

Veterinary inspectors also conduct physical and visual examination of consignments. Live animals are screened for clinical signs such as fever, blisters, coughing, abnormal behavior, or unusual mortality that may indicate infectious disease. Animal products are inspected for spoilage, contamination, or improper handling. In addition, vector surveillance is undertaken to check transport vehicles including trucks, ships, and aircraft for arthropod vectors such as ticks, mosquitoes, or midges that may carry pathogens. Biosecurity measures also include strict management of swill and food waste from international flights and vessels, which must be properly destroyed to prevent the introduction of diseases such as African Swine Fever.

### **c. Sampling and Laboratory Testing**

When risks are identified, inspectors conduct targeted sampling and diagnostic testing. Point-of-care diagnostic kits may be used at the border for rapid screening, while additional samples such as blood, tissue, or swabs may be referred to national veterinary laboratories for confirmatory testing. During this process, consignments may be held at quarantine stations until laboratory results confirm their safety.

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### **Movement Control and Digital Reporting**

Cross-border movement of livestock requires official permits issued by veterinary authorities. Unauthorized movements are intercepted and animals may be confiscated, quarantined, or returned to the country of origin. Surveillance data collected at ports of entry is recorded and compiled into monthly reports submitted to the DVS for monitoring and policy action.

### **Multi-agency Collaboration**

Border surveillance is strengthened through collaboration with other border management agencies through joint patrols, harmonized standard operating procedures, and coordinated information sharing. Regular meetings of Joint Border Committees, Border Management Committees, and Joint Operations Committees enable updates on emerging disease threats and operational procedures. Despite these efforts, several challenges remain, including limited diagnostic capacity at ports of entry, inadequate quarantine facilities, and insufficient training on digital reporting systems such as KABS. Strengthening training for port-of-entry officers, provision of point-of-care diagnostic kits for priority diseases such as Brucellosis and RVF, improved biosecurity measures including vehicle disinfection, and establishment of adequate quarantine infrastructure would significantly enhance Kenya's capacity to prevent the entry and spread of transboundary animal diseases.

### **3.2.3 Wildlife Surveillance**

This involves monitoring of diseases in free-ranging, captive and farmed wildlife with emphasis on the wildlife–livestock–human interface for priority zoonotic and transboundary animal diseases. It integrates ranger-based morbidity/mortality reporting, opportunistic sampling during immobilizations or interventions, postmortem investigations during mass die-offs, sero-surveys in protected and non-protected areas, research findings, and syndromic/event-based reports.

### **3.2.4 Laboratory surveillance**

Laboratory plays a key role in surveillance. All diseases detected during passive and active surveillance should be confirmed in the laboratory. Laboratory surveillance involves the use of diagnostic tests/measures for a disease/condition in question. The inferences that can be drawn about the disease situation depend on the characteristics of the diagnostic test being used. These characteristics can be defined in terms of repeatability (precision) and validity (sensitivity and specificity).

### **3.2.5 Event-Based Surveillance (EBS)**

The EBS system involves the organized collection, monitoring, assessment and interpretation of mainly unstructured ad hoc information regarding Animal and Public Health Events (AHE&PHE) which may represent an acute risk to both animal and human health. The AHE&PHEs are detected using signal (alerts) which is an observation that may represent an event occurring in a population. These could be clustering patterns of animal diseases or other conditions of public health importance, unexplained animal deaths, disasters such as radio-nuclear accidents, floods, etc. Any signal that is verified to be true becomes an event.

In summary, a signal is a set of observations that may represent an occurrence of an event in the community/population. There are four types of EBS based on the sources of information, that is Community Event Based Surveillance (CEBS), Health facility Event Based Surveillance (HEBS), Hotlines/Phones Event Based Surveillance (PEBS) and Media scanning Event Based Surveillance (MEBS) and in this context, we'll focus on CEBS.

The EBS signals should be short statements that are simple, non-technical and flexible. For standardization, the MOALD/MOH and stakeholders have pre-defined community signals for use in routine EBS. However, where necessary during an outbreak, the MOALD/MOH and stakeholders will develop additional signal(s) to enhance CEBS. The additional signal(s) will be specific to the outbreak and discarded upon control of the outbreak.

### Pre-defined signals

1. Two or more people presenting with similar signs and symptoms in a community (village, estate, school, other institution, community gathering e.g. funeral, wedding, market) within a week
2. Any death in the community (not in the hospital)
3. Any child less than 15 years with a sudden onset of weakness of the limb/s
4. Any person 5 years of age or more with lots of watery diarrhea on the same day
5. **Increased sickness including abortions and/or deaths of animals (wild or domestic and poultry/ birds or fish)**
6. **Any event that causes public health anxiety/concern E.g animal bites, floods, death of animals**

The DVS places particular emphasis on the last two signals, that is signal 5 and 6 given their relevance to both animal and public health.

Undertaking EBS is organized into the following six (6) main steps: signal detection, signal reporting, signal triage, signal verification, event risk assessment, and public health action (Figure 3).

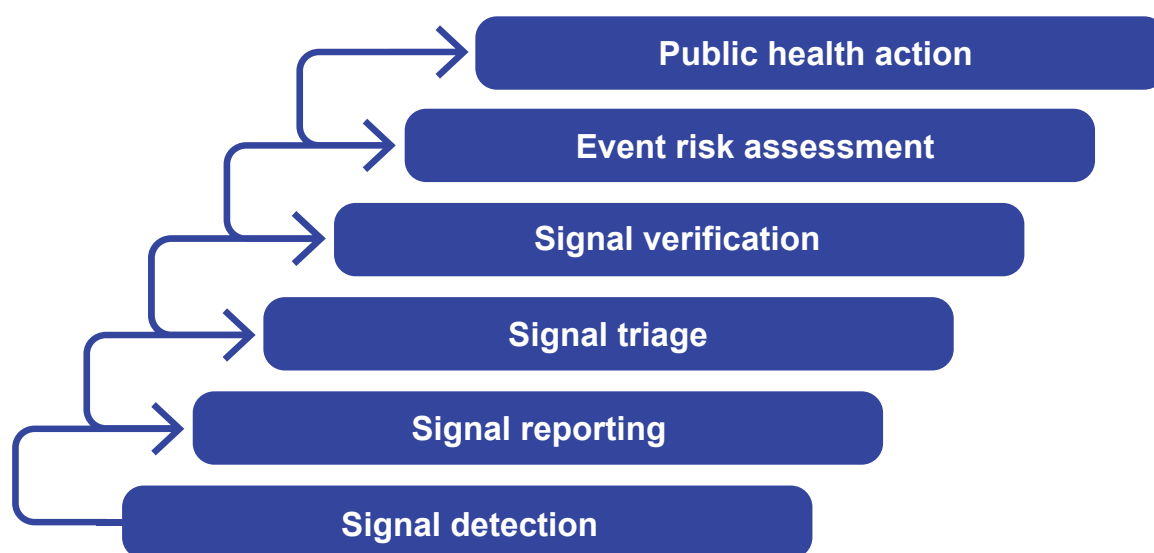


Figure 3: Steps in the EBS Process

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## Signal detection

Signal detection is the process of recognizing the presence/occurrence of information that matches any of the predefined signals. The signals are likely to be detected by community networks or animal health service providers.

## Signal reporting

Signal reporting involves communicating the information on detected signals to a higher-level animal health authority. A clear and simple reporting structure is a prerequisite for a well-functioning EBS system. Reporting is an integral function in all the steps of the EBS process, however, reporting a detected signal reduces missed opportunities in the EBS system. Detected signals must be reported immediately through an agreed method of reporting or any other available channels. Reporting of EBS will be done using the

The EBS utilizes information from multiple sources which makes it highly sensitive generating signals for real and non-real events. So that the next level is not overburdened by all the signals most of which may just be white noise, it is important to filter or triage the signals. Signal triage is the process of sorting out reported signals to identify which ones are likely to be real events. This is done by subjecting the reported signals to the following guiding triage criteria:

1. Reported signal information matches a predefined signal
2. Reported signal constituting a likely animal and human health threat (relevant for EWAR)
3. Reported signal has not been reported previously (not a duplicate)

Any signal that meets all the criteria above is subjected to verification. Triage must be done as soon as a signal report is received by seeking the details through a phone call or visit to the person who has reported the signal.

## m-Dharura application

The m-Dharura is a web-based system with SMS functionality built out of an open-source, global public good software - the community health toolkit (CHT). It is designed to strengthen event-based surveillance while leveraging existing community health structures, human resources (e.g.CDRs/CHPs, CHA/AHA, sub-county, county and national surveillance teams and infrastructure such as mobile handsets at the hands of the users.

The m-Dharura was also designed for technical simplicity, real-time and efficiency in reporting as well as to embody the one health concept. Feedback and escalation mechanisms have also been inbuilt. Community level users (CDRs/CHPs) use basic SMS to report signals. All reports, feedback and escalation mechanisms are facilitated through a short code 40327, that is toll-free to the end-users. This makes m-Dharura easily scalable. A dashboard is also available to support data-driven decision making from the sub-county to national level.

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## Signal Verification

Signal verification is the process of confirming if a signal reported is authentic/valid, that is, whether it is true or false. This is undertaken immediately after signal triage either through:

1. Seeking additional information from a contact where the event is happening
2. Considering trusted sources of signals like the administrators, faith-based leaders, teachers, health care workers, etc.; or
3. Validation of one source with a second source.

A signal that is confirmed true (verified) becomes an event and should be immediately reported to

## Event Risk Assessment

All animal/public health events don't present the same level of risk. Risk assessment (RA) means determining the level of risk an event poses to animals and human health and the appropriate level of response needed. Some of the important concepts during risk assessment include:

- Hazard: Anything that can cause injury, illness or death to animals and humans if not controlled properly. Hazards can be biological, chemical, physical or radioactive.
- Risk: Is the probability of experiencing adverse health effects if exposed to a hazard.
- Risk assessment: A systematic process for gathering, assessing and documenting information to characterize and assign a level of risk to an animal/ public health event.

After a signal has been verified to be an animal/ public health event, an initial risk assessment is conducted. Risk assessment can be conducted independently or as part of an investigation of an event. The process of risk assessment may be biased by an individual's (assessor's) personal risk perception. Due to this subjectivity, it is recommended to be done by a team of at least three assessors who then reach a consensus to the final risk level. The sub-county team should lead the risk assessment, and if necessary, be supported by higher levels.

The Sub- County level will receive several event reports within a given time period. Knowing the level of risk an event presents will help prioritize response, considering the constraints of resources. The Sub- County veterinary authorities gather, evaluate all available information, and then assess or characterize the level of risk that the situation poses to animal and human health. This is done based on the likelihood of exposure to the hazard and the consequences of exposure. All possible consequences, such as social, economic, environmental, political, and long-term consequences e.g., anticipated morbidity, disability, and mortality, should be considered. The first risk assessment of an event MUST take place within 48 hours of the detection of the signal.

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## Animal/ Public Health Action

Animal/Public health action is also referred to as a response. It involves taking appropriate animal health measures to prevent or control the adverse outcomes associated with an event. The type and level of response may include: no action and the event is closed; monitoring the event closely; enhancing surveillance; immediate enhanced response; or round-the-clock response based on the event risk category (Table 4).

Table 4: EBS animal health actions based on risk categories

Level of Risk	Animal health action
Low Risk	Managed according to standard response protocols, routine control programs and regulation (e.g. monitoring through routine surveillance systems)
Moderate Risk	Roles and responsibility for the response must be specified. Specific monitoring or control measures required (e.g. enhanced surveillance, additional vaccination campaigns)
High Risk	Senior management attention needed: there may be a need to establish command and control structures; a range of additional control measures will be required some of which may have significant consequences
Very High Risk	Immediate response required even if the event is reported out of normal working hours. Immediate senior management attention needed (e.g. the command-and-control structure should be established within hours); the implementation of control measures with serious consequences is highly likely

### 3.2.5.1 Community Event-Based Surveillance (CEBS)

Community EBS is the systematic detection and reporting of events that may present a risk to animal and public health within a community, by community members. A community is a residential, social, religious, occupational, or other group of people sharing common characteristics or interests and perceiving itself as distinct in some respect from the larger society within which it exists.

A member of the community is any person residing/belonging to the community under surveillance. It is represented by basic village-level service providers such as community animal disease reporters (CDRs), community health promoters (CHPs), animal health assistants (AHAs), community health assistants (CHAs), community drug dispensers, or similar care providers, village leaders (religious, traditional, administrative or political) or school teachers, traditional healers, etc.

Most events that present an acute risk to animal/ public health occur within a community; thus, undertaking EBS at the community level with the involvement of the members greatly improves timeliness in detection and reporting. The CEBS decentralizes EBS to the lowest community level possible, thus does not overburden intermediate and national levels. To function well, CEBS should be integrated into the KABS and data from CEBS should be actionable and timely with well-defined reporting mechanisms, a feedback mechanism and a monitoring and evaluation process to benefit the community.

Tracks all types of events that may pose a risk to both animal and human health, as opposed to priority diseases. Reports events in real time and not periodically, thus improving the early warning mechanisms. The CDR/CHPs do not have to visit households weekly but rely on informal and formal community communication channels and networks for information. Has a strong one health component in implementation.

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Data transmission is automated through the Mdhara application, which can run on both basic (future) and smart (Android-based) phones; can be paid for centrally, making it cost-effective; CDR/CHPs don't have to travel to report; and has an interactive dashboard which facilitates monitoring.

Whereas CEBS has strength in expanding the scope and strengthening the EWAR mechanisms of Community-Based Disease Surveillance (CBDS), its implementation as spelt out in this document fosters sustainability building from lessons learnt from CBDS.

### **Process of Community Event-Based Surveillance**

Community Event-Based Surveillance is undertaken in the six (6) EBS steps of signal detection, signal reporting, signal triage, signal verification, event risk assessment and public health action (response). It utilizes the predefined community signals. CEBS draws information primarily from the community level networks: community members, key informants, leaders, village elders, nyumba kumi leaders, CBOs, drug stores, agro-vets, learning institutions, FBOs, CHPs, CDRs, etc.

These networks are sensitized on the community signals, whereupon observing, witnessing, or being informed, they report to their respective CDR/CHP or AHA/CHA in person or through any other available means. To enable the network report, the contacts (physical/phone) of the CDR/CHP should be published among the community members and the networks. The CDR/CHPs should then evaluate the information against the predefined signals, and if it matches any, the predefined signal is considered detected.

The CDR/CHP is responsible for sensitizing the community networks on signals to facilitate detection. The CDR/CHPs can utilize household visits, barazas, dialogue days etc., to sensitize the networks. Traditional communication channels, such as banners, fliers, posters, etc. can also be used to aid detection of signals. Upon detecting a signal, the CDR/CHPs should record the details in their notebooks capturing the date detected, signal details and date reported to the next level.

They then relay the information to their respective AHAs/CHAs immediately through the Mdhara application. Should the application be down, they should report through the nearest call center. Under the CEBS, the CDR/CHP are the designated focal points at the community level responsible for receiving signal information from the networks and reporting to the AHAs/CHAs. The AHAs/CHAs should then immediately triage and verify the signals, and those verified true should be reported to the SCVO for risk assessment and public health action.

### **Organization of Community Event-Based Surveillance**

To foster sustainability, the CEBS is implemented within the existing community health structures, that is, community animal health systems in both the MOALD and MOH. The MOALD also has a system of CDRs supervised by the AHAs/SCVOs, however, this may not be as elaborate as the community health strategy due to human resource challenges. The MOALD has animal health care centers (clinics) that provide health extension services largely through licensed private practitioners.

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At a higher level, the animal extension workers report to the Sub-County level focal points (SCVO). There are also focal points at the county and national levels.

The recommended reporting timelines are

- Signals - immediately detected
- Triage - immediately (within 8 hours of signal receipt)
- Events - immediately (within 8 hours of signal receipt)
- Risk assessment - Within 48 hours of signal report
- Response - Daily from receipt of risk assessment feedback

The CEBS primarily takes place at the community and sub county levels of the health system. The county and national levels provide a supportive role as and when needed e.g., events with very severe consequences, events with very high risks, and in cases of inadequate technical capacity and resources. The community level also provides additional information needed e.g., in verification, risk assessment and response. The information generated by each level of the CEBS is as summarized in the table below.

### **3.2.5.2 EBS Connect**

To address fragmentation and enhance efficiency, Kenya is in the final stages of integrating these systems through a digital layer termed EBS Connect. This integration seeks to harmonize EBS data flows across human and animal health systems, linking eCHIS, EBS Mdarura, KABS, and KHIS.

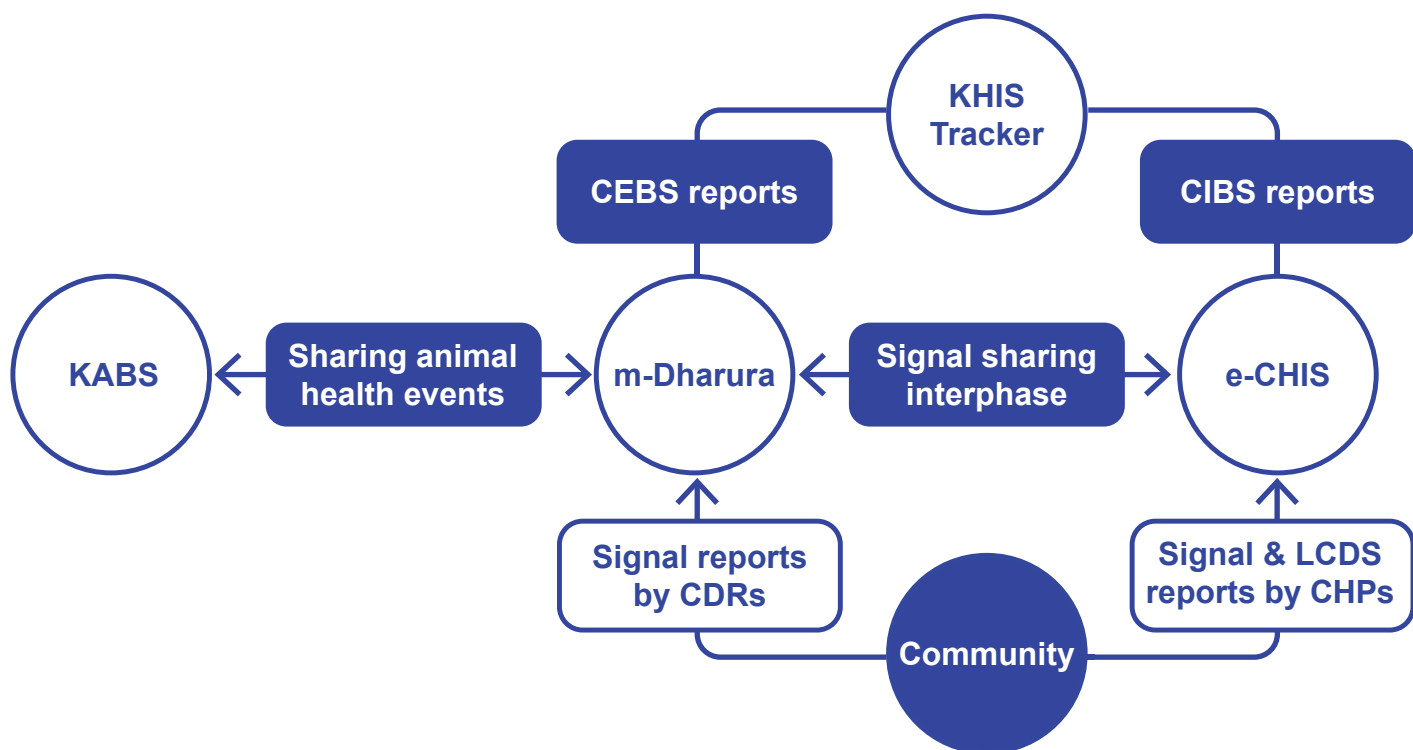
The integration of KABS with EBS Connect enables:

- Real-time sharing of animal disease data.
- Transmission of animal health signals(zoonotic in nature) from KABS to EBS Connect.
- Automated alert generation based on the forms ND1 (Zero Report) and CDR (Case Disease Report).
- Alert Vets on KABS about signals relating to animals for quicker response and action

This integration ensures that both platforms maintain a cohesive and coordinated approach to bio -surveillance, preventing potential outbreaks.

EBS Connect is designed to enable seamless interoperability by allowing data exchange and ensuring that signals reported from the community (via eCHIS) or other sectors can automatically be subjected to verification, risk assessment, and trigger coordinated multi-sectoral response workflows in Mdarura, while ultimately feeding into KHIS for national analytics and decision-making. This approach will overcome existing challenges such as delayed data availability, duplication of efforts, and isolated system operations, thereby strengthening Kenya's capacity for early detection and rapid response to public health threats in line with International Health Regulations (IHR 2005) and One Health objectives.

Figure 3: EBS connect a digital layer that will integrate both KABS, Mdhara and E-Chis



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### **3.2.5.3 Implementation of EBS in animal health sector in Kenya**

Within the animal health sector, EBS implementation focuses on several key animal populations and ecological interfaces.

#### **3.2.5.3.1 Farm Animal Event-Based Surveillance**

Farm animal EBS strengthens early detection of unusual health events in livestock and poultry production systems. It captures information from a wide network of sources including farmers, farm workers, veterinarians, animal health officers, community disease reporters, producer organizations, markets, abattoirs, laboratories, and border inspection points. Events of interest may include sudden increases in morbidity or mortality, unexplained abortions, unusual clinical signs, disease clusters, reduced productivity, or unexpected treatment failures. Reported signals are rapidly assessed and verified, with credible events prompting field investigations, diagnostic sampling, and laboratory confirmation before integration into the national surveillance system for coordinated response and disease control.

#### **3.2.5.3.2 Arthropod Vectors Event-Based Surveillance**

Event-based surveillance for arthropod vectors involves the organized collection, monitoring, and assessment of unstructured information regarding unexpected, unusual, or emerging occurrences related to arthropod vectors of priority animal diseases. This focuses on changes in weather patterns followed by a sudden upsurge, emergence, and resurgence of arthropod vector populations; upsurge of incidences of vector-borne diseases in animals; detection of pathogens and parasites in vectors.

#### **3.2.5.3.3 Wildlife Event based Surveillance**

Wildlife event-based surveillance focuses on detecting and reporting unusual wildlife health events (like animal deaths or signs of disease) that could signal emerging threats to wildlife, livestock, or human health. This is part of Kenya's broader One Health surveillance strategy, which links human, animal, and environmental health. Disease related information and specimens for surveillance from wildlife may be available from sources such as wildlife veterinarians, ecologists, managers and rangers, naturalists and conservationists. Additional information may be obtained from personnel working in wildlife sanctuaries, orphanages and farms and morbidity and mortality observations by the general public. Wildlife population data such as census data, trends over time, distribution and movement data and reproduction trends can be used in a manner similar to farm production records for epidemiological purposes.

#### **3.2.5.3.4 Aquatic animals' event-based surveillance**

Event-based surveillance for aquatic animal health will form a rapid reporting approach that captures unusual or unexpected health events from aquaculture production areas and marine environments, such as sudden increases in fish mortality, abnormal behavior, disease signs, or environmental anomalies (e.g., water discoloration or sudden oxygen depletion). Information is generated from multiple sources including fish farmers, fishermen, Beach Management Units (BMUs), extension officers, aquatic animal health professionals, community

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disease reporters, and environmental monitors and transmitted through existing reporting platforms to veterinary and fisheries authorities for verification and follow-up. This system complements routine indicator-based surveillance by enabling early detection of emerging threats, supporting timely risk assessment, targeted investigations, and rapid response to protect aquatic animal health, livelihoods, and ecosystems.

### 3.2.6 Vector surveillance

#### Priority vectors of animal health importance

Vectors have varied abundance and species richness that vary spatially and temporally, thereby affecting Vector Borne Diseases transmission dynamics. Priority vectors and arthropods of veterinary importance in Kenya include:

- a. Ticks: among the most important tick species in Kenya are *Rhipicephalus appendiculatus* (brown ear tick) that transmit *Thileria* spp and Nairobi sheep disease. *Amblyomma* spp that transmit *Ehrlichia ruminantium* (Heartwater disease), *Rhipicephalus evertsi evertsi* (red legged tick) and *Rhipicephalus (Boophilus) decoloratus*, which transmit *Babesia* & *Anaplasma* spp, *Hyalomma* spp which transmit Crimean Haemorrhagic Fever a zoonotic disease, *Ornithodoros moubata* which transmit African Swine Fever disease. Mosquitoes: are vectors of multiple viruses, bacteria and parasites in humans and animals and are responsible for various animal diseases, including West Nile Virus (WNV), Rift Valley Fever (RVF), dog heartworm (*Dirofilaria immitis*), Eastern equine encephalitis (EEE), fowl pox Avian malaria and lumpy skin disease (LSD). The key species include *Aedes* spp., *Culex* spp., *Mansonia* spp., and *Anopheles* spp.
- b. Tsetse flies are the primary vectors of African animal trypanosomiasis (AAT). There are seven species in Kenya, including, *Glossina austeni*, *Glossina brevipalpis*, *Glossina pallidipes*, *Glossina fuscipes*, *Glossina fuscipleuris*, *Glossina longipennis* and *Glossina swynnertoni*. They generally occur in the Lake Victoria Basin, South Western Kenya, Rift Valley, Central Kenya, Coastal, Eastern Kenya and Northern Kenya belts. Each tsetse zone has its unique tsetse species composition.
- c. Biting midges of the *Culicoides* genus are the primary vectors of blue tongue virus (BTV) and African horse sickness viruses (AHSV), affecting sheep and horses respectively.
- d. Biting flies; include tabanids, stomoxys, camel flies and clegs. Camel flies are the primary vectors of camel trypanosomiasis (surra), caused by *Trypanosoma evansi*, making them particularly important vectors in camel rearing regions of Kenya. They are also secondary vectors of Trypanosomiasis in other livestock species. Similarly they are implicated in the spread of other mechanically transmitted hemoparasites in cattle, sheep and goats. Stomoxys are also implicated in the spread of Lumpy Skin Disease (LSD).
- e. Bot flies; their larval stages develop in animal tissues, resulting in a disease known as myiasis (serious tissue damage)..

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- f. Varroa mites are the most economically important external parasite of bees, which transmits viral infections (Varroosis), including the deformed wing virus (DWV). The main species of varroa mites in Kenya is *V. destructor*. A significant mite infestation can lead to the death of bees, resulting in colony collapse.
  - g. Fleas they are primary vectors of important diseases such as *Yersinia pestis* (Bubonic plague), *Dipylidium caninum* (flea tapeworm)

### **Existing vector surveillance structures and reporting mechanisms**

Robust vector surveillance entails a sustained periodical systematic sampling of all vectors of veterinary importance. The resulting data is then used to build a database that can be subjected to analysis and used in decision-making with regard to Vector management and ultimately management of vector-borne diseases.

Such resultant actionable information includes:

- a. Vector distribution mapping.
- b. Vector species abundance and richness in specific foci.
- c. Temporal and spatial changes in vector abundance in specific foci.
- d. The level of pathogen loads in sampled vectors at specific times at specific foci.
- e. The effectiveness of vector and vector-borne diseases management interventions.
- f. The presence of resistance by vectors to control products.

Vector surveillance and control in Kenya is largely a county government function as stipulated in the Constitution of Kenya. However, several challenges affect its effective implementation, including ecological and seasonal variations in vector populations, transboundary movement of vectors, and capacity gaps at county level. Surveillance initiatives are therefore undertaken collaboratively by both national and county veterinary authorities. Within the national government, the Directorate of Veterinary Services (DVS), through the Disease Surveillance, Vector Regulatory and Zoological Services Division, provides technical coordination and oversight. The Zoological Services Section also conducts capacity building for county staff on vector collection, identification, and management.

During periods of heavy rainfall or flooding, the DVS collaborates with the Ministry of Health (Public Health) and the Zoonotic Disease Unit (ZDU) to undertake mosquito vector surveillance for Rift Valley Fever outbreaks. This surveillance involves trapping arthropod vectors of importance, followed by sorting, identification, preservation, and transportation of specimens to Kabete for further analysis. Surveillance of vectors of trypanosomiasis, particularly tsetse flies and biting flies, is conducted by the Kenya Tsetse and Trypanosomiasis Eradication Council (KENTTEC), while tick surveillance is undertaken by the DVS. Data generated through these activities is collated, analyzed, and used to inform policy direction and disease control strategies.

Despite these efforts, vector surveillance at both national and county levels has not been consistent due to limited resources for sustained monitoring. In

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addition, several partners, including International Centre of Insect Physiology and Ecology (ICIPE), International Livestock Research Institute (ILRI), Kenya Medical Research Institute (KEMRI), Kenya Agricultural and Livestock Research Organization (KALRO), and academic institutions also undertake vector investigations. However, collaboration and data-sharing mechanisms among these institutions remain limited, and their surveillance objectives are not always fully aligned with the mandate of the DVS.

## **Roles and responsibilities of officers involved at different levels**

### **County Government Level:**

- a. Mobilization and allocation of resources for vector control
- b. Carry out vector surveillance and management (Vector Control officers).
- c. Collaboration with national agencies in Planning and execution of Vector surveillance and management.

### **National Government Level**

- a. Develop and disseminate policies and strategies for vector surveillance and management.
- b. Through the Vector Regulatory and Zoological services section, the DVS offers technical support to County Governments in the development of capacity to carry out surveillance, monitoring, reporting, management and suppression of vectors.
- c. Support deployment & transfer of new Vector surveillance and management technologies to the counties.

## **Tools, frameworks, or guidance documents currently in use**

The DVS, through the Zoological services section carries out surveillance of vectors, especially mosquitoes and biting midges during outbreaks. The section has the capacity to sample and identify these vectors. Similarly, through molecular tools the section has equipment and technical capacity to check vector samples for pathogens at the Entomology Lab in Kabete. There is a zoological lab in Kiboko that carries out surveillance in Lower eastern counties and involves the community in vector management Technology transfer programs. Available tools: - Laboratories, Community participation, Acaricide impregnated control methods, Vector push and pull technologies, rearing of hardy disease-resistant animals.

### **3.2.7 Abattoir surveillance**

Slaughterhouses are critical for food safety & disease detection, and form an important part of a passive surveillance system employing ante and post mortem inspection methods. It can pick up disease incidences at abattoir level thereby triggering active disease search through trace-back of the animals. It is suitable for detecting non-fatal chronic diseases that are difficult to detect in live animals e.g. Parasites like Cysticercosis, hydatidosis; CBPP, TB etc Specimens can be collected and submitted to the lab for further analysis on residue monitoring, AMR monitoring and other bacteriology investigations. Animal welfare issues can also be detected at ante mortem inspection. The abattoir surveillance data including ante and post mortem inspection records as well as condemnation

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records is collected and recorded on the meat inspection form on the KABS platform. These data is available at the county and national levels for analysis and further use for action. However, sustained/consistent use of KABS at the abattoir level is required to generate meaningful or actionable data.

## **Abattoir surveillance Protocols and Tools**

### **Introduction**

Abattoir surveillance is a critical, cost-effective component of animal health monitoring that uses post-mortem inspection to detect, track, and control diseases (such as bovine tuberculosis or African Swine Fever) and monitor welfare, often acting as the “post-mortem hall of the nation”. These systems involve systematic data collection from slaughtered animals, ranging from passive surveillance of lesions to active, risk-based testing, to provide early warnings and inform control programs.

### **Key Surveillance Protocols**

1. **Post-Mortem Inspection:** Qualified veterinarians and meat inspectors perform detailed examinations of carcasses, organs, and lymph nodes for lesions.
2. **Ante-Mortem Inspection:** Evaluation of live animals in lairage to detect signs of disease and ensure welfare.
3. **Risk-Based Surveillance:** Targeting specific high-risk populations, such as older animals, those from specific regions, or animals showing symptoms, to improve efficiency.
4. **Food Chain Information (FCI):** Pre-slaughter data on farm health status is used to identify risks.
5. **Standardized Data Collection & Reporting:** Using structured forms and digital tools (e.g., apps) to ensure consistency, reducing bias, and enabling rapid feedback.
6. **Sampling for Laboratory Testing:** Targeted collection of tissues (e.g., spleen, tonsils, lymph nodes) for PCR, culture, or serology, particularly for suspected cases.
7. **Animal Welfare Monitoring:** Use of Closed-Circuit Television (CCTV) to record live animal handling, lairage, and stunning to ensure compliance with humane standards.

### **Tools and Technologies for Surveillance**

1. **Digital Data Management & Mobile Apps:** Tools for real-time reporting, uploading photos of lesions, and rapid communication with veterinary services.
2. **CCTV and Video Monitoring Systems (VMS):** Essential for auditing animal welfare, with recordings stored for 30+ days for review.
3. **Laboratory Diagnostic Tools:** Techniques such as direct PCR, ELISA, and histopathology for validating findings.
4. **Epidemiological Modeling Software:** Tools like epiR (R package) and Stata for analyzing surveillance data.
5. **Standardized Checklists:** Structured inspection, such as the “Rural Abattoir Checklist,” used to evaluate sanitation, meat inspection, and welfare.

6. Electronic Identification (EID) and Tracking: Systems (e.g., LITS) that link carcass findings back to the farm of origin.

### Challenges and Considerations

- Variable sensitivity: The accuracy of detection can vary depending on factors such as slaughter line speed, lighting conditions, and the experience of inspectors.
- Data quality and reporting: Manual data entry, inconsistent terminology, and delays in data transmission can affect the quality and timeliness of surveillance information.
- Sampling bias: Animals presented for slaughter may not accurately represent the broader animal population, potentially limiting the generalizability of findings.

Strengthening abattoir surveillance therefore requires building the capacity of inspectors, standardizing reporting systems, and ensuring effective integration of abattoir data into national animal health surveillance databases.

Table 5: Summary of surveillance systems and data sources in Kenya

Type	Description	Main Source
Indicator-Based Surveillance (IBS)	Routine, structured reporting of confirmed or suspected priority diseases; KABS	Monthly/weekly reports from field veterinarians, CAHWs, private vets, abattoirs, dip records, and laboratories
Event-Based Surveillance (EBS)	Detection and reporting of unusual events or signals (e.g., sudden deaths, rumours); Mdharura	Community reports, Community Disease Reporters (CDR), media monitoring, farmer hotlines (e.g., 07.....), social media scans
Syndromic Surveillance	Monitoring clinical syndromes before laboratory confirmation: Avian Influenza, Enhanced syndromic surveillance for RVF	Reports of abortions, respiratory distress, nervous signs, and sudden mortality in livestock/poultry/wildlife/bees
Active Surveillance	Planned, targeted surveys and screening (serosurveys, slaughterhouse inspections, apiary surveys; RVF sero surveillance by ILRI)	Sub-county, County, and National surveys, pre-movement testing, market screening
Passive Surveillance	Routine reporting triggered the occurrence of notifiable conditions	Farmers → Ward → sub-county → county → national level
Sentinel Surveillance	Continuous monitoring at selected high-risk sites (borders, wetlands, markets, wildlife areas); Abattoirs	Wildlife-livestock interface sites, migratory bird sites

### 3.2.6 Food and feed safety surveillance

Monitoring of biological and chemical hazards along the animal-source food value chain is coordinated between the Directorate of Veterinary Services (DVS), Kenya Bureau of Standards (KEBS), and county veterinary inspectors under frameworks like the Meat Control Act (Cap 356). Key components of feed and food safety surveillance include Meat inspection at abattoirs, milk hygiene testing (platform tests, mastitis, brucellosis), egg and fish sampling, residue monitoring (antibiotics, pesticides), market-level rapid screening and animal feeds sampling and testing. Key activities include routine condemnation records, specimen collection for lab analysis, AMR residue monitoring, traceability of diseased animals, and meat contamination surveillance. Integration with AH-IDSR allows for better data flow, such as linking abattoir findings to KABS for

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real-time alerts. Emerging issues, like AMR exposure risks to slaughterhouse workers (e.g., from studies in western Kenya), are also addressed through enhanced monitoring. Digital innovations, such as electronic meat inspection forms, improve data accuracy over traditional paper-based systems. Priority hazards include: Salmonella, Campylobacter, E. coli O157, Drug residues, Toxins (aflatoxin in feed)

## **Food safety surveillance Protocols and Tools**

### **Introduction**

Food safety surveillance is a systematic, continuous process of collecting, analyzing, and interpreting data to prevent foodborne illnesses and ensure food quality. It involves a “farm-to-fork” approach using a combination of regulatory protocols, laboratory analysis, and digital tools.

### **Key Protocols and Frameworks**

1. Hazard Analysis and Critical Control Points (HACCP): A preventive management system that identifies, evaluates, and controls biological, chemical, and physical hazards.
2. Good Manufacturing Practices (GMPs): Core requirements for hygienic production, personnel sanitation, and facility maintenance.
3. Sanitation Standard Operating Procedures (SSOPs): Detailed procedures for cleaning and sanitizing facilities and equipment to prevent cross-contamination.
4. ISO 22000: A global standard integrating HACCP principles with management systems.
5. Food Safety Modernization Act (FSMA): US FDA regulation requiring preventive controls, often utilizing Hazard Analysis and Risk-Based Preventive Controls (HARPC).
6. Codex Alimentarius: International food standards and codes of practice (e.g., General Principles of Food Hygiene).
7. Integrated Disease Surveillance and Response (IDSR): to integrate foodborne disease data into national public health systems.

### **Tools for Surveillance and Monitoring**

1. Laboratory-Based Surveillance: Molecular typing (e.g., PFGE), polymerase chain reaction (PCR) for pathogen detection, and antibiotic resistance testing (e.g., PulseNet, GFN).
2. Temperature Monitoring Devices: Digital, infrared, and probe thermometers; data loggers for continuous monitoring of refrigerators, freezers, and hot-holding units.
3. Microbiological and Chemical Testing Kits: Rapid testing for pathogens (e.g., Listeria, Salmonella) and toxins, allergens, pH meters, and water activity meters.
4. Digital Apps and Software: Real-time data collection tools (e.g., AuditApp, FoodDocs, ColInspect, PathSpot) for digital checklists, automated reports, and audit trails.
5. IoT and Smart Sensors: Internet of Things (IoT) devices for continuous, real-

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- time tracking of environmental conditions during transportation and storage.
6. Blockchain Technology: Secure, immutable records for improving traceability and reducing the time required to trace food origins.
  7. Contaminant Detection Equipment: Metal detectors and X-ray scanners to detect physical contaminants.

### **Surveillance Strategies**

1. Indicator-Based Surveillance (IBS): Monitoring notifiable syndromes and diseases (e.g., diarrhea).
2. Event-Based Surveillance (EBS): Detecting outbreaks through unofficial sources or ad-hoc reports.
3. Total Diet Studies (TDS): Monitoring the concentration of chemical contaminants in food for risk assessment.
4. Audits and Inspections: Regular, documented checks (internal and external) for compliance with safety standards.
5. Consumer Complaints and Feedback: A tool to detect issues in the market.

### **Key Agents in Surveillance**

#### **Global:**

WHO and FAO: Through initiatives like INFOSAN (International Food Safety Authorities Network) and GEMS/Food (Global Environmental Monitoring System).

#### **National Authorities:**

E.g., CDC, FDA, USDA in the US; EFSA in Europe.

#### **While in Kenya:**

Food safety is managed through a multi-sectoral approach involving several agencies under the guidance of the National Food Safety Policy (2013) and the 2021 National Food Safety Policy.

### **Key Food Safety Authorities in Kenya**

1. The DVS plays a critical role in food safety, specifically by ensuring the safety and quality of food products of animal origin (such as meat, milk, and eggs) from the farm to the consumer. They are responsible for implementing, monitoring, and evaluating animal health strategies that reduce the risk of zoonotic diseases and chemical hazards in food.  
Key ways the DVS contributes to food safety include:
  - a. Meat Inspection and Quality Control: The DVS conducts ante-mortem (live animal) and post-mortem (carcass) inspections at slaughterhouses to ensure meat is safe for human consumption.
  - b. Zoonotic Disease Management: They control and eradicate animal diseases that can be transmitted to humans (zoonoses), such as anthrax and tuberculosis, thereby preventing their entry into the food chain.
  - c. Veterinary Public Health (VPH): They monitor the use of veterinary drugs, such as antibiotics and acaricides, to ensure food products do not contain harmful residues that exceed maximum residue limits (MRLs).

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- d. **Regulatory Enforcement:** The DVS enforces regulations regarding the hygienic handling of animal products and inspects processing plants and transport carriers.
  - e. **Trade Certification:** They provide health certification for international trade, ensuring that exported animal products meet international food safety standards.
  - f. **One Health Collaboration:** The DVS collaborates with health and environment sectors to manage food-based hazards.
2. **Kenya Bureau of Standards (KEBS):** Responsible for setting, enforcing, and monitoring food standards across the supply chain, including quality control and the “Diamond Mark” certification.
  3. **Agriculture and Food Authority (AFA):** Regulates and promotes food quality through its various directorates (e.g., Food, Horticulture, Nuts & Oil Crops).
  4. **Kenya Plant Health Inspectorate Services (KEPHIS):** Focuses on plant health and quality assurance of agricultural inputs.
  5. **Ministry of Health (including NPHI and NPHL):** Specializes in laboratory testing for contaminants, chemical safety, and foodborne disease monitoring.
  6. **Pest Control Products Board (PCPB):** Regulates the use of chemicals in food production.
  7. **National Food Safety Coordinating Committee (NFSCC):** A multi-sectoral body coordinating activities between these various agencies: Regulatory Developments Kenya is working towards enhancing its food control system with the proposed Food & Feed Safety Control Co-ordination Bill (2023), which seeks to establish an Office of the Food Safety Controller to manage a centralized, “farm-to-fork” regulatory system, reducing conflicts between agencies.
  8. **Local Level Oversight:** County Governments are responsible for local enforcement, such as issuing Food Handler’s Certificates for workers in the food industry.

### **3.2.7 Apiculture surveillance**

Disease surveillance in apiculture, or beekeeping, involves systematic monitoring of honey bee colonies to detect, identify, and manage pests and diseases that threaten hive health and productivity. This is crucial for preventing outbreaks, minimizing economic losses, and supporting pollination services, as honey bees contribute significantly to agriculture—pollinating over 100 crop types and adding billions in value annually. Surveillance helps track both endemic issues like Varroa mites and exotic threats, enabling early intervention through integrated pest management (IPM) strategies. Since bees are sensitive to chemicals and hive products need to be kept free of chemical residues, it is key to always use non-chemical means of pest and disease management.

#### **Surveillance Methods and Monitoring**

Effective surveillance combines regular inspections, sampling, and diagnostics of sentinel and other apiaries representative of the country. Beekeepers and bee health practitioners should monitor colonies seasonally, focusing on brood frames, adult bees, hive conditions, and the surrounding apiary environment. Surveillance activities involve beekeepers, community hive monitors, and veterinary apiculture personnel. Regular training on bee colony inspection is

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essential to strengthen capacity, facilitate knowledge transfer, and expand the national network of reporters. Sustained surveillance, supported by systematic sample collection and analysis, enables the detection of trends, outbreaks, and assessment of intervention outcomes.

**Visual Inspections:** Abnormal signs to check for include: dead bee larvae, odors, discolored brood, mummified brood, pest larvae, and cocoons are important in the detection of bee health issues on site. Where foulbrood diseases (AFB) are suspected, use of the “ropy test” by picking larval remains within the cells using a toothpick, if it stretches elastically, it confirms AFB.

**Sampling Techniques:** Target samples to be collected for laboratory testing include:- brood, brood comb, adult bees, honey, and pests observed in the colony during sampling. Diagnostic techniques used in further analysis are varied based on the pests or diseases being investigated. Broadly, there are rapid test kits for brood diseases, Microscopy to check for nosemosis and tracheal mites, molecular techniques in the identification of pests and Foul brood diseases.

**Laboratory Diagnostics:** Morphological identification of bee pests, Microscopic exams for Nosema or tracheal mites; molecular tests for AFB/EFB and varoosis can be done at the Entomological laboratory in Kabete. Additionally, samples can be sent to facilities like the Bee Research Lab for further analysis.

**National Programs:** Currently, the DVS, through the Zoological Services Section, conducts training for County Veterinary staff and community hive monitors on bee colony inspection. In addition, sentinel apiaries have been established at ten sites; however, only two are currently operational due to resource constraints.

Going forward, it is essential for the DVS to strengthen apiculture surveillance through the development of the following:

1. Enhanced strategies for training and knowledge transfer, including surveillance and reporting of bee pests and diseases, as well as improved biosecurity practices at the apiary level;
2. A contingency and preparedness plan for the introduction of exotic honey bee pests, diseases, and undesirable bee species
3. A network of regional sentinel apiaries to support systematic monitoring of honey bee pests and diseases

### 3.2.8 Aquatic animal health surveillance

Aquatic animal health surveillance is critical for safeguarding Kenya’s aquaculture expansion, biodiversity, food security, public health, and trade. The intensification of aquaculture, increased movement of live and ornamental aquatic species, and shared transboundary water bodies heighten the risk of emerging and WOAH-notifiable aquatic animal diseases such as Tilapia Lake Virus (TiLV), Koi Herpesvirus, Infectious Hematopoietic Necrosis Virus (IHNV), Epizootic Ulcerative Syndrome (EUS), White Spot Syndrome Virus (WSSV), as well as the emergence of antimicrobial resistance (AMR). Guided by the Animal Diseases Act (Cap 364), the National Aquatic Animal Health Strategy, and WOAH standards, the Directorate of Veterinary Services (DVS) implements an integrated, risk-based, and One Health-oriented surveillance system

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encompassing farmed, ornamental, and wild aquatic animals, as well as aquatic ecosystems.

## Surveillance Scope

The system targets:

- Farmed food fish (tilapia, catfish, trout) and other aquaculture species such as oysters.
- Ornamental fish and invertebrates.
- Wild aquatic animals across lakes, rivers, wetlands, and marine ecosystems.
- Aquatic environments including water quality, sediments, and vectors.

Prioritization of surveillance activities is guided by WOAH-listed diseases, risk pathways such as broodstock and live fish movements, zoonotic and food safety relevance, trade sensitivity, and environmental and climate vulnerability. Risk assessments will inform the disease list, sampling intensity, and geographic focus.

## Surveillance Approaches

- **Passive Surveillance:** Farmers, hatcheries, traders, processors, Beach Management Units (BMUs), veterinarians, and aquatic animal health officers report unusual mortalities or disease events via KABS. Integrating aquatic animal health data into KABS enables real-time syndromic and event-based surveillance, rapid verification, and risk-based response. Continuous training ensures personnel recognize priority syndromes and report accurately.
- **Active Surveillance:** Passive surveillance data guide targeted field investigations, sampling, and laboratory testing. Reports of unusual mortalities, clinical signs, or production declines help identify high-risk areas, species, and value-chain nodes. Priority diseases and sentinel sites are monitored through quarterly sampling to validate passive surveillance and provide early detection of emerging threats. High-density aquaculture zones, hatcheries, ornamental fish facilities, and shared water bodies, including Lake Victoria and the coastal region, are prioritized for sampling.
- **Event-Based and Community Surveillance:** Multiple stakeholders including fish farmers, fishermen, BMUs, extension officers, and community disease reporters provide rapid alerts of unusual events, such as sudden mortality, abnormal behavior, disease signs, or environmental anomalies like water discoloration or oxygen depletion. Reports are verified and acted upon by veterinary and fisheries authorities to enable timely response.
- **Sentinel and Ecosystem Surveillance:** Selected farms, hatcheries, ornamental fish facilities, and representative wild habitats are regularly monitored to provide early warning of disease emergence. Environmental indicators such as water quality, pollutants, temperature, dissolved oxygen, vector abundance, and biodiversity changes are tracked to understand disease dynamics and ecosystem health. Sentinel sites are chosen based on biodiversity, production density, history of disease outbreaks, ecological vulnerability, proximity to trade routes, and representation of different production systems. Initial sentinel counties include Kisumu and Homa Bay (Lake Region), Kirinyaga and Nyeri (Central Region), and Kilifi and Kwale (Coastal Region).

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## **Diagnostics, Laboratories, and Data Management**

Laboratory capacity is strengthened at national and regional levels to support molecular, bacteriological, and histopathological testing of priority and emerging diseases, following WOAAH quality standards. Clear sample referral pathways link county teams with the National Veterinary Referral Laboratory (NVRL) in Kabete. Laboratory outputs feed into the KABS aquatic animal health database, enabling integrated analysis with terrestrial animal health data. Routine analysis provides disease trends, early warning alerts, and evidence-based reports to guide national control measures and international reporting obligations.

## **Emergency Preparedness and Response**

Preparedness focuses on early detection, rapid response, and containment of outbreaks through contingency plans for priority diseases. Measures include quarantine, stamping out where appropriate, biosecurity enforcement, and coordinated One Health response. Movement controls are applied to live animals, eggs, feed, equipment, and water from affected zones, complemented by targeted surveillance to monitor high-risk areas and verify disease freedom. Standard operating procedures, rapid response teams, biosecurity measures, and risk communication strategies are integral to outbreak management.

## **Cross-Cutting Interventions**

Sustainability and effectiveness rely on enhanced farm-level biosecurity, stakeholder engagement, good aquaculture practices, record keeping, and traceability. AMR and residue monitoring are integrated into surveillance systems to ensure prudent antimicrobial use and compliance with food safety standards. Capacity-building programs target veterinary officers, fisheries inspectors, laboratory staff, and aquaculture stakeholders, supported through partnerships with research institutions and development partners, and progressively institutionalized through domestic financing for long-term resilience and scalability of aquatic animal health surveillance in Kenya.

### **3.2.9 One Health Approach in Surveillance**

The One Health approach promotes a holistic and collaborative method for detecting events and conducting joint risk assessments at the human–animal–environment interface. Effective event detection under this approach requires strong coordination and information sharing across all levels; community, ward, sub-county, county, and national. All relevant sectors share the responsibility of identifying and reporting events with potential impacts on animal health, human health, and the environment.

Through joint surveillance activities, timely information exchange, and coordinated field investigations, the One Health approach ensures comprehensive detection of threats and facilitates rapid, multisectoral response to safeguard health across species and ecosystems.

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### 3.3 Data collection, entry, and reporting

In Kenya, data collection, entry, analysis, and reporting for animal health surveillance are coordinated through the Kenya Animal Biosurveillance System (KABS), which serves as the national electronic platform for reporting notifiable and other important animal diseases in the country. In line with legal requirements under the Animal Diseases Act and related veterinary regulations, animal health service providers, including county veterinary officers, veterinary paraprofessionals, and authorized surveillance focal persons are required to submit disease reports through KABS using standardized case definitions and reporting tools. Data are captured at the field level through mobile devices and entered into the system in near real time, enabling timely visibility of disease events across production systems and geographic areas.

Once entered, surveillance data are routinely verified, analyzed, and visualized at ward, subcounty, county, regional, and national levels to identify disease trends, spatial distribution, and unusual events requiring follow-up. The system supports risk-based decision-making by enabling rapid prioritization of investigations, targeted surveillance, and deployment of control measures for notifiable, emerging, and other priority diseases relevant to Kenya's livestock and production systems, and biodiversity conservation. Aggregated and validated information from KABS informs regular surveillance reports, outbreak alerts, and strategic planning, and supports Kenya's national and international reporting obligations, including notification to the World Organisation for Animal Health (WOAH).

#### Information flow

Frontline animal health workers receive information from livestock keepers (passive surveillance) and undertake routine active surveillance at the villages, abattoirs, and livestock sale yards. In some counties where community disease reporting and event-based surveillance has been adopted the Community Disease Reporters (CDRs) and/or Community Health Promoters (CHP) send information on the observed clinical signs or events which are verified by the frontline animal health workers, responded to where possible, and reported via KABS. The frontline animal health workers, including private practitioners, report disease occurrences using their mobile phones. The data in KABS is accessible to the sub-county and county administrators who can download data through the dashboard and use it to make their own disease control decisions. This information is also concurrently accessible to the VEES (Kahariri et. al 2024). This flow of information is visualized in the flowchart below (Figure 5).

The regional and national veterinary laboratories submit data to VEES every week through the VETINFO mailing group. Most laboratories use a standard Excel spreadsheet for reporting, while three of them utilize Laboratory Information Management Systems (LIMS).

On the KABS, data is collected via a mobile application, which has 6 standardized forms as highlighted in Table 6.

Figure 5: Information Flow for Animal Health Surveillance

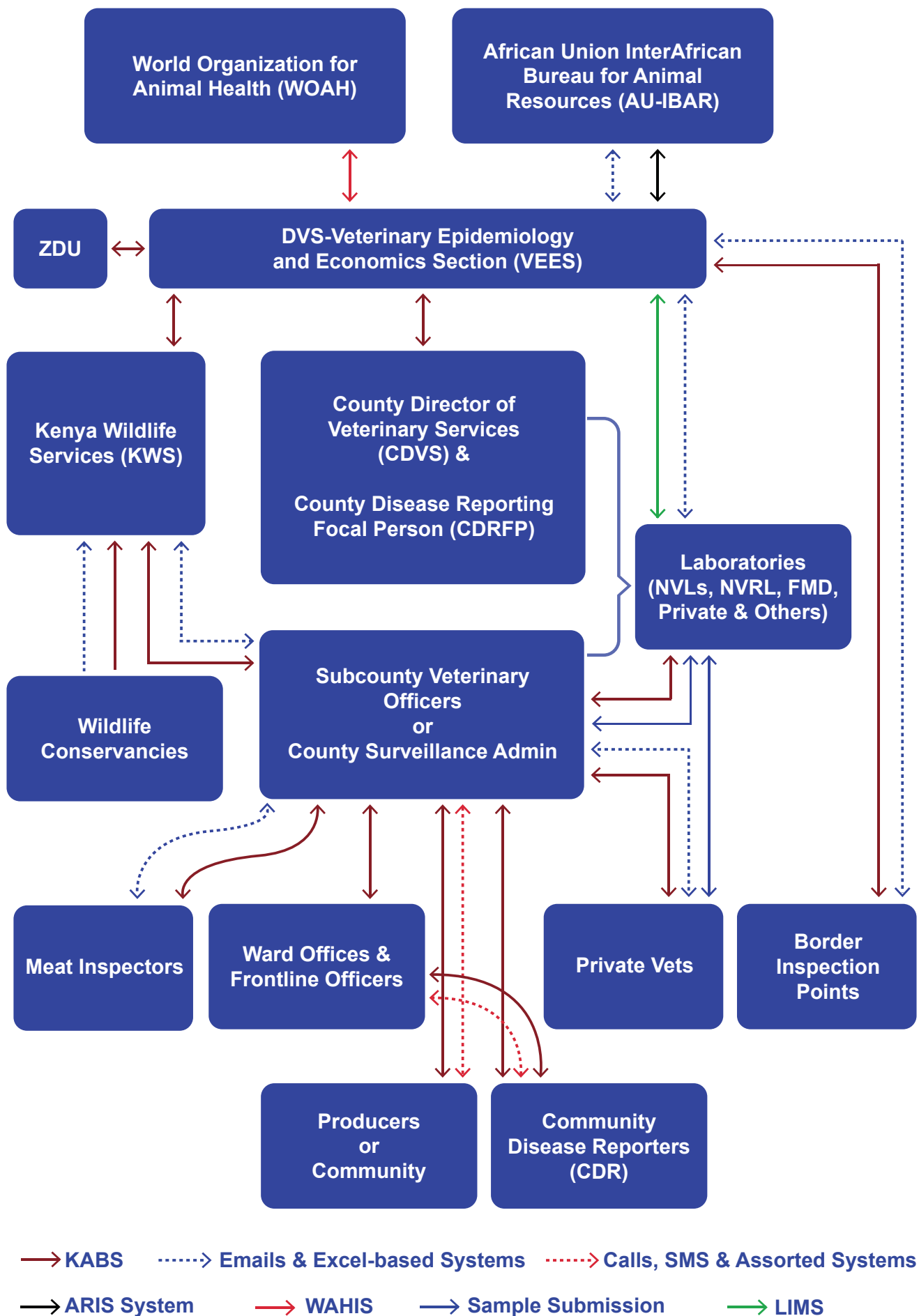


Table 6: KABS data reporting tools

Reporting form type	Intended Users	Diseases/ Syndrome/ Event reported	Key Considerations
Sanitary Report Form (also known as Notifiable Disease 1 form (ND1))	All animal Health practitioners (private and public)	PRESENCE of all health events of interest (disease and/syndrome).	<ul style="list-style-type: none"> <li>Reporting should be done on a weekly basis (KABS).</li> <li>Each report should contain only one species and only one disease.</li> </ul>
Zero-report forms	practitioners.Sub- County Veterinary Officers	ABSENCE of the priority Diseases (Annex XXXX)	<ul style="list-style-type: none"> <li>Reporting should be done weekly in (KABS).</li> <li>Each report should contain only one species and all priority diseases.</li> <li>Each farm/ epidemiological unit can have more than 1 zero report at a time.</li> </ul>
Community Disease reports form	All non- technical community members (CDRs, CHPs and other livestock value chain actors).	ALL animal health events/ syndromes based on observed clinical signs	<ul style="list-style-type: none"> <li>Reporting to be done in real-time (KABS).</li> <li>Each report should contain only one species and health events (syndromes) observed.</li> <li>More than 1 report can be filled in the same farm/ Epi unit.</li> </ul>
Livestock Vaccinations form	All Animal Health practitioners	ALL vaccines - preventable diseases in animals.	<ul style="list-style-type: none"> <li>Reporting to be done in real-time (KABS).</li> <li>Livestock vaccinations forms to be filled per species per vaccination site per day.</li> </ul>
Wildlife disease form	All wildlife health practitioners	PRESENCE of ALL health events in wildlife populations (diseases/ syndrome)	<ul style="list-style-type: none"> <li>Reporting to be done in real-time (KABS).</li> <li>Fill one form per species and disease.</li> </ul>
Wildlife events form	All non- technical wildlife disease reporters (rangers, tour guides, conservancy managers etc.)	ALL animal health events	<ul style="list-style-type: none"> <li>Reporting to be done in real-time (KABS).</li> <li>Each report should contain only one species and health events (syndromes) observed.</li> <li>More than 1 report can be filled in the same Epidemiological unit</li> </ul>
Meat inspection form	Veterinary Public Health Officers, Meat inspectors	PRESENCE of all animal health events of interest	<ul style="list-style-type: none"> <li>Reporting to be done in real-time (KABS).</li> <li>Each report should contain only one species and health events (syndromes) observed.</li> <li>More than 1 report can be filled in the same unit/ facility</li> </ul>

## Guidelines for Data Entry: Mandatory KABS Forms

To ensure standardized data reporting and analysis, this section defines the entries within the mandatory KABS forms, clarifying what information is expected for each field.

### 1. Sanitary Report Form (ND1)

This form is organized into three sections: general information, syndromic information, and number affected in the herd and diagnosis, each comprising several data entries (Table 7).

Table 7: Entries in sanitary report form

Section	Entry	Definition	Syndromic Information
General Information	Date of Report	The date the practitioner collects data from a farm, village, etc.	Do not enter a future date (e.g., beyond 2026).
	Date of Start of Outbreak/Event	The date provided by the farmer when the specific condition started.	Do not enter a future date. The date of start cannot be after the date of report.
	GPS Location	Latitude and longitude coordinates, automatically captured by KABS.	Leave blank if coordinates cannot be picked up.
	Location	Includes County, Sub-County, Ward, and Locality.	Provide accurate location details where data was collected.
	Species affected	Species experiencing any events that prompted the visit.	Report on one species per form.
	Production system	<p>Intensive: Animals kept in confined spaces with high input and output level</p> <p>Extensive: Animals allowed to graze freely over large areas with minimal inputs.</p> <p>Mixed: A combination of intensive and extensive practices.</p> <p>N/A: Not applicable.</p>	Select the most appropriate production system for the reported species.

Table 7: Entries in sanitary report form

Section	Entry	Definition	Syndromic Information
Syndromic Information	Abortion	Expulsion of a fetus before term.	Refer to KABS user guide for specific definitions and reporting.
	Sudden death	Unexpected and rapid death of an animal.	Refer to KABS user guide for specific definitions and reporting.
	Haemorrhagic signs	Presence of bleeding or indications of internal/external haemorrhage.	Refer to KABS user guide for specific definitions and reporting.
	Neurologic signs	Abnormalities related to the nervous system (e.g., tremors, incoordination, paralysis).	Refer to KABS user guide for specific definitions and reporting.
	Animal bites	Injuries sustained from an animal bite.	Refer to KABS user guide for specific definitions and reporting.
	Respiratory signs	Symptoms related to the respiratory system (e.g., coughing, difficulty breathing, nasal discharge).	Refer to KABS user guide for specific definitions and reporting.
	Cutaneous/Skin lesions	Abnormalities on the skin (e.g., rashes, sores, scabs).	Refer to KABS user guide for specific definitions and reporting.
	Gastrointestinal tract syndromes	Symptoms related to the digestive system (e.g., diarrhea, vomiting, colic).	Refer to KABS user guide for specific definitions and reporting.
Number affected in the herd and diagnosis	Disease/Condition	The specific diagnosis of the illness.	Report one disease per species per ND1 form.
	Nature of diagnosis	How the diagnosis was reached (e.g., laboratory confirmation, post-mortem examination, clinical observation).	Clearly indicate the basis of the diagnosis.
	Number at risk	The number of animals susceptible to the condition but not yet showing signs.	Do not include sick animals in this count.
	Number sick	The number of animals currently showing clinical signs.	Accurately reflect the morbidity within the herd.
	Number dead	The number of animals that died due to the reported disease.	Confirm with the farmer that deceased animals exhibited the reported symptoms.
	Number of humans affected (if zoonosis)	The number of humans showing signs of the zoonotic disease, or who have reported/been diagnosed with it.	Only complete for zoonotic diseases.
	Number slaughtered	The number of animals slaughtered as a means of salvage due to the disease.	Accurately capture the number of animals that were slaughtered due to the specific disease
	Number destroyed	The number of animals euthanized or destroyed because of the disease.	Accurately capture the number of animals that were euthanized or slaughtered due to the specific disease
	Number vaccinated	The number of animals previously vaccinated against the suspected disease.	This refers to historical vaccination; for current vaccinations, fill in the livestock vaccination form.
	Disease control method	Methods employed by the Animal Health Service Provider (AHSP) to control the disease (e.g., treatment, vaccination).	Describe the primary control strategies implemented.
Notes	Any additional relevant information not captured elsewhere in the form.	Provide concise and pertinent details.	

## 2. Livestock Vaccination Form

This form is organized into seven data entries including: location, date of vaccination, GPS, species, disease, total number vaccinated and number of beneficiaries (Table 8)

Table 8: Variables in livestock vaccination form

Entry	Definition	Key Considerations
Location	The precise geographical details where the vaccination was conducted. This includes County, Sub-County, Ward, and the specific Vaccination Site	Ensure accurate and complete geographical details for proper mapping and analysis of vaccination coverage.
Date of vaccination	The date the practitioner carried out the vaccination	Put in the correct date. Do not enter a future date.
GPS	Latitude and longitude coordinates are automatically captured by KABS.	If the system is unable to automatically capture GPS coordinates, leave this field blank.
Species	The specific animal species that received the vaccination.	Report on one species per vaccination form to maintain data clarity and avoid aggregation errors.
Disease	The specific disease against which the animals were vaccinated.	Report one disease per species per vaccination event. If multiple diseases were vaccinated against in the same species, use separate entries or forms
Total Number Vaccinated	The total count of animals of the specified species that received the vaccination.	This should accurately reflect the exact number of individuals vaccinated.
Number of Beneficiaries	The total number of households or farms whose animals were vaccinated .	This should accurately capture the exact number of households whose animals were vaccinated

## 3. Zero Report Form

This form is organized into four data entries including: date of report, location, species examined, and production system (Table 9)

Table 9: Variables in zero reporting form

Entry	Definition	Key Considerations
Date of report	The date the practitioner is filling in the form	Once a week if no disease was reported in the ward by any officer
Location	The precise geographical details of the area being reported on. This includes GPS coordinates (Latitude and Longitude), County, Sub-County, Ward, and Locality.	Ensure accurate and complete geographical details. This identifies the specific area where active surveillance was conducted and no notifiable diseases were observed. If GPS coordinates cannot be automatically captured, leave blank.
Species Examined	The primary animal species that were the focus of the surveillance during the reporting period within the specified location.	While a Zero Report indicates the absence of disease, it's crucial to specify the target species under observation. This helps understand the scope of the "zero" finding. One form per species if the surveillance focus was distinct for different species (e.g., small ruminants vs. cattle).
Production System	The predominant method of animal production within the reported area for the species examined:  Intensive: Animals kept in confined spaces with high inputs.  Extensive: Animals allowed to graze freely over large areas with minimal inputs.  Mixed: A combination of intensive and extensive practices.  N/A: Not applicable or unknown.	Select the most appropriate system(s) for the area.

#### 4. Community Disease Report (CDR) form

This form is organized into three sections: general information, syndromic information, and number affected in the herd, each comprising several data entries (Table 10).

Table 10: Variables in CDR form

Section	Entry	Definition	Key Consideration
General Information	Date of Report	The date the practitioner collects data from a farm, village, or reporting site.	Do not enter a future date.
	Date of Start of Sickness	The date provided by the farmer indicates when the disease/ condition first began.	Must not be after the date of report.
	GPS Location	Latitude and longitude coordinates are automatically captured by KABS.	Leave blank if coordinates cannot be captured.
	Location	County, Sub-County, Ward, and Village	Ensure accuracy and completeness.
	Species Affected	Animal species experiencing the event that prompted the visit.	Report one species per form.
Syndromic Information	Abortions (Mimba kutoka)	Expulsion of a fetus before full term.	Refer to KABS user guide definitions.
	Sudden Death	Unexpected and rapid death of an animal.	Refer to KABS user guide definitions.
	Bleeding from Openings (Kuvuja damu)	Evidence of internal or external hemorrhage from natural body openings.	Refer to KABS user guide definitions.
	Excess Salivation (Kumwaga mate)	Excessive saliva production is often linked to oral lesions.	Refer to KABS user guide definitions.
	Aggressiveness (Ukali)	Abnormal behavior suggestive of nervous system involvement.	Refer to KABS user guide definitions.
	Difficulty Breathing (Kushindwa kupumua)	Respiratory signs such as coughing or labored breathing.	Refer to KABS user guide definitions.
	Skin Swellings (Uvimbe wa ngozi)	Skin abnormalities including swellings, rashes, or sores.	Refer to KABS user guide definitions.
	Diarrhoea (Kuhara)	Abnormal fecal consistency indicating digestive involvement.	Refer to KABS user guide definitions.
	Bloody Faeces	Presence of blood in feces indicating severe gastrointestinal involvement.	Refer to KABS user guide definitions.
	Swollen Glands	Enlargement of lymph nodes suggesting systemic infection.	Refer to KABS user guide definitions.
	Discharge from eyes (kutoa machozi kwa wingi)	Excessive lacrimation	Refer to KABS user guide definitions.
	Nasal discharges	Excess production of mucus, pus, or blood from the nostrils, indicating an underlying issue in the respiratory tract, sinuses,	Refer to KABS user guide definitions.

<b>Section</b>	<b>Entry</b>	<b>Definition</b>	<b>Key Consideration</b>
Numbers Affected in the Herd	Total Number of Animals in the Herd	Number of animals susceptible but not showing clinical signs.	Do not include sick animals.
	Number Sick	Number of animals currently showing clinical signs.	Reflect true herd morbidity.
	Number Dead	Number of animals that died due to the reported disease.	Confirm deaths with the farmer.
	Number of Humans Affected (if zoonosis)	Number of humans showing signs of or diagnosed with the zoonotic disease.	Complete only for zoonotic diseases.
	Notes	Additional relevant information not captured elsewhere.	Keep concise and relevant.

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## Common Reporting Errors to Avoid in KABS

Accurate and consistent data reporting is essential for effective disease surveillance and timely response. The following are common errors observed during reporting through KABS. Kindly avoid these to ensure data quality and reliability:

### 1. **Incorrect Dates**

Ensure that the correct dates are filled in all relevant sections of the forms. Incorrect or inconsistent dates can affect outbreak tracking and response timelines.

### 2. **Use of Incorrect Forms**

Example: Vaccination data is sometimes mistakenly entered in the ND1 (sanitary) form, which is strictly for disease reporting.

Suggestion: Use each form strictly for its intended purpose

### 3. **Reporting Routine Husbandry Activities**

Do not report routine procedures such as deworming, dehorning, or castration, as these are not considered notifiable disease events.

### 4. **Recording “Unknown” in Disease/Condition Section**

Avoid using “Unknown” as a placeholder for unidentified diseases.

Suggestion: Consult colleagues, refer to the KABS Case Definitions Guidelines, or contact the Emergency Operations Centre (EOC) for guidance in classifying unclear cases.

### 5. **Using “Nil” or “None” in Numeric Fields**

Avoid non-numeric responses in fields designated for numbers.

Correct Entry: Use 0 (zero) when there are no cases, deaths, or vaccinated animals to ensure smooth and consistent data analysis.

### 6. **Incorrect Reporting of Zoonotic Diseases**

Ensure zoonotic diseases are correctly identified and classified. Cross-reference with the KABS Case Definitions Guidelines and KABS User Guide to avoid misreporting.

### 7. **Delayed Data Entry**

Timeliness is critical in surveillance. Ensure reports are submitted promptly to support early detection and response.

## 3.4 Data cleaning, Analysis & Interpretation

### 3.4.1 Data Collation

Data collation is the systematic process of collecting, aggregating, organizing, and harmonizing animal health surveillance data from multiple sources into a unified, structured dataset for analysis and decision-making. In Kenya's integrated animal health surveillance system, data are collated from diverse streams, including passive and active surveillance reports, event-based surveillance (EBS), laboratory information systems, market and abattoir surveillance, community-based reporting, wildlife interfaces, and other digital platforms.

The collation process involves standardization of data formats, coding of diseases and syndromes, alignment of spatial and temporal variables, and consolidation of multi-source datasets to ensure consistency, comparability,

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and interoperability across sectors and levels (county, national, and regional). Effective data collation strengthens data integrity, reduces fragmentation and duplication, and provides a reliable foundation for subsequent data cleaning, validation, analysis, interpretation, reporting, and risk assessment, thereby supporting evidence-based decision-making and integrated One Health surveillance operations.

### **3.4.2 Data Cleaning**

Data cleaning is the systematic process of detecting, correcting, validating, and standardizing surveillance data to ensure accuracy, completeness, consistency, and reliability prior to analysis and interpretation. Within the integrated animal health surveillance system, data cleaning addresses common data quality challenges, including missing values, duplicate records, inconsistent disease names and codes, incorrect geolocation data, temporal errors, outliers, and misclassification of variables.

This process involves data validation checks, removal of duplicate entries, harmonization of variable definitions, standard coding of diseases and events, verification of source credibility, and cross-referencing with laboratory and field investigation records. Cleaned datasets provide a credible evidence base for analysis, trend assessment, risk modeling, early warning, reporting, and policy decision-making, and are essential for maintaining the integrity, credibility, and operational effectiveness of national animal health surveillance and One Health information systems.

### **3.4.3 Data analysis**

Data analysis is a core function of the animal health surveillance system, transforming raw surveillance data into actionable intelligence for early warning, decision-making, and response. Routine analysis focuses on understanding what is happening, where it is happening, when it is happening, and which species are affected, to support timely detection of outbreaks, emerging threats, and abnormal health patterns.

Analysis is guided by key questions, including:

- Whether priority or notifiable diseases have been detected
- Whether there is evidence of outbreaks or unusual events
- The geographic distribution of reported events
- Trends over time compared to previous reporting periods
- The representativeness and completeness of reporting
- The species and production systems most affected

### **Core Analytical Dimensions**

#### **1. Time (Temporal Analysis)**

Temporal analysis examines disease patterns across defined time periods (daily, weekly, monthly, quarterly, annually) to detect trends, outbreaks, seasonality, and anomalies. It supports early outbreak detection, monitoring of disease progression, evaluation of control measures, and comparison with historical baselines.

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## 2. Place (Spatial Analysis)

Spatial analysis focuses on the geographical distribution of animal health events to identify hotspots, clusters, and spread patterns. It informs targeted surveillance, risk-based interventions, resource prioritization, and mapping of high-risk areas such as border zones, markets, wildlife–livestock interfaces, and high-mobility corridors.

## 3. Species (Population Analysis)

Species-based analysis identifies which animal populations are most affected, enabling species-specific risk assessment, prioritization of control measures, and targeted interventions. It supports understanding of disease burden across livestock species and production systems.

### Analytical Outputs

Routine analysis produces:

- Trend summaries and situation reports
- Early warning alerts
- Predictions of priority health events
- Risk profiles and hotspot maps
- Disease burden indicators
- Performance and coverage metrics
- Decision-support dashboards

### Analytical Tools

Analysis is supported by routine tools such as Microsoft Excel for summaries and visualization, GIS platforms for spatial analysis, and statistical software such as R for advanced analytics, trend modeling, and reporting automation.

#### 3.4.5 Data Governance, Management, and Security

Animal health surveillance data in Kenya is managed within a structured governance framework that defines clear roles, responsibilities, and accountability at national and county levels. Data stewardship is vested in designated institutions within the livestock sector, with clearly defined mandates for data ownership, access control, and authorized use. Surveillance data is treated as a strategic national resource and managed in accordance with applicable national policies, legal frameworks, and ethical standards.

All surveillance data is stored in secure, standardized digital systems with defined procedures for data storage, archiving, backup, version control, and system maintenance to ensure data integrity, continuity, and long-term accessibility. Measures are implemented to protect data confidentiality, system security, and controlled access, including user authentication, role-based permissions, and cybersecurity safeguards.

Clear protocols govern data sharing and information exchange within the animal health sector and across human, wildlife, and environmental health sectors, ensuring timely access to information while protecting sensitive data. Data sharing arrangements support routine reporting, emergency response, national planning, regional coordination, and international reporting obligations, while maintaining trust, transparency, and accountability across institutions.

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### **3.4.6 Data Integration, Interoperability and Digital Surveillance Systems**

Animal health surveillance systems in Kenya operate within an integrated digital environment that enables seamless data exchange across national and county platforms. Surveillance data is generated, stored, and transmitted using harmonized data standards, common disease classifications, standardized coding systems, and defined metadata structures to ensure consistency, comparability, and interoperability.

Digital platforms support real-time reporting, automated data flows, visualization, analytics, and decision support. Animal health surveillance systems are technically and operationally linked with laboratory information systems, market and abattoir surveillance platforms, wildlife surveillance systems, and relevant environmental and public health information systems to enable integrated One Health surveillance, joint risk assessment, and coordinated response. Geospatial systems, dashboards, and digital analytics tools are used to support early warning, outbreak detection, risk mapping, and operational planning. System interoperability enables routine data integration, automated reporting, and information sharing across sectors and levels of government, strengthening preparedness, responsiveness, and coordinated disease control.

### **3.4.7 Data Use, Reporting, Feedback and Decision Support**

Surveillance data is systematically transformed into actionable intelligence to inform prevention, preparedness, response, and recovery. Data interpretation and reporting should support routine situation monitoring, early warning, outbreak detection, risk assessment, and strategic planning at both national and county levels.

Standardized reporting mechanisms should be used to generate routine surveillance reports, alerts, situation updates, and outbreak notifications. Data products should be disseminated through structured channels to policymakers, technical officers, county authorities, and field personnel to support timely and coordinated action.

Feedback mechanisms ensure that surveillance information is communicated back to reporting units, communities, and frontline actors to strengthen trust, compliance, and continuous system improvement. Surveillance data shall directly inform operational decisions, resource allocation, policy formulation, preparedness planning, and One Health coordination, ensuring that information generated by the surveillance system leads to concrete action and measurable impact on animal health, public health, livelihoods, and national resilience.

## **3.5. Response-Animal health Emergency Operations Center (AH EOC)**

The Animal Health Emergency Operations Center (AH EOC) is the central coordination platform for preparedness, detection, response, and recovery from animal health emergencies, including transboundary animal diseases (TADs), zoonotic outbreaks, agro-terrorism events, and food safety emergencies. It provides a structured, institutionalized mechanism for the coordination of information, resources, and operational actions to support preparedness, response, and recovery during animal health incidents that pose acute risks to livestock production, livelihoods, public health, trade, food security, and national stability. The AH EOC enables timely, evidence-based decision-making, effective

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resource mobilization, and unified operational control, consistent with the IDSR framework, the One Health approach, and national disaster risk management structures.

The AH EOC functions as the command, control, and coordination hub for animal health emergencies, integrating surveillance intelligence, laboratory information, field operations, logistics, and inter-sectoral coordination into a single operational structure. It links national and county veterinary services, laboratories, security agencies, border control authorities, and One Health partners to ensure coherent and synchronized action across sectors and levels of government.

## **Modes of Operation**

The AH EOC operates under a modal system that is activated based on structured risk assessment and predefined thresholds. These modes ensure scalability, proportionality, and readiness:

### **1. WatchMode**

Watch mode represents the routine preparedness and monitoring phase. A designated core team undertakes continuous monitoring of animal health risks through indicator-based surveillance systems and event-based surveillance (EBS) streams, including routine disease reports, laboratory notifications, community alerts, hotlines, market surveillance, wildlife reports, and media scanning. Risk analysis and horizon scanning are conducted to identify emerging threats. Watch mode functions as the foundation for early warning, enabling timely detection and rapid escalation when risk thresholds are exceeded.

### **2. AlertMode**

Alert mode is activated when risk assessment indicates an elevated likelihood of an animal health emergency. This is a preparedness and standby phase characterized by intensified surveillance, rapid verification of signals, and preliminary field investigations. Preparedness measures include activation of coordination mechanisms, readiness of Rapid Response Teams (RRTs), pre-positioning of critical supplies, enhanced laboratory preparedness, strengthened coordination with county veterinary services, and engagement of relevant One Health institutions. Risk communication to key stakeholders is initiated, and contingency planning is operationalized to ensure rapid transition to response if escalation occurs.

### **3. ResponseMode**

Response mode is activated when predefined emergency thresholds are met, triggering partial or full activation of the AH EOC based on the scale, severity, and geographic spread of the event. During this phase, the AH EOC coordinates national and county response operations, including:

- Deployment of Rapid Response Teams
- Epidemiological investigations and enhanced surveillance
- Laboratory confirmation and diagnostic coordination
- Implementation of control measures such as isolation, quarantine, movement control, zoning, and stamping-out where applicable
- Vaccination campaigns and strategic prophylaxis
- Vector control for vector-borne diseases

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- Enforcement of biosecurity measures across production systems and value chains
  - Logistics coordination, supply chain management, and resource mobilization
  - Inter-county and cross-border coordination

## **Core Functions**

Across all modes of operation, the AH EOC serves as the central hub for information management, situation analysis, and operational coordination. It ensures:

- Real-time data integration from surveillance, laboratory, and field systems
- Continuous situation analysis and risk assessment
- Timely information dissemination to decision-makers, counties, and stakeholders
- Structured risk communication to livestock keepers, value chain actors, and the public
- Coordinated inter-sectoral collaboration under the One Health framework
- Linkages with human health emergency structures for zoonotic events
- Alignment with national disaster risk management and emergency response systems

The establishment and operationalization of the AH EOC will significantly strengthen Kenya's early warning capacity, preparedness architecture, and coordinated response mechanisms for animal health emergencies. It will enhance national resilience, protect livelihoods, safeguard public health, secure trade and food systems, and ensure compliance with national, regional, and international animal health obligations.

## **3.6. Feedback**

To ensure timely analysis, response, and stakeholder engagement, the KABS data management team is responsible for generating and disseminating epidemiological bulletins based on data submitted through the platform.

### **3.6.1 Weekly Bulletins**

Submission Timeline:

- Weekly bulletins must be compiled and shared every Tuesday.
- These bulletins should summarize data collected for the preceding epidemiological week (i.e., from Monday to Sunday).

### **Diseases Covered:**

The weekly bulletin will focus on priority transboundary and zoonotic diseases of significant public health and trade concern. These include: Anthrax, CCPP, FMD, LSD, NCD, PPR, Rabies, ASF, RVF, and Rinderpest (Although eradicated, surveillance for rinderpest remains a global requirement under WOAHP guidelines)

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### 3.6.2 Monthly Bulletins

#### Submission Timeline:

Quarterly bulletins shall be submitted every month, on the first Friday of the week following the last month.

#### Content Scope:

The monthly bulletin will focus on priority transboundary and zoonotic diseases of significant public health and trade concern. These include Anthrax, CCPP, FMD, LSD, NCD, PPR, Rabies, ASF, RVF, HPAI and Rinderpest.

- Food safety
- EOC
- Vector surveillance
- Aquaculture surveillance

### 3.6.3 Annual Bulletins

#### Submission Timeline:

Annual bulletins shall be submitted yearly, within the first two weeks of the new year.

#### Content Scope:

These reports provide a more comprehensive overview of all animal health data captured in KABS. They should include:

- All reported animal health events(including those not listed in the weekly bulletin)
- Zero reports (to account for absence of disease in some areas)
- Food safety
- EOC
- Vector surveillance
- Aquaculture surveillance
- Apiculture health
- Vaccination data

### 3.6.4 Integration of Emergency Reports from the EOC

#### Event-Based Reporting:

Any event reported through the Emergency Operations Center (EOC) should also be entered into KABS after confirmation of the case or outbreak.

#### Data Confirmation and Feedback Loop:

Once such an event is confirmed:

- The respective county team must be notified and provided with feedback on the laboratory results or verification findings.
- The case should be updated in KABS using the appropriate reporting form.

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- **Coordination:**  
The data management team must ensure close collaboration with the EOC and relevant response teams to avoid duplication and to maintain consistency in reporting.

### **3.6.5 Dissemination to stakeholders**

All bulletins and reports generated through KABS must be promptly shared with relevant stakeholders to support timely response and planning.

- **Weekly, Monthly and Annual Bulletins:**  
Distributed to the Head of VEES, Head of the Disease Surveillance Division, County Directors of Veterinary Services (CDVS), Sub-County Veterinary Officers (SCVOs), the EOC, and other designated partners.
- **Notifiable disease (ND1)**  
Submitted to the Head of VEES every month, who validates and shares them with the Head of the Disease Surveillance Division and other relevant stakeholders.
- **ARIS (Animal Resource Information System) data**  
Submitted to the Head of VEES, who validates and shares them with the Head of the Disease Surveillance Division and AU – IBAR

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# Chapter 4: Important Diseases, Conditions & Events

## 4.1 Standard Case Definitions

A standard case definition is an agreed-upon set of criteria used to determine whether an animal has a suspected disease or condition. Case definitions outline the clinical features, laboratory criteria, and epidemiological specifications related to time, place, and species. Using standard case definitions ensures harmonized detection, reporting, and confirmation of priority animal diseases across all levels of the surveillance system.

### Why Standard Case Definitions Are Needed

Standard case definitions help to:

1. Determine whether an animal has a presumed disease or condition, or to rule out other possible diagnoses.
2. Ensure consistent diagnosis across different locations, times, and personnel.
3. Trigger immediate reporting and initial response even before laboratory confirmation is available.
4. Facilitate comparison of disease occurrence across different geographical areas and periods.

Standard case definitions are essential for implementing the WOAHA Terrestrial and aquatic animal health code and manual, and IHR (2005). All frontline staff animal health, human health, and environmental officers should understand the definitions for priority diseases that affect the local area or have potential for transboundary or international spread.

### Classification of Cases

A three-tiered classification system is commonly used:

**Suspected case:** An animal that meets the clinical case definition based on typical presenting symptoms, but without laboratory confirmation.

**Probable case:** An animal that meets the clinical case definition and has an epidemiological link to a confirmed case, but lacks definitive laboratory confirmation (e.g., sample not collected, animal died, or specimen was inadequate); may be supported by a positive rapid diagnostic test or pathognomonic post-mortem findings.

**Confirmed case:** A suspected or probable case verified by WOAHA recommended laboratory testing standards.

Note: Classification criteria may differ depending on the epidemiology of specific diseases. During outbreaks, a highly sensitive case definition should be applied to capture all suspected cases. Case detection will primarily rely on syndromic surveillance, based on clinical presentation without laboratory confirmation. Once the causative agent is identified, any other cases epidemiologically linked to the confirmed case may be classified as probable or confirmed.

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Where appropriate, a “probable” case category may be applied to cases with compatible clinical signs and epidemiological links, when routine laboratory testing is not required.

### **Epidemiological link**

It is the association between a suspected case and a confirmed case within a defined time and place that suggests a plausible pathway of disease transmission.

#### **Key elements of an epidemiological link include:**

1. **Place:** Occurrence in the same farm, herd, production unit, market, slaughter facility, water body, or geographic area where a confirmed case has been detected.
2. **Time:** Exposure or occurrence within the expected incubation or transmission period of the disease relative to the confirmed case or outbreak.
3. **Contact or exposure:** Direct or indirect contact with infected animals, contaminated materials, vectors, shared equipment, or environments associated with disease transmission.

### **Reporting Using Standard Case Definitions**

All animal health practitioners must use the standard case definitions when reporting suspected cases and conditions to the county director of veterinary services (CDVS) and the DVS. The IDSR framework provides continuous reporting of epidemiological information to support national and international reporting obligations under IHR (2005). Reliable reporting enables animal health practitioners and national focal points (IHR and WOA/FAO) to:

- Strengthen preparedness and prevention measures
- Identify emerging animal health threats
- Guide timely response actions
- Monitor disease trends
- Assess the effectiveness of interventions

#### **4.2 Lay case definitions**

These are simplified, easy-to-use descriptions of diseases or conditions designed for non-technical community disease reporters, community health promoters, wildlife rangers/ community scouts. At the community and farm level, simplified case definitions are used to enable rapid detection of priority animal diseases. Community disease reporters and farmers identify suspected cases based on key clinical signs in individual animals or herds and promptly notify the relevant veterinary authorities for investigation, laboratory confirmation, and response.

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### 4.3. Categorization of important diseases and events

For this strategy, important diseases are those that fall into one or more of the following categories:

- Notifiable diseases under WOAHA standards
- Transboundary animal diseases (TADs): highly contagious or transmissible diseases with the potential for rapid spread across borders, causing significant economic and public health impacts
- Zoonotic diseases prioritized for surveillance due to their risk to human health
- Emerging or re-emerging infectious diseases that threaten animal or public health
- Production and trade-sensitive diseases that substantially impact livestock productivity, market access, or livelihoods

The IDSR system for Kenya adopts a species-specific disease flow approach to ensure clear, practical, and standardized reporting at all levels (community, sub-county, county, and national). Each priority disease or event is assigned to the primary affected animal species or production system (cattle, small ruminants, pigs, poultry, camels, donkeys/horses, dogs/cats, bees, fish/aquatic species, and wildlife). This species-oriented structure simplifies case definitions, reporting tools, investigation protocols, and laboratory submission pathways, while still highlighting zoonotic and transboundary risks. The complete list of important diseases and events under the national IDSR framework is presented below using this species-specific flow with clear indication of:

1. Zoonotic potential
2. WOAHA notifiability and immediate reporting requirement
3. Epidemic-prone status
4. Targeted eradication/elimination programs for others.

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#### 4.3.1 Multiple species (cattle, sheep, goats)



##### 1. Actinobacillosis (Wooden tongue)

Actinobacillosis is an infectious bacterial disease caused by *Actinobacillus lignieresii*, a gram-negative coccobacillus that is part of the normal flora of the upper digestive tract and oral cavity in many animals.

**Species affected:** Cattle, sheep, goats, pigs, and horses.

**Suspected case:** In cattle suspect presents with a hard and swollen tongue that may protrude from the mouth, inability to eat, swelling and reddening of the gums, abscesses forming nodules in the mouth, dehydration, weight loss.

In other species (e.g., pigs, horses): It may manifest as septicemia, pleuropneumonia, arthritis, abscesses, or systemic infections (e.g., *Actinobacillus equuli* in foals causing diarrhea, meningitis, or joint infections).

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed:** A suspected or probable case with bacteria identified in tissue samples by culture, PCR, or ELISA or histopathology.

**Reporting tool:** Sanitary Report Form/ ND1 in KABS.

## 2. Actinomycosis (Lumpy jaw)

Actinomycosis is a bacterial disease caused by *Actinomyces bovis* and *Actinomyces suis*; a gram-positive, filamentous, anaerobic bacterium that is part of the normal oral flora in ruminants. Actinomycosis is a chronic, progressive bacterial infection primarily affecting cattle, commonly known as “lumpy jaw” (or “big jaw” in some regions).

**Species affected:** Cattle, pigs, and horses

**Suspected case:** Suspect presents with hard, non-movable swelling of the mandible (lower jaw) or maxillae (upper jaw), difficulty in chewing and/or breathing, dropping of feed from the mouth, swelling of the pharynx, excessive salivation

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through culture of the organism from the lesion (aspirated purulent sample) under anaerobic conditions, Cytology (a gram stain of purulent material will reveal gram-positive, club-shaped rods and filaments (sulfur granules) or PCR.

**Reporting tool:** Sanitary Report Form/ ND1 in KABS

## 3. Anaplasmosis

Anaplasmosis is a tick-borne infectious disease primarily caused by obligate intraerythrocytic bacteria of the genus *Anaplasma*, most commonly *Anaplasma marginale* and *Anaplasma centrale*.

**Species affected:** ruminants (especially cattle, but also sheep, goats, and some wild ruminants (buffalo, antelope))

**Suspected case:** Suspect presents with constipation (Pelleted fecal matter), high fever (> 40 C), pale mucous membranes, jaundice, anorexia, drop in milk production, abortions, sudden death

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through microscopic examination of Giemsa-stained thin smears to confirm *Anaplasma* bodies from whole blood collected from the ear and jugular veins, or serology (cELISA, IFAT), or PCR.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 4. Anthrax

Anthrax is an acute, often fatal, infectious zoonotic disease caused by the bacterium *Bacillus anthracis*, a gram-positive, spore-forming, rod-shaped organism. The spores are highly resistant and can survive in soil for decades, making anthrax a persistent environmental threat.

**Species affected:** Herbivorous animals (cattle, goats, donkeys, camels), wild animals (warthogs, buffalo, hippos, elephants, zebras), and pigs.

**Suspected case:** Suspect presents with sudden death of animal(s), dark unclotted blood oozing from natural body openings, fever (> 40°C), bloat, weak or absence of Rigor Mortis, prostration, weakness, inappetence

**Probable case:** A suspected case that tests positive by Giemsa/gram staining (blood smear (polymorphic rods with square ends, “bamboo appearance”), OR A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case that tests positive by culture and Polychrome Methylene Blue staining or PCR, or gamma phage test in a high containment facility.

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**NB:** Post-mortem should be avoided in suspected cases to prevent spore release; use blood from ear vein or incision.

**When to report:** Immediately

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 5. Aspergillosis

Aspergillosis is an opportunistic fungal infection caused by species of the genus *Aspergillus* (most commonly *A. fumigatus*, but also *A. flavus*, *A. terreus*, *A. niger*, and others), which are ubiquitous saprophytic molds found worldwide in soil, decaying vegetation, stored grain, compost, and indoor environments. In animals, it is typically sporadic and non-contagious, occurring when animals inhale large numbers of spores (conidia) or, less commonly, through ingestion or wound contamination. It primarily affects immunocompromised, stressed, or young animals, with predisposing factors including poor ventilation, overcrowding, immunosuppression (e.g., from concurrent disease, stress, or therapy), unhygienic conditions, or anatomical issues (e.g., skull conformation in dogs).

**Species affected:** All Poultry, dogs, cats, cattle, horses, and humans

### **Suspected Cases:**

**Poultry:** Suspect presents with difficulty in breathing, accelerated respiratory rate, silent gasping, incoordination, poor balance, opacity of the eyes in cases of ocular infection.

**Ruminants:** Suspect presents with pyrexia, nasal discharges, productive cough, abortions at 6-9 months, retained fetal membranes, bronchopneumonia, mastitis

**Dogs:** Suspect presents with nasal pain, ulceration, and/or depigmentation of the nares, sneezing, unilateral or bilateral bleeding, purulent and/or bloody discharge from the nares. On post-mortem, the suspect presents with white, creamy nodules in and on the air sacs and viscera.

**Birds (especially poultry, raptors, psittacines, penguins):** Most common form is pulmonary/bronchopulmonary aspergillosis, with dyspnea, gasping, weight loss, anorexia, and high mortality in flocks due to air sac granulomas or pneumonia.

**Dogs:** Often sinonasal (unilateral nasal discharge, sneezing, epistaxis, facial pain) or disseminated/systemic (lethargy, lameness, weight loss, neurological signs; common in young female German Shepherds).

**Cats:** Mainly sino-nasal or sino-orbital (sneezing, nasal discharge, exophthalmos, neurological signs).

**Horses:** Guttural pouch mycosis (epistaxis, dysphagia) or mycotic keratitis.

**Cattle:** Mycotic abortion or pulmonary involvement.

**Other forms:** Mycotic keratitis, osteomyelitis, or disseminated disease in various species.

**Confirmed case:** Suspected or probable case confirmed by culture in a high containment facility and Histopathology.

**NB:** The growth of only a few colonies should never be considered sufficient evidence for diagnosis, because *Aspergillus* is ubiquitous and can contaminate plates.

**Reporting tool:** Sanitary Report Form/ ND1 in KABS

## 6. Babesiosis

Babesiosis is a tick-borne disease caused by protozoan parasites of the genus *Babesia* (*Babesia bovis*, *Babesia bigemina*, and *Babesia divergens*).

**Species affected:** Ruminants (cattle, buffalo, camels, goats, sheep, kudu,

and impala), pigs, canines, primates, and rhinos.

**Suspected case:** Suspect presents with haemoglobinuria, pale or yellow mucous membranes, hemolytic anemia, high fever ( $> 40^{\circ}\text{C}$ ), dry muzzle, loss of appetite, weakness, ataxia, increased respiratory and/or heart rates  
On post-mortem, the suspect carcass presents with an enlarged, dark, pulpy spleen with or without a friable consistency

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed using microscopic examination (Giemsa staining technique) and PCR.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 7. Black quarter or black leg

Black quarter is an acute bacterial disease of mainly cattle characterized by emphysematous swelling usually in heavy muscles. It is caused by *Clostridium chauvoei*.

**Species affected:** Cattle, sheep, and buffalo.

**Suspected case:** Suspect presents with edematous and crepitant swelling in the hip, shoulder, chest, back, or neck, hot and painful swellings, tremors, onset of lameness, fever ( $> 40^{\circ}\text{C}$ ), prostration, abnormal breathing  
On post-mortem, the suspect presents with dark red muscles and a rancid odor

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case with *Clostridium* positive (culture results of tissues OR biochemical characterization and gram staining/microscopy).

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 8. Bluetongue

Bluetongue (BT) is an infectious, primarily vector-borne viral disease caused by Bluetongue virus, a member of the Orbivirus genus of the family Reoviridae. Midges in the genus *Culicoides* (the insect host) typically transmit bluetongue virus (BTV) among susceptible ruminants, having become infected by feeding on viraemic animals (the vertebrate host).

**Species affected:** sheep, goats, cattle, buffalo, and most species of African antelope, and camelids.

**Suspected case:** Suspect presents with hyperaemic, edematous, and/or cyanotic tongue that may protrude from the mouth, facial oedema and/or haemorrhages, fever, erosion of the mucous membranes, coronitis, laminitis, pleural and/or pericardial haemorrhages

On post-mortem, the suspect carcass presents with interalveolar hyperaemia, severe alveolar oedema, the bronchial tree may be filled with froth, plasma-like fluid in the thoracic cavity and/or pericardial sac, distinctive haemorrhage near the base of the pulmonary artery

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** Suspected or probable case confirmed through virus isolation or RT-PCR

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 9. Botulism

Botulism in most cases, is an intoxication that results from ingestion of the toxin in food. There are seven types of *Clostridium botulinum*, differentiated by the antigenic specificity of the toxins: A, B, C1, D, E, F, and G. C1 is the most common in animal species, notably wild ducks, pheasants, chickens, mink, cattle, and horses while D is common in cattle.

**Species affected:** cattle, wild ducks, chickens, cattle, horses, wild waterfowl

**Suspected case:** Suspect presents with flaccid muscle paralysis, progressive motor paralysis, difficulty in chewing and/or swallowing, drooling, decreased tongue tone, dysphagia, inability to urinate, sternal recumbency, disturbed vision, generalized progressive paresis, death

**Confirmed case:** Suspected or probable case confirmed through culture of the organism from tissue of the affected animal

**NB:** Diagnosis is difficult to establish by demonstrating the toxin in animal tissues or feed, and so is commonly made by eliminating other causes of motor paralysis.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 10. Bovine ephemeral fever (three-day sickness)

Bovine ephemeral fever (BEF) is an insect-transmitted, non-contagious viral disease caused by Bovine ephemeral fever virus (BEFV), a member of the genus Ephemerovirus in the family Rhabdoviridae. The disease is primarily transmitted via insect vectors, such as mosquitoes and biting midges (genus *Culicoides*).

**Species affected:** cattle and water buffalo

**Suspected case:** Suspect presents with sharp drops in milk production, high fever (41 °C), stiffness, lameness, nasal/ocular discharge, muscle tremors, listlessness, tachypnea or dyspnea, shivering, pulmonary emphysema, drooling, inappetence

On post-mortem, the suspect presents with polyserositis (affecting pleural, pericardial, or peritoneal surfaces), serofibrinous polysynovitis, polyarthritis, polytendinitis, cellulitis, focal necrosis of skeletal muscles

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through PCR

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 11. Bovine Genital Campylobacteriosis or Bovine venereal campylobacteriosis

Bovine genital campylobacteriosis (BGC) is a venereal disease caused by *Campylobacter fetus* subsp. *venerealis* (Cfv).

**Species affected:** Cattle

**Suspected case:** Suspect presents with infertility, early embryonic death, abortion

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through culture and identification of the organism, and ELISA

**Reporting tool:** Sanitary Report Form/ ND1 in KABS

## 12. Bovine spongiform encephalopathy (BSE)

Bovine Spongiform Encephalopathy (BSE) is a fatal disease of the nervous system in cattle caused by the accumulation of an abnormal protein called 'prion' in nervous tissue.

**Species affected:** Cattle, humans

**Suspected case:** Suspect presents with changes in behavior and temperament, hyper-reactivity, incoordination, apprehension, pelvic limb ataxia, hyperesthesia to touch and sound, difficulty in rising from a lying position, reluctant to enter the milking parlor, kicks vigorously during milking, weight loss, decreased milk production

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed with post-mortem microscopic examination of the medulla oblongata or immunochemical methods for the detection of misfolded prion proteins in the brain.

**Reporting tool:** Sanitary Report Form/ ND1 in KABS

## 13. Bovine tuberculosis

Bovine tuberculosis (TB) is a chronic disease of animals caused by *Mycobacterium bovis* (*M. bovis*). Tuberculosis is a zoonotic disease that affects most mammals, causing a general state of illness, coughing, and can eventually cause death.

**Species affected:** Cattle, goats, cats, sheep, dogs, swine, equine, avian species, human, and wildlife (boars, antelope, elephants, squirrels, primates, buffalo).

**Suspected case:** Suspect presents with chronic cough, emaciation/ weight loss, fluctuant fever, loss of appetite, enlarged prominent lymph nodes, breathing difficulties, body weakness, diarrhea

On post-mortem, the suspect carcass presents with localized and generalized tubercles in organs and crepitus sounds in the lungs

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed with a positive Modified Ziehl-Neelsen (ZN) test of respiratory discharge and aspirates from prominent lymph nodes.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 14. Brucellosis

Brucellosis is a zoonotic disease caused by bacteria of the genus *Brucella*, which tend to be mostly host-specific (*B. abortus* affects cattle, *B. melitensis* affects goats and sheep, and *B. suis* affects pigs); however, these *Brucella* species can infect other animal species.

**Species affected:** Domestic ruminants, pigs, one-humped camel, wildlife (ruminants, wild pigs, primates), and occasionally horses

**Suspected case:** Suspect presents with late-term abortions, retained placenta, infertility, epididymitis, swelling of testicles (orchitis in males), arthritis, weak young ones, low milk yield (in females)

On post-mortem, the suspect carcass presents with cotyledonous uterine lesions

**Probable case:** A suspected case that tests positive by Rose Bengal test kits OR A suspected case with evidence of epidemiological links to a

confirmed case

**Confirmed case:** A suspected or probable case confirmed with bacterial isolation and PCR or CFT

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

#### 15. **Contagious Bovine Pleuropneumonia (CBPP)**

Contagious bovine pleuropneumonia (CBPP) is a bacterial disease of major economic importance in sub-Saharan Africa. It is caused by *Mycoplasma mycoides* subsp. *mycoides*.

**Species affected:** Cattle and buffalo

**Suspected case:** Suspect presents with respiratory signs such as dyspnoea, polypnoea, or cough, nasal discharges, fever ( $> 40^{\circ}\text{C}$ ), anorexia, emaciation  
In hot seasons, the animal often stands by itself in the shade, its head lowered and/or extended, its back slightly arched, its elbows turned out  
On post-mortem, the suspect carcass presents with clear yellow or turbid fluids in the thoracic cavity, adhesions, and/or fibrinous deposits, lungs characterized with consolidation, marbling appearance, and/or caseous lesions

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case with a positive competitive ELISA, complement fixation test using sera, or PCR.

**Reporting tool:** Sanitary Report Form/ ND1, Meat Inspection Form, Wildlife Disease Form in KABS and Earth Ranger.

**Thresholds:**

#### 16. **Contagious Caprine Pleuropneumonia (CCPP)**

Contagious caprine pleuropneumonia (CCPP) is one of the most severe diseases that affects goats. It is caused by *Mycoplasma capricolum* subsp. *Capripneumoniae*, or *Mccp* (previously *Mycoplasma* biotype F38).

**Species affected:** Sheep, goats, and some small wild ruminants

**Suspected case:** Suspect presents with respiratory signs such as snoring, dyspnoea, polypnea, or cough, nasal discharges, fever ( $> 40^{\circ}\text{C}$ ), anorexia, general body weakness

Exercise intolerance progresses to respiratory distress, with open-mouth breathing, frothy salivation

On post-mortem, the suspect carcass presents with straw-colored pleural effusion, acute fibrinous pneumonia, distention of interlobular septa by serofibrinous fluid

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected case with positive results on bacterial culture and PCR, complement fixation, or ELISA

**Reporting tool:** Sanitary Report Form/ ND1, Meat Inspection Form, Wildlife Disease Form in KABS and Earth Ranger.

#### 17. **East Coast fever (ECF)**

East Coast fever (ECF) is a tick-borne disease caused by a protozoan called *Theileria parva parva*. *T.parva* sporozoites are injected into cattle by infected vector ticks, *Rhipicephalus appendiculatus*, during feeding.

Species affected: Domestic (Cattle), Wildlife (waterbucks and buffaloes)

**Suspected case:** Suspect presents with onset of fever (above  $42^{\circ}\text{C}$ ), petechial hemorrhages on the mucous membranes, under the tongue, eyes,

and/or vulva, corneal opacity, swollen lymph nodes (prescapular & parotids), nasal discharge, diarrhea, lacrimation, listlessness, anorexia

On post-mortem, the suspect carcass presents with pulmonary oedema, froth in the trachea, bronchioles, and/or bronchi, enlarged, swollen, and edematous lymph nodes, cigar-shaped ulcerations on the abomasum

**Probable:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case with *Theileria Parva* protozoan detected by microscopy in Giemsa-stained lymph node smears.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 18. Ebola and Marburg diseases

These are deadly zoonotic diseases caused by the Marburg and Ebola viruses of the Filoviridae family. Ebola Virus Disease (EVD) and Marburg hemorrhagic fever virus (MARV) are clinically similar, highly virulent zoonotic diseases with case fatality rates surpassing 50% in humans and approaching 100% in primates.

**Species affected:** Primates (apes or gorillas, chimpanzees, monkeys), pigs, fruit bats, duiker antelopes, and humans.

**Suspected case:** Suspect presents with sudden death of primates in large numbers, diarrhea in primates, blood oozing from the natural orifices, fever, facial edema, depression, anorexia, weakness, cough

On post-mortem, the suspect carcass presents with lymphopenia, disseminated intravascular coagulation indicated by round spots that appear on the skin, hemorrhagic, septic shock

**Probable Case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed through RT-PCR or IgM antibodies ELISA against the Ebola virus.

When to report: Immediately

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

## 19. Foot and mouth disease (FMD)

Foot-and-mouth disease (FMD) is a highly infectious and contagious viral disease of many wild and domestic cloven-hoofed mammals caused by the family Picornaviridae, genus Aphthovirus.

**Species affected:** Domestic and wild cloven-hoofed animals e.g., cattle, goats, pigs, sheep, buffalo.

**Suspected case:** In cattle, the suspect will present with drooling saliva, vesicular lesions (in the mouth, tongue, gums, teats, and/or hooves), a drop in milk production, limping, mastitis, fever (39.4 - 41.1°C), loss of appetite, weight loss, death in young

On post-mortem, the suspect carcass will present with ulcerative lesions on the tongue, palate, gums, pillars of the rumen and/or feet, inflammation in the abomasum walls, necrosis of the heart muscle (tiger heart)

**NB.** Previously affected or vaccinated animals may not show all the clinical signs.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed with virus isolation, antigen detection, enzyme-linked immunosorbent assay (ELISA), or reverse transcription Polymerase chain reaction (RT-PCR).

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**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

## 20. Foot rot

Foot rot is a highly contagious bacterial disease affecting the interdigital (between toes) tissue of ruminants; caused by *Dichelobacter nodosus* and *Fusobacterium necroforum* (goats and sheep) and *Bacteroides mealaninogenicus* (cattle).

**Species affected:** Sheep, goats, cattle, pigs, and buffalo.

**Suspected case:** Suspect presents with lameness, acute swelling (sometimes up to the fetlock and/or coffin joint) of the interdigital hooves, redness of the corona bands, skin between the hooves develops pus and has a foul smell, sloughing off of the hoof, reduced milk production

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected case confirmed by bacterial isolation and identification of *Dichelobacter nodosus*, *Fusobacterium necroforum*, and *Bacteroides mealaninogenicus*

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

## 21. Heartwater (HW)

Heartwater (HW) is a bacterial disease caused by *Ehrlichia ruminantium*, transmitted by the *Amblyomma* ticks.

**Species affected:** All domestic and wild ruminants

**Suspected case:** Suspect presents with fever (>41°C), dyspnea, nervous signs (walks in circles, make sucking movements, stands rigidly with tremors of the superficial muscles, inappetence, listlessness, diarrhea (particularly in cattle), Terminally ill cases present with nervous signs that are usually associated with uncoordinated movement, circling, convulsions, chewing movements, circling gait, tremors

On post-mortem, the suspect carcass presents with hydropericardium, hydrothorax, pulmonary oedema, intestinal congestion, oedema of the mediastinal and/or bronchial lymph nodes, petechiae on the epicardium and/or endocardium, congestion of the brain, moderate splenomegaly

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed with microscopic identification and PCR

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

## 22. Helminthiasis

The major groups of worms that affect animals are cestodes, nematodes, and trematodes. Among the cestodes, tapeworms include *Echinococcus*, *Cysticercus bovis* in cattle, *Taenia solium* in pigs, and *Moniezia* in cattle are of economic importance. Ruminants are intermediate hosts for the cysts of tapeworm larvae. Nematodes include *Ascaris* (roundworms, common in poultry and pigs), *Haemonchus*, *Ostertagia*, *Trichostrongylus*, *Nematodorus*, *Strongyloides*, and *Dictyochoilus*. Among the trematodes, fasciola larvae are of greater economic importance than paramphistomes and schistosomes. This affects animal productivity and is of public health significance. Some can be transmitted to humans e.g. infestation with the *Taenia solium* (tapeworm) occurs following consumption of raw or undercooked infected pork.

### **a) Echinococcosis (hydatid disease)**

Echinococcosis, or hydatid disease, is an infection caused by tapeworms of the genus *Echinococcus*. Cystic Echinococcosis is a zoonotic disease transmitted to humans when larvae (cysts) are ingested through eating undercooked meat.

**Species affected:** Domestic (dogs, pigs, cattle, goats, and sheep), wildlife (hyenas, lions, and leopards), and humans.

**Suspected case:** Suspect presents with

In carnivores (dogs, hyenas, and lions): visible segments of the tapeworm (proglottids) in faeces, coughing, weight loss, loss of appetite, grass chewing, vomiting  
In ruminants and pigs: potbelly, coughing, rough hair coat, weight loss, poor growth, diarrhea

**NB:** In all affected species, morbidity depends on the level of infestation and infected organs. Mortality is usually low.

**Probable case:** On post-mortem, the suspect carcass presents with:

Carnivores - adult worms in the gastrointestinal system

**Confirmed case:** A suspected or probable case is confirmed by microscopy, computerized tomography and magnetic resonance imaging, or by ELISA

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

### **b) Bovine Cysticercosis**

Bovine Cysticercosis is a parasitic infection of cattle caused by the cysticercus (larval stage) of the cestode *Taenia saginata*. The infection is zoonotic, as the lifecycle and transmission of the parasite involve humans, animals, and the environment.

**Species affected:** Cattle, buffalo, human

**Suspected case:** Usually asymptomatic.

**Probable case:** A suspected case which, on post-mortem examination, reveals cysts in intestines, muscles, organs, OR identification by histopathology

**Confirmed case:** A suspected or probable case confirmed with enzyme-linked immunoelectrotransfer blot (EITB), or commercial enzyme-linked immunoassays positive for cysticercosis.

**Note:** The suspected case definitions are similar for infection with *Cysticercus bovis* in cattle, *Taenia solium* in pigs, and *Moniezia* spp in cattle; however, specimen types and confirmatory tests may differ. Suspected moniezia infection in cattle presents with projectile diarrhea, emaciation, anemia and/or visible segments of the tapeworm (proglottids) in faeces.

**Reporting tool:** Sanitary Report Form/ ND1, Meat Inspection Form, Wildlife Disease Form in KABS and Earth Ranger.

### **a) Fascioliasis (Common Liver Fluke Infection; Sheep Liver Fluke Infection)**

Fascioliasis is infection with the liver flukes *Fasciola hepatica* or *Fasciola gigantica*.

**Species affected:** Sheep, cattle, camelids, deer, buffalo, human

**Suspected case:** suspect presents with ,bottle jaw,abdominal pain, nausea, vomiting, intermittent fever, urticaria, malaise, weight loss

**NB:** Chronic infection may be asymptomatic

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** Suspected or probable case confirmed by microscopic examination of feces for eggs or ELISA

### **b) Haemonchosis**

Haemonchus contortus is the most common pathogenic gastrointestinal parasite in small ruminants.

**Species affected:** sheep, goats

**Suspected case:** suspect presents with, bottle jaw, anemia, generalized edema, weight loss

**Probable case:** a suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** suspected or probable case confirmed by demonstration of eggs on fecal examination (qualitative and quantitative evaluations)

### **c) Coenurosis**

Coenurosis is a disease of the central nervous system in sheep caused by Coenurus cerebralis, the larval stage of Taenia multiceps, a tapeworm, which infests the small intestine of carnivores.

**Species affected:** sheep, rabbits, and other herbivorous animals, dogs, human

**Suspected case:** suspect presents with purulent nasal discharge, neurological signs (seizures, loss of consciousness), impaired vision, a fluctuant tender nodule on the subcutaneous tissue

**Reporting tool:** Sanitary Report Form/ ND1

### **23. Infectious bovine rhinotracheitis (Infectious pustular vulvovaginitis)**

Infectious bovine rhinotracheitis/ infectious pustular vulvovaginitis (IBR/IPV) is a disease of domestic and wild cattle caused by bovine herpesvirus 1 (BoHV-1).

**Species affected:** Domestic and wild bovines

**Suspected case:** Suspect presents with (muco)purulent nasal discharge, hyperaemia of the muzzle (red nose disease), abortions, conjunctivitis, fever, depression, inappetence, reduced milk yield

On post-mortem, the suspect carcass presents with rhinitis, laryngitis, and/or tracheitis

**Probable cases:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed by real-time PCR or virus isolation.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

### **24. Infectious Kerato-conjunctivitis (Pink Eye)**

Infectious keratoconjunctivitis (Pink Eye) is a bacterial eye disease caused by Moraxella bovis in cattle. Other animals like small ruminants can also be affected by this disease, where the causative agents are M. ovis, Chlamydia pecorum, Mycoplasma spp, Colesiota conjunctivae, Listeria monocytogenes, etc.

**Species affected:** Cattle, sheep, goats

**Suspected case:** Suspect presents with conjunctivitis, blepharospasm, lacrimation, corneal opacity, central corneal ulceration, mucopurulent ocular discharge, extensive corneal necrosis, neovascularization, and/or dense granulation tissue corneal fibrosis

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed with microbial culture

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**Reporting tool:** Sanitary Report Form/ ND1 in KABS

**25. Johne's disease (Para-tuberculosis)**

Para Tuberculosis is a chronic enteritis caused by Mycobacterium avium subsp paratuberculosis (MAP).

**Species affected:** Cattle, sheep, goats, camelids, and buffaloes

**Suspected case:** Suspect presents with slowly progressive wasting, projectile smelly diarrhea which soils the hock, progressive weight loss, sunken eyes, loss of appetite, non-responsive to treatment

On post-mortem, the suspect carcass presents with lesions on the walls of the small intestine, draining mesenteric lymph nodes, ileum, jejunum, caecum, and/or colon

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** Suspected or probable case confirmed with culture and histopathology, or PCR.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

**26. Leptospirosis**

Leptospirosis is a zoonotic bacterial disease caused by infection with the genus Leptospira. The disease affects most mammals and has a broad range of clinical effects, from mild, subclinical infection to multiple-organ failure and death.

**Species affected:** cattle, pigs, dogs, rats, sheep, goats, horses, and human beings

**Suspected case:** Suspect presents with bloody urine (haemoglobinuria), yellowing of the mucous membranes, stillbirth, abortions after 1st trimester, delivery of weak young ones which die after a few days, fever, sudden onset of agalactia,

Dogs: chronic renal failure/chronic active hepatitis

Horses: periodic ophthalmia

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed with isolation and identification, and ELISA or PCR

**Reporting tool:** Sanitary Report Form/ ND1 in KABS

**27. Lumpy skin disease (LSD)**

Lumpy Skin Disease (LSD) is a viral disease of cattle caused by the LSD virus Capripoxvirus that is characterized by skin eruptions (lumps).

**Species affected:** Cattle, water buffalo

**Suspected case:** Suspect presents with generalized firm nodular swellings around the neck, head, perineum, udder, genitalia, and/or limb areas, enlarged superficial lymph node, salivation/drooling, fever (>39.5°C), loss of appetite, drop in milk production, swelling of the joints, especially knee joints, emaciation

With time, the nodules either regress or undergo necrosis, resulting in hard, raised areas ("sit-fasts") clearly separated from the surrounding skin. These areas slough to leave ulcers, which heal, resulting in a scar.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed by virus isolation, real-time or conventional PCR

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**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

**28. Malignant catarrhal fever (MCF)**

MCF is a fatal lymphoproliferative viral disease in cattle, caused by gammaherpesviruses of the Macavirus genus. The principal carriers and their viruses are sheep (ovine herpesvirus-2), wildebeest (alcelaphine herpesvirus-1), and goats (caprine herpesvirus-2).

**Species affected:** Domestic cattle, buffalo and other wild ruminants

**Suspected case:** Suspect presents with severe eye lesions (panophthalmitis, hypopyon, corneal opacity), fever, oculonasal discharge, mucosal erosions, cystitis, skin lesions (erythema, exudation, cracking, crust formation), nervous signs (hyperaesthesia, incoordination, nystagmus and/or head pressing), salivation

On post-mortem, the suspect carcass presents with fibrinoid necrosis of small muscular arteries, inflammation and necrosis of respiratory, alimentary, or urinary mucosal epithelium, subepithelial lymphoid infiltration, generalized lymphoid proliferation and necrosis, vasculitis, mucosal ulcerations, hemorrhage on the parenchymatous organs, particularly lymph nodes

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case.

**Confirmed case:** A suspected or probable case confirmed through PCR

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

**29. Mange (cutaneous acariasis)**

Mange is a contagious skin disease characterized by crusty, pruritic dermatitis and hair/feather loss, and caused by a variety of parasitic mites burrowing in or living on the skin. Mites that cause mange are a group of arachnid arthropods.

**Species affected:** Wild and domestic birds, pigs, dogs, cattle, sheep, goats, horses, donkeys, camels, cheetahs, lions and antelopes.

**Suspected case:** Suspect presents with hair/feather loss, crusty or scaly skin with itching or scratching

In poultry, there is pecking of the skin and/or feet

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected case confirmed with mites identified in skin scrapings by the modified centrifugation-floatation technique.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

**30. Mastitis**

Mastitis is an inflammation of the udder caused by various species of microorganisms such as bacteria and fungi.

**Species affected:** Cattle, goats, sheep, mares, and pigs

**Suspected case:** Suspect presents with swelling of the udder, pain on palpation, gangrenous udder, a drop in milk production, clots, flakes, blood-tinged pus or watery milk, fever

Subclinical cases are characterized by reduced milk production.

**Probable case:** A suspected case that tests positive for the California

Mastitis Test Confirmed case: A suspected or probable case with confirmed microorganisms under culture and isolation.

**Reporting tool:** Sanitary Report Form/ ND1

### 31. Orf (contagious ecthyma or infectious dermatitis of sheep and goats)

Orf also known as contagious ecthyma or scabby mouth or sore mouth, is caused by the Orf virus (poxvirus).

**Species affected:** Sheep, goats, and humans (direct contact)

**Suspected case:** Suspect presents with scabby sores around the lips, muzzle, nostrils, and/or tongue (The sores appear reddish in the early stages of the disease and later turn black), lesions on the teat and/or udder, loss of appetite, high fever ( $>38.5^{\circ}\text{C}$ ), weight loss, lameness, mastitis, dullness

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed with a PCR test.

**Reporting tool:** Sanitary Report Form/ ND1

### 32. Peste des Petits Ruminants (PPR)

Peste des Petits Ruminants (PPR), also known as sheep and goat plague, is caused by the PPR virus, a member of the Morbillivirus genus in the family Paramyxoviridae.

**Species affected:** Domestic small ruminants (sheep and goats) and wild small ruminants (gazelles).

**Suspected case:** Suspect presents with diarrhoea (soft faeces that progress to profuse, watery, foul-smelling output, often staining hindquarters. Watery blood-stained diarrhoea is common in the later stage), pyrexia, serous ocular or nasal discharges, pneumonia with foul offensive breath, erosive lesions on different mucous membranes, particularly in the mouth, anorexia, dry muzzle, excessive salivation, high mortality in young goats and sheep. On post-mortem, the suspect carcass presents with crusty scabs along the outer lips, erosive or haemorrhagic enteritis, engorgement and blackening of folds of the large intestine (zebra striping), erosions in the gastrointestinal or urogenital tracts, interstitial bronchopneumonia, secondary bacterial pneumonia, necrotic Peyer's patches, enlarged lymph nodes, necrotic liver or spleen

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed with a positive ELISA or PCR test result.

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

### 33. Photo sensitivity/photodermatitis

Photosensitivity is a skin condition that occurs when photoactive substances interact with ultraviolet (UV) light to produce free radicals and reactive oxygen species locally, resulting in skin damage.

**Species affected:** can affect any species, but it is most observed in cattle, sheep, goats, and horses

**Suspected case:** Suspect presents with reddening of non-pigmented parts of the animal body (skin, muzzle, udder, teats, vulva, and/or upper surface of the tail), ulceration, scab formation, skin necrosis, sloughing of the affected skin

**Confirmed case:** A suspected with confirmed measured porphyrin in blood, faeces, and urine.

**Reporting tool:** Sanitary Report Form/ ND1

### 34. Query (Q) Fever

Query (Q) fever (or Coxiellosis) is a zoonotic disease caused by *Coxiella burnetii*.

**Species affected:** cattle, sheep, goats, humans

**Suspected case:** Suspect presents with sporadic abortions, dead or weak offspring, premature births, infertility, metritis in cattle

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through culture of sample tissue and ELISA, or PCR

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

### 35. Rabies

Rabies is a viral zoonotic disease caused by the rabies virus (lyssavirus). The disease affects the central nervous system of mammals and is associated with a fatality rate of almost 100%.

**Species affected:** All mammals

**Suspected case:** Suspect presents with onset of drooling/salivation, aggressiveness, restlessness, hydrophobia with or without paralysis, seizures, howling, swaying movement

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case OR A suspected case with a history of contact with a rabid (suspect, probable, or confirmed) animal

**Confirmed case:** Suspected or probable case with a positive direct fluorescent antibody test, virus neutralization, or ELISA

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger

### 36. Rift Valley fever

Rift Valley Fever (RVF) is a fatal, arthropod-borne viral zoonotic disease caused by a single serotype of Bunyavirus, a mosquito-borne virus of the genus Phlebovirus.

**Species affected:** sheep, goats, cattle, camels, and humans.

**Suspected case:** Suspect presents with a storm of abortions in pregnant animals, melaena or bloody, foul-smelling diarrhea, fever (40°C and above), regurgitation, blood-stained mucopurulent nasal discharge, deaths among very young animals (calves, lambs, kids), lachrymation, salivation, dysgalactia

On post-mortem, the suspect carcass presents with or without jaundice (yellowing of mucous membranes, including eyes), hemorrhages in internal organs.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case OR Any suspected case linked to abnormally high rainfall and presence of the vector

**Confirmed case:** A suspected or probable case positive by PCR, virus isolation, or RVF antibodies by ELISA

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

### 37. Sheep and goat pox

Sheep and goat pox is caused by Capripoxviruses that result in widespread skin eruptions.

**Affected species:** Sheep and Goats

**Suspected case:** Suspect presents with generalized cutaneous papules or nodules, vesicles, lesions that discharge pus on the skin (muzzle, ears) and/or hairless parts, 100% mortality in naïve animals, fever

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On post-mortem, the suspect carcass presents with necrotic mucous membrane, enlarged and edematous lymph nodes, ulcerated papules in the abomasal mucosa, rumen, large intestine, on the tongue, hard and soft palate, trachea, and/or oesophagus

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** Suspected or probable case is confirmed by a virus isolation or PCR

**Reporting tool:** Sanitary Report Form/ ND1

### 38. Trichomoniasis

Trichomoniasis is a bovine venereal disease caused by the flagella protozoan parasite *Tritrichomonas foetus*.

**Species affected:** Cattle

**Suspected case:** Suspect presents with infertility, abortion, embryonic and early fetal death, fetal maceration in cows, vaginal discharge, pyometra.

Bulls are asymptomatic

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through identification and isolation of the agent through culture and microscopy, and PCR. The most reliable source for isolation and identification of *T. foetus* is the bull.

**Reporting tool:** Sanitary Report Form/ ND1

### 39. Trypanosomiasis or Nagana

Trypanosomiasis is a zoonotic disease caused by a protozoan of the genus *Trypanosoma*, including *Trypanosoma brucei*, *Trypanosoma congolense*, and *Trypanosoma vivax*, and transmitted by infected tsetse flies (*Glossina* spp).

Species affected: Cattle, goats, sheep, pigs, camels, dogs, cats, horses, humans

**Suspected case:** Suspect presents with swollen lymph nodes, intermittent fever, anemia, abortions or stillbirths, decline in milk production, weight loss

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case with demonstrated trypanosomes in thin and thick stained blood smears, wet mounts, and at the buffy coat in the hematocrit tube.

**Reporting tool:** Sanitary Report Form/ ND1

### 40. Type D Enterotoxaemia (Pulpy kidney disease, Overeating disease)

The causative agent of Type D enterotoxemia is *Clostridium perfringens* type D.

**Species affected:** sheep, rare in goats, cattle, horses, and gazelles

**Suspected case:** Suspect presents with sudden death, convulsions, staggering (ataxia), grinding teeth, neurological signs (excitement, incoordination, seizures, opisthotonus, circling, pushing the head against fixed objects), diarrhoea, weakness

On post-mortem, the suspect carcass presents with hyperemic areas on the intestine and/or myocardium, fluid-filled pericardial sac, pulmonary edema and/or congestion, hemorrhagic or necrotic enterocolitis, pulpy kidney

**Confirmed case:** Suspected or probable case confirmed through PCR

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

#### 41. Tetanus

Tetanus toxemia is caused by a specific neurotoxin produced by *Clostridium tetani* in necrotic tissue.

**Species affected:** All mammals

**Suspected case:** Suspect presents with localized stiffness of, often involving the masseter muscles, the neck, the hind limbs, lockjaw and/or the region of the infected wound, tonic spasms, hyperesthesia, difficulty in prehension and mastication of food, opisthotonus, bloating in ruminants

**Confirmed case:** Suspected or probable case confirmed through PCR

**Reporting tool:** Sanitary Report Form/ ND1, Wildlife Disease Form in KABS and Earth Ranger.

#### 42. Nairobi sheep disease

Nairobi sheep disease (NSD) is a tick-borne viral disease caused by Nairobi sheep disease virus (NSDV), genus *Orthonairovirus*, family *Nairoviridae*.

**Species affected:** sheep, goats

**Suspected case:** Suspect presents with abortion, mucopurulent to hemorrhagic nasal discharge, occasional conjunctivitis, fetid dysentery, fever, high mortality, depression, anorexia

On post-mortem, the suspect carcass presents with enlarged and edematous lymph nodes, mild splenomegaly, hemorrhages in the GI tract (particularly the abomasum), respiratory tract, female genital tracts, gallbladder, spleen, and/or heart, petechial and ecchymotic hemorrhages in the mucosa of the cecum and/or colon, conjunctivitis with dried crusts around the nostrils

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** suspected or probable case confirmed through RT-PCR

**Reporting tool:** Sanitary Report Form/ ND1

#### 43. Rinderpest

Rinderpest is a viral disease caused by a negative-strand RNA virus of the *Morbillivirus* genus within the family *Paramyxoviridae*. The disease was eradicated globally in 2011.

**Species affected:** cattle, wild African buffalo (*Syncerus caffer*), and Asian water buffalo (*Bubalus bubalis* and *B. arnee*). Sheep, goats, pigs, and wild ungulates might also be affected

**Suspected case:** Suspect presents with serous ocular and/or nasal discharges, watery/bloody diarrhea, necrotic mouth lesions (giving rise to shallow, non-haemorrhagic mucosal erosions), watery/bloody diarrhea, dry muzzle, serous ocular and/or nasal discharges, pyrexia (40- 41 °C), partial anorexia, constipation, congestion of visible mucosae, depression

On post-mortem, the suspect carcass presents with engorged or grey discoloration of the abomasum and/or Peyer's patches, lymphoid necrosis, linear engorgement, and blackening of the crests of the folds of the caecum, colon, and/or rectum (referred to as 'zebra striping')

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case is confirmed through virus isolation or RT-PCR.

**Reporting tool:** Sanitary Report Form/ ND1 Wildlife Disease Form in KABS and Earth Ranger.

### 4.3.2 Suidae (swine)



#### 1. African Swine Fever (ASF)

This is a disease of domestic and wild swine, caused by the African swine fever virus (ASFV), transmitted by soft ticks and contact between sick and healthy pigs

**Species affected:** Domestic pigs, warthogs, bush pigs, and giant forest hogs

**Suspected case:** Suspect presents with reddening of the skin, snout, ears or lower abdomen, purple-blue discoloration on the ears, abdomen, and/or feet with dark red spot progressing to ulcers, swaying gait, high fever (> 40°C), recumbency, shivering, rapid or labored breathing, loss of appetite or dullness, huddling together, non-response to treatment interventions. Sudden death of between 50% to 100% occurs either on the farm or in the community. On post-mortem, the suspect carcass presents with pinpoint hemorrhages of kidney heart and intestines, and blood tinged fluid in the intestines and abdominal cavity, an enlarged dark and friable spleen, swelling and haemorrhagic of the gastrohepatic, renal and mesenteric lymph nodes

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through virus isolation, or Real Time - PCR

**Reporting tool:** Sanitary Report Form/ Wildlife Disease Form in KABS and Earth Ranger.

#### 2. Atrophic rhinitis

Atrophic rhinitis has been divided into two forms: a) nonprogressive atrophic rhinitis, caused by *Bordetella bronchiseptica*, is mild, transient, and generally has little effect on growth and performance. b) Progressive atrophic rhinitis, caused by toxigenic *Pasteurella multocida*, is severe, permanent, and usually accompanied by poor growth.

**Species affected:** Swine

**Suspected case:** Suspect presents with nasal deformity (shortening or twisting of the upper jaw, distortion of the nasal septum,), sneezing, cough, nasal bleeding, lacrimation, poor growth, On post-mortem, the suspect carcass presents with clear nasal cavities with variable degrees of softening, atrophy, or grooving of the turbinates; deviation of the nasal septum; and/or asymmetric distortion of the surrounding bone structure.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case, OR histopathology confirming nasal turbinate atrophy and epithelial changes

**Confirmed case:** Suspect or probable case confirmed by microbial culture of toxigenic *P. multocida*.

**Reporting tool:** Sanitary Report Form Wildlife Disease Form in KABS and Earth Ranger.

#### 3. Porcine reproductive and respiratory syndrome (PRRS)

Porcine reproductive and respiratory syndrome (PRRS) is caused by the PRRS virus (PRRSV), a virus currently classified as a member of the order Nidovirales, suborder Arnidovirineae, family Arteriviridae, subfamily Variarterivirinae, genus Betaarterivirus.

**Species affected:** Pigs

**Suspected case:** Suspect presents with infertility, birth of weak piglets, late fetal mummification, abortions, stillbirths, birth of weak piglets that often

die soon after birth from respiratory disease and secondary infections. Respiratory syndromes include dyspnoea (“thumping”), fever, anorexia, listlessness

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed with virus isolation or PCR (conventional, real-time)

**Reporting tool:** Sanitary Report Form

#### 4. Swine dysentery (Bloody Scours)

Swine dysentery is a mucohemorrhagic diarrheal disease of pigs that is limited to the large intestine. It is caused by *Brachyspira hyodysenteriae*, *B. hampsonii*, and *B. suanatina*.

**Species affected:** swine

**Suspected case:** suspect presents with passage of soft faeces (diarrhea that increases in severity and quickly becomes mucohemorrhagic, with copious mucus and frank blood), dehydration, weight loss, anorexia  
On post-mortem, the suspect carcass presents with lesions confined to the cecum, spiral colon, and/or rectum, mesocolonic edema, mucosal lesions at the apex of the spiral colon, a mixture of blood, fibrin, and necrotic debris in the colonic lumen. The affected mucosa is variably swollen and covered with a layer of transparent to slightly opaque mucus, often with suspended flecks of blood

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case OR demonstration of typical histologic lesions in the large intestine of the suspect.

**Confirmed case:** A suspected or probable case confirmed by PCR assay.

**Reporting tool:** Sanitary Report Form/ Wildlife Disease Form in KABS and Earth Ranger.

#### 5. Swine erysipelas

Swine erysipelas is an infectious disease caused by the bacterium *Erysipelothrix rhusiopathiae*.

**Species affected:** Pigs

**Suspected case:** Suspect presents with diamond-shaped lesions under the skin, especially around the ears, snout, jowls, neck, or ventral abdomen, arthritis and sudden death., lameness, swollen joints, abortion, sudden death fever (40- 42 °C), loss of appetite. On post-mortem, the suspect carcass presents with congested lymph nodes, subcapsular hemorrhage, enlarged spleen, petechial hemorrhages on the kidneys, epicardium, and/or endocardium, congested and/or edematous lungs.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed by culture, microscopy, and PCR

**Reporting tool:** Sanitary Report Form Meat Inspection Form

#### 6. Transmissible gastroenteritis

Transmissible gastroenteritis (TGE) is an enteric disease of pigs caused by TGE virus (TGEV), a member of the Coronaviridae. Possible wild and domestic animal reservoirs for TGEV have been suggested. Wild and domestic carnivores (foxes, dogs, possibly mink) and cats are suggested as potential subclinical carriers of TGEV, serving as reservoirs between seasonal epidemics. However, only the virus excreted by serially TGEV-infected dogs has been confirmed as infectious for pigs.

**Species affected:** swine

**Suspected case:** Suspect presents with vomiting, profuse diarrhea, dehydration, 100% mortality in piglets. On post-mortem, the suspect carcass presents with thin-walled, small-intestinal segments filled with watery contents, suckling piglets may have undigested milk in the colon.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** Suspect or probable case confirmed by PCR

**Reporting tool:** Sanitary Report Form

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### 4.3.3. Aves (poultry)



#### 1. Avian Infectious Bronchitis

Infectious bronchitis is an acute, highly contagious upper respiratory tract disease in chickens caused by the Infectious Bronchitis Virus (IBV), a Gammacoronavirus.

**Species affected:** Domestic and wild birds

**Suspected case:** Suspect presents with respiratory signs (coughing, sneezing, or difficult breathing), and in laying birds, drop in egg production, eggs with thin-walled and/or misshapen shells, shell-less watery whites/ thin albumens, respiratory signs (coughing, sneezing, or difficult breathing), redness of the eyes (conjunctivitis), swelling of the eyes or face and drop in egg production, On post-mortem, the suspect carcass presents with atrophied oviduct, regressed ovaries, misshapen ova in abdominal cavity, exudates in the trachea, inflammation of the trachea, air sacculitis, nephritis, femoral head necrosis

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed by virus isolation or RT-PCR.

**Reporting tool:** Sanitary Report Form

#### 2. Avian influenza

Avian influenza (AI) is a zoonotic viral disease caused by the influenza A virus. AI viruses are classified as either highly pathogenic (HPAI), which causes severe illness and high mortality, or low pathogenic (LPAI), which causes milder disease but can evolve into more virulent strains. Influenza virus type A, members of the family Orthomyxoviridae, causes “bird flu” with virus subtypes A (H5N1) and A (H9N2) in birds and “swine flu” with virus subtypes A (H1N1) and A (H3N2) in swine.. Infection with HPAI results in high mortality in wild migratory birds around lake shores and in mortality in wild migratory birds around lake shores and free-ranging birds.

**Species affected:** Wild migratory birds (e.g. black winged tern), domestic birds (ducks, chickens, turkeys, quails, and guinea fowl), wild birds (e.g., waterfowl), swine, humans, domestic and wild mammals.

**Suspected case:** Suspect presents with sudden death with high morbidity and mortality often up to 100%, cyanosis of the unfeathered skin, wattles or comb, swelling of head, eyes, legs, combs, or wattles, red streaks on legs, respiratory signs (coughing, sneezing, ocular discharge, nasal discharge, or dyspnea), apathy, reduced vocalization, marked reduction in feed and

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water intake,, incoordination, diarrhea and decrease in egg production. On post-mortem, the suspect carcass presents with reddened combs and/or wattles, conjunctivitis, lesions in the trachea, edematous and/or hemorrhages on shanks or gastrointestinal, congestion and/or edematous lungs, multiple hemorrhages on the mucosal surface of the proventriculus, serosal hemorrhages over the Peyer's patches.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case OR Suspected case that tests positive for Avian Influenza using Bio-note Rapid Diagnostic Test (RDT) .

**Confirmed case:** A suspected or probable case confirmed positive by virus isolation or real-time RT-PCR.

**Reporting tool:** Sanitary Report Form, Wildlife Disease Form in KABS and Earth Ranger.

### 3. Avian mycoplasmosis

Avian mycoplasmosis is caused by several pathogenic mycoplasmas, among which *Mycoplasma gallisepticum* (MG) , *M. meleagridis* (MM) and *M. synoviae* (MS) are considered the most important.

**Species affected:** Turkey, chicken, and game birds

**Suspected case:** Suspect presents with coryza and its more prevalent in Turkeys. Morbidity is very high with low mortality.., conjunctivitis, sneezing, sinusitis, nasal exudate, rales, difficulty breathing through the partially open beak, fragile dis-colored egg tips. Unilateral or bilateral sinusitis may also be a feature, particularly in turkeys and game birds, and the infraorbital sinuses may become so swollen that the eyelids are closed and distinctive sweet odor associated with nasal discharge

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** Suspected or probable case confirmed by RT-PCR

**Reporting tool:** Sanitary Report Form, Wildlife Disease Form in KABS and Earth Ranger.

### 4. Coccidiosis

Coccidiosis is a serious gastrointestinal parasitic disease caused by protozoan parasites of the genus *Eimeria* in poultry.

**Species affected:** Poultry, cattle, sheep, goats, pigs, and rabbits

**Suspected case:** Suspect presents with brown yellow and bloody or mucoid diarrhoea, dehydration, general body weakness and loss of appetite in young birds. On post-mortem, the suspect carcass presents with peeling of the epithelial lining, associated with thickened intestines, a blood tinge, or clots of blood in the caeca

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through identification of oocysts by microscopy.

**Reporting tool:** Sanitary Report Form

### 5. Colibacillosis

Colibacillosis is caused by systemic infection with a pathogenic strain of *Escherichia coli*.

**Species affected:** Poultry, pigs, cattle, sheep, and goats

**Suspected case:** A suspect presents with droopy wings, difficulty in breathing, reduced feeding, general body weakness. On post-mortem, the suspect carcass presents with air sacculitis, septicemia, peritonitis,

omphalitis, salpingitis, pericarditis

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through culture and isolation

**Reporting tool:** Sanitary Report Form

## 6. Fowl Typhoid

Fowl Typhoid is a bacterial disease of poultry caused by *Salmonella enterica* serotype Gallinarum biovar Gallinarum in chickens and *Salmonella pullorum* in chicks and turkeys.

**Species affected:** Chicken, Turkeys

**Suspected case:** In younger birds, suspect presents with diarrhea (whitish), adherence of faeces to the vent, dehydration, weakness, anorexia, pale comb and wattle

In older birds, suspect presents with pale gums, whitish diarrhea and drop in egg production., dehydration, diarrhea, drop in egg production, poor hatchability

On post-mortem, the suspect carcass presents with enlargement of the liver, spleen, heart, ovary or peritoneum, cecal cores, nodular lesions in the liver, spleen, lungs, heart, gizzard, or intestines, inflamed unabsorbed yolk sac

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed by isolation, identification, and serotyping of *Salmonella gallinarum*, *pullorum*.

**Reporting tool:** Sanitary Report Form, Wildlife Disease Form in KABS and Earth Ranger.

## 7. Gumboro (Infectious Bursal Disease (IBD))

Gumboro (Infectious Bursal Disease) is a poultry disease caused by infectious bursal disease virus (IBDV) of genus Avibirnavirus, family Birnaviridae.

**Affected species:** Chicken, turkeys, ducks, guinea fowl, and ostriches.

**Suspected case:** Suspect presents with prostration, inflammation of cloaca, swelling of the vent, trembling, roughened feathers, watery diarrhea, incoordination, soiled vent feathers, inflammation of the cloaca, vent picking, sticky discharge from the mouth, sudden death. Petechial or ecchymotic hemorrhages in the thigh and breast muscles are characteristic

On post-mortem, the suspect carcass presents with swollen, edematous, and/or hemorrhagic cloacal bursal with muscular and/or proventricular hemorrhages, bursal atrophy, nephritis

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed with a positive ELISA test result, histopathological examination of the bursae, or RT-PCR.

**Reporting tool:** Sanitary Report Form

## 8. Infectious Coryza

Infectious coryza is an acute respiratory disease of chickens caused by *Avibacterium paragallinarum*.

**Species affected:** Chicken

**Suspected case:** Suspect presenting with facial swelling (face and wattles), thick, sticky and foul-smelling nasal mucus discharge, respiratory distress (sneezing, coughing, rattling) serous nasal discharge with foul smelling

mucus, sneezing, vision loss, decreased activity

On post-mortem, the suspect carcass presents with edema, hyperplasia, or erosion of the respiratory mucosal or glandular epithelia

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** Suspected or probable case confirmed by bacterial culture and PCR assay

**Reporting tool:** Sanitary Report Form

## 9. Mareks

Marek's disease is an avian viral disease caused by Marek's disease virus, a member of the genus *Mardivirus* within the subfamily *Alphaherpesvirinae*.

**Species affected:** Gallinaceous birds

**Suspected case:** Suspect presents with uncoordinated movement, paralysis of the legs and wings, lameness, death (40% to 80% mortality from tumors within the age of 8 and 17 weeks of age), severe depression, anorexia, emaciation, dehydration

The neural form is characterized by paralysis of the legs (One of the legs is extended forward and one tucked under the bird). The extremities affected are legs, wings and the neck. The visceral form is characterized by tumors in the internal organs (heart, liver, spleen, ovary, lungs). The cutaneous form is characterized by swollen feather follicles (bumps) on the skin.

Ocular Marek's disease is characterized by decreased pupil size and/or irregular pupil diameter

On post-mortem, the suspect carcass presents with soft, grey tumors in the gonads, liver, kidney, heart or other tissues, enlarged peripheral nerves (brachial and sciatic nerve); two or three times their normal thickness, the normal cross-striated and glistening appearance is absent, may appear greyish or yellowish, and edematous

**Probable cases:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** Suspected or probable case confirmed by histopathology or real-time PCR

**Reporting tool:** Sanitary Report Form

## 10. Newcastle Disease

Newcastle Disease (NCD) is a highly infectious and contagious viral disease of birds. It is caused by Newcastle Disease Virus (NDV), a paramyxovirus.

**Species affected:** Wild and domestic birds

**Suspected case:** Suspect presents with greenish diarrhea, 100% morbidity and mortality especially in naive populations nervous signs (tremors, paralyzed wings and/or legs, twisted necks or torticollis, circling, spasms), respiratory signs (difficulty breathing, gasping, coughing, sneezing, rales and/or nasal discharges), swelling and/or redness of the eyelids and/or comb, drop in egg production, loss of appetite, decreased weight, 100% morbidity and mortality especially in naive populations

On post-mortem, the suspect carcass presents with hemorrhage in the proventriculus, cecal tonsils, gastrointestinal tract, larynx, trachea, esophagus, intestines and egg yolk peritonitis.

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed by real-time PCR, virus isolation, or conventional PCR

**Reporting tool:** Sanitary Report Form

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#### 4.3.4. Equidae (Horse and Donkey)



##### 1. African horse sickness (AHS)

African Horse Sickness (AHS) is an arthropod-borne viral disease caused by the AHS virus. There are nine distinct identified serotypes of AHSV (Types 1 – 9), all present in Kenya.

**Species affected:** Horses, mules, donkeys, and zebras

**Suspected case:** Suspect presents with swelling and/or redness around the eyes, and/or face, fever, slow and heavy breathing, coughing, frothing, discharge from the nostrils, 100% mortality in naïve horses

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** A suspected or probable case confirmed through virus isolation, ELISA, or complement fixation tests

**Reporting tool:** Sanitary Report Form, Wildlife Disease Form in KABS and Earth Ranger.

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#### 4.3.5. Camelidae (Camel)



##### 1. Camelpox

Camelpox is a viral disease caused by the camelpox virus, belonging to the family Poxviridae, subfamily Chordopoxvirinae, genus Orthopoxvirus.

**Species affected:** Camel

**Suspected case:** Suspect presents with localized or generalised pox lesions (erythematous macules, papules, vesicles, pustules, crusts) on the skin (head, neck and abdomen) and/or in the mucous membranes of the mouth and/or respiratory tract, enlarged lymph nodes, swollen head, salivation, lacrimation, mucopurulent nasal discharge, diarrhoea, fever, anorexia  
On post-mortem, the suspect carcass presents with multiple pox-like lesions on the mucous membranes of the mouth and/or respiratory tract

**Probable case:** A suspected case with evidence of epidemiological links to a confirmed case

**Confirmed case:** Suspected or probable case confirmed by transmission electron microscopy (TEM), virus isolation, or PCR.

**Reporting tool:** Sanitary Report Form

##### 2. Middle East Respiratory Syndrome (MERS)

Middle East Respiratory Syndrome (MERS) is a viral respiratory infection of humans and dromedary camels that is caused by a coronavirus called Middle East respiratory syndrome coronavirus (MERS-CoV). While the impact of MERS-CoV on animal health is very low, human infections have a significant public health impact.

**Species affected:** Camels, human

**Diagnostic techniques:** the disease is confirmed through virus isolation and identification or Real-time RT PCR.

### 4.3.6 Aquatic diseases



#### 1. Tilapia Lake Virus (TiLV)

**Disease agent:** Tilapia lake virus (Orthomyxo-like virus)

**Target species:** Nile tilapia and other tilapiines

**Suspected case:** An individual or group of tilapia exhibiting clinical signs consistent with TiLV infection, including anorexia, lethargy, abnormal swimming (erratic or surface swimming), skin erosion, exophthalmia, abdominal distension, pale gills, high unexplained mortality (especially in juveniles), or histopathological lesions suggestive of hepatic or neurological involvement, without laboratory confirmation.

**Probable case:** A suspected case occurring in a farm, hatchery, cage system, or water body with an epidemiological link to a confirmed TiLV outbreak (e.g., shared water source, fish movement, shared hatchery stock).

**Confirmed case:** A suspected or probable case in which TiLV infection is confirmed by laboratory testing (e.g., RT-PCR, sequencing, virus isolation, or other validated molecular assays) in an approved laboratory.

#### 2. Enzootic Ulcerative Syndrome (EUS)

**Disease agent:** *Aphanomyces invadans*

**Target species:** Freshwater and estuarine fish species

**Suspected case:** Fish present with hemorrhagic skin lesions, deep ulcerations, necrotizing granulomatous lesions in muscle tissue, lethargy, and increased mortality in freshwater systems, particularly during environmental stress periods.

**Probable case:** A suspected case in a water body or farm with known prior EUS occurrence or epidemiological linkage to affected water systems, particularly following flooding or environmental disturbance.

**Confirmed case:** Detection of *Aphanomyces invadans* through histopathology (characteristic mycotic granulomas), PCR, or other validated diagnostic techniques in a suspected or probable case.

#### 3. Infectious Pancreatic Necrosis (IPN)

**Disease agent:** Infectious pancreatic necrosis virus (IPNV)

**Target species:** Salmonids (primarily), other susceptible fish

**Suspected case:** Fish exhibiting abdominal distension, darkening, abnormal corkscrew swimming, pale gills, increased mortality in fry or juveniles, with gross or histopathological evidence of pancreatic necrosis.

**Probable case:** A suspected case in a hatchery or farm with epidemiological linkage to a confirmed IPN-positive source (e.g., broodstock, eggs, shared water). Recent reports of import of eggs or fingerlings from temperate countries could be an indicator.

**Confirmed case:** Detection of IPNV through RT-PCR, virus isolation, or immunological assays in an accredited laboratory.

#### 4. Infectious Haematopoietic Necrosis (IHN)

**Disease agent:** Infectious haematopoietic necrosis virus (IHNV)

**Target species:** Salmonids

**Suspected case:** Fish showing lethargy, darkening, abdominal distension, anemia, exophthalmia, and high mortality, especially in fry and juveniles, consistent with systemic viral infection.

**Probable case:** A suspected case with epidemiological linkage to a confirmed IHN outbreak (e.g., imported eggs, shared hatchery equipment, common water source)

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**Confirmed case:** Laboratory confirmation of IHNV through molecular detection (RT-PCR), virus isolation, or validated immunodiagnostic methods.

5. **White Spot Syndrome (WSS)**

**Disease agent:** White spot syndrome virus (WSSV)

**Target species:** Shrimp and other crustaceans eg Lobsters

**Suspected case:** Shrimp and Lobsters exhibiting white cuticular spots, reddish discoloration, lethargy, reduced feeding, and sudden high mortality in ponds or marine systems. Softening of the shell.

**Probable case:** A suspected case epidemiologically linked to a confirmed WSSV-positive facility or water source.

**Confirmed case:** Detection of WSSV by PCR or other validated molecular diagnostic assays.

6. **Infectious Spleen and Kidney Necrosis Virus (ISKNV)**

**Disease agent:** ISKNV (Megalocytivirus)

**Target species:** Tilapia and ornamental fish species

**Suspected case:** Fish present with lethargy, erratic swimming, abdominal swelling, anemia, splenomegaly, and increased mortality, particularly in juveniles, with histopathological evidence of enlarged cells (megalocytes).

**Probable case:** A suspected case with epidemiological link to confirmed ISKNV-infected stock or hatchery.

**Confirmed case:** Laboratory confirmation of ISKNV via PCR, sequencing, or histopathological identification of characteristic inclusion bodies supported by molecular testing.

7. **Streptococcus agalactiae Infection (Streptococcosis)**

**Disease agent:** Streptococcus agalactiae

**Target species:** Tilapia and other cultured fish

**Suspected case:** Fish exhibiting erratic swimming, exophthalmia, corneal opacity, ascites, hemorrhages at fin bases, neurological signs, and increased mortality, particularly under high temperature or high stocking density.

**Probable case:** A suspected case occurring in a farm with recently confirmed streptococcosis or epidemiological linkage (shared fingerlings, water system).

**Confirmed case:** Isolation and identification of Streptococcus agalactiae via bacteriological culture and biochemical or molecular characterization.

8. **Aeromonas hydrophila Infection (Motile Aeromonas Septicemia)**

**Disease agent:** Aeromonas hydrophila

**Target species:** Freshwater fish species

**Suspected case:** Fish showing hemorrhagic septicemia, skin ulceration, scale loss, ascites, fin rot, and sudden mortality, particularly under environmental stress conditions.

**Probable case:** A suspected case with epidemiological linkage to confirmed outbreaks or exposure to high organic load or poor water quality

**Confirmed case:** Isolation and identification of Aeromonas hydrophila from internal organs using bacteriological culture and confirmatory biochemical or molecular testing.

### 4.3.7 Bees disease



#### 1. **Acarapisosis (Infestation of Honey Bees with *Acarapis woodi*)**

Acarapisosis is a disease of the adult honey bee *Apis mellifera* caused by tracheal mites, *Acarapis woodi*. These mites are internal parasites of the respiratory system, living and reproducing mainly in the large prothoracic tracheae of the bee. The mites can cause both mechanical injuries and physiological disorders consequent to the obstruction of air ducts, lesions in the tracheal walls, and the depletion of haemolymph.

**Case definition:** There are no reliable clinical signs for the diagnosis of acarapisosis. The signs of infestation are not specific and the bees behave in much the same way as bees affected by other diseases or disorders. They crawl around in the front of the hive and climb blades of grass, unable to fly. Dysentery may be present.

**Confirmatory Diagnosis:** The mites are detected only by laboratory methods either by microscopy, or molecular detection. The gold standard test is confirmation by bee dissection and microscopy.

#### 2. **American Foulbrood (Infection of Honey Bees with *Paenibacillus larvae*)**

American foulbrood (AFB) is an infectious brood disease of the honey bee *Apis mellifera* and other *Apis* spp. It is caused by Gram-positive bacterium, *Paenibacillus larvae*. This bacterium is capable of producing more than one billion spores in each infected larva.

**Case definition:** In severely infected colonies, the combs have a mottled appearance caused by a pattern of healthy capped brood, uncapped cells containing the remains of diseased larvae, and empty cells. The capping of a cell that contains a diseased larva appears moist, darkened concave and/or punctured. Larva or pupa becomes discolored with colour ranging from beige to dark brown. The larvae can become glutinous in consistency and can be drawn out as threads when a probe is inserted into the larval remains and removed from the cell (match-stick test). Appearance of pupal tongue is a definitive diagnosis of AFB. Brood has a characteristic Sulfurous smell.

**Confirmatory Diagnosis:** bacterial culture and isolation, Conventional PCR, or real time PCR

#### 3. **European Foulbrood (Infection of Honey Bees with *Melissococcus plutonius*)**

Bee larvae infected by European foulbrood (EFB) die before or shortly after the bee cells are sealed. Generally, EFB is considered less serious than American foulbrood (AFB) because rates of recovery from EFB are higher than those from AFB, and it can often clear up with little or no intervention. However, it remains a disease of national and global concern. Indeed, more aggressive forms of the bacterium have been described in different countries.

**Case definition:** Irregular capping of the brood, capped and uncapped cells irregularly distributed over the brood frame. EFB usually affects young larvae, which die while still coiled before they are sealed. Infected larvae assume unnatural positions in the cells, twisted around the walls. The larvae eventually decay to a point where they form dry rubbery scales that can easily be removed from the cells. Severely affected broods may have a stale or sour odour, sometimes acidic, like vinegar, but there may be no smell.

**Confirmatory diagnosis:** Microscopy, PCR or Bacterial culture and isolation.

#### 4. Infestation of Honey Bees with *Aethina tumida* (Small Hive Beetle)

The small hive beetle, *Aethina tumida* is a parasite and predator of honey bees. Adults and larvae of small hive beetles feed on honey bee brood, honey and pollen. While feeding on food stores, honey becomes fermented and combs are destroyed. Small hive beetles can promote structural collapse of the nest and cause the adult honey bees to abscond from severely infested colonies.

**Case definition:** Occurrence of colony-wide damage associated with the small hive beetles or observation of small hive beetle eggs, larvae, and/or adults. Small hive beetles can be sighted under the colony lid, on the bottom board, or hiding in the combs.

**Confirmatory Diagnosis:** Visual inspection of adult and or larval stages in bee colonies.

#### 5. Infestation of Honey Bees with *Tropilaelaps* Spp.

*Tropilaelaps* is a genus of mites which reproduces in bee brood. *Tropilaelaps* can act as a potential vector for honey bee viruses, such as deformed wing virus (*Iflavirus aladeformis*), black queen cell virus (*Triatovirus nigereginacellulae*), acute bee paralysis virus (*Aparavirus apisacutum*), Israeli acute paralysis virus (*Aparavirus israelense*) and sacbrood virus (*Iflavirus sacbroodi*). *Tropilaelaps* infestation is exotic in many areas, biosecurity measures must be implemented to avoid its dispersal. Suspect mites must be dead when sent to the laboratory.

**Case definition:** Death of many bee larvae (up to 50%), resulting in an irregular brood pattern. Many malformed bees occur, with shortened abdomens, distorted and stubby wings and deformed or missing legs. Some of the affected bees crawl at the hive's entrance. Infested colonies may abscond, carrying the mites to a new location.

**Confirmatory diagnosis:** Capped brood examination and Morphological identification of mites.

#### 6. Varroosis (Infestation of Honey Bees with *Varroa* Spp.)

*Varroa* spp are external parasites and only adult female varroa mites are seen outside of the brood cells. They are reddish-brown in color, oval and small in size but visible to the naked eye (1.5 mm by 1 mm) with eight legs. Mites are found on the hive floor debris, on adult bees, on wax combs and in capped brood cells. Varroosis, also called varroatosis, is currently considered the largest threat to apiculture worldwide. Apart from feeding on honey bee haemolymph, *Varroa destructor* can act as a vector for deformed wing virus (DWV), acute bee paralysis virus (ABPV), Kashmir bee virus (KBV) and Israeli acute paralysis virus (IAPV), among others. Without treatment of the honey bee colony, the number of parasites steadily increases with the growth of the bee population and its increasing brood activity leading to the collapse of the colony within 1–4 years.

**Case definition:** Deformed bees, occurrence of any of the Varroa Borne Viral diseases. Observation of *Varroa* on adult bees and or on larval drone bees.

**Confirmatory diagnosis:** Adult bee and Capped brood examination followed by Morphological identification of mites.

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## 7. Infestation of Honey bees with *Galleria mellonella* or *Achroia grisella* (Wax Moth)

Wax moth infestation of bee colonies is not listed under the notifiable diseases but remains one of the most destructive honey bee pests in Kenya. There are two species of Wax moth, the Greater Wax Moth (*Galleria mellonella*) and the Lesser Wax Moth (*Achroia grisella*). Wax moth larval stages mainly invade weak honey bee colonies, eating unprocessed beeswax, pollen, and wooden parts of hives.

**Case definition:** occurrence of wax moth larva or pupa in bee colonies, webs littered with black faecal matter of the pest.

**Confirmatory Diagnosis:** visual demonstration of larval/pupal wax moth in bee hives



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# Chapter 5: Laboratory networks

## 5.1 Introduction

The laboratories are core in animal health surveillance by providing confirmatory diagnosis, research and monitoring for suspected, priority, notifiable, and emerging disease-causing agents in animals, animal products, animal feeds, and the environment. Laboratories support surveillance by guiding safe and standardized specimen collection, handling, packaging, storage, and transportation in accordance with national biosafety and biosecurity requirements. They ensure timely testing, validation, and reporting of results, with routine feedback to surveillance and field teams to support early warning, outbreak detection, and response.

## 5.2. Laboratory Network and Functions Tiers

### 5.2.1 Structure and Tiers of the Veterinary Laboratory Network in Kenya

Kenya's veterinary laboratory network is coordinated by the DVS under the State Department for Livestock Development, focusing on diagnostics, surveillance, and research on animal diseases, syndromes, conditions or events of public health importance. The network is backed by formal legal instruments but follows a tiered structure emphasizing national coordination with sub-national decentralization in sample flow and communication. The Kenya laboratories are linked to international reference labs for specialized confirmatory diagnostics and external quality assurance (EQA). Laboratory capacities are described in the table below:

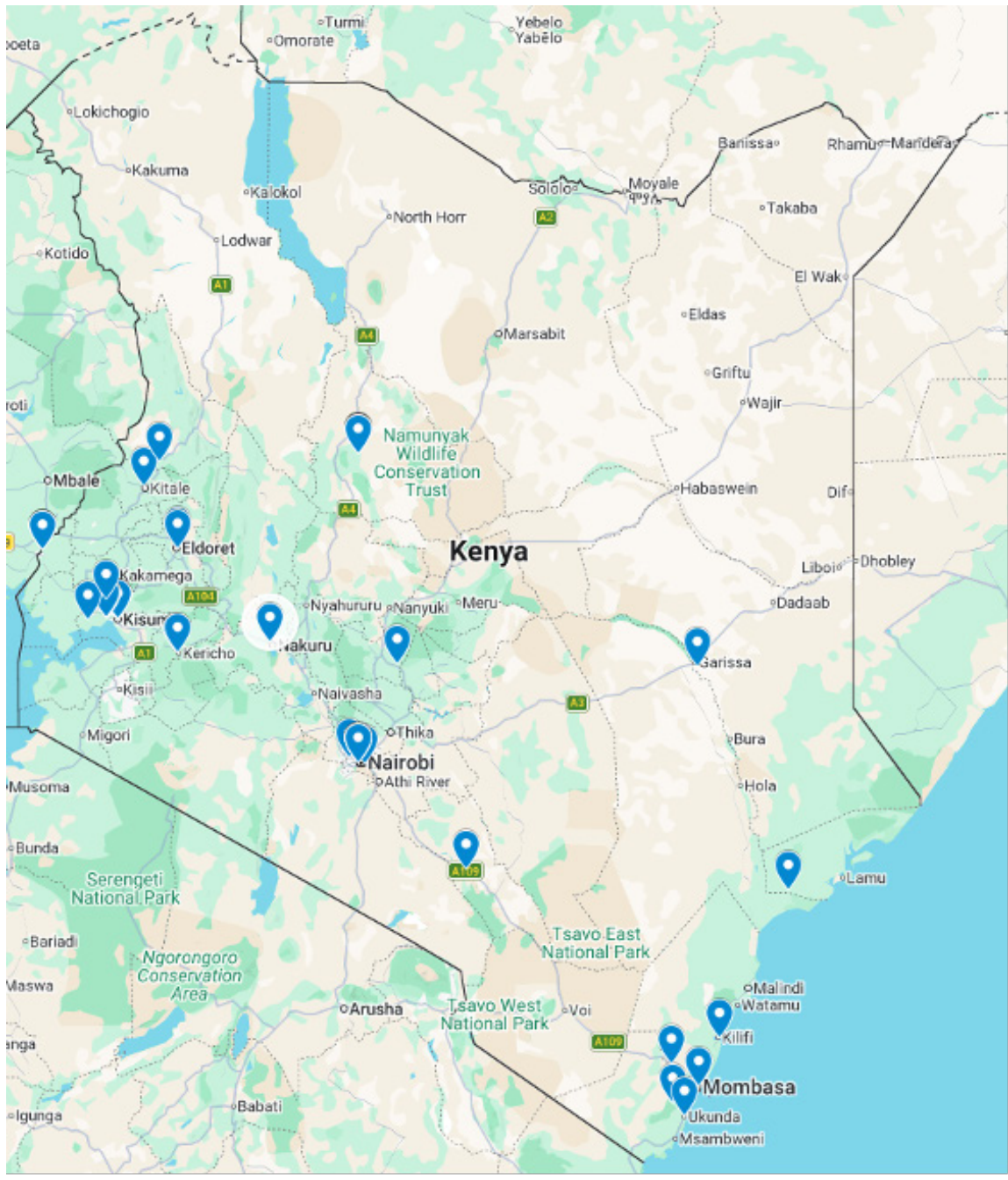


Figure 6: Kenya laboratory capacity mapping - NPHL

Labratory network in Kenya  
Annex combination of table 11 and 12  
Table 11: Lab types, description, key facilities, functions, capacities

Lab types	Description	Key facilities	Functions	Technical capacities
National/Reference	Central hub for confirmatory Diagnostic tests, quality assurance/control, biorisk management and policy support. Serves as reference laboratories for the country as well as for the East African region.	NVRL Kabete and Foot and Mouth Disease lab- Embakasi	diagnostics, surveillance, export certification, research, Training	Molecular diagnostics (PCR), culture and Sensitivity, Virus neutralization, Pathogen isolation, AMR surveillance, and Export certification, serology, ELISA, Helminthology tests, Food and feeds safety, toxicology, Pathology, Haematological tests, Histopathology, Information management (data capture, analysis, interpretation, report generation), inhouse media production, efficacy trials. Field screening tests
Sub-National/Regional and satellite labs	Intermediate Labs frontline facilities, each responsible for a cluster of counties for diagnostics and investigation, Quality Assurance and Biorisk Management	Karatina, Eldoret, Nakuru, Kericho, Garissa, Mariakani, Entomology lab kabete, kiboko Witu and Ukunda labs	Diagnostics, Training, Vector Identification and Surveillance	Pathology, Culture & sensitivity, serology, Helminthology and Haematological tests, Information management (data capture, analysis, interpretation, report generation). Media production. Identification of vectors and vector borne pathogens
County laboratories	These are laboratories managed by respective county governments	Isiolo, West pokot, Kakamega, Kisii, Turkana, Busia, Kajiado, Marsabit, Mandera,	Diagnostics, Training and Surveillance	Culture (in some labs) and identification , haematology, sampleprocessing, packaging and transport
Research and diagnostic lab	Institutions mandated to undertake research in animals, animal health and related fields	KALRO, ILRI, KEMRI, KMFRI, ICIPE, KEPHIS, WRTI, KEBS, KIPRE, Government Chemist Lab	Research Training and diagnostics, Quality assurance/control	Molecular diagnostics, culture and sensitivity, pathogen isolation, AMR surveillance, serology, , Helminthology tests, Food and feeds safety, toxicology, Pathology, Haematological tests, Histopathology, Information management (data capture, analysis, interpretation, report generation), inhouse media production, efficacy trials. Mobile/portable units for on-site screening.
Training and support (Academia)	Institutes for human capacity building and research.	Animal Health Training Institutes, Colleges, Universities,	Training, Diagnostics, research, Quality assurance/ control	Pathology, Histopathology, molecular, Culture & sensitivity, serology, Helminthology and Haematological tests, Toxicology, Feed analysis, Entomology (parasite identification)
Other Labs	Other labs that support animal health and zoonotic surveillance	LANCET, Norbrook, Kenchic, ANALABS, Vet Clinics, Pathcare	Diagnostics, training, research	Pathology, molecular, Culture & sensitivity, serology, Helminthology and Hematological tests, food and feed safety



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### 5.2.3.2 Result Reporting Mechanisms

Reporting uses digital tools for real-time dissemination, with LIMS/Excel for data management.

Referral laboratories can be national, regional or international. They can be accredited by WOAAH or any other accrediting body (e.g. KENAS, SANAS etc).

Reference Laboratories that are WOAAH accredited are designated to pursue all the scientific and technical problems relating to a named disease. They provide scientific and technical assistance and expert advice on topics linked to diagnosis and control of the diseases of interest to the primary laboratory. for which they are responsible.

Reference Laboratories should also provide scientific and technical training for personnel from Member Countries, and coordinate scientific and technical studies in collaboration with other laboratories or organizations, including through the WOAAH Laboratory Twinning programme. The WOAAH gives guidelines on the terms of reference for a reference laboratory.

#### **Sample transportation**

The sample transportation system involves the physical movement of specimens from one facility to another and makes use of the available modes of transport in the country (e.g., government vehicles, motorcycles, courier services, rail, airplanes, animals and trekking). The current national specimen transport system uses a combination of transport methods tailored to transporting specimens into the national veterinary reference laboratories and to other laboratories within the network. The sample transportation system refers to the physical movement of specimens from collection sites to designated laboratories for testing. It utilizes available modes of transport within the country, including government vehicles, motorcycles, courier services, rail, air transport, and, where necessary, animal transport or manual carriage in hard-to-reach areas. The specimen transport system applies a combination of these transport methods, depending on location, urgency, and accessibility, to ensure timely delivery of samples to the veterinary laboratories within the network.

#### **SOPs**

#### **Laboratory Quality Assurance/ Control**

A functional laboratory quality assurance/ control system, encompassing both internal quality control and participation in external quality assessment schemes, is essential for ensuring reliable and accurate results within the animal health surveillance system. Laboratory quality assurance builds confidence in test results and underpins effective disease detection, reporting, and response. Strengthening laboratory quality assurance mechanisms improve the reliability, consistency, and reproductibility of laboratory results generated for animal health surveillance.

Coordination within the lab network enables standardized quality assurance activities to ensure accurate laboratory results that support timely and evidence-based decision-making under the AH-IDSR framework.

All veterinary diagnostic laboratories should participate in recognized external quality assurance/control programs and corrective actions should be implemented promptly in response to sub-standard or unsatisfactory performance. This will support continuous quality improvement and maintenance of laboratory excellence.

The veterinary laboratory quality assurance (QA) system, ensures reliable, accurate diagnostics to support animal health surveillance, disease control, food safety, trade certification, and One Health initiatives. The framework aligns with national standards and World Organisation for Animal Health (WOAH) benchmarks.

Key components include **ISO/IEC 17025:2017** accreditation, achieved in March 2022 by the National Veterinary Reference Laboratory (NVRL) at Kabete and the Foot-and-Mouth Disease Quality Control Laboratory in Embakasi through the Kenya Accreditation Service (KENAS). The **Kenya Veterinary Board (KVB)** regulates minimum standards for all veterinary laboratories (public and private), addressing infrastructure, personnel competence, biosafety/biosecurity, record-keeping, and quality control. Public labs (regional NVLs and reference facilities) follow DVS guidelines, while private labs are licensed by KVB. Overall, Kenya's veterinary QA framework has advanced significantly, positioning the NVRL as a credible hub for disease confirmation and trade facilitation.

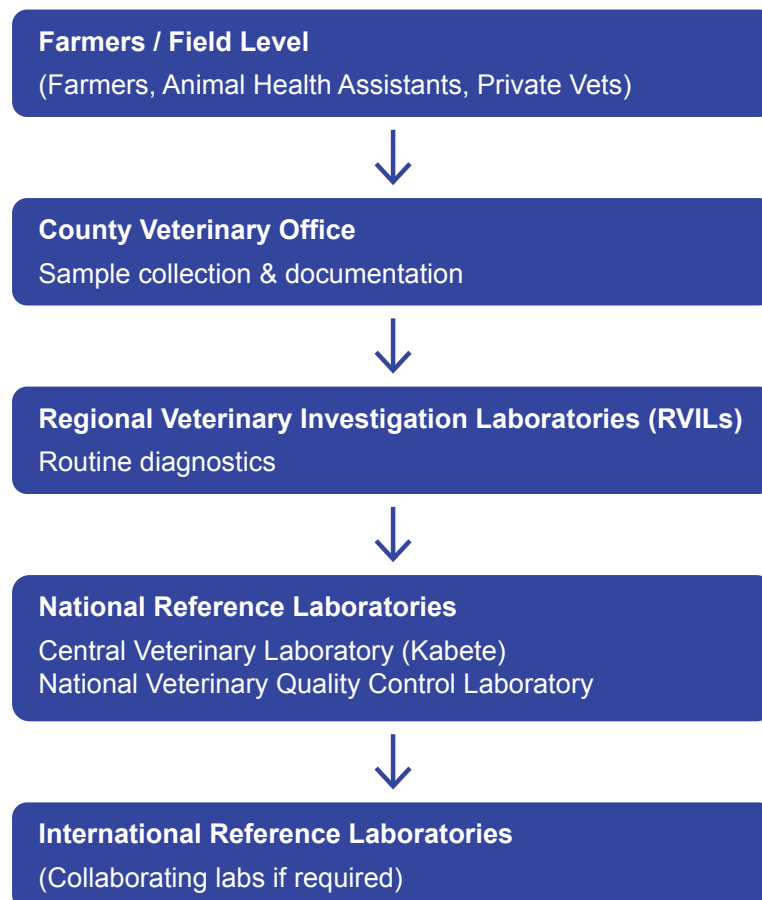


Figure 8: Sample referral pathway

# Annexes

## Annex 1 - Line List Templates

County.....  
 District.....  
 Sub-location.....Code.....  
 Date.....  
 GPS coordinates: Latitude: .....  
 Longitude.....

Table 12: Line List Templates

**F - Female M-Male**  
**C-castrate**

**Age group in years:**  
 <1 Years  
 1-2 Years  
 2-3 Years  
 >3 Years

**Vaccination history**  
 ?-unknown  
 Yes-vaccinated  
 No-not vaccinated

**Samples taken**  
 WB-whole blood  
 S-Serum

No	Animal Identification	F	M	C	< 1	1-2	2-3	>3	Yes	No	?	WB	S
1													
2													
3													
4													
5													
6													
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## Annex 2 - Outbreak Investigation Tools

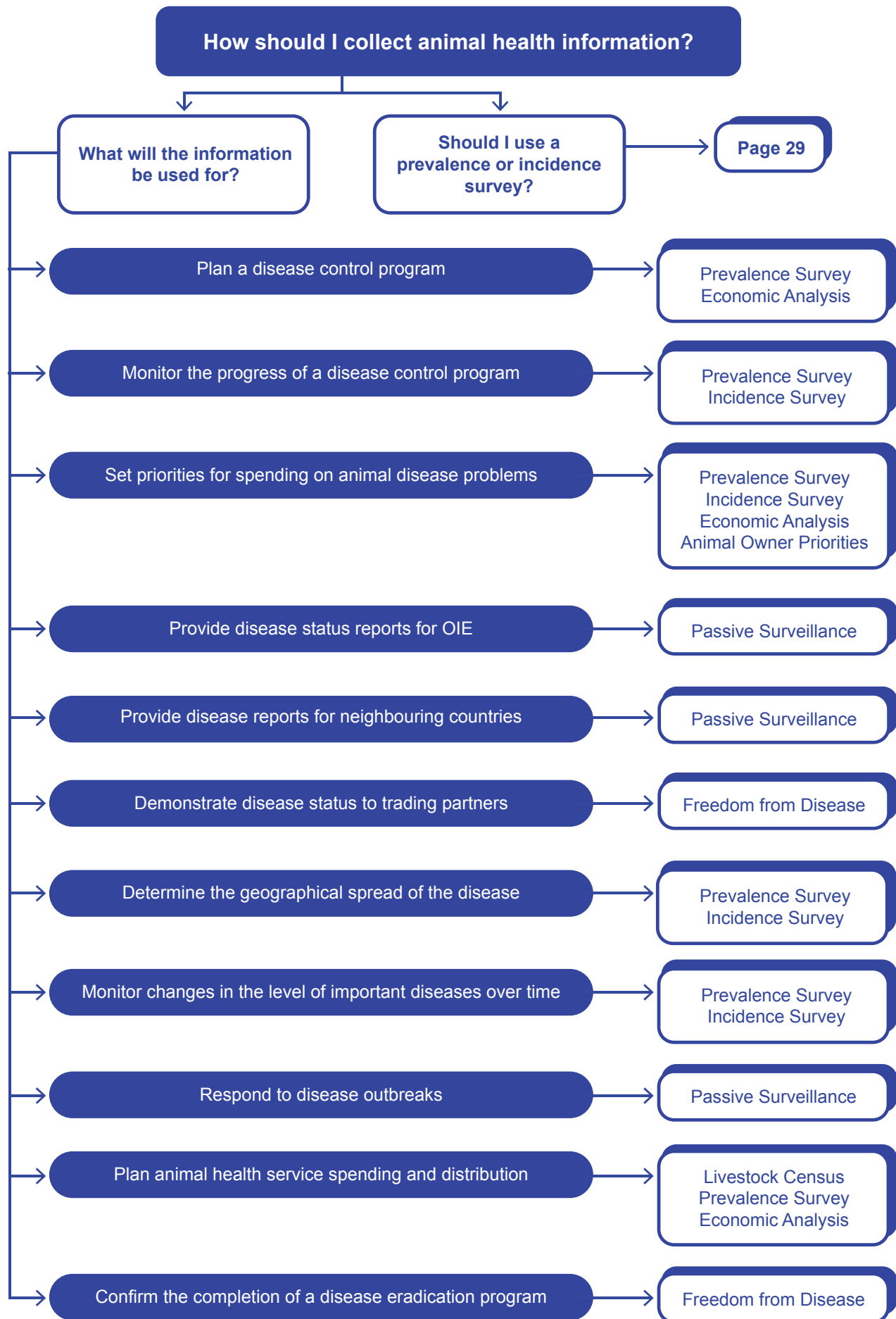


Figure 9: How to collect animal health information through surveys

## Annex 3 - Laboratory request form

### LB1 Form

**Form LB.1** Serial No. **18851**

**ORIGINAL**

**LABORATORY REPORT FORM**

**Instructions.** This form is to be completed if any samples are taken and submitted to a laboratory. It is to be filled in triplicate. The Original and Duplicate to accompany the sample to the laboratory and the triplicate to be retained by the Originator (DVO).

**Note:** The CVL/VIL's should send the Original copy back to the originator and the Duplicate to DVS (Epidemiology Unit) after adequately filling in the laboratory results.

**DETAILS FOR SPECIMEN(S) — LABORATORY**

Number & type of specimen(s):	Time collected (only for sensitive organisms):	In case of RABIES, was there any human contact? [Yes]      [No] If Yes, how many people affected:	
	Examination(s) requested:	Owner's name:	Owner's address:
	ID and reference number if from satellite laboratory:	If not official, does lab have permission to do extra test at owner's cost: [Yes] [No]	
	Serial number of ND1 form if sample from field:	Costing: [Official] [Post price list]	
	Serial number of PPI form if sample from Abattoir or slaughterhouse:		

DVO's/DDSRO's Signature: \_\_\_\_\_ DVO/DDSRO Full name: \_\_\_\_\_ Date: \_\_\_\_\_

FOR LABORATORY USE ONLY					
Date samples received	Lab number	Number of copies required		Distribution	
Sections	micro/path	path	Chem tox	Referral centres (specify)	Add. Examination decided upon
	Nutr	virol	serol		
Is this a follow-up report	Yes	No	Another report to follow		Yes No
<b>LAB RESULT (FREE FORMAT)</b>					
<b>LABORATORY COMMENT TO FIELD VET:</b>					
<b>PATHOLOGY</b>					
Blood smear:	Respiratory system:				
Egg per gram:	Central nervous system:				
General:	Musculoskeletal system:				
Body cavities:	Skin:				
Gastrointestinal tract:	Other:				
Liver:	Pathological diagnosis:				
Urogenital system:	Etiological diagnosis:				
Circulatory system:	Differential diagnosis:				
Lymphnodes:					
<b>COMMENT/RECOMMENDATION:</b>					
Laboratory personnel's Signature		Laboratory Personnel's full name		Date	

Distribution : Original - Laboratory, Duplicate - Epidemiology Unit, Triplicate - Book Copy

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## Annex 4 - SpotRep Template

### 1. Header

**Purpose:** Identify the report, its origin, and timing clearly.

**Include:**

- County/Sub-county: \_\_\_\_\_
- SPOTREP Number: SPOTREP-XXX (sequential number)
- Date/Time of Report: \_\_\_\_\_
- Date/Time of Event: When first signs were observed or reported

### 2. Key Highlights

**Purpose:** Provide a concise summary of the incident at a glance.

**Include (if available):**

- Total Cases: Suspected / Confirmed / Dead / Recovered
- Species Affected
- Number of Holdings/Households/Farms Affected
- Location: Village/Ward/Sub-county/County
- Initial Diagnosis or Suspicion: (e.g., suspected FMD, anthrax)
- Zoonotic Risk
- Initial Control Actions Taken: (e.g., isolation, treatment started)

Example:

As of 31st July 2025, a total of 12 suspected cases of Foot and Mouth Disease (FMD) have been reported in cattle at Rimoti Farm in Baringo County. Two calves under six months of age have died, while no recoveries have been recorded so far. The affected species is cattle; no clinical signs have been observed in goats or sheep kept on the same premises. Only one commercial farm—Rimoti Farm—has been affected. The suspected outbreak is located in Rimoti Village, Mogotio Sub-county. The initial clinical assessment points to FMD, though laboratory confirmation is pending following sample dispatch on 30th July 2025. FMD poses no known zoonotic risk. Immediate control actions undertaken include isolation of symptomatic animals, initiation of supportive treatment (including antibiotics and multivitamins), and notification of both county and national EOC teams.

### 3. Incident Description

**Purpose:** Document the initial detection and presenting signs.

**Include:**

- Who reported the case: (e.g., farmer, CAHW, vet officer)?
- Date of symptom onset
- Clinical signs observed (e.g., salivation, diarrhea, lameness, abortions)
- How many animals are affected/dead
- Production system involved: (e.g., intensive dairy, pastoralist)

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Example:

On 30th July 2025, the farm manager at Rimoti Farm reported sudden onset of drooling, inappetence, and lameness in 10 out of 234 cattle. Lesions were noted on the tongue and hooves. Two calves under 6 months of age died overnight before veterinary intervention. The production system is a semi-intensive dairy operation with regular animal movement from markets.

#### 4. Management and Initial Response

**Purpose:** Document immediate containment or treatment actions.

**Include:**

- Isolation or quarantine of affected animals.
- Supportive treatment given (e.g., antibiotics, fluid therapy).
- Vaccination if emergency stocks were available.
- Any samples collected (blood, fecal, swabs).
- Reporting to county or national authorities.

Example:

The sub-county veterinary officer advised immediate separation of affected animals. The farm initiated supportive therapy using multivitamins and antibiotics. Blood and vesicular swab samples were collected and dispatched to the Nakuru Veterinary Investigation Laboratory. The county veterinary office and national EOC were notified.

#### 5. Status of Affected Animals

**Purpose:** Give a snapshot of the current condition of affected animals.

**Include:**

- Are animals stable, worsening, or recovering?
- Any new cases reported since initial detection?
- Any additional species now affected?

Example:

As of 31st July 2025, 15 animals are affected. No new deaths have been reported. The clinical condition of 3 animals appears to be worsening. No signs observed in goats or sheep kept on the same premises.

#### 6. Next Steps / Recommendations

**Purpose:** Outline immediate next actions needed or planned.

**Include:**

- Sample submission and lab follow-up
- Intensified surveillance or risk-based assessment in neighboring farms
- Movement restrictions or public alerts
- Stakeholder engagement (e.g., CVO, county team, partners)

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Example:

- Reinforce on-farm quarantine and restrict animal movement in and out of the area.
- Conduct trace-back and trace-forward investigation on livestock movement.
- Monitor adjacent farms for signs and intensify surveillance in the area.
- Expedite confirmatory laboratory results and initiate targeted vaccination if FMD is confirmed.
- Notify regional stakeholders for early awareness.

## 7. Prepared By

**Purpose:** Acknowledge source and contact for follow-up.

**Include:**

- Name, Title, Institution
- Signature (if submitting printed)
- Contact (Phone/Email)

## Annex 5 – Animal Health SitRep Template

### 1. Header

**Purpose:** Clearly label the report with essential identifying details for proper tracking and reference.

**Include:**

- Report Title: e.g., FMD Outbreak, Baringo County
- Report Number: Use a sequential system (e.g., SITREP 004).
- Date/Time of Reporting: Date and time the report is generated.
- Reporting Period: The dates the information in the report covers.

### 2. Key Highlights

**Purpose:** Provide a quick summary of the most critical updates, especially for high-level decision-makers.

**Include:**

- New outbreaks or significant case increases.
- Summary case and death numbers.
- Any new counties/sub-counties affected.
- Major control activities implemented (e.g., vaccination, quarantines).
- Any emerging concerns such as zoonotic transmission or drug-resistant infections.

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### 3. Epidemiological Situation Overview

**Purpose:** Describe the current epidemiological status of the disease/outbreak.

**Include:**

- Summary narrative describing the disease progression.
- Total cumulative confirmed, suspected, and probable cases.
- Total animal deaths and case fatality rate (CFR).
- Breakdown of cases by species, age group, and production system (e.g., dairy, beef, free-range).
- Date of index case, trend over time (with epidemic curve).

### 4. Laboratory Testing and Diagnostics

**Purpose:** Provide updates on diagnostic capacity, testing outcomes and reliability of results.

**Include:**

- Number of samples collected and tested.
- Type of tests used (e.g., RT-PCR, ELISA, viral isolation).
- Number and percentage of positive results.
- List of laboratories involved (and their capacities.)
- Genotyping or AMR testing results (if applicable).
- Observed delays or gaps in testing turnaround times.

### 5. Affected Populations and Species

**Purpose:** Highlight which animals are being affected and characterize the risk profile.

**Include:**

- Distribution of cases by animal species.
- Breakdown by age group, sex (if relevant), breed or use (e.g., dairy vs beef).
- Description of production systems impacted.
- Information on at-risk populations not yet affected.

### 6. Geographic Distribution and Mapping

**Purpose:** Illustrate the spatial spread and intensity of the outbreak across the country/county.

**Include:**

- Counties and sub-counties affected.
- Case distribution map showing hotspots.
- Livestock movement patterns that may affect spread.
- Proximity to border areas or markets.
- Risk zones and potential for cross-border transmission.

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## 7. Vaccination and Preventive Measures

**Purpose:** Update on preventive interventions in place or planned.

**Include:**

- Number of animals vaccinated (by species and region).
- Type of vaccine used, coverage rates and vaccination strategy (ring, mass, targeted).
- Availability and stock levels of vaccines.
- Compliance with movement restrictions and biosecurity protocols.
- Community engagement or farmer sensitization activities.

## 8. Coordination and Stakeholder Engagement

**Purpose:** Describe how the response is being coordinated and which actors are involved.

**Include:**

- Summary of coordination meetings or decisions made.
- Inter-agency collaboration (One Health teams, NGOs, FAO, AU-IBAR, etc.).
- Support from county governments or veterinary associations.
- Logistics and operational support coordination.

## 9. Surveillance, Case Management, and Control Measures

**Purpose:** Explain how cases are being detected, treated, and contained.

**Include:**

- Type of surveillance used (passive, active, risk-based).
- Details of case investigations and trace-back activities.
- Case management strategies: treatment protocols, supportive care, isolation.
- Quarantine enforcement, movement control, disinfection procedures.
- Community animal health worker engagement.

## 10. Key Challenges and Constraints

**Purpose:** Flag major issues that may hinder response efforts.

**Examples:**

- Limited diagnostic/lab capacity.
- Delayed reporting or under-reporting.
- Shortage of vaccines, cold chain, or field personnel.
- Community resistance to control measures.
- Logistics challenges (fuel, transport, PPE).

## 11. Recommendations and Next Steps

**Purpose:** Provide a forward-looking section that guides the response.

**Examples:**

- Immediate actions to be taken (by national/county/sub-county levels).
- Surveillance intensification in at-risk zones.
- Targeted vaccination or containment plans.
- Requests for technical or logistical support.
- Deadlines for next actions or reviews.

## 12. Contact Information

**Purpose:** Ensure ease of follow-up and clarifications.

**Include:**

- Names, titles, emails and phone numbers of key team members.
- If available, include a link to a real-time dashboard (e.g., KABS, EarthRanger).
- Emergency contacts for rapid communication with the national office or relevant partners.

Table 13: Summary of Notifiable Diseases in Kenya.

Disease	Rationale for Priority	Surveillance Focus	Key Surveillance Triggers	Reporting & Response	One Health Linkage	Alert Threshold	Action Threshold
Anthrax	Highly fatal zoonotic disease; endemic in ASALs and wildlife–livestock interfaces; environmental persistence of spores	Event-based, supported by indicator-based in endemic areas	Sudden unexplained livestock/wildlife deaths; bleeding from natural orifices; clustered deaths after rains/flooding	Immediate notification via KABS & mDharura (≤24 hrs); quarantine; safe carcass disposal; joint response with PH, KWS	Integrated animal, wildlife, and human surveillance coordinated by ZDU	1 suspected case	1 confirmed case
Foot-and-Mouth Disease (FMD)	Highly contagious; major trade and livelihood impact; endemic with frequent outbreaks	Indicator-based; event-based during outbreaks	Vesicular lesions, salivation, lameness; rapid herd-to-herd spread; market-linked outbreaks	Immediate reporting via KABS; movement control; targeted vaccination	Supports food security and economic stability	1 suspected case	1 confirmed outbreak
Contagious Bovine Pleuropneumonia (CBPP)	Endemic in pastoral systems; high mortality and productivity losses	Indicator-based; outbreak investigations	Chronic coughing, respiratory distress; increased cattle mortality; recent animal movement	Reporting via KABS (≤24 hrs); quarantine; vaccination	Livelihood protection and trade facilitation	1 suspected case	1 confirmed case
Rift Valley Fever (RVF)	Zoonotic; epidemic potential following heavy rains/flooding	Event-based; climate-informed surveillance	Abortion storms; high neonatal mortality; concurrent human febrile illness	Immediate reporting via KABS & mDharura; joint OH investigation; vector control	Strong animal-human-environment interface coordinated by ZDU	Increase above baseline	Sustained increase/confirmed outbreak
Peste des Petits Ruminants (PPR)	Severe losses in sheep/goats; targeted for global eradication	Indicator-based; active case search in high-risk areas	Fever, oral lesions, diarrhea; high morbidity/mortality in small ruminants	Reporting via KABS; outbreak confirmation; vaccination and movement control	Food security and poverty reduction	1 suspected case	1 confirmed outbreak

Disease	Rationale for Priority	Surveillance Focus	Key Surveillance Triggers	Reporting & Response	One Health Linkage	Alert Threshold	Action Threshold
Contagious Caprine Pleuropneumonia (CCPP)	High fatality in goats; major impact in ASALs	Indicator-based	Acute respiratory distress; sudden high goat mortality	Immediate reporting via KABS; quarantine; vaccination	Livelihood and nutrition protection	1 suspected case	1 confirmed case
Trypanosomiasis (Nagana)	Major productivity constraint in tsetse-infested ASAL regions	Indicator-based; vector surveillance	Progressive weight loss, anemia; increased cases above baseline	Routine reporting via KABS; vector control; treatment campaigns	Integrated vector management	Increase above baseline	Sustained increase/ confirmed outbreak
Rabies	Fatal zoonotic disease; public health emergency	Event-based; bite surveillance	Suspected rabid animals; animal/human bite exposure; clustering of bites	Immediate reporting via KABS & mDharura; joint response; PEP and dog vaccination	Fully integrated OH surveillance via ZDU	1 suspected case	1 confirmed case
Lumpy Skin Disease (LSD)	Emerging viral disease; production and trade losses	Indicator-based	Fever, skin nodules; drop in milk yield; rapid herd spread	Immediate reporting via KABS; vaccination; movement control	Food security and trade protection	1 suspected case	1 confirmed outbreak
African Swine Fever (ASF)	Near-100% mortality in pigs; major livelihood impact	Event-based	Sudden high pig mortality; hemorrhagic signs	Immediate reporting via KABS; quarantine; stamping-out; biosecurity	Safe food systems	1 suspected case	1 confirmed case
Newcastle Disease (Poultry)	Leading cause of poultry mortality; food security risk	Event-based; indicator-based	Sudden poultry deaths; neurological/ respiratory signs	Reporting via KABS; vaccination; biosecurity	Livelihood and nutrition protection	Increase above baseline	Sustained increase/ confirmed outbreak
American Foul Brood (AFB)	Highly contagious	Indicator-based	Discoloration and sulphuric odour in the beehive	Immediate reporting via KABS; Destruction of the apiary (stamping out) Check at ports of Entry	Livelihoods protection, pollination services, food safety and security	1 suspected case	1 confirmed case
Varroosis	Bee colony collapse; Deformed wings	Indicator based	Discoloration of brood, dead bees, visual presentation of Varroa mites,	Immediate reporting via KABS; Strengthen bee colonies	Livelihoods protection, pollination services, food safety and security	6 to 9 mites in a population of 300	6 to 9 mites in a population of 300
Small hive beetle (SHB)	Contamination and fermentation of honey	Event based; Indicator based	Presentation of larval and adult small hive beetle	Immediate reporting via KABS; cleaning hives and burning of collected waste(s), SHB trapping	Livelihoods protection, pollination services, food safety and security	1 suspect case	1 confirmed positive
Wax moth	Absconding, destruction of colony and hive	Event based; Indicator based	Presentation of the Wax moth larve in hive	Immediate reporting via KABS; cleaning hives and burning of collected waste(s), Wax moth trapping	Livelihoods protection, pollination services, food safety and security	Increase above baseline	Sustained increase/ confirmed outbreak

Disease	Rationale for Priority	Surveillance Focus	Key Surveillance Triggers	Reporting & Response	One Health Linkage	Alert Threshold	Action Threshold
Epizootic Ulcerative Syndrome (EUS)	Highly infectious with up to 100% mortality in aquaculture, Has been detected in Southern Africa and spreading upwards	Event based	Reports of high mortality in aquatic environments presenting ulcers and hemorrhagic spots	Immediate notification via KABS, WOAHP notification, quarantine measures, outbreak confirmation and control	Supports food security and economic stability and trade	1 suspected case	1 confirmed case
Tilapia Lake Virus (TiLV)	Highly infectious with up to 90% mortality in aquaculture, Has been detected in Lake Victoria Basin in Tanzania and Uganda	Event based	Reports of sudden high mortality in Tilapia presenting changes in body color, skin and eye lesions	Immediate notification via KABS, WOAHP notification, quarantine measures, outbreak confirmation and control	Supports food security and economic stability and trade	1 suspected case	1 confirmed case
White Spot Syndrome Virus	Highly contagious, affecting farmed and wild crustaceans causing up to 100% mortality within 3-10 days of infection. Trade sensitive	Event based	Reports of sudden high mortality in farmed and wild crustaceans presenting shell lesions and white spots	Immediate notification via KABS, WOAHP notification, quarantine measures, outbreak confirmation and control	Supports food security and economic livelihoods and trade	1 suspected case	1 confirmed case
Infectious Hematopoietic Necrosis Virus	Causes up to 90-95% mortality in farmed Salmonid fish	Event based	Reports of sudden high mortality in Salmonid fish presenting body and eye lesions	Immediate notification via KABS, WOAHP notification, egg disinfection and quarantine measures, outbreak confirmation and control	Supports food security and economic livelihoods and trade for Rainbow Trout farming	1 suspected case	1 confirmed case

## ANIMAL HEALTH IDSR – COMPREHENSIVE DISEASE DIAGNOSTICS MATRIX

National Veterinary Diagnostic Manual | All Disease Conditions | Kenya – Enriched with Specimen Types, Transport Media, TAT & Fees (per Appendix 5)

### IMPORTANT NOTES:

(1) All packaging must comply with WOHAT Terrestrial & Aquatic Codes and IATA triple packaging requirements (P650). (2) TAT = time from sample arrival at laboratory to result reporting. (3) Fees are indicative and subject to change; contact the testing laboratory for current schedules. (4) Notifiable diseases are tested free of charge for disease control purposes; trade testing may attract fees. (5) Do NOT open carcasses suspected of Anthrax.

Table 14: Specimen types, transport media and testing laboratory

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Actinobacillosis (Actinobacillus lignieresii)	Cattle, sheep (primary); horses, pigs (occasional)	Lesion aspirate; tissue biopsy from affected lymph nodes or tongue	Sterile leak-proof universal bottle or sample bag	2–8°C; submit promptly within 24–48 hrs	Aerobic culture & biochemical ID, Gram stain, PCR	Regional NVL / NVRL
Actinomycosis (Actinomyces bovis)	Cattle (primary); sheep, pigs (rare)	Purulent aspirate (sulphur granules); bone biopsy (mandible/maxilla lesion)	Sterile container; anaerobic transport medium preferred	2–8°C; anaerobic conditions maintained in transit	Anaerobic culture, Gram stain (filamentous Gram-positive rods), PCR	Regional NVL / NVRL
Anaplasmosis (Anaplasma marginale / A. centrale)	Cattle (primary); sheep, goats	EDTA whole blood; thin blood smears (prepared at field if possible)	Purple Top vacutainer (EDTA, 5–10 ml); slides in slide box/mailers	Blood: 4°C cold chain; smears: air-dried and fixed	Giemsa-stained blood smear (microscopy), cELISA, PCR	Microscopy: NVRL / NVIL / Satellite NVLs; PCR/cELISA: NVRL
Anthrax (Bacillus anthracis)	Cattle, sheep, goats, horses, wildlife (all herbivores susceptible)	Peripheral blood smear; EDTA blood — DO NOT open carcass; muzzle/ear tissue (Ascoli test)	Glass slide in slide holder (smear); sealable leak-proof universal bottle in sterile saline (tissue); triple packaging mandatory	Triple packaging (IATA P650); spore-forming organism — biosafety precautions required	M'Fadyean staining (microscopy), Culture & isolation (BSL-2), PCR, Ascoli thermoprecipitin test	ALL NVLs (microscopy, Ascoli); NVRL (PCR, culture)
Aspergillosis (Aspergillus fumigatus)	Poultry (brooder pneumonia); cattle, horses (guttural pouch); immunosuppressed animals	Lung tissue; air sac membrane; tracheal swab	Sterile container or swab in fungal transport medium	2–8°C	Fungal culture & morphological ID, Histopathology (PAS/GMS stain)	NVRL
Babesiosis (Babesia bovis / B. bigemina)	Cattle (primary); sheep, goats (B. ovis)	EDTA whole blood; thin blood smears prepared at field; blood/tissue PCR	Purple Top vacutainer (EDTA, 5–10 ml); slides in slide box	Blood: 4°C cold chain; smears: air-dried and fixed	Giemsa-stained blood smear (microscopy), PCR	Microscopy: NVRL / NVIL / Satellite NVLs; PCR: NVRL
Black Quarter (Blackleg) (Clostridium chauvoei)	Cattle (6 months–2 years, primary); sheep	Affected skeletal muscle (swollen, crepitant lesion) collected aseptically post-mortem	Anaerobic transport container or sealed sterile bag; submit ≤24 hrs of death	2–8°C; anaerobic conditions essential	Anaerobic culture, Gram stain (Gram-positive rods), Fluorescent Antibody Test (FAT), PCR	Regional NVL / NVRL
Bluetongue (Bluetongue virus, Orbivirus)	Sheep (clinical disease); cattle, goats (usually subclinical reservoir hosts)	EDTA whole blood (acute phase); spleen (post-mortem)	Purple Top vacutainer (EDTA, 5–10 ml); sterile container for spleen	2–8°C; freeze at –70°C if transit exceeds 48 hrs	RT-PCR (genome detection & serotyping), Virus isolation (cell culture), cELISA (serology)	NVRL

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Botulism ( <i>Clostridium botulinum</i> )	Cattle, horses (Type C/D); poultry (Type C)	Serum (early acute); rumen/gastrointestinal content; incriminated feed	Red Top vacutainer (10 ml serum); sterile sealed containers for gut content and feed	2–8°C; do not freeze serum if mouse bioassay is required	Toxin neutralisation (mouse bioassay — gold standard), Toxin ELISA, PCR (toxin gene)	NVRL
Bovine Ephemeral Fever (Ephemerovirus/cattle, Rhabdoviridae)	Cattle, water buffalo	EDTA whole blood (acute febrile phase, within first 24 hrs of fever)	Purple Top vacutainer (EDTA, 10 ml)	2–8°C; submit within 24 hrs of collection for virus isolation	RT-PCR, Virus isolation, Serum Neutralisation Test (SNT)/VNT (paired sera)	NVRL
Bovine Genital Campylobacteriosis ( <i>Campylobacter fetus</i> subsp. <i>venerealis</i> )	Cattle	Preputial wash (bulls); vaginal/cervicovaginal mucus (cows); aborted foetal tissues	<i>Campylobacter</i> transport medium (e.g., <i>Leptospira-Campylobacter</i> medium or Amies charcoal); sterile sealed container for foetal tissue	2–8°C; submit within 24 hrs — organism is fragile	Microaerophilic culture & biochemical ID, IFAT, PCR	Regional NVL / NVRL
Bovine Spongiform Encephalopathy (BSE) (Prion disease)	Cattle (> 30 months showing progressive neurological signs)	Brainstem (obex) — dual submission: fresh and 10% neutral-buffered formalin fixed	Fresh: sterile sealed container, 2–8°C; Fixed: separate formalin-filled container	Fresh tissue: 2–8°C; Formalin-fixed: ambient; prion decontamination protocols apply	Histopathology (vacuolar spongiform changes), Immunohistochemistry (IHC), Western blot (immunoblotting), Rapid ELISA (screening)	NVRL
Bovine Tuberculosis (BTB) ( <i>Mycobacterium bovis</i> )	Cattle (primary reservoir); goats, pigs, wildlife (spillover hosts)	Retropharyngeal, mediastinal & mesenteric lymph nodes; lung granulomata; whole blood (IFN-γ); live animal for tuberculin test	Separate sample bag per tissue (triple package for culture); Purple Top vacutainer (EDTA blood for IFN-γ, process within 8 hrs)	Fresh tissue & blood: 4°C cold chain; culture specimens: 4°C (do NOT freeze); formalin-fixed for histology	Acid-Fast (Ziehl-Neelsen) staining, Culture & ID ( <i>M. bovis</i> — slow-growing, up to 8 weeks), PCR/NAAT, Tuberculin Skin Test (in vivo — comparative cervical), Gamma-Interferon (IFN-γ) assay	ZN stain & PCR: NVRL / NVILs / KALRO / KEMRI / MOH; Culture: NVRL / KEMRI / MOH (BSL-3); Tuberculin & IFN-γ: NVRL / NVIL / KALRO
Brucellosis ( <i>Brucella abortus</i> — cattle; <i>B. melitensis</i> — small ruminants; <i>B. suis</i> — pigs)	Cattle, sheep, goats, pigs, camels; zoonotic risk to humans	Serum; whole blood (PCR); milk; aborted foetus & placenta; vaginal discharge	Red Top vacutainer (serum); Purple Top vacutainer (blood); sterile bottle (milk); sealable leak-proof container (foetus) — triple packaging for foetal material	4°C cold chain; freeze –20°C if delay; culture material must NOT be frozen	Rose Bengal Precipitation Test (RBPT — screening), Competitive ELISA (cELISA — confirmatory), CFT (OIE-prescribed), PCR, Culture (BSL-3), Milk Ring Test (herd screening)	RBPT, Milk Ring Test: ALL NVLs; cELISA, CFT, PCR: NVRL / NVIL; Culture: NVRL BSL-3, Kabete
Contagious Bovine Pleuropneumonia (CBPP) ( <i>Mycoplasma mycoides</i> subsp. <i>mycoides</i> — MmmSC)	Cattle (all breeds; zebu relatively more resistant)	Lung tissue (lesion margin); pleural fluid; lymph node; nasopharyngeal swab; serum	<i>Mycoplasma media</i> (Hayflick's or PPLO broth) for tissue/swabs; Red Top vacutainer (10 ml serum)	Tissue/swabs: 4°C cold chain; serum: 4°C; do NOT freeze tissue for culture	Culture & ID ( <i>Mycoplasma mycoides</i> subsp. <i>mycoides</i> — slow-growing, 3–4 weeks), cELISA (OIE-prescribed serology), Indirect ELISA (LppQ antigen), Conventional PCR, LAMP-PCR	Culture: NVRL / KALRO Muguga; cELISA: NVRL / NVIL Nakuru; PCR: NVRL
Contagious Caprine Pleuropneumonia (CCPP) ( <i>Mycoplasma capricolum</i> subsp. <i>capripneumoniae</i> — Mccp)	Goats (primary); sheep (occasionally)	Pleural fluid; lung tissue (consolidated lesion); lymph node; nasopharyngeal swab; serum	Newlin's Tryptose broth or PPLO broth (culture); Red Top vacutainer (10 ml serum); sample bag (PCR)	Tissue/swabs: 4°C cold chain; serum: 4°C; do NOT freeze tissue intended for culture	Culture (in vitro — Newlin's Tryptose medium, up to 20 days), CFT (OIE-prescribed), Competitive ELISA (C.ELISA), PCR	Culture: NVRL / KALRO; CFT/C. ELISA: NVRL / NVIL; PCR: NVRL

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Coenurosis (Gid) (Coenurus cerebralis — larval stage of Taenia multiceps)	Sheep, goats (intermediate hosts); dogs (definitive host — tapeworm)	Brain tissue with intact cyst (post-mortem); CSF; excised cyst (if surgical)	Sterile sealed container	2–8°C	Gross pathology (macroscopic cyst identification), Histopathology, Protoscolex morphology	Regional NVL / NVRL
East Coast Fever (ECF) (Theileria parva)	Cattle (all breeds; zebu relatively more tolerant)	Lymph node biopsy aspirate (prescapular or parotid); EDTA whole blood; impression smears from lymph node/spleen	Slide in slide box; Purple Top vacutainer (EDTA, 5–10 ml); sample bag	Smears: air-dried and fixed (Giemsa); blood: 4°C cold chain	Giemsa-stained lymph node smear (macroscopic detection), Giemsa-stained blood smear (piroplasm detection), PCR (RLB hybridisation for speciation)	Microscopy: NVRL / NVIL / Satellite NVLs; PCR: NVRL
Echinococcosis (Cystic Hydatid Disease) (Echinococcus granulosus sensu lato)	Cattle, sheep, goats, camels (intermediate hosts); dogs, wild canids (definitive hosts)	Hydatid cyst fluid & germinal layer (from slaughter/post-mortem); faeces (dogs — coproantigen ELISA/PCR)	Sterile sealed container (cyst material); clean sealed container (dog faeces)	2–8°C; cyst fluid should not be frozen before microscopy	Protoscolex microscopy (hydatid fluid), Coproantigen ELISA (dogs), PCR (genotyping strain)	Regional NVL / NVRL
Foot and Mouth Disease (FMD) (Aphthovirus, Picornaviridae — 7 serotypes: O, A, C, SAT1, SAT2, SAT3, Asia1)	All cloven-hoofed animals: cattle, sheep, goats, pigs, camels, wildlife	Vesicular epithelium (unruptured vesicle preferred); vesicular fluid; oesophago-pharyngeal fluid (probang); EDTA blood; serum	Epithelium/probang: Phosphate-Buffered Saline (PBS) fortified with antibiotic; serum: Red Top vacutainer	Virus Transport Media (isotonic PBS + protein + antibiotics); 4°C; specimens must reach lab within 24 hrs; triple packaging (OIE/IATA)	Antigen detection ELISA (serotyping), RT-PCR (genome detection & serotyping), Virus isolation in cell culture, NSP Antibody ELISA (DIVA — differentiating infected from vaccinated), Serotype-specific competitive ELISA, VNT	FMD NVL – Embakasi, Nairobi (primary); NVRL (serology support)
Haemorrhagic Septicaemia (Pasteurella multocida serotypes B:2 and E:2)	Cattle, water buffalo (highly susceptible); other bovids	EDTA whole blood; long bone marrow or spleen; visceral organs (lung, liver, spleen); peripheral blood smear	Purple Top vacutainer (EDTA, 10 ml); sterile containers (organs); standard bacterial transport medium	4°C cold chain; submit within 24–48 hrs	Bacterial culture & isolation, Biochemical identification, Serotyping (Heddleston scheme), Gram stain/Leishman's stain (bipolar staining), PCR	NVRL / NVIL / MOH
Heartwater (Cowdriosis) (Ehrlichia ruminantium)	Cattle, sheep, goats (tick-transmitted by Amblyomma spp.)	Brain smear from cortical grey matter (post-mortem, capillary endothelial cells); EDTA whole blood (acute febrile phase)	Slide in slide box; Purple Top vacutainer (EDTA, 5–10 ml)	Smears: air-dried and fixed; blood: 4°C cold chain	Giemsa-stained brain crush smear (intracellular colonies in endothelial cells), PCR (pCS20 gene)	County / Regional NVL (microscopy); NVRL (PCR)
Helminthiasis (Gastrointestinal & Pulmonary Nematodes, Cestodes)	Cattle, sheep, goats, camels (species-specific genera apply)	Fresh faeces (≥10 g); adult worms or worm segments at post-mortem	Clean sterile container (faeces); sterile container with saline (worms)	Faeces: 2–8°C; process within 24 hrs to prevent larval hatching and egg embryonation	Faecal flotation (qualitative), McMaster egg count (quantitative — EPG), Larval culture & differentiation (L3), Worm morphology	County / Regional NVL
Infectious Bovine Rhinotracheitis (IBR) (Bovine Herpesvirus-1 — BoHV-1)	Cattle (respiratory, genital, and encephalitic forms)	Nasal swab (respiratory form); vaginal/preputial swab (infectious pustular vulvovaginitis/balanoposthitis); EDTA blood (latent infection)	Swab in VTM	2–8°C; freeze at –70°C if transit exceeds 24 hrs	PCR (diagnostic test of choice), Virus isolation (cell culture), Serum Neutralisation Test (SNT/VNT — paired sera, 4 weeks apart)	NVRL

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Johne's Disease (Paratuberculosis) (Mycobacterium avium subsp. paratuberculosis — MAP)	Cattle, sheep, goats, deer (ruminants; subclinical infection common)	Serum (ELISA); faeces (PCR/ ZN stain/culture); ileal mucosa & mesenteric lymph node (post-mortem)	Red Top vacutainer (10 ml serum); sterile containers (faeces, tissue)	4°C cold chain; faeces should not be frozen before culture	Absorbed ELISA (serum — detects clinical stages), Ziehl-Neelsen (ZN) staining of faeces/tissues, PCR (IS900 target), Culture (Herrold's egg yolk medium — 12–16 weeks)	NVRL / NVIL
Leptospirosis (Leptospira interrogans sensu lato — multiple serovars)	Cattle, pigs (maintenance hosts); horses, dogs; zoonotic risk to humans	Paired serum (acute & convalescent, 2 weeks apart); urine (chronic shedding, leptospiraemic phase); kidney tissue (post-mortem)	Red Top vacutainer (10 ml serum); sterile container (urine — process immediately or add buffer); sterile container (tissue)	Serum: 4°C cold chain; urine: 2–8°C — submit within 2 hrs or add buffer to pH 7.2; tissue: 2–8°C	Microscopic Agglutination Test (MAT — gold standard, OIE-prescribed), ELISA (IgM for acute infection), PCR (urine/blood in acute phase)	Regional NVL / NVRL
Lumpy Skin Disease (LSD) (Lumpy Skin Disease virus — Capripoxvirus)	Cattle, water buffalo	Skin nodule biopsy (full-thickness, including necrotic core); EDTA blood (acute febrile phase); serum	Sterile PBS or Minimum Essential Medium (MEM) with antibiotics (virus isolation); sample bag/ sterile container (PCR); Red Top vacutainer (serum)	PBS/MEM at 4°C (virus isolation); 4°C cold chain (PCR/serology); formalin-fixed separate sample for histology	PCR (OIE-prescribed), Virus isolation in cell culture, Histopathology (intracytoplasmic inclusion bodies), Virus Neutralisation Test (VNT — serology)	NVRL; Histopathology: NVRL / UoN
Malignant Catarrhal Fever (MCF) (Ovine herpesvirus-2 — OvHV-2; Alcelaphine herpesvirus-1 — AIHV-1)	Cattle (clinically affected); wildebeest and sheep (subclinical reservoir hosts)	EDTA whole blood (acute phase); buffy coat; lymph node (post-mortem)	Purple Top vacutainer (EDTA, 10 ml)	2–8°C; process within 24 hrs	PCR (OvHV-2 or AIHV-1 specific), Histopathology (lymphoproliferative vasculitis)	NVRL
Mange (Sarcoptes scabiei — sarcoptic; Psoroptes spp. — psoroptic; Chorioptes bovis — chorioptic)	Cattle, sheep, goats, camels, horses (species-specific mite genera)	Deep skin scrapings at active lesion margin (until capillary bleeding to capture mites in dermis)	Dry sterile container or directly onto slide in liquid paraffin (mineral oil)	Ambient temperature; process within 24 hrs	Direct microscopy (mite identification — morphological speciation)	County / Regional NVL
Mastitis (Staphylococcus aureus, Streptococcus agalactiae, S. uberis, S. dysgalactiae, coliforms — multiple pathogens)	Dairy cattle, dairy goats, camels	Aseptic quarter milk sample (10–15 ml per quarter, discard first 3 streams)	Sterile wide-mouth screw-cap container per quarter	2–8°C; process within 24 hrs; freeze at –20°C if delayed	California Mastitis Test (CMT — pen-side somatic cell count screening), Bacterial culture & antimicrobial sensitivity (ISO standard), PCR (mastitis pathogen panel)	ALL NVLs (culture); NVRL (PCR)
Nairobi Sheep Disease (Nairobi sheep disease orthonairovirus — Bunyaviridae)	Sheep, goats (tick-transmitted by Rhipicephalus appendiculatus)	EDTA whole blood (acute febrile phase); serum (paired for serology)	Purple Top vacutainer (EDTA, 10 ml); Red Top vacutainer (serum)	2–8°C	RT-PCR (primary diagnostic test), ELISA (IgG/IgM — serology)	NVRL
Peste des Petits Ruminants (PPR) (Morbillivirus caprinae — Paramyxoviridae)	Sheep, goats (primary clinical disease); cattle & pigs (subclinical — surveillance relevant)	Serum; EDTA whole blood; conjunctival, nasal & buccal swabs; lymph node, spleen, intestine (post-mortem)	Red Top vacutainer (serum); Purple Top vacutainer (EDTA blood); VTM (swabs); sterile leak-proof universal bottle (tissues)	All samples: 4°C cold chain; tissues in VTM or chilled	Rapid antigen test (field screening), cELISA (serology, OIE-prescribed), RT-PCR (confirmatory), Virus isolation (tissue culture), Histopathology	ALL NVLs (rapid test/ cELISA); NVRL / KALRO (RT-PCR); NVRL (virus isolation, histopathology)

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Photosensitisation (Primary: ingested photodynamic agents; Hepatogenous: liver dysfunction)	Cattle, sheep (white-skinned, unpigmented areas affected)	Serum (liver enzymes); urine (porphyrins); liver biopsy (histopathology); plant material (if primary — for toxin identification)	Red Top vacutainer (serum); sterile dark container (urine — porphyrins are light-sensitive); formalin (liver biopsy)	Urine: protect from light; 2–8°C; serum: 4°C cold chain	Serum hepatic enzyme profile (GGT, AST, ALP, bilirubin), Urinary porphyrin quantification, Hepatic histopathology	Regional NVL / NVRL
Q-Fever (Coxiellosis) (Coxiella burnetii — Category B zoonotic pathogen)	Cattle, sheep, goats (reservoir hosts); zoonotic risk — highly infectious aerosol	Placenta; aborted foetal tissues (spleen, liver, lung, stomach content); vaginal discharge/swabs; milk/colostrum; serum	Sample bag/ universal bottle (tissues/ placenta); Red Top vacutainer (serum) — ALL specimens: triple packaging (IATA P650)	4°C cold chain; triple packaging mandatory (Category B pathogen)	PCR (IS1111 target — most sensitive for tissues), ELISA (phase I & II antibodies), IFA (Indirect Fluorescent Antibody — OIE-prescribed reference test)	NVRL (BSL-3 handling required)
Rabies (Rabies lyssavirus — Lyssavirus, Rhabdoviridae)	All warm-blooded animals; dogs (primary vector in Kenya); cattle, wildlife	Brain tissue (cerebellum, hippocampus, medulla/brainstem — minimum 1 g each); whole head/carcass (if transport feasible)	Leak-proof sealed container in sterile phosphate-buffered saline; triple packaging (IATA P650)	2–8°C preferred; freeze only if transit exceeds 48 hrs (freezing impairs FAT sensitivity)	Fluorescent Antibody Test (FAT — OIE gold standard), Rapid Immunodiagnostic Test (RIDT/Rapid test — field use), Direct Rapid Immunohistochemistry Test (DRIT), Seller's staining (Negri bodies — historical), RT-PCR (confirmatory, strain typing)	NVRL (FAT, RT-PCR)
Rift Valley Fever (RVF) (Phlebovirus, Phenuiviridae — zoonotic arbovirus)	Sheep (highest mortality), cattle, goats, camels; zoonotic — high risk to humans	Serum (acute phase — IgM); EDTA blood; spleen, liver (post-mortem — highest viral titre); aborted foetal liver	Red Top vacutainer (10 ml serum); separate sample bag per tissue; triple packaging (IATA P650 — zoonotic)	4°C cold chain; triple packaging mandatory	RT-PCR (acute detection, OIE-prescribed), IgM-capture ELISA (acute serology), Indirect IgG ELISA (past exposure/ vaccination titres), Virus isolation (BSL-3)	NVRL / NVIL; Virus isolation: NVRL (BSL-3)
Rinderpest (Morbillivirus bovis — ERADICATED globally since 2011)	Cattle, buffalo, wildlife (cloven-hoofed) — any suspected case must be reported immediately	EDTA blood; nasal/ocular/buccal swabs; lymph node (post-mortem)	Purple Top vacutainer; VTM (swabs); triple packaging mandatory	4°C cold chain; triple packaging; IMMEDIATE reporting to DVS and FAO	RT-PCR (OIE reference test), cELISA (serology) — ALL positive results require OIE Reference Laboratory confirmation	NVRL — immediate escalation to OIE Reference Lab (Pirbright Institute, UK)
Sheep & Goat Pox (SGP) (Capripoxvirus — Sheeppox virus / Goatpox virus)	Sheep (Sheeppox virus), goats (Goatpox virus); some strains cross-infect both species	Skin papule/nodule biopsy; lung lesion biopsy; lymph node; serum (paired)	Sterile PBS or MEM with antibiotics (virus isolation); sample bag (PCR); Red Top vacutainer (serum); formalin (histopathology)	PBS/MEM: 4°C (virus isolation); 4°C cold chain (PCR/serology); formalin-fixed separate sample	PCR (OIE-prescribed), Virus isolation in cell culture, Histopathology (intracytoplasmic inclusion bodies — Bollinger bodies), VNT (serology)	NVRL; Histopathology: NVRL / UoN
Tetanus (Clostridium tetani — neurotoxin: tetanospasmin)	Horses (highly susceptible), cattle, sheep, goats; all mammals at risk via wound contamination	Wound tissue/exudate (necrotic wound at portal of entry)	Anaerobic transport container or sterile sealed bag	2–8°C; anaerobic conditions; submit within 24 hrs	Anaerobic culture (spore detection), Gram stain (slender Gram-positive rods with terminal spores — 'drumstick'), Mouse toxin neutralisation test (gold standard), PCR (tpi toxin gene)	Regional NVL / NVRL

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Bovine Trichomoniasis (Trichomonas foetus)	Cattle (venereally transmitted; bulls are asymptomatic carriers)	Preputial wash/smegma (bulls — primary sample); vaginal/cervicovaginal mucus (cows); aborted foetal abomasal content	Campylobacter Transport Medium or Diamond's TYM medium (for culture); sterile container (foetal material)	2–8°C; submit within 4 hrs — protozoan is extremely fragile; do NOT refrigerate culture medium below 4°C	Direct microscopy (motile trichomonads in fresh smear — examine immediately), Culture (Diamond's TYM medium), PCR (most sensitive)	Regional NVL / NVRL
Trypanosomiasis (Trypanosoma brucei, T. congolense, T. vivax — African Animal Trypanosomiasis)	Cattle, camels, horses (highly susceptible); goats, sheep (more tolerant)	EDTA whole blood; buffy coat; thin blood smears prepared immediately; impression smears from spleen/lymph node; serum	Purple Top vacutainer (EDTA, 10 ml); slide box (smears); Red Top vacutainer (serum); dried blood spots on Whatman filter paper (DBS)	Fresh smears: air-dried and fixed; blood: 4°C; DBS: ambient with desiccant	Buffy coat technique / Haematocrit Centrifugation Technique (HCT — direct parasite detection), Giemsa-stained blood smear, Card Agglutination Test for Trypanosomiasis (CATT — T. b. evansi), ELISA, PCR (species differentiation)	Microscopy/ CATT: NVRL / NVIL / Satellite NVLs; ELISA: NVRL / NVIL / KALRO; PCR: NVRL
Enterotoxaemia (Pulpy Kidney Disease) (Clostridium perfringens type D — epsilon toxin)	Sheep, goats (primary — sudden death in well-nourished animals); cattle, deer (less common)	Intestinal content (ileum — taken immediately post-mortem); kidney (soft/liquefied — 'pulpy' change); serum	Sterile sealed containers; anaerobic conditions for intestinal content	2–8°C; intestinal content must be processed promptly — toxin degrades rapidly	Epsilon toxin ELISA (intestinal content/ serum), PCR (etx toxin gene), Anaerobic culture & toxin typing (mouse neutralisation test)	Regional NVL / NVRL
African Swine Fever (ASF) (African swine fever virus — Asfarviridae)	Domestic pigs, wild boar (Phacochoerus spp. are reservoir hosts in Africa)	EDTA whole blood; spleen; lymph nodes (haemorrhagic); tonsil	Purple Top vacutainer (EDTA); sterile sealed containers; triple packaging	4°C cold chain; triple packaging (notifiable disease)	Real-time PCR (OIE-prescribed — primary diagnostic), Antibody ELISA (surviving animals), Virus isolation (porcine bone marrow macrophages — in containment)	NVRL (High Containment — BSL-3)
Atrophic Rhinitis (Bordetella bronchiseptica; toxigenic Pasteurella multocida type D)	Pigs (young piglets most severely affected)	Deep nasal swab; nasal turbinate tissue (post-mortem — turbinate atrophy grading)	Deep nasal swab in Amies charcoal transport medium	2–8°C; submit within 24 hrs	Bacterial culture & isolation (B. bronchiseptica and P. multocida), Toxin gene PCR (tox A — dermonecrotic toxin of P. multocida)	Regional NVL
Porcine Reproductive & Respiratory Syndrome (PRRS) (PRRS virus — Arterivirus, Arteriviridae)	Pigs (all ages; reproductive failure in sows, respiratory disease in piglets/ growers)	Serum (serology); EDTA blood (PCR); lung tissue (acute respiratory cases)	Red Top vacutainer (serum); Purple Top vacutainer (EDTA blood); sterile container (lung tissue)	2–8°C; freeze at –70°C if delayed	RT-PCR (primary — genome detection, genotyping European vs. North American strain), ELISA (antibody detection — seroconversion from 3–4 weeks post-infection)	NVRL
Swine Dysentery (Brachyspira hyodysenteriae)	Pigs (growing/ finishing pigs; mucohemorrhagic diarrhoea)	Fresh faeces (mucus and blood-streaked); colonic mucosa swab (post-mortem)	Sterile sealed container; anaerobic transport system for swabs	2–8°C; anaerobic transport for culture; process within 24 hrs	Anaerobic culture (selective — spectinomycin agar), Gram stain (large, weakly Gram-negative spirochaetes), PCR (nox gene — species identification)	Regional NVL / NVRL

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Swine Erysipelas (Erysipelothrix rhusiopathiae)	Pigs (septicaemic, urticarial 'diamond skin', and chronic arthritic/endocarditic forms); turkeys; zoonotic	EDTA blood (septicaemic — acute); skin lesion biopsy (urticarial form); joint fluid/synovial membrane (chronic arthritis); heart valve (endocarditis)	Purple Top vacutainer (5 ml EDTA blood); sterile sealed containers	2–8°C	Bacterial culture & isolation (blood agar — alpha-haemolysis), Biochemical ID, PCR, Slide agglutination (serotyping)	Regional NVL
Transmissible Gastroenteritis (TGE) (Transmissible Gastroenteritis coronavirus — TGEV, Alphacoronavirus)	Pigs (all ages; near-100% mortality in piglets <2 weeks)	Jejunum/ileum with contents (acute cases — DO NOT freeze for FAT); faeces	Sterile sealed container	2–8°C; jejunum submitted in unfixed, chilled state for FAT and viral isolation	RT-PCR (primary — most sensitive), Fluorescent Antibody Test (FAT on frozen sections), Virus isolation	NVRL
Avian Infectious Bronchitis (IB) (Infectious Bronchitis virus — Gammacoronavirus)	Domestic chickens (all ages; respiratory, renal, and reproductive tract tropism)	Tracheal swab (respiratory form); cloacal swab; kidney tissue (renal form); oviduct/ reproductive tract (laying hens)	Swabs in VTM; sterile container (tissue)	2–8°C; freeze at –70°C if transit exceeds 24 hrs	RT-PCR (primary — genotyping essential due to multiple serotypes), Virus isolation (embryonated eggs — reference test), Haemagglutination Inhibition (HI — serology, serotype-specific antisera required)	Regional NVL / NVRL
Avian Influenza (AI) (Influenza A virus — H5/H7 subtypes notifiable; HPAI vs. LPAI differentiation required)	Poultry (chickens, turkeys, ducks); wild birds (reservoir hosts)	Oropharyngeal swabs (preferred over nasal — pool 5–10 birds per submission); cloacal swabs; lung, trachea, spleen, brain (post-mortem — pooled from ≥5 birds)	Swabs in VTM; sterile containers (tissues); triple packaging (IATA P650)	4°C cold chain; freeze at –70°C if delay; HPAI: BSL-3 handling	Real-time RT-PCR (matrix gene — screening; H5/H7 specific — subtyping), Virus isolation (embryonated eggs — OIE reference method), Haemagglutination (HA) test, Haemagglutination Inhibition (HI) test, DIVA ELISA (NP antibody)	NVRL (BSL-3)
Avian Mycoplasmosis (Mycoplasma gallisepticum — MG; M. synoviae — MS; M. meleagridis — MM in turkeys)	Chickens (MG, MS), turkeys (MM, MG, MS), other poultry	Tracheal swab (MG/MS); infraorbital sinus swab (sinusitis); joint fluid (MS — synovitis); serum	Swab in Mycoplasma transport medium (Frey's broth or PPLO broth); Red Top vacutainer (serum)	2–8°C; process promptly — Mycoplasma spp. are fragile	PCR (species-specific — primary diagnostic), Serum Plate Agglutination (SPA — rapid screening), Haemagglutination Inhibition (HI), Culture (Mycoplasma-specific media — slow-growing)	NVRL
Coccidiosis (Eimeria spp. — E. tenella, E. necatrix, E. acervulina etc. in poultry; multiple Eimeria spp. in ruminants)	Poultry (all species); cattle, sheep, goats (species-specific Eimeria spp.)	Fresh faeces (≥10 g); intestinal scraping/section (post-mortem for species identification)	Clean sterile container	2–8°C; process within 24 hrs — unsporulated oocysts are non-infective	Faecal flotation (oocyst detection & quantification), Intestinal lesion scoring (post-mortem), Sporulated oocyst morphology (species ID)	County / Regional NVL
Colibacillosis (Avian Pathogenic Escherichia coli — APEC)	Poultry (chickens, turkeys — respiratory, septicaemic, peritonitis, salpingitis forms)	Heart blood; liver; air sac membrane (early lesion); spleen; affected organs	Sterile container; aspirate heart blood aseptically with syringe	2–8°C; submit within 24–48 hrs of death	Bacterial culture on MacConkey and blood agar, Biochemical identification (IMViC), PCR (APEC virulence genes — iutA, hlyF, iron, iss, ompT), Antimicrobial sensitivity testing	Regional NVL

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Fowl Typhoid (Salmonella enterica serovar Gallinarum biovar Gallinarum)	Chickens, turkeys, Guinea fowl (acute septicaemia in adults; higher mortality than Pullorum)	Liver, spleen, bile (fresh); cloacal swab; serum	Sterile container (organs); Amies/Carry-Blair transport medium (swabs); Red Top vacutainer (serum)	4°C cold chain	Bacterial culture & isolation (Brilliant Green Agar, XLD agar), Biochemical ID, Serotyping (Kauffmann-White scheme), Serum Plate Agglutination (SPA — rapid screening)	NVRL
Pullorum Disease (Salmonella enterica serovar Gallinarum biovar Pullorum)	Chickens, turkeys (high mortality in chicks <3 weeks; adults: chronic carrier state with reduced egg production)	Liver, spleen, yolk sac (chicks); ovary/testicle (adults); cloacal swab; whole blood (agglutination test); serum	Sterile container (organs); Amies/Carry-Blair transport medium (swabs); Red Top vacutainer (serum)	4°C cold chain	Bacterial culture & isolation, Biochemical ID, Serotyping (serovar Pullorum — related to Gallinarum, O antigen group D), Whole Blood Agglutination Test (WBAT — rapid pen-side screening), Serum Plate Agglutination (SPA)	NVRL
Gumboro Disease (IBD) (Infectious Bursal Disease virus — Birnavirus)	Chickens (3–6 weeks old most severely affected; immunosuppression in survivors)	Bursa of Fabricius (primary target organ — swollen, haemorrhagic or atrophied); spleen; serum	Organs in VTM (PBS with protein & antibiotics) in sterile container; Red Top vacutainer (serum)	2–8°C; freeze at –70°C if delayed	RT-PCR (primary — detects very virulent (vvIBDV) and variant strains), ELISA (serology — maternal antibody titres, vaccination response), Virus isolation (embryonated eggs)	Regional NVL / NVRL
Infectious Coryza (Avibacterium paragallinarum)	Chickens (characterised by serofibrinous sinusitis and nasal discharge; rarely fatal but significant production losses)	Infraorbital sinus exudate; tracheal swab; nasal turbinate mucosa (post-mortem)	Swab in Amies charcoal transport medium	2–8°C; submit within 24 hrs — organism is fragile	Bacterial culture (microaerophilic conditions — 5–10% CO <sub>2</sub> ; chocolate agar), Biochemical ID, PCR, Haemagglutination Inhibition (HI — serology, serovar-specific)	Regional NVL
Marek's Disease (MD) (Marek's Disease virus — Alphaherpesvirus, Gallid herpesvirus-2)	Chickens (peripheral nerve lymphoma; visceral tumours; ocular disease — cutaneous and neural forms)	Peripheral nerves (brachial, sciatic plexus — enlarged/oedematous); feather follicle epithelium (highest viral load for PCR); visceral tumour tissue; iris (ocular form)	Fresh tissue: sterile container, 2–8°C; formalin-fixed separate sample for histology	2–8°C (fresh); formalin (fixed); process promptly	Histopathology (lymphoproliferative lesions in nerves — key diagnostic), PCR (feather pulp — early detection), Immunofluorescence (cell culture)	NVRL
Newcastle Disease (ND) (Avian orthoavulavirus-1 — Paramyxoviridae; velogenic, mesogenic & lentogenic pathotypes)	Poultry (all species); pigeons; wild birds (reservoir)	Oropharyngeal/tracheal swabs (preferred — pool 5–10 birds); cloacal swabs; brain, lung, spleen (post-mortem); serum	Swabs in VTM; sterile containers (tissues); Red Top vacutainer (serum)	4°C cold chain; freeze at –70°C if delay	Real-time RT-PCR (primary — matrix gene screening; F gene sequencing for pathotype determination), Virus isolation in embryonated eggs (OIE reference test), Haemagglutination (HA) & Haemagglutination Inhibition (HI) tests	NVRL

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
African Horse Sickness (AHS) (African Horse Sickness virus — Orbivirus, Reoviridae — 9 serotypes)	Horses (90–95% case fatality — pulmonary form); mules, donkeys (milder); zebra (subclinical reservoir)	EDTA whole blood (acute febrile phase); spleen, lung (post-mortem); serum (paired — 3 weeks apart)	Purple Top vacutainer (EDTA); organs in VTM in sterile container; Red Top vacutainer (serum); triple packaging	4°C cold chain; freeze at -70°C if delayed; triple packaging for suspect outbreaks	RT-PCR (primary — serotype determination by sequencing), Virus isolation (Vero cells), cELISA (OIE-prescribed serology), SNT (serotype-specific — definitive)	NVRL
Camelpox (Camelpox virus — Orthopoxvirus, Poxviridae)	Dromedary camel ( <i>Camelus dromedarius</i> ); Bactrian camel ( <i>C. bactrianus</i> ) occasionally	Skin scab/crust (from active papulo-vesicular lesions); skin biopsy; serum	Sample bag/universal bottle (skin material); Red Top vacutainer (serum)	Skin material: 4°C cold chain or -20°C for delayed transport; serum: 4°C cold chain	PCR (primary — genome detection), Electron microscopy (poxvirus morphology), Virus isolation in cell culture (Vero cells), ELISA (serology), AGID	NVRL / NVIL / KALRO (ELISA, AGID); NVRL / KALRO (PCR, virus isolation)
MERS-CoV (Middle East Respiratory Syndrome Coronavirus) (Betacoronavirus — Zoonotic; dromedary camels = primary reservoir)	Dromedary camels ( <i>Camelus dromedarius</i> — subclinical shedders); humans (spillover — notifiable zoonosis)	Nasal swab (highest shedding); oropharyngeal swab; turbinate tissue; lymph node; serum	Swabs in VTM; sterile sealed containers (tissue); triple packaging (IATA P650 — zoonotic pathogen)	4°C cold chain for short-term; -70°C for long-term storage; triple packaging mandatory	Real-time RT-PCR (upE gene — WHO-recommended screening; ORF1a — confirmatory), Competitive ELISA (antibody detection — seroprevalence surveys)	NVRL (BSL-3); immediate notification to DVS and MOH
Tilapia Lake Virus (TiLV) (Tilapia tilapinevirus — Amnoonviridae)	Nile tilapia ( <i>Oreochromis niloticus</i> ) and tilapia hybrids (primary); other cichlids (susceptible)	Brain; retina/eye; liver (submit 3–5 affected fish whole)	Whole fish in sealed sterile plastic bag on ice	Transport on ice (2–8°C); submit within 24 hrs	RT-PCR (primary diagnostic), Partial genome sequencing (confirmation & phylogeny), Histopathology (syncytial multinucleated cells in brain — pathognomonic)	NVRL (Aquatic Unit)
Epizootic Ulcerative Syndrome (EUS) ( <i>Aphanomyces invadans</i> — oomycete; secondary bacterial involvement)	Multiple freshwater fish species (snakehead, catfish, carp, tilapia)	Skin/muscle lesion biopsy (margin of active ulcer — full depth); 5–10 g per submission	Sterile sealed container	2–8°C; do not freeze — freezing destroys fungal hyphae morphology	Histopathology (non-septate hyphae invading muscle — diagnostic), Fungal culture ( <i>Aphanomyces</i> -specific medium), PCR	NVRL
Infectious Pancreatic Necrosis (IPN) (Infectious Pancreatic Necrosis virus — Aquabirnavirus)	Salmonids: rainbow trout ( <i>Oncorhynchus mykiss</i> ), Atlantic salmon; high mortality in fry	Kidney, spleen, pancreas (pool from ≥5 fish of similar clinical status)	Sterile container; fish pooled on ice	2–8°C; submit within 24 hrs	RT-PCR (primary), Virus isolation (CHSE-214 cell line — OIE reference method), ELISA (antigen detection)	NVRL
Infectious Haematopoietic Necrosis (IHN) (Infectious Haematopoietic Necrosis virus — Novirhabdovirus)	Salmonids: rainbow trout, chinook & sockeye salmon; high mortality in juvenile fish	Kidney, spleen, brain (pool from ≥5 fish of similar clinical status)	Sterile container; fish pooled on ice	2–8°C; submit within 24 hrs; do NOT freeze — virus is labile	RT-PCR (primary), Virus isolation (EPC or BF-2 cell lines — OIE reference method), ELISA (antigen confirmation)	NVRL
American Foulbrood (AFB) ( <i>Paenibacillus larvae</i> — spore-forming bacterium)	Honeybees ( <i>Apis mellifera</i> — larvae affected; adult bees carry spores)	Diseased/dead larvae from capped brood; wax comb sample (5×5 cm with affected larvae)	Dry sterile container or sealed paper bag	Ambient; spores are heat and desiccation resistant — no refrigeration required	Microscopy (characteristic ropy brown mass), Culture (J medium), PCR (most sensitive — rpoB gene)	NVRL / Entomology Lab, Kabete

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
European Foulbrood (EFB) ( <i>Melissococcus plutonius</i> — non-spore-forming bacterium)	Honeybees ( <i>Apis mellifera</i> — uncapped larvae affected)	Diseased larvae (twisted, discoloured — yellow/brown); comb sample (5×5 cm)	Dry sterile container or sealed paper bag	2–8°C (M. <i>plutonius</i> is less hardy than AFB spores); process within 48 hrs	Microscopy (Gram stain — Gram-positive cocci), Culture, PCR	NVRL / Entomology Lab, Kabete
Varroosis ( <i>Varroa destructor</i> — ectoparasitic mite)	Honeybees ( <i>Apis mellifera</i> ); <i>Varroa jacobsoni</i> in <i>A. cerana</i>	Adult bees (≥100 workers from brood area — highest mite load); capped drone brood (highest infestation rate)	Dry container; avoid moisture (mites detach in liquid)	Ambient; process within 72 hrs	Alcohol wash / sugar roll (mite count from adult bees — standard monitoring method), Microscopy (morphological speciation: <i>V. destructor</i> vs <i>V. jacobsoni</i> )	County / Regional NVL / Entomology Lab, Kabete
Nosemosis ( <i>Nosema apis</i> — spores larger; <i>N. ceranae</i> — smaller spores; microsporidian fungi)	Honeybees ( <i>Apis mellifera</i> — adult bee midgut infection)	Adult bee abdomens (30–50 bees; avoid newly emerged bees — not yet infected)	Dry container or 70% ethanol (for PCR — not for fresh microscopy)	2–8°C (fresh); ethanol-preserved for PCR	Microscopy of macerated abdomen in water (spore morphology — <i>N. apis</i> spores larger than <i>N. ceranae</i> ), PCR (species differentiation — <i>N. apis</i> vs <i>N. ceranae</i> )	Regional NVL / Entomology Lab, Kabete
Small Hive Beetle (SHB) ( <i>Aethina tumida</i> — invasive coleopteran pest)	Honeybees ( <i>Apis mellifera</i> — <i>A. cerana</i> has behavioural resistance)	Adult beetles (≥10 specimens); larvae; damaged comb with slime	Dry container (adults alive if possible for ID); 70% ethanol for preserved specimens	Ambient; living adults preferred for confirmation	Morphological identification (adult and larval morphology — diagnostic confirmation required for new incursions)	County / Regional NVL / Entomology Lab, Kabete
Tropilaelaps Infestation ( <i>Tropilaelaps clareae</i> / <i>T. mercedesae</i> — ectoparasitic mites)	Honeybees ( <i>Apis mellifera</i> — exotic pest; native host: Asian giant honey bee <i>A. dorsata</i> )	Adult bees (30–50 workers from brood area); capped brood comb (mites reproduce only in capped brood)	Dry container; avoid moisture	Ambient; process within 72 hrs	Microscopy (morphological ID — <i>Tropilaelaps</i> mites are smaller and faster-moving than <i>Varroa</i> ; lack of forelegs adapted for gripping)	NVRL / Entomology Lab, Kabete
Tracheal Mites (Acarapisosis) ( <i>Acarapis woodi</i> — internal endoparasitic mite of tracheae)	Honeybees ( <i>Apis mellifera</i> — young adult bees ≤5 days old are susceptible to infestation)	Adult bees (30–50 bees — freshly dead or chilled)	Chilled container (2–8°C) or 70% ethanol; avoid freezing	2–8°C; dissect bee tracheae for microscopy within 48 hrs	Tracheal dissection microscopy (visual identification of mites in first thoracic tracheal ring — brown/black discoloration)	Regional NVL / Entomology Lab, Kabete
Wax Moth Infestation ( <i>Galleria mellonella</i> — Greater Wax Moth; <i>Achroia grisella</i> — Lesser Wax Moth)	Honeybees ( <i>Apis mellifera</i> — affects weakened colonies; stored comb)	Wax comb with larvae/cocoons (5×5 cm section); adult moths; silken tunnels in comb	Dry container; sealed bag to prevent spread	Ambient	Morphological identification of larvae and adults (visual inspection — usually sufficient for control decisions)	County / Regional NVL / Entomology Lab, Kabete
Sacbrood Virus (SBV) (Sacbrood virus — <i>Iflavirus</i> , <i>Iflaviridae</i> )	Honeybees ( <i>Apis mellifera</i> — unsealed larvae affected; characteristic sac-like appearance)	Diseased larvae (Chinese slipper appearance — head elevated, fluid-filled sac)	Sterile container or sealed bag	2–8°C; process within 48 hrs or freeze at –20°C	RT-PCR (definitive — most sensitive), Gross morphology (provisional identification of characteristic sac-shaped dead larvae)	NVRL / Entomology Lab, Kabete
Chronic Bee Paralysis Virus (CBPV) (Chronic bee paralysis virus — <i>Alphaflexivirus</i> )	Honeybees ( <i>Apis mellifera</i> — adult bees affected; trembling, hairless black bees — Type 1 and Type 2 syndromes)	Adult bees showing paralysis signs (30–50 bees)	Sterile container	2–8°C or –20°C for storage	RT-PCR (definitive identification — distinguishes from other adult bee viruses)	NVRL / Entomology Lab, Kabete

Disease / Condition	Primary Species	Recommended Specimen(s)	Container / Transport Medium	Shipping & Preservation	Diagnostic Test(s)	Testing Laboratory
Black Queen Cell Virus (BQCV) (Black queen cell virus — Cripavirus, Dicistroviridae)	Honeybees ( <i>Apis mellifera</i> — queen larvae and pupae affected; black discolouration of queen cells)	Dead queen larvae/pupae; adult workers from affected colonies (30–50 bees); comb scrapings	Sterile container	2–8°C; freeze at –20°C for longer storage	RT-PCR (primary — most sensitive and specific; distinguishes from other queen cell pathogens including sacbrood)	NVRL / Entomology Lab, Kabete

## Laboratory Key & Abbreviations

NVRL: National Veterinary Reference Laboratory, Kabete, Nairobi

NVIL: National Veterinary Investigation Laboratory (regional laboratories)

KALRO Muguga: Kenya Agricultural & Livestock Research Organisation – Muguga Campus

KEMRI: Kenya Medical Research Institute (for zoonotic diseases shared with MOH)

MOH: Ministry of Health (joint testing for zoonotic diseases)

FMD NVL: Foot and Mouth Disease National Veterinary Laboratory – Embakasi, Nairobi

UoN: University of Nairobi, Faculty of Veterinary Medicine (histopathology)

BSL-3 Kabete: Biosafety Level-3 containment laboratory at NVRL Kabete (Brucella culture, HPAI)

ALL NVLs: Test may be performed at any accredited NVL/NVIL countrywide

Satellite NVLs: County-level satellite veterinary laboratories (microscopy only)

TAT: Turnaround time from sample receipt at laboratory; field-to-lab transport time is additional


VTM: Virus Transport Media – isotonic buffered saline with protein and antibiotics






DBS: Dried Blood Spots collected on Whatman filter paper stored with desiccant


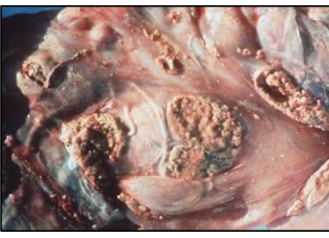
LN2: Liquid nitrogen (used where long-term storage at –196°C is required)


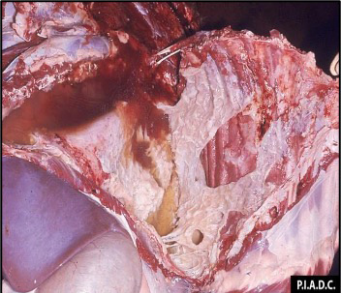

## Annex 6 - Disease condition and type of sample to be collected



Table 15: Disease condition and type of sample to be collected

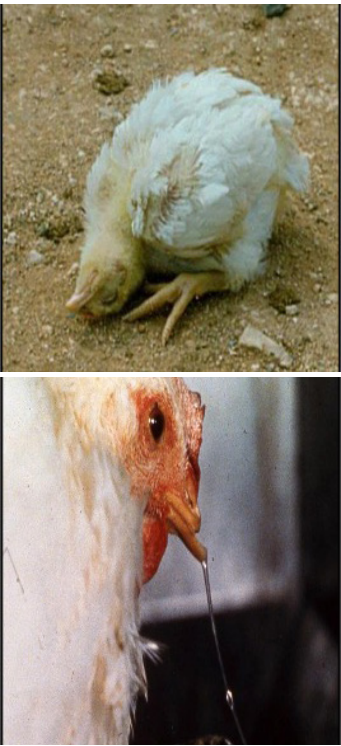

Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
1 Foot & Mouth Disease	<p>Cattle show the following clinical signs, which may be mild to severe:</p> <ul style="list-style-type: none"> <li>• Fever for 2 to 3 day, anorexia.</li> <li>• Profuse salivation and nasal discharge that is mucoid at first, but becomes mucopurulent.</li> <li>• lameness, vesicles between</li> <li>• claws and on the coronary band, rupturing to become erosions.</li> <li>• Vesicles in the buccal and nasal mucous membrane that rupture and discharge clear or cloudy fluid, leaving raw, eroded areas surrounded by ragged fragments of loose tissue</li> <li>• Sticky, foamy, stringy saliva</li> <li>• Lameness, vesicles between claws and coronary band.</li> <li>• Reluctance to move</li> <li>• Abortions</li> <li>• Low milk production in dairy cows</li> <li>• Heart disease and death, especially in newborn animals</li> </ul>		<p>Live animal</p> <ul style="list-style-type: none"> <li>• Epithelial tissue from vesicles – put in virus transport media</li> <li>• Vesicular fluid.</li> <li>• Nasal and oral secretions</li> <li>• Esophageal-pharyngeal fluids collected to identify carrier animals. Repeated sampling may be necessary to identify carriers, as the amount of virus is often low and fluctuates.</li> <li>• Blood and milk.</li> </ul> <p>Necropsy</p> <ul style="list-style-type: none"> <li>• Myocardium tissue samples such.</li> <li>• Epithelium from un-ruptured or freshly ruptured vesicles, or vesicular fluid. In cases with no vesicles.</li> <li>• Blood [serum] and esophageal–pharyngeal fluid samples, taken by probang cup.</li> </ul>

Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
2 Peste des petits ruminants	<p>One or more sheep or goats with a range of the following clinical signs:</p> <ul style="list-style-type: none"> <li>• Sudden rise in body temperature (40–41°C) with effects on the general state: animals become depressed or restless, anorexic and develop a dry muzzle and dull coat.</li> <li>• Serous nasal discharge becoming mucopurulent and resulting, at times, in a profuse catarrhal exudate which crusts over and occludes the nostrils.</li> <li>• Within 4 days of onset of fever, gums become hyperemic, and erosive lesions develop in the oral cavity with excessive salivation</li> <li>• Necrotic stomatitis with halitosis.</li> <li>• Small areas of necrosis on the visible mucous membranes</li> <li>• Congestion of conjunctiva, crusting on the medial canthus and sometimes profuse catarrhal conjunctivitis</li> <li>• Severe, watery, blood-stained diarrhoea is common in later stages</li> <li>• Bronchopneumonia evidenced by coughing is a common feature; rales and abdominal breathing</li> <li>• Abortions.</li> <li>• Dehydration, emaciation, dyspnoea, hypothermia and death may occur within 5–10 days.</li> <li>• Survivors undergo long convalescence</li> </ul>	    	<p>Live animal</p> <ul style="list-style-type: none"> <li>• Ocular, nasal and buccal swabs</li> <li>• Whole blood collected in EDTA; preferably collected in early stages of disease.</li> </ul> <p>At post mortem</p> <ul style="list-style-type: none"> <li>• lymph nodes (especially the mesenteric and bronchial nodes), lung and spleen tissues are collected aseptically chilled on ice and transported under refrigeration.</li> </ul> <p>Set of tissues for histopathology should be placed in 10% neutral buffered formalin</p>



Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
3 Brucellosis	<p>Brucellosis should always be considered in all cattle abortions, particularly when multiple abortions (abortion storms) occur in a herd.</p> <p>Suspect cattle exhibiting one or more of these signs warrant testing:</p> <ul style="list-style-type: none"> <li>• abortion</li> <li>• reduction in milk yield,</li> <li>• stillborn or weak calves ,</li> <li>• increased frequency of retained placentas , or testicular enlargement or abscesses</li> </ul> <p>Bacteremia, abortions, prostatitis, epididymitis, lymphadenitis and splenitis characterize clinical infections in dogs.</p> <p>Neurological signs and blindness in wild animals –(african buffalo, elands, hippopotamus, zebra, waterbuck and impala)</p> <p>Orchitis or Epididymitis in rams</p> <p>Infertility in ewes</p> <p>Brucella bovis Brucella melitensis Brucella suis.....etc</p>	 <p>Third Trimester Abortion</p>  <p>Retained placenta, once expelled, will have a leathery appearance</p>	<p>Live Animal</p> <ul style="list-style-type: none"> <li>• uterine discharges(aborting cow lochia)</li> <li>• colostrum</li> <li>• milk</li> <li>• semen</li> <li>• whole blood in EDTA</li> <li>• serum</li> </ul> <p>At Post moterm</p> <ul style="list-style-type: none"> <li>• Foetal organs(foetal stomach fluid,liver,lung &amp;spleen)</li> <li>• Cotelydons</li> <li>• lymphnodes</li> </ul>

Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
4 Contagious Bovine Pleuropneumonia	<p>Caused by <i>Mycoplasma mycoides</i> subsp. <i>Mycoides</i> Small Colony</p> <p>One or more cattle with a range of the following acute or chronic signs:</p> <ul style="list-style-type: none"> <li>• depressed, inappetent animal with moderate fever, thoracic pain and increased respiratory rate.</li> <li>• Rapid, difficult or noisy respiration,</li> <li>• Nasal discharge,</li> <li>• Fever,</li> <li>• Coughing, especially after exertion,</li> <li>• Chronic mild cough</li> <li>• Weight loss</li> </ul> <p>As pneumonia progresses, there is laboured respiration and dyspnoea, and animals prefer to stand with elbows abducted to decrease thoracic pain and increase chest capacity</p> <p>Auscultation of the lungs may reveal a wide variety of sounds, depending on how severely the subjacent pulmonary parenchyma is affected.</p> <p>Reputations, rales, and pleuretic friction rubs are all possible.</p> <p>At percussion, dull sounds can be noticed in the low areas of the thorax.</p> <p>CBPP often evolves into a chronic disease, characterised by ill thrift and recurrent low grade fever that may be difficult to recognise as pneumonia</p> <ul style="list-style-type: none"> <li>• Forced exercise may precipitate coughing</li> </ul>	  	<p>Live animals</p> <ul style="list-style-type: none"> <li>• nasal swabs and /or broncho-alveolar washings.</li> <li>• pleural fluid obtained by puncture.</li> <li>• whole blood</li> <li>• serum</li> </ul> <p>At post mortem:</p> <ul style="list-style-type: none"> <li>• lung tissue, lymph</li> <li>• nodes, pleural fluid and synovial fluids from those animals with arthritis.</li> <li>• Samples should be shipped cool but may be frozen if transport to the laboratory is delayed.</li> </ul>

Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
5 Contagious Caprine Pleuropneumonia	<p>CCPP is a respiratory disease affecting goats and some wild ruminants. Manifested in goats by</p> <ul style="list-style-type: none"> <li>• anorexia, fever, Laboured breathing (dyspnea), Nasal discharge.</li> <li>• In the terminal stages, animals are unable to move, they stand with their front legs wide apart, the neck is stiff and extended, and sometimes saliva continually drips from the mouth., respiratory signs such as increased respiratory rate and coughing and diarrhea develops.</li> </ul>		<p>Samples to be taken from live animals are broncho-alveolar washings or pleural fluid obtained by puncture.</p> <p>Samples to be taken at necropsy are lung lesions, lymph nodes, and pleural fluid. For cultivation of the pathogen, the tissues are ground in buffered solution and inoculated into selective broth and solid media with antibiotics or other inhibitors to prevent the growth of other bacteria. Growth of Mccp requires very rich media containing high percentages of serum. Isolation is hampered by the very slow growth of Mccp, up to 15 days, and the presence of other Mycoplasma species such as <i>M. ovipneumoniae</i></p>
6 Rift Valley Fever	<p>Sudden onset abortion storms in cattle, sheep, goats and camels, at all stages of pregnancy.</p> <p>Adults sheep, goats and cattle have a range of the following clinical signs, mild to severe;</p> <ul style="list-style-type: none"> <li>• fever</li> <li>• nasal and ocular discharge</li> <li>• Bloody/fetid diarrhea.</li> <li>• vomiting</li> <li>• colic</li> <li>• jaundice.</li> </ul> <p>Sheep are most severely affected, with high mortality in neonatal lambs.</p>		<p>Live animal</p> <ul style="list-style-type: none"> <li>• Whole blood</li> <li>• Serum</li> </ul> <p>At post mortem:</p> <ul style="list-style-type: none"> <li>• liver, spleen, lymph</li> </ul> <p>Node, kidney, brain from dead animals or aborted fetuses. Specimen should be submitted preserved in 10% formalin and in glycerol/saline and transported at 4°C.</p> <p>NB Zoonotic.</p>

Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
7 New Castle Disease	<p>Combination of the following clinical signs seen in case of ND suspicion: low to high morbidity and mortality, nervous signs such as loss of balance, circling, twisted neck, head tremors, wing and leg paralysis, ,Respiratory signs:gasping,coughing,rale &amp;sneezing.</p> <p>Digestive signs: diarrhea</p> <p>Partial to complete loss in egg production;eggs could be abnormal in colour and shape(thin shelled) with watery albumin.</p>		<p>Samples from dead birds should consist of oro -nasal swabs, as well as samples collected from lung, kidneys, intestine (including contents), caecal tonsils, spleen, brain, liver and heart tissues. These may be collected separately or as a pool, although brain and intestinal samples are usually processed separately from other samples. Samples from live birds should include both tracheal or oropharyngeal and cloacal swabs, the latter should be visibly coated with faecal material.</p> <p>Swabbing may harm small, delicate birds, but the collection of fresh faeces may serve as an adequate alternative.</p>
8 African Swine Fever	<p>Severe cases of the disease are characterized by high fever and death in 2-10 days on average. The mortality rate can be as high as 100%. Other clinical signs may include loss of appetite, depression, redness of the skin of the ears, abdomen, and legs, respiratory distress, vomiting, bleeding from the nose or rectum and sometimes diarrhoea. Abortion may be the first event seen in an outbreak</p>		<p>Blood in anticoagulant (EDTA), spleen, lymph nodes, tonsil and kidney. These should be kept as cold as possible, without freezing, during transit.</p> <p>After the samples arrive at the laboratory, they should be stored at -70°C if processing is going to be delayed.</p>
9 Anthrax	<ul style="list-style-type: none"> <li>• Sudden death of an animal (often within 2-3hours of being apparently normal)</li> <li>• Occasionally, some animals may show trembling, fever, difficulty in breathing, collapse and convulsions before death. This usually occurs within a period of 24hrs.</li> <li>• After death, there's discharge of unclotted blood from the orifices.</li> <li>• Do not open a suspected anthrax case.</li> </ul>		<ul style="list-style-type: none"> <li>• Blood slide for microscopy</li> </ul>

Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
10 Rabies	<p>In domestic animals, rabies causes severe encephalitis, characterized by strange behavior progressing to aggression, neurologic impairment, and then paralysis and coma.</p> <p>In some animals, aggression may be absent and they have</p> <p>Predominately a paralytic course of illness.</p> <p>From the first signs of illness to death is usually less than 7 days, despite treatment.</p>		<p>Laboratory techniques are preferably applied on samples from the central nervous system of the suspected animal.</p> <p>Samples should be collected following the opening of the skull.</p> <p>If the skull cannot be opened there are two alternative routes for collected brain samples: the occipital foramen route and retro-orbital route.</p> <p>Shipment conditions must be considered to be part of the 'rabies diagnostic chain' and should follow the description given in the OIE Terrestrial Manual</p>
11 East Coast Fever	<ul style="list-style-type: none"> <li>• Swelling of the draining lymph node, usually the parotid.</li> <li>• Fever.</li> <li>• Anaemia.</li> <li>• Petechial and ecchymotic haemorrhage on most mucous membranes of the conjunctiva and the buccal cavity.</li> <li>• Lacrimation,</li> <li>• Corneal opacity.</li> <li>• Frothy nasal discharge</li> <li>• Terminal dyspnoea,</li> <li>• Diarrhoea</li> </ul>		<p>Live animals</p> <ul style="list-style-type: none"> <li>• Blood or Buffy coat smears air-dried and fixed in methanol for demonstration of schizonts</li> <li>• Lymph node aspirate for demonstration of schizonts.</li> </ul> <p>Necropsy</p> <ul style="list-style-type: none"> <li>• Impression smears from lung, spleen, kidney and lymph node, air-dried and fixed in methanol, for demonstration of schizonts.</li> <li>• Lung, kidney, brain, liver, spleen, and lymph nodes for histopathology: demonstration of schizonts and infiltrations of immature lymphocytes</li> <li>• A nervous syndrome called 'turning sickness' is sometimes observed and intravascular and extravascular aggregations of schizonts-infected lymphocytes are observed, causing thrombosis and ischemic necrosis throughout the brain</li> <li>• Serum for antibody detection</li> </ul>
12 Bovine Spongiform Encephalopathy	<p>Is a progressive fatal disease of the nervous system of cattle</p> <p>Incubation period of 4-5years. May demonstrate the following</p> <ul style="list-style-type: none"> <li>• Nervousness, depression, hypersensitive to sound and touch, twitching and tremors, abnormal gait</li> <li>• Weight loss, decreased milk production</li> </ul>		<ul style="list-style-type: none"> <li>• Brain tissue for microscopic examination</li> </ul>

Disease	Clinical case Definition	Clinical signs/PM lesion photos	Samples for the laboratory Confirmation
13 Middle East Syndrome Coronavirus(MERSCOV)	Has never been reported as a disease in camels though in experimental infections, it has been associated with mild respiratory signs.	N/A	<ul style="list-style-type: none"> <li>• Serology</li> <li>• Viral isolation</li> </ul>
14 Highly Pathogenic Avian Influenza(HPAI)	<p>Sudden death with very high morbidity and mortality in poultry</p> <ul style="list-style-type: none"> <li>• Severe respiratory signs, watery diarrhea, nervous signs and drastic drop in egg production</li> <li>• In wild birds, there's mild respiratory signs</li> </ul>		<ul style="list-style-type: none"> <li>• Tissue samples (trachea, lungs, intestines) cloacal and tracheal swabs.</li> </ul>
15 Sheep & Goat Pox	<p>Sheep &amp; Goat pox should be suspected in a febrile patient with characteristic thickened skin lesions and enlarged lymph nodes.</p> <p>Laboured breathing, nasal discharge, and conjunctivitis may also be seen.</p> <p>The mortality rate is usually high in naïve animals.</p> <p>Although sheep pox and goat pox are usually distinctive in fully susceptible animals, these diseases can be subtler and more difficult to diagnose in indigenous animals.</p>		<p>Live animals</p> <ul style="list-style-type: none"> <li>• Biopsies of skin lesions should be taken for virus isolation and antigen detection</li> <li>• Vesicular fluids</li> <li>• Scrapings on skin lesions</li> <li>• Lymph node aspiration</li> <li>• Blood</li> </ul> <p>At post mortem</p> <ul style="list-style-type: none"> <li>• Skin scrapings: macules, papules and/or necrotic lesions and scabs, surrounded by areas of edema</li> </ul>

## Annex 7 - Roles and responsibilities of CEBS workforce

The CEBS workforce have individual roles and responsibilities which are either primary or supportive as summarized in the tables below.

Table 16: Roles and responsibilities of the community animal disease reporter (cdr) and community health promoter (chp)

Step	Responsibility
Identify	Use signals to identify potential animal health and public health threats in the community  Build networks: animal health workers, drug stores (chemists and agro vets), traditional healers, nyumba kumi admin heads, women groups, local admin leaders, religious leaders, teachers, livestock traders, youth groups, Community Based Organizations (CBOs), etc.  Sensitize community networks on CEBS
Record	Maintain an up-to-date record of detected and reported signals in a notebook
Report	Report signal to AHA/CHA via Mधारुरा immediately
Verification	Support AHA/CHA during event verification  By giving detailed information about the signal  Providing contact information for further sources of information on the signal

Table 17: Roles and responsibilities of the animal health assistant (aha)/community health assistant (cha)

Step	Responsibility
Identify	Ensure appropriate use of signal definitions to identify potential animal health threats
Record	Maintain an up-to-date log of all reported signals from his/her community /ward
Triage	Conduct triaging of signals reported immediately
Verification	Conduct verification of events within 6 hours
Report	Report events to SCVO/SCDSC
Risk assessment	Work with SCVO to conduct rapid risk assessment of events
Respond	Support Sub-County RRT during response
Feedback	Give feedback to CDR/CHPs and community on reported signals, prevention, and control measures of events
Analyze and interpret	Analyze CEBS data and prepare and disseminate monthly reports to the SCVO and local authority
Support function	Provide regular feedback to the CDR/CHPs  Supervise CDR/CHPs  Convene quarterly review meetings for CDR/CHPs  Maintain and update database of trained CDR/CHPs in his/her ward  Ensure CDR/CHPs have required logistics  Training/sensitization of CDR/CHPs

Table 18: Roles and responsibilities of scvo/scdsc

<b>Role</b>	<b>Responsibility</b>
Identify	Ensure appropriate use of signals
Record	Maintain a log of all reported events in his sub-county by AHA/CHA
Verification	Follow up on delayed verifications by AHA/CHA
Report	Receive event reports from the AHAs/CHAs Report risk assessment findings to county and national level
Risk assessment	Conduct preliminary rapid risk assessment of event as the leads Communicate the risk assessment findings
Respond	Respond to animal and public health events Involve higher levels of response where need be
Analysis	Analyze CEBS data, prepare and disseminate monthly reports to the county and lower levels e.g. wards and community Ensure data use for decision making
Feedback	Give feedback to AHAs/CHAs and community about reported events
Support function	Sensitization / training of AHAs/CHAs Convene quarterly review meetings for CDR/CHPs and AHA/CHA Maintain and update database of trained CDR/CHPs Monitoring implementation of CEBS activities Supervisory role for lower level Mobilize resources for CEBS and response Ensure lower levels have the appropriate resources e.g., log books

Table 19: Roles and responsibilities of cdvs

Role	Responsibility
Identify	Ensure appropriate use of signals to identify potential animal and public health threats in the community
Record	Ensure proper keeping of records of CEBS system at the county
Verification	Ensure verification of all signals reported
Risk assessment	Support SCVO/SCDSC to conduct preliminary rapid assessment
Respond	Support RRTs to respond to animal health events
Analysis	Analyze CEBS data and prepare and disseminate monthly reports Ensure data use for decision making
Feedback	Immediate feedback to stakeholders (Community, DVS(VEES), MOH)
Support function	Sensitization/training of SCVOs/SCDSCs Monitoring implementation of CEBS activities Feedback on the performance of CEBS system Coordinate meetings with the SCVOs and AHAs on CEBS Supervise SCVOs Resource mobilization for CEBS and response Provide an oversight role for CEBS
National level	Coordinate CEBS program in the country Develop policies and guidelines to guide implementation of CEBS in the country Offer capacity building and technical assistance on CEBS to counties Resource mobilization for EBS and response Monitoring and evaluation of CEBS program in the country

## References

1. Woolhouse MEJ, Dye C, Taylor LH, Latham SM, woolhouse MEJ. Risk factors for human disease emergence. *Philos Trans R Soc Lond B Biol Sci.* 2001 Jul 29;356(1411):983–9.
2. Morens DM, Fauci AS. Emerging Infectious Diseases: Threats to Human Health and Global Stability. *PLOS Pathog.* 2013 Jul 4;9(7):e1003467.
3. Bedi JS, Vijay D, Dhaka P, Singh Gill JP, Barbuddhe SB. Emergency preparedness for public health threats, surveillance, modelling & forecasting. *Indian J Med Res.* 2021 Mar;153(3):287.

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12	Dr. Joseph Wairia	DVS
13	Edith Ogega	DVS
14	Fridah Mutunga	DVS
15	Flookie Owino	DVS
16	Irene Onyango	DVS
17	Kelvin Wachira	DVS
18	Kenneth Orengo	DVS
19	Miriam Mbatha	DVS
20	Mumbua Mbithi	DVS
21	Paul Ndungu	DVS
22	Stella Mwangi	DVS
23	Yvonne Nyapendi	DVS
24	Collins Ouma	DVS
25	Dr John Owino	DVS
26	Gideon Cheruitot	DVS
27	Harriet Singoi	DVS
28	Rose Chege	DVS
29	Eunice Omondi	DVS-NVRL
30	Boru Abkil	DVS
31	Victor Yamo	GOHAA
32	Nazaria Nyaga	Kajiado County Government
33	Duncan Ithinji	KALRO
34	Kanangoi Limbaso	KEMRI
35	Dr. Samuel Kadivani	KNPHI
36	Matthew Mutiiria	KNPHI-ZDU
37	Nyabta Matones	KNPHI-ZDU
38	Francis Lekan	KVA
39	Mohammed Umlai	Kwale County Government
40	Bernard Rono	KWS
41	Isaac Lekolool	KWS
42	Kamau Mwangi	NVRL-DVS
43	Cornelius Wafula	PCO
44	Diana Kioko	PCO
45	Kahariri Samuel	SDLD
46	Shaleen Angwenyi	SmithiS. GHP
47	Vivian Chemweno	STRIDES/FHI360
48	Francis Gakuya	WRTI
49	Arani Bosire	ZDU
50	Catherine Oywa	Palladium
51	Samuel Nganga	Palladium
52	Kadondi Kasera	Palladium



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