AFRICAN UNION
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FOR ANIMAL RESOURCES

GUIDELINES FOR FEED AND FODDER DATA MANAGEMENT

Resilient African Feed and Fodder Systems Project

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We extend our sincere appreciation to the dedicated team of experts whose profound expertise and insights were instrumental in crafting the Guidelines for a Feed and Fodder Data Management Framework and a Platform for an Integrated and Harmonized Multi-Actor Ecosystem. Their contributions have strengthened data-driven decision-making and have enhanced the robustness of feed and fodder systems throughout Africa.

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EXECUTIVE SUMMARY

The Guidelines for Feed and Fodder Data Management have been developed to address the critical data and digital capacity challenges affecting the feed and fodder sector across Africa. The sector faces data fragmentation, lack of standardized reporting mechanisms, and limited digital infrastructure, making it difficult for stakeholders to make informed decisions. These challenges are further exacerbated by external shocks such as climate change, conflicts, and pandemics, which disrupt feed and fodder supply chains and increase the vulnerability of livestock systems. The guidelines provide a structured framework for data collection, management, and sharing to enhance data availability, accessibility, and reliability, ultimately strengthening the resilience of the feed and fodder systems.

A key focus of these guidelines is the development of a harmonized digital ecosystem that integrates data from multiple stakeholders. The proposed multi-actor data platform ensures that feed and fodder information is collected using standardized methods, analyzed effectively, and disseminated to relevant stakeholders in real-time. The guidelines propose feed and fodder indicators that can be tracked by value chain actors for providing evidence-based interventions around early warning systems, disaster response mechanisms, policy planning, resource allocation, and market efficiency.

The guidelines also emphasize the importance of capacity building and governance structures to ensure the effective implementation and sustainability of feed and fodder data management systems. The proposed framework outlines how countries can establish clear data governance policies, quality assurance protocols, and training programs to manage, analyze, and utilize feed and fodder data effectively.

While designed to address the specific data and digital challenges faced by RAFFS Project countries, the framework offers universal principles and best practices applicable across different national contexts. By implementing these guidelines, African Union Member States can build robust, data-driven feed and fodder ecosystems.

TABLE OF CONTENTS

01 About the Guidelines for Feed and Fodder Data Management

02 Feed and Fodder Data Management Framework

03 Integrated and Harmonized Multi-Actor Ecosystem

04 Capacity Building

05 Conclusions

06 Appendices

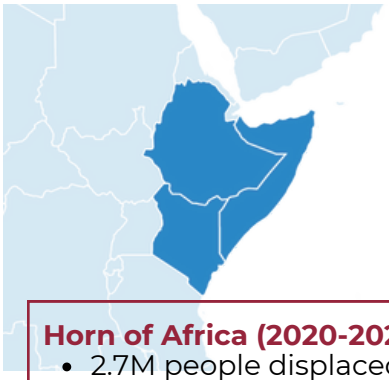
ACRONYMS

AU-IBAR	-	African Union - InterAfrican Bureau for Animal Resources
ERP	-	Enterprise Resource Planning
FAO	-	Food and Agriculture Organization
FDGs	-	Focus Group Discussions
FMARD	-	Federal Ministry of Agriculture and Rural Development (Nigeria)
ILRI	-	International Livestock Research Institute
KDSH	-	Kenya Demographic and Health Survey
KIIs	-	Key Informant Interviews
LMAC	-	Livestock and Meat Advisory Council
MLAFWRD	-	Ministry of Lands, Agriculture, Fisheries, Water, and Rural Development
NASRDA	-	National Space Research and Development Agency
NBS	-	National Bureau of Statistics
ODK	-	Open Data Kit
PKS	-	Land Potential Knowledge System
PLEWS	-	Predictive Livestock Early Warning System
RAFFS	-	Resilient African Feed and Fodder System
SMA	-	Stock Feed Manufacturers Association
TWG	-	Technical Working Group
ZAGP	-	Zimbabwe Agricultural Growth Programme
ZFU	-	Zimbabwe Farmers' Union

BACKGROUND

Climate Change, Covid-19, and Conflicts have collectively exerted significant impacts on livestock feed and fodder production, resulting in a staggering $2 billion loss in the Horn of Africa[1], representing an extreme case. Within these guidelines, we thoroughly examine the effects of these factors and present a strategy along with justification for effectively managing data access challenges, gaps, and anomalies.

Climate change has induced erratic and unpredictable weather patterns, coupled with alterations in rainfall and temperature, profoundly affecting the growth and quality of feed and fodder. Consequently, animal productivity has declined, and susceptibility to diseases and malnutrition has escalated. Covid-19 outbreak has disrupted feed and fodder supply networks, leading to shortages and price hikes.



Horn of Africa (2020-2023)
- 2.7M people displaced
- 13M livestock deaths
- $2+ Billion loss

Additionally, movement restrictions and quarantine measures have complicated access to markets and vital information, exacerbating the existing data access challenges. On the other hand, conflict in various regions across Africa and other parts of the world has triggered relocations and the loss of livelihoods and markets. This has further strained already fragile feed and fodder supply networks, underscoring the imperative for enhanced management of information, access, and measures to mitigate the adverse effects of conflicts on the livestock value chain.

Addressing data access difficulties and associated irregularities demands a multi-pronged approach. This entails investments in collecting and analyzing data technologies and infrastructure, establishing partnerships and collaborations for information sharing, and developing rules and procedures that prioritize data management and access. The framework will enable the development of a user-friendly platform for an integrated and harmonized multi-actor ecosystem, where all stakeholders can access and share relevant data in a secure, reliable, and standardized manner.

[1] Horn of Africa Drought Regional Humanitarian Overview & Call to Action (OCHA, May 2023)

Status of Feed and Fodder Data in RAFFS Project Countries

In Africa, the status of feed and fodder data management presents a multifaceted landscape marked by both opportunities and challenges. A significant portion of the continent's agricultural activities revolves around livestock production, making the effective management of feed and fodder data pivotal for ensuring food security and economic sustainability. However, most RAFFS Project Countries face obstacles in establishing robust data management frameworks. Limited technological infrastructure, particularly in rural areas, hampers the collection and dissemination of accurate and timely feed and fodder data. This digital divide contributes to a fragmented data landscape, hindering comprehensive understanding and decision-making in the livestock sector.

The existing data management systems in many these countries often lack standardization and integration. Inconsistencies in data formats, collection methodologies, and reporting practices impede the harmonization of information across diverse regions. This lack of uniformity complicates collaborative efforts, making it challenging to develop a cohesive strategy for addressing common issues such as climate-induced disruptions, disease outbreaks, or market fluctuations. Despite these challenges, there are encouraging initiatives emerging across the continent, driven by regional organizations, governmental bodies, and international collaborations. These initiatives aim to enhance data-sharing platforms, promote capacity building, and establish guidelines for standardized feed and fodder data management, reflecting a growing recognition of the importance of informed decision-making in ensuring sustainable livestock practices.

In the face of emerging global challenges, such as climate change, African nations are increasingly recognizing the urgency of establishing their feed and fodder data management systems. The integration of advanced technologies and the establishment of harmonized multi-actor ecosystems are becoming central to fostering resilience within the livestock sector. As African nations navigate these complexities, fostering cross-border collaboration, leveraging innovative data management technologies, and building institutional capacities will be crucial for achieving a more robust and interconnected feed and fodder data landscape across the continent.

KEY AIMS AND SCOPE

The Guidelines for Feed and Fodder Data Management provide a comprehensive approach to managing feed and fodder data across African Union Member States through a framework for standardized and harmonized data collection and reporting. The guidelines outline essential data variables and indicators, propose a unified platform architecture to facilitate stakeholder collaboration and outline capacity-building and training programs to effectively implement this framework in establishing a feed and fodder data ecosystem.

Benefits of using the Guidelines for Feed and Fodder Data Management

- Reduce $2B+ livestock losses in crisis scenarios.
- Improve coordination among feed and fodder value chain actors (farmers, aggregators, processors, and policymakers).
- Establish a robust feed and fodder data Ecosystem and Integrated Framework to respond to emergencies such as early warning systems for feed shortages.

Who are these Guidelines for?

Individuals or teams responsible for overseeing data management practices in the feed and fodder value chain to:

- Oversee and/or develop institution practices and standards for handling data; and
- Oversee transfer of data between feed and fodder value chain actors.

How to use the Guidelines?

This guide is organised along Data Management Framework components: Data Architecture, Governance, Quality, Integration, Analysis, Security, Privacy, Retention. There are checklists and resources highlighted under each component that stakeholders can tap on for assistance.

FEED AND FODDER DATA MANAGEMENT FRAMEWORK

What is Data Management?

End-to-end data management is the practice of collecting, storing, using, sharing and archiving/destroying data in a secured and efficient manner.

Why do you need data?

Data contributes to knowledge building; good data helps stakeholders in their evidence-based decision-making process to:

- Enhance and sustain continuity ensuring that interventions are timely and effective
- Measure impact of services offered
- Identify trends and gain actionable insights on service users' needs
- Enhance service planning, operations and quality of existing services
- Optimise resources or improve efficiencies

What is a standardized data management framework?

A standardized data management framework is a structured system that facilitates the collection, collation, analysis and utilization of data across multiple users.

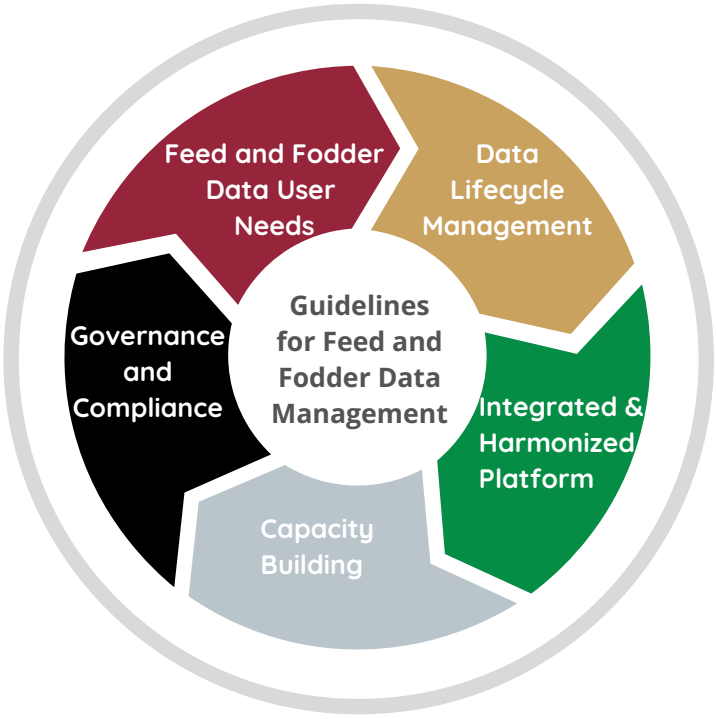
In the context of feed and fodder, this framework ensures a structured approach and consistency in data handling while guaranteeing that no single stakeholder has an exclusive approach. The data management architecture should be capable of handling enormous data sets, as well as being dependable, in the short, medium and long term to aid decision-making.

The framework ensures that the data is available, accurate, comprehensive, retrievable, shareable, and secure with adequate access controls in place to guarantee compliance with data access legislation and best global practices.

LAYOUT OF GUIDELINES FOR FEED AND FODDER DATA MANAGEMENT

This Guidelines for Feed and Fodder Data Management, while non-exhaustive, supports and guides stakeholders in feed and fodder value chain in handling data in a typical lifecycle approach and to build its data management capability.

The Guidelines are organised along five components to reflect the requirements of a feed and fodder data ecosystem.



01 About the Guidelines for Feed and Fodder Data Management

CHAPTER 1: FEED AND FODDER DATA USER NEEDS

1.1	Introduction to Data User Needs	1
1.2	Key Stakeholders and their Data Requirements	1
1.3	Types of Data Needed in the Feed and Fodder Sector	2
1.4	Feed and Fodder Indicators	3
1.5	Challenges in Accessing and Utilizing Data	4

CHAPTER 2: DATA LIFECYCLE MANAGEMENT

2.1	Overview of the Data Lifecycle in Feed and Fodder Management	6
2.2	Defining the Stages of the Data Lifecycle	6
2.3	Importance of Structured Data Management	7
2.4	Data Collection Strategies	7
2.5	Data Processing and Standardization	8
2.6	Data Storage and Security	9
2.7	Data Analysis and Interpretation	9
2.8	Data Archiving and Retention Policies	9

CHAPTER 3: INTEGRATED & HARMONIZED PLATFORM

3.1	The Need for an Integrated Data Management Platform	10
3.2	Key Components of an Integrated Platform	10
3.3	Cross-Border and Multi-Stakeholder Data Sharing	13
3.4	Digital Solutions for Feed and Fodder Data Management	14
3.5	Interoperability Between National and Regional Systems	15
3.6	Ensuring Data Quality and Security on Integrated Platforms	15
3.7	Sustainability and Future-Proofing the Data Platform	15

CHAPTER 4: CAPACITY BUILDING

4.1	The Role of Capacity Building in Feed and Fodder Data Management	17
4.2	Training Programs for Data Collection and Analysis	17
4.3	Infrastructure Development and Digital Tools Adoption	19

CHAPTER 5: GOVERNANCE AND COMPLIANCE

5.1	Principles of Data Governance in the Feed and Fodder Sector	21
5.2	Policy and Regulatory Frameworks for Data Management	21
5.3	Data Protection, Security, and Privacy	22
5.4	Standardization of Data Collection and Reporting	23
5.5	Harmonization of Governance Approaches Across AU Member States	23

CHAPTER 1: FEED AND FODDER DATA USER NEEDS

1.1 Introduction to Data User Needs

Effective management of feed and fodder data is foundational to addressing challenges posed by **climate change, pandemics, and conflicts (the "3Cs")**. These global and regional disruptions impact livestock productivity, market stability, and food security. To build resilience, stakeholders across the feed and fodder value chain—from policymakers to smallholder farmers—require **accurate, timely, and accessible data** to make informed decisions.

This chapter explores the **types of data** needed, the key stakeholders involved, and the challenges they face in accessing and utilizing feed and fodder data. The goal is to enhance data-driven decision-making, ensuring efficient resource allocation and promoting long-term sustainability in livestock systems.

1.2 Key Stakeholders and their Data Requirements

A diverse range of stakeholders depends on feed and fodder data for planning, investment, and decision-making. The most prominent groups and their data needs include:

1.2.1 Policymakers and Government Authorities

- Require **aggregated national and regional data** on feed availability, market trends, and climate impacts to design policies, including:
  - Feed subsidies and price regulation mechanisms.
  - Disaster response plans for droughts, floods, and pandemics.
  - Trade and cross-border market policies.
- Depend on **real-time early warning systems** to implement risk mitigation strategies.

1.2.2 Farmers and Livestock Keepers

- Need localized **pasture condition updates, feed price trends, and weather forecasts** to plan feeding strategies.
- Benefit from **mobile apps and digital extension services** providing advisory services on sustainable feeding practices.
- Require access to **climate-smart feed technologies** and information on their adoption.

1.2.3 Researchers and Academia

- Require granular data on:
  - Feed quality metrics (e.g., crude protein, fiber content, digestibility).
  - Effectiveness of **alternative feed sources** and climate-adaptive fodder species.
  - Livestock nutrition trends and impact assessments.
- Need **open-access datasets** for modeling and scientific studies.

1.2.4 Traders and Private Sector

- Depend on **real-time market data** on:
  - Feed supply chains, price fluctuations, and demand forecasts.
  - Cross-border trade policies, taxation, and customs regulations.
- Require **logistics and infrastructure data** to optimize transport and storage operations.

1.3 Types of Data Needed in the Feed and Fodder Sector

Comprehensive data is necessary to track trends, ensure food security, and promote sustainable livestock production. Key data types include:

1.3.1 Production Data

- Total feed production per region (metric tons/year).
- Availability of **crop residues, fodder yields, and pasture biomass.**
- Seasonal variations in feed supply.

1.3.2 Feed Quality Metrics

- Nutritional composition (crude protein %, fiber %, metabolizable energy).
- **Contaminant levels (aflatoxins, heavy metals, pesticide residues).**
- Digestibility and palatability factors for different livestock species.

1.3.3 Market and Trade Data

- **Feed price trends** and their drivers (e.g., climate shocks, input costs).
- **Import/export statistics,** taxation, and tariffs on feed ingredients.
- Supply-demand gaps at local, national, and regional levels.

1.3.4 Environmental and Climate Data

- **Soil health indicators** affecting pasture productivity.
- Water usage for feed production and irrigation of fodder crops.
- **Greenhouse gas emissions** linked to feed production and livestock digestion.

1.3.5 Infrastructure and Logistics Data

- Availability of **feed storage facilities and processing plants.**

- Road networks and logistics capacity for moving feed supplies.
- Digital platforms for traceability and market access.

1.4 Feed and Fodder Indicators

Effective monitoring and evaluation of feed and fodder systems require well-defined indicators that capture critical aspects of production, availability, quality, and utilization. These indicators are essential for guiding policy decisions, investment planning, and the development of sustainable livestock feed and fodder systems. This chapter outlines key feed and fodder indicators, their relevance, and their application in data-driven decision-making within the livestock sector.

1.4.1 Key Feed and Fodder Indicators

1.4.1.1 Availability Indicators

- **Total forage and feed production (MT/year) –** Measures the quantity of feed and fodder produced annually within a given region.
- **Land area under fodder cultivation (Ha) –** Tracks the extent of land allocated for fodder and pasture production.
- **Stocking density of livestock per pasture unit (heads/Ha) –** Indicates the carrying capacity of available grazing land.
- **Imports and exports of feed and fodder (MT) –** Monitors trade flows to understand reliance on external feed sources.

1.4.1.2 Quality and Nutritional Indicators

- **Crude protein content (% in dry matter) –** Measures the protein levels in different feed and fodder sources.
- **Metabolizable energy (MJ/kg DM) –** Indicates the energy available for animal consumption and productivity.
- **Feed digestibility (%) –** Determines how efficiently animals can utilize the feed for growth and maintenance.
- **Presence of contaminants (toxins, aflatoxins, heavy metals) –** Ensures feed safety for livestock consumption.

1.4.1.3. Economic and Market Indicators

- **Average market price of key feed commodities (USD/MT) –** Tracks price trends of major feed ingredients such as maize, soybeans, and hay.
- **Feed cost as a percentage of total livestock production costs (%) –** Determines the economic burden of feeding livestock.
- **Number of registered feed and fodder suppliers –** Assesses the competitiveness and diversity of the feed sector.

- **Investment in feed processing infrastructure (USD) –** Monitors private and public sector investments in feed production facilities.

1.4.1.3 Sustainability and Environmental Indicators

- **Water footprint of feed production (liters/kg of feed) –** Measures water consumption in feed and fodder production.
- **Greenhouse gas emissions from feed production (CO_2 equivalent/kg of feed) –** Assesses the environmental impact of different feed sources.
- **Proportion of crop residues and agro-industrial by-products used in livestock feed (%) –** Evaluates circular economy practices in feed utilization.
- **Rate of pasture degradation and soil fertility loss (%) –** Monitors the sustainability of grazing systems and pastureland management.

1.4.2 Data Collection and Reporting on Feed and Fodder Indicators

The effectiveness of feed and fodder indicators depends on the consistency and accuracy of data collection and reporting. This section outlines best practices in data management for feed and fodder monitoring.

1.4.2.1 Data Sources and Collection Methods

- **Household and farm surveys –** Gather first-hand data on feed production, costs, and livestock feeding practices.
- **Satellite and remote sensing data –** Used for pasture condition monitoring and biomass estimation.
- **Government and industry reports –** Provide official statistics on feed production, trade, and prices.
- **Laboratory analysis of feed quality –** Ensures compliance with nutritional and safety standards.

1.4.2.2 Data Integration and Use in Decision-Making

- **National and regional feed balance sheets –** Helps estimate surpluses and deficits in feed availability.
- **Early warning systems for feed crises –** Uses real-time data to anticipate feed shortages and prevent livestock losses.
- **Policy formulation and investment planning –** Supports data-driven policies for sustainable feed production.

1.5 Challenges in Accessing and Utilizing Data

Despite its importance, many African Union (AU) member states face significant challenges in feed and fodder data management. Key constraints include:

1.5.1 Fragmented and Inconsistent Data Systems

- **72% of AU member states** lack centralized databases for feed and fodder data.
- Data collection efforts are often isolated and **not harmonized across national and regional levels.**

1.5.2 Irregular and Incomplete Data Collection

- **52% of countries collect feed-related data intermittently,** leading to gaps in historical trends.
- Lack of dedicated funding results in **ad-hoc data gathering efforts** with limited quality assurance.

1.5.3 Limited Digital Infrastructure and Connectivity

- **Rural areas lack stable internet access,** hindering real-time data collection and dissemination.
- **Few national governments have invested in digitizing agricultural data systems** for feed monitoring.

1.5.4 Security and Data Privacy Concerns

- **Cross-border data sharing is vulnerable** to cyber threats and unauthorized access.
- There is a **lack of clear data governance policies** ensuring ownership and security of sensitive information.

For a detailed list of feed and fodder data indicators see Appendix 1

CHAPTER 2: DATA LIFECYCLE MANAGEMENT

2.1 Overview of the Data Lifecycle in Feed and Fodder Management

Effective data lifecycle management is crucial for ensuring that feed and fodder data is **accurate, accessible, secure, and useful** for decision-making. The **data lifecycle** in feed and fodder management follows a structured process that includes **data collection, processing, storage, analysis, sharing, and archiving.** Each stage must be carefully managed to enhance the quality of insights generated from the data and to ensure its applicability in policy development, market analysis, and resource planning.

Data serves as the backbone for **livestock production, trade, and sustainability planning,** providing stakeholders with the necessary information to optimize feeding strategies, anticipate shortages, and mitigate climate and market risks. **A structured approach to data lifecycle management** minimizes errors, enhances efficiency, and ensures that data remains relevant and actionable over time.

2.2 Defining the Stages of the Data Lifecycle

The data lifecycle in feed and fodder management consists of several key stages:

1. **Data Collection:** This involves gathering raw data from various sources, including field surveys, satellite imagery, government records, and market monitoring systems. The accuracy of data collected at this stage determines the reliability of subsequent analyses.
2. **Data Processing:** Raw data is cleaned, validated, and standardized to remove inconsistencies, errors, and redundancies. Processing ensures that data is structured and formatted correctly for storage and analysis.
3. **Data Storage:** Data must be securely stored in scalable databases, cloud platforms, or local repositories, ensuring it remains accessible while maintaining security protocols.
4. **Data Analysis:** Statistical and computational tools are applied to interpret trends, make predictions, and generate insights that aid in decision-making.
5. **Data Sharing:** Processed data is disseminated to stakeholders through dashboards, reports, and open-access platforms while maintaining compliance with data privacy regulations.

6. **Data Archiving and Retention:** Data is archived for future reference, regulatory compliance, and long-term trend analysis. Old or irrelevant data is either securely stored or discarded based on retention policies.

Structured management of these lifecycle stages helps reduce **data silos, duplication, and inefficiencies,** ensuring that feed and fodder data remains an asset for policymakers, researchers, and industry players.

2.3 Importance of Structured Data Management

Structured data management ensures **consistency, reliability, and security** in feed and fodder data handling. The key benefits include:

- **Improved Decision-Making:** Accurate and timely data enables policymakers and livestock managers to make informed decisions regarding feed subsidies, distribution, and emergency preparedness.
- **Operational Efficiency:** Data standardization reduces redundancy and speeds up information retrieval, benefiting farmers, traders, and feed manufacturers.
- **Enhanced Data Security:** Protecting sensitive livestock production and trade data prevents data breaches and unauthorized access.
- **Better Compliance:** Structured data aligns with national and international **data governance regulations,** ensuring legal compliance and ethical use of information.
- **Support for Innovation:** A structured approach fosters innovation in feed technology, market forecasting, and climate adaptation strategies for sustainable livestock management.

2.4 Data Collection Strategies

The effectiveness of a feed and fodder data management system is largely dependent on how well data is collected. A mix of traditional and digital methods is required to ensure a **comprehensive and real-time understanding** of feed availability, pricing, and demand patterns.

2.4.1 Field Surveys and Direct Assessments

Field data collection remains one of the most important methods for gathering information on feed and fodder production, distribution, and usage. **Enumerators visit farms, markets, and grazing areas to collect firsthand information** on feed availability, pasture health, and livestock feeding practices. Direct engagement with farmers and traders provides qualitative insights that complement numerical data.

2.4.2 Remote Sensing and GIS Monitoring

Remote sensing technologies, including **satellite imaging and drone-based monitoring,** offer an advanced method for tracking pasture conditions, biomass availability, and climate variations. GIS tools help in **mapping grazing lands, detecting drought-affected areas, and predicting seasonal feed shortages.**

2.4.3 Market Intelligence and Trade Monitoring

Market data collection involves tracking **feed prices, supply chain movements, import/export statistics, and demand trends.** Government agencies and private entities collaborate to **monitor market fluctuations, ensure fair pricing, and enhance feed security policies.**

2.4.4 Use of Automated Data Collection Tools

With advancements in technology, automated data collection tools such as **IoT-enabled livestock monitoring systems** and **mobile applications** are increasingly being adopted. These tools collect **real-time data on feed consumption, animal health, and climate conditions,** reducing dependency on manual data entry and improving efficiency.

2.5 Data Processing and Standardization

2.5.1 Data Cleaning and Validation Techniques

After collection, data must be cleaned and validated to ensure accuracy. This process involves:

- **Detecting and correcting errors** such as duplicate entries or missing values.
- **Standardizing data formats** across multiple sources.
- **Verifying accuracy** by cross-referencing with historical data and satellite observations.

2.5.2 Standardization of Data Formats and Structures

Standardization ensures that all feed and fodder data follows **uniform measurement units, classifications, and terminologies,** improving interoperability across different platforms and institutions.

2.5.3 Cross-Verification with Historical Data

Cross-verification techniques compare newly collected data with historical records to **identify anomalies, validate trends, and ensure logical consistency.**

2.6 Data Storage and Security

2.6.1 Secure and Scalable Storage Solutions

Storage solutions must be **secure, scalable, and resilient** to support long-term data needs. Options include **cloud-based systems, hybrid storage models, and decentralized databases.**

2.6.2 Data Encryption and Access Control Measures

Protecting sensitive feed and fodder data requires **encryption, multi-factor authentication, and access controls** to ensure that only authorized users can retrieve or modify data.

2.7 Data Analysis and Interpretation

2.7.1 Statistical Methods for Trend Analysis

Advanced statistical techniques such as **regression models and time-series forecasting** help identify trends in feed supply, price fluctuations, and demand cycles.

2.7.2 Integration of Machine Learning and AI

Artificial intelligence enables **automated anomaly detection, predictive analytics, and smart decision-making** in feed and fodder data management.

2.8 Data Archiving and Retention Policies

2.8.1 Long-Term Data Storage and Retrieval Strategies

A well-defined archiving policy ensures that **historical data remains accessible** for long-term planning and research while reducing storage burdens.

2.8.2 Regulatory and Legal Requirements for Data Retention

Data retention policies must comply with **AU and national regulations,** specifying how long data should be stored and under what conditions it can be deleted or archived.

CHAPTER 3: INTEGRATED & HARMONIZED PLATFORM

3.1 The Need for an Integrated Data Management Platform

The effective management of feed and fodder data requires an **integrated and harmonized data platform** that consolidates information from various sources into a single, accessible system. Many AU member states currently rely on fragmented data collection methods, leading to inconsistencies, inefficiencies, and data gaps that hinder effective decision-making. An integrated platform serves as **a centralized hub for real-time data collection, storage, processing, and dissemination,** allowing stakeholders to access and share information seamlessly.

The need for such a platform is driven by several key factors, including the **increasing demand for accurate livestock data, climate change-induced feed shortages, and the necessity for coordinated responses to crises.** By integrating multiple datasets—such as **market prices, feed availability, pasture conditions, and livestock health records—policymakers,** researchers, and private sector players can make more informed decisions, improving the resilience of the livestock sector.

Moreover, an integrated platform **reduces redundancy, enhances efficiency, and fosters collaboration among diverse stakeholders.** By streamlining data collection, validation, and analysis, the platform ensures that all relevant actors—from government agencies to private feed producers—operate using a **consistent and accurate dataset.**

3.2 Key Components of an Integrated Platform

An effective feed and fodder data management platform consists of several key components that work together to provide a seamless data ecosystem:

1. **Centralized Data Repository:** A unified database that consolidates information from multiple sources, ensuring ease of access, accuracy, and security.
2. **Interoperable Data Standards:** Standardized data formats that allow seamless data exchange between national, regional, and international systems.
3. **Automated Data Collection Tools:** Integration of IoT sensors, mobile apps, and remote sensing technologies to collect real-time data.
4. **Advanced Analytics and AI Integration:** AI-driven tools for predictive modeling, risk assessment, and decision support.

5. **User Access Management and Security Controls:** Role-based access to ensure data privacy and protect sensitive information.
6. **Visualization and Reporting Dashboards:** Interactive tools for data interpretation, trend analysis, and decision-making support.
7. **APIs for Third-Party Integration:** Enabling external systems, research institutions, and private stakeholders to connect and share relevant datasets.

These components form the foundation of a robust data platform that enhances transparency, efficiency, and collaboration within the feed and fodder value chain.

3.2.1 Structure and Functionalities

The structure of the platform for Feed and Fodder Integrated and Harmonized Multi-Actor Ecosystem will be designed to accommodate the diverse needs and roles of stakeholders involved in the feed and fodder value chain. It will encompass a flexible and scalable architecture, allowing for seamless integration of various modules and features tailored to the specific requirements of different actors within the system. Key functionalities will include data management, communication tools, knowledge sharing, decision support systems, and collaborative workflows to facilitate smooth interactions and operations.

3.2.2 Integration of Diverse Stakeholders

The platform will prioritize the integration of diverse stakeholders, including smallholder farmers, feed suppliers, fodder producers, agricultural extension services, researchers, policymakers, and other relevant actors. By fostering the active involvement of these diverse entities, the platform aims to create a cohesive ecosystem that leverages the unique expertise, knowledge, and resources multilingual support, and custom access levels to accommodate the specific needs of each participant. Integration will be facilitated through user-friendly interfaces, eds and capacities of different stakeholders.

3.2.3 Data and Knowledge Exchange Mechanisms

The focus of the platform will be the establishment of robust data and knowledge exchange mechanisms. This will involve the creation of secure data repositories, standardized data formats, and interoperable systems for sharing critical information related to feed and fodder production, distribution, and utilization. Additionally, the platform will feature knowledge management tools, including best practices, research findings, and training resources, to facilitate continuous learning and capacity building across the multi-actor ecosystem.

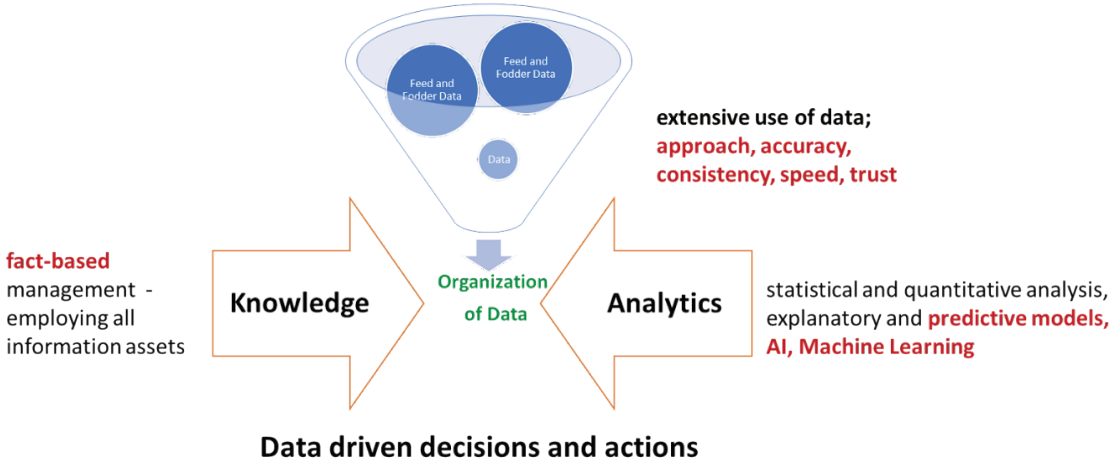


Figure 3.2 Knowledge and Analytics

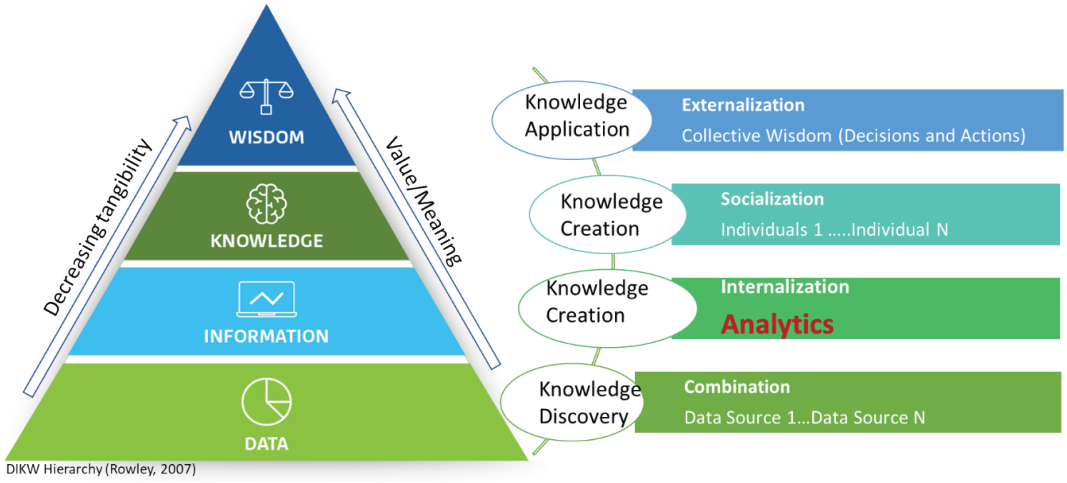


Figure XX Knowledge Conversion through Analytics Process

3.2.4 Strategies for Implementation

i. **Assessment.** The proposed approach will commence with a thorough assessment of the current landscape and dynamics of the feed and fodder value chain. This assessment will encompass the identification of key challenges, existing gaps, stakeholder capacities, and resource availability, setting the stage for the formulation of targeted interventions and strategies aligned with the specific needs of the ecosystem.

ii. **Data Analytics**. Linked to Knowledge The approach will integrate advanced data analytics capabilities with knowledge management systems to derive meaningful insights and actionable intelligence from the wealth of information available within the platform. By leveraging cutting-edge data analytics tools, stakeholders will be empowered to extract valuable knowledge from the data, enabling them to make informed decisions, identify emerging trends, and drive continuous improvement across the feed and fodder value chain.

iii. Indicators for Early/Emergency Action.

The proposed approach will incorporate the establishment of early/emergency action indicators to proactively identify and respond to critical events or emerging challenges within the feed and fodder ecosystem. By defining and monitoring key indicators, stakeholders, and decision-makers will be equipped to swiftly identify potential risks, enabling timely interventions that mitigate adverse impacts and foster resilience within the system.



Figure 3.4: Proposed Knowledge and Analytical Ecosystem

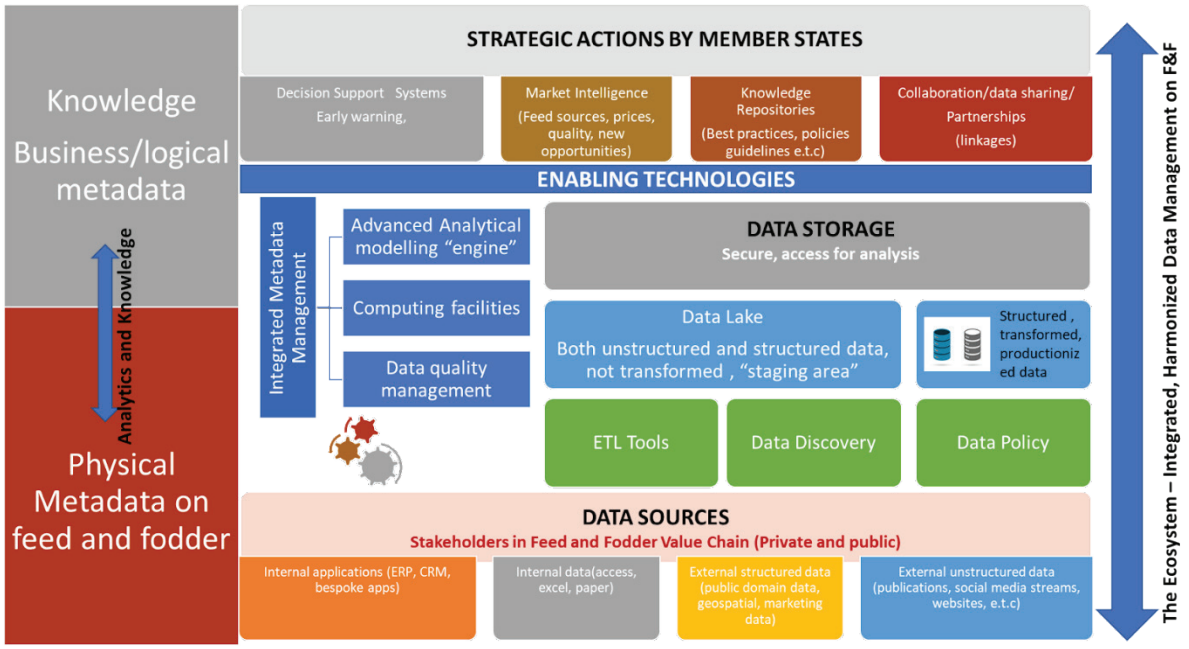


Figure 3.4 Framework for an Integrated, harmonized Data management Ecosystem

3.3 Cross-Border and Multi-Stakeholder Data Sharing

The livestock sector is inherently regional and international, with **feed and fodder trade crossing multiple borders.** To ensure food security and economic stability, **harmonized cross-border data sharing mechanisms** must be established. This involves the creation of **regional databases that allow AU member states to share key data** on feed production, distribution, market trends, and livestock movement.

Multi-stakeholder data sharing is equally critical, as **various actors—including governments, research institutions, feed manufacturers, and farmers—require access to reliable data.** A successful data-sharing framework should:

- **Ensure compatibility between different national databases,** facilitating seamless information exchange.
- **Encourage partnerships between public and private entities** to increase data availability.
- **Define clear data governance policies** that regulate access, security, and ethical considerations.
- **Implement data access controls** to protect sensitive commercial and policy-related information.

By establishing structured cross-border and multi-stakeholder collaborations, AU member states can strengthen feed and fodder monitoring, market predictability, and crisis response mechanisms.

3.4 Digital Solutions for Feed and Fodder Data Management

Modern **digital solutions** provide **efficient, scalable, and real-time data collection, processing, and analysis** for feed and fodder management. The adoption of **cloud computing, mobile applications, IoT devices, and AI-powered analytics** ensures data reliability and accessibility.

Key Digital Solutions:

1. **Mobile Applications for Farmers:** Apps that allow livestock keepers to report feed shortages, access advisory services, and receive market price updates.
2. **Remote Sensing and Satellite Data:** Monitoring pasture conditions, climate trends, and biomass availability.
3. **Blockchain Technology:** Improving traceability in feed production, ensuring food safety, and enhancing market transparency.
4. **Artificial Intelligence (AI):** AI-powered tools for feed demand forecasting, risk assessment, and optimization of feeding programs.
5. **Internet of Things (IoT) Sensors:** Real-time tracking of feed storage conditions, pasture utilization, and livestock nutritional intake.

By integrating these digital tools, AU member states can improve data accuracy, enhance decision-making, and reduce data collection costs.

3.5 Interoperability Between National and Regional Systems

Interoperability ensures that **data collected by different national and regional agencies can be effectively shared and utilized** across systems. Achieving this requires:

- **Standardization of data formats and collection protocols** to align national and regional databases.
- **Adoption of common metadata structures** that enable cross-platform integration.
- **Integration of APIs and cloud-based solutions** that facilitate seamless data exchange.
- **Capacity building for data users** to ensure proper handling and interpretation of shared data.

Interoperable systems **prevent duplication of efforts, improve data consistency, and enhance the efficiency of policy interventions across borders.**

3.6 Ensuring Data Quality and Security on Integrated Platforms

Maintaining **high-quality and secure data** is essential for building trust and usability within an integrated platform. This requires:

- **Automated data validation techniques** to detect errors and inconsistencies.
- **Regular data audits and verification procedures** to uphold integrity.
- **End-to-end encryption and secure authentication mechanisms** to protect against cyber threats.
- **Compliance with data protection laws and regulations** to safeguard sensitive information.
- **Role-based access controls** to ensure that only authorized personnel can modify or retrieve critical data.

A focus on **data quality and security strengthens confidence in the platform,** ensuring long-term sustainability and stakeholder buy-in.

3.7 Sustainability and Future-Proofing the Data Platform

To ensure the longevity and continued relevance of an integrated feed and fodder data platform, sustainability measures must be implemented:

- **Investment in long-term infrastructure,** including cloud storage and AI-driven analytics.

- **Public-private partnerships to secure funding** for platform maintenance and expansion.
- **Capacity-building programs** to train data managers, analysts, and end-users.
- **Scalability considerations,** ensuring that the platform can evolve to accommodate new data sources and technological advancements.
- **Regular platform updates and system improvements** to integrate emerging technologies and best practices.

By future-proofing the system, AU member states can ensure that the platform remains **resilient, adaptive, and responsive to changing needs** within the feed and fodder value chain.

CHAPTER 4: CAPACITY BUILDING

4.1 The Role of Capacity Building in Feed and Fodder Data Management

Capacity building plays a crucial role in ensuring that feed and fodder data management systems function effectively. A well-trained workforce, equipped with the necessary skills and tools, is essential for collecting, processing, analyzing, and utilizing data for decision-making. The primary objectives of capacity building in feed and fodder data management include:

- **Enhancing technical skills:** Providing stakeholders with knowledge in data collection, statistical analysis, GIS mapping, and predictive modeling.
- **Promoting data-driven decision-making:** Enabling policymakers, researchers, and private sector players to make informed choices based on real-time and historical data.
- **Encouraging adoption of digital tools:** Ensuring seamless integration of mobile applications, cloud computing, and AI-driven analytics in data collection and processing.
- **Strengthening institutional frameworks:** Establishing sustainable structures for managing feed and fodder data at national and regional levels.
- **Fostering collaboration among stakeholders:** Encouraging data sharing and engagement between governments, research institutions, the private sector, and development partners.

Capacity building efforts should be tailored to the **specific needs of different actors** in the feed and fodder value chain, from smallholder farmers to policymakers and IT specialists. Investing in human capital will **increase efficiency, reduce data collection errors, and enhance the overall effectiveness of data management systems.**

4.2 Training Programs for Data Collection and Analysis

Developing **structured training programs** is essential to equip stakeholders with the necessary skills to handle feed and fodder data efficiently. Training should be **continuous and adaptive,** keeping up with emerging technologies and best practices in data management.

4.2.1 Training for Data Collectors and Field Enumerators

Field data collectors play a critical role in ensuring the accuracy and reliability of data gathered. Training programs should focus on:

- **Survey methodologies:** Teaching best practices in administering questionnaires and conducting interviews.
- **Use of mobile-based data collection tools:** Training on platforms such as **Open Data Kit (ODK)** and **KoBoToolbox**.
- **Quality assurance and validation:** Ensuring data is cross-checked and verified before submission.
- **Ethical considerations:** Addressing issues related to data privacy, informed consent, and responsible data handling.

4.2.2 Training for Data Analysts and Researchers

Data analysts require specialized training to interpret feed and fodder data effectively. Training areas should include:

- **Statistical analysis tools:** Proficiency in **SPSS, R, Python, and Excel** for trend analysis.
- **GIS and remote sensing:** Use of **ArcGIS, QGIS, and Google Earth Engine** to monitor pasture conditions and land use.
- **Machine learning and predictive modeling:** Implementing AI-driven analytics to forecast feed shortages and market trends.
- **Data visualization techniques:** Developing dashboards and interactive reports for better data interpretation.

4.2.3 Training for Policymakers and Decision-Makers

Policymakers need **high-level training** to understand how data influences policy and strategic planning. Training programs should emphasize:

- **Evidence-based policy development:** Using data insights to draft policies that enhance feed and fodder security.
- **Data-driven emergency response planning:** Leveraging early warning systems for feed shortages and climate-induced crises.
- **Stakeholder engagement and coordination:** Understanding how to incorporate multi-sectoral data inputs into national strategies.

4.2.4 E-Learning and Knowledge-Sharing Platforms

To make training accessible, digital platforms such as **webinars, e-learning courses, and virtual workshops** should be developed. These platforms allow for:

- **Continuous learning:** Ensuring stakeholders stay updated on emerging trends.
- **Cross-border knowledge exchange:** Facilitating information sharing between AU member states.

- **Certification programs:** Recognizing and standardizing expertise in feed and fodder data management.

4.3 Infrastructure Development and Digital Tools Adoption

Infrastructure development is a key enabler of effective feed and fodder data management. Investing in **robust digital tools and infrastructure** ensures seamless data collection, processing, and sharing across multiple stakeholders.

4.3.1 Expanding Internet Connectivity in Rural Areas

One of the biggest challenges in data collection is limited internet access in rural regions. Governments and development partners should invest in:

- **Broadband expansion projects** to improve connectivity in livestock-rearing areas.
- **Deployment of satellite-based internet solutions** for remote regions.
- **Public-private partnerships** to make digital connectivity more affordable for smallholder farmers and extension officers.

4.3.2 Investment in Cloud-Based and Hybrid Data Storage Systems

To enhance **data accessibility, security, and scalability,** cloud-based data storage solutions should be prioritized. Key actions include:

- **Developing national and regional cloud databases** for feed and fodder data.
- **Integrating hybrid storage models** that combine on-premise and cloud-based solutions for enhanced security.
- **Ensuring interoperability between different data storage platforms** for seamless cross-border collaboration.

4.3.3 Adoption of Mobile-Based Data Collection Tools

Mobile applications play a critical role in real-time data collection and reporting. Promoting the use of mobile platforms will:

- **Reduce paperwork and manual data entry errors.**
- **Increase efficiency in capturing and transmitting field data.**
- **Provide instant feedback to farmers and livestock officers** through advisory notifications.

Popular mobile tools for feed and fodder data collection include:

- **KoBoToolbox and Open Data Kit (ODK)** for surveys and structured interviews.
- **mAgric and AfriFARM** for real-time monitoring of feed prices and availability.
- **Livestock traceability applications** for tracking feed supply chains and animal nutrition.

4.3.4 AI and Machine Learning in Data Analytics

Adoption of **artificial intelligence (AI) and machine learning algorithms** can revolutionize feed and fodder data management. AI applications include:

- **Predictive analytics** for forecasting feed shortages and price fluctuations.
- **Automated data processing and anomaly detection** to improve data accuracy.
- **Livestock health monitoring systems** that analyze nutritional intake and optimize feed efficiency.

4.3.5 Establishing National and Regional Data Centers

To ensure long-term sustainability of feed and fodder data management, national governments should:

- **Set up dedicated data management units** within agricultural ministries.
- **Develop regional data centers** that provide cloud storage, analytics, and visualization services.
- **Support the formation of a continental feed and fodder data network** to enhance cross-border collaboration and data standardization.

CHAPTER 5: GOVERNANCE AND COMPLIANCE

5.1 Principles of Data Governance in the Feed and Fodder Sector

Effective governance of feed and fodder data is critical to ensuring **data integrity, security, accessibility, and compliance** with national, regional, and international standards. Governance frameworks help **streamline data collection, processing, storage, and sharing to facilitate evidence-based decision-making** and improve sectoral efficiency.

Key principles of data governance in the feed and fodder sector include:

- **Transparency:** Data management processes should be open, clear, and accessible to relevant stakeholders, promoting accountability.
- **Accuracy and Reliability:** Data should be collected and processed using standardized methodologies to ensure consistency and credibility.
- **Security and Confidentiality:** Measures must be in place to protect sensitive data from unauthorized access and misuse.
- **Interoperability:** Systems should be designed to ensure seamless **cross-border and multi-stakeholder data exchange,** supporting regional integration.
- **Inclusivity:** All relevant actors, including **government agencies, private sector players, researchers, and farmers,** should be involved in data governance structures.
- **Ethical Data Use:** Ethical guidelines should be established to prevent data manipulation and misuse.

Adherence to these governance principles fosters **trust, collaboration, and efficiency in feed and fodder data management,** leading to **better decision-making and policy implementation** across AU member states.

5.2 Policy and Regulatory Frameworks for Data Management

A **well-defined policy and regulatory environment** is essential to govern feed and fodder data management effectively. Policies should align with national laws and regional agreements, including the **African Union Data Policy Framework,** which provides **guidelines on data sovereignty, protection, and sharing mechanisms** among AU member states.

Key policy and regulatory areas include:

- **Data Ownership and Sovereignty:** Clear guidelines on who owns data, how it is accessed, and who has rights to use and modify it.
- **Cross-Border Data Exchange Agreements:** Legal frameworks that facilitate the **harmonized sharing of feed and fodder data** while ensuring national security concerns are addressed.
- **Public and Private Sector Collaboration:** Regulations that promote partnerships between government institutions, research organizations, and private industry players to **enhance data availability and utilization.**
- **Legal Enforcement Mechanisms:** Provisions for monitoring compliance, handling data breaches, and implementing penalties for non-compliance with governance standards.

Governments should work towards **harmonizing national regulations with the AU Data Policy Framework**, ensuring a **cohesive and legally sound approach** to feed and fodder data management.

5.3 Data Protection, Security, and Privacy

As digital solutions become increasingly integrated into feed and fodder data management, **data protection and security measures** must be prioritized to safeguard **sensitive agricultural information** from cyber threats, unauthorized access, and data breaches.

Key Considerations for Data Protection and Security

- **Adherence to the AU Data Policy Framework:** Ensuring compliance with AU **guidelines on cybersecurity, data privacy, and cross-border data handling.**
- **End-to-End Encryption:** Securing data transmission and storage to prevent cyber-attacks and unauthorized modifications.
- **Role-Based Access Controls (RBAC):** Implementing multi-layered access control to ensure that **only authorized personnel can access, edit, or delete sensitive data.**
- **Data Anonymization and Masking:** Protecting personally identifiable information (PII) and confidential business data.
- **Disaster Recovery and Backup Systems:** Establishing secure backup protocols to prevent data loss due to system failures or cyber-attacks.

Governments and institutions should develop **strong data security policies to maintain trust in data systems and prevent vulnerabilities that could disrupt feed and fodder markets.**

5.4 Standardization of Data Collection and Reporting

To **ensure consistency and comparability of feed and fodder data across AU member states,** standardized methods for **data collection, analysis, and reporting** must be adopted.

Key Areas of Standardization

- **Common Data Formats and Metrics:** Developing uniform measurement standards for feed quality, pasture productivity, and trade volumes.
- **Data Collection Methodologies:** Establishing **harmonized survey instruments, digital tools, and data validation protocols.**
- **Reporting Frequency and Protocols:** Setting **clear timelines for data submission, updates, and public dissemination.**
- **Use of Digital Platforms for Real-Time Data Sharing:** Encouraging AU member states to integrate **interoperable digital tools** that facilitate seamless data exchange.

The **AU and regional economic communities (RECs)** should lead the efforts to create **continent-wide standardization protocols,** ensuring that **national and regional data systems can effectively communicate and** facilitate **evidence-based decision-making.**

5.5 Harmonization of Governance Approaches Across AU Member States

To enhance **regional cooperation and data-sharing,** AU member states should work towards **harmonizing governance frameworks for feed and fodder data.** A **coordinated approach ensures that data systems remain compatible, secure, and policy-driven.**

Key Strategies for Harmonization

- **Establishing a Regional Data Governance Task Force:** A dedicated body to **coordinate data policies, ensure compliance, and oversee standardization efforts.**
- **Promoting Mutual Recognition of Data Standards:** Encouraging AU member states to align national policies with **regional and continental data governance frameworks.**
- **Developing Intergovernmental Agreements on Data Sharing:** Creating **binding agreements** to facilitate **seamless, secure, and ethical exchange of feed and fodder data.**
- **Capacity Building for Data Governance:** Providing training and resources for government agencies, farmers, and industry players to **effectively manage and**

utilize feed and fodder data.

- **Leveraging Regional Economic Communities (RECs):** Strengthening the role of RECs in **facilitating data-sharing agreements, standardization processes, and governance oversight.**

By adopting **harmonized governance models,** AU member states can improve **data transparency, policy coordination, and crisis response mechanisms,** ultimately **enhancing food security and livestock sector resilience.**

APPENDICES

Appendix 1: Indicators for Feed and Fodder

Table XX Data Variables and Indicators

Value Chain Process	Data Domains	Sub Domains	Indicators
Input Supply	Availability of seeds	Seeds	Quantity of Seed produced by the seed breeder per year (MT)
			Quantity of seed purchased by farmers per year (MT)
			Quantity of Seed imported per year (MT)
			Average market price of seed (legume&/grass) (USD)
		Seedlings and Cuttings	Quantity of Seedlings and cuttings produced by the seed breeder per year (MT)
			Quantity of seedlings and cutting purchased by farmers per year (MT)
			Quantity of Seedlings and cutting imported per year (MT)
			Average market price of seedlings and cuttings (USD)
			Number of seed breeders and suppliers
	Availability of Fertilizer		Quantities of fertilizers imported (MT)
			Quantities of fertilizers locally produced (MT)
			Number of Fertilizer suppliers
			Average price of fertilizer in the market (USD/MT)
	Availability of agro-chemicals		Quantities of Pesticides imported (MT)
			Quantities of herbicides imported (MT)
			Average market price of pesticides and herbicides (MT)
			Number of agro chemicals and seeds dealers
	Availability of additives and concentrate (minerals, vitamins, premixes)		Quantity of additives imported (MT)
			Quantity of concentrate imported
			Average cost of additives (MT)
			Number of industries processing and reconstituting additives

Value Chain Process	Data Domains	Sub Domains	Indicators
	Input equipment suppliers		Number of suppliers of input equipment for feed and fodder value chain
			Value of Investment in input supply equipment industries for the feed and fodder value chain (USD) (To link with the information from investment team)
Production	Forage feeds (Pasture, fodder, Browse, Crop residues)		Area under forage feeds (Ha)
			Yield of forage per hectare (MT)
			Quantity of forage per year (MT)
			Number of forage feed producers
			Quantity of dry matter (MT)
			Value of the dry matter (USD)
	Grain Feed (Cereals, oil seeds)		Area under grain feeds (Ha)
			Yield of grain per hectare (MT)
			Quantity of grain per year (MT)
			Number of grain feed producers
			Value of the grain produced (USD)
	Feed Production Equipment		Number of heavy farm production equipment (harvesters, tractors, ploughs,)
			Number of light farm production equipment (hoe, axe, hand cutters, chaff cutters, chainsaws)
Aggregation	Forage feeds		Total number of aggregators
			Total number of aggregation facilities
			Number of functional aggregation facilities
			Installed Capacity (MT)
			Utilisation capacity (%)
			Cost of storage per (MT)
	Grain Feeds		Total number of aggregators
			Total number of aggregation facilities
			Number of functional aggregation facilities
			Installed Capacity (MT)
			Utilisation capacity (%)
			Cost of storage per (MT)

Value Chain Process	Data Domains	Sub Domains	Indicators
Processing	Forage feeds		Number of value chain actors
			Number of processing plants (disaggregated by scale)
			Quantity of Processed forage (MT) (silage, hay, forage meal)
			Installed Capacity (MT)
			Utilisation capacity (%)
			Value of processed forage (USD)
			Cost of storage per (MT)
	Grain feeds (Semi-processing of grains and oil seeds)		Number of value chain actors
			Number of processing plants (disaggregated by scale)
			Quantity of Processed forage (MT) (cakes, meals)
			Installed Capacity (MT)
			Utilisation capacity (%)
			Value of processed cakes and meals (USD)
			Cost of storage per (MT)
	Compound feed (Formulation and blending)		Number of value chain actors
			Number of processing plants (disaggregated by scale)
			Quantity of Processed compound feeds (MT) (poultry feeds, dairy feeds)
			Installed Capacity (MT)
			Utilisation capacity (%)
			Value of processed cakes and meals (USD)
			4.3.1.7 Cost of storage per (MT)
Marketing	Forage feeds		Number of the value chain actors
			Number of distributors/dealers
			Stocking capacity of distributors/ dealers
			Quantity of the Forage feed sold (MT)
			Value of the Forage feed sold (USD)
			Quantity of export (MT)
			Value of exports (USD)

Value Chain Process	Data Domains	Sub Domains	Indicators
	Semi processed concentrate feeds		Number of the value chain actors
			Number of distributors/dealers
			Stocking capacity of distributors/ dealers
			Quantity of the semi processed feed sold (MT)
			Value of the semi processed feed sold (USD)
			Quantity of export (MT)
			Value of exports (USD)
	Complete feeds		Number of the value chain actors
			Number of distributors/dealers
			Stocking capacity of distributors/ dealers
			Quantity of the complete feed sold (MT)
			Value of the complete feed sold (USD)
			Quantity of export (MT)
			Value of exports (USD)
	Marketing and distribution equipment		Number of marketing and distribution equipment (trailers, Lorries and small distribution vehicles)
			Number of storage equipment (warehousing, stores, retail shops)
End Users	Animal feed requirement for forage feeds		Number of Farms Red meat animal, Dairy animals)
			The population of animals (segregated by type and age)
			Feed intake per animal per day (FM/ kg)
			Feed cost per (FM/kg)
	Animal feed requirement for complete feeds		Number of Farms(Poultry, Red meat animal, Dairy animals)
			The population of animals (segregated by type and age)
			Feed intake per animal per day (FM/ kg)
			Feed cost per (FM/kg)

Table 2.3 Outcome and Impact Indicators

	Outcome/ Impact	Data Domains	Indicators
1	Outcomes	1.1 Feed and fodder availability for livestock production, improvement of livelihoods and ensure business continuity.	1.1.1 Quantity of available feed and fodder in Member States (Domestically produced + imports) (Dry Matter (MT)
			1.1.2 Change in the proportion of feed costs relative to the total cost of production (%)
		1.2 Increased investment in feed and fodder systems	1.2.1 Value (in USD) of investments in feed and fodder value chain catalysed by the project (USD)
			1.2.2 Number of partnerships and collaborations established among public and private actors
		1.3Better articulated and more resilient feed and fodder systems	1.3.1 Change in national feed requirements gap (%)
			1.3.2 # of MSs with functional multi- stakeholder feed and fodder dialogue / interactive platforms
			1.3.3 # of MSs and RECs coherent policy and legislative frameworks and strategies on feed and fodder
		1.4 Evidence based decision making	1.4.1 Number of countries with functional real-time feed and fodder action mechanisms that are triggered by early warning systems
			1.4.2 Change in average animal mortalities that are related to feed and fodder shortages (%)
			1.4.3 # of Member states that have feed and fodder development plan among the top priorities (Linkage of feed to key development objectives).
			1.4.4 # of countries with operational contracting models for feed and fodder supply chain. (Survey)
		1.5 Improved access to livestock sourced protein by women and children	1.5.1 Growth rate of the per capita consumption of livestock-sourced proteins in target countries (CAGR)
			1.5.2 # of finance and credit schemes targeted at women and youth in the feed and fodder value chains (Finance and credit services for women)
			1.5.3 Number feed and fodder women cooperatives and associations formed along the feed and fodder value chain

	Outcome/ Impact	Data Domains	Indicators
		1.6 Improved nutrition outcomes for women and children and other vulnerable groups	1.6.1 Prevalence of stunting in target countries (%)
			1.6.2 Prevalence of malnutrition in target countries (%)
			1.6.3 Prevalence of anaemia in women aged 15 to 49 years, by pregnancy status (%)
2	Impacts	2.1 A Knowledge and Analytical Ecosystem for Informing Evidence Based Solutions Established	2.1.1 Number of initial assessment / scoping studies conducted
			2.1.2 Number of data management frameworks/ Platforms developed
			2.1.3 Number of stakeholders utilising the platforms
			2.1.4 Number of data management platform and ecosystems operationalized
		2.2 Viable business models, Strategic Partnerships, Catalytic Interventions for Coordinated Action Supported to Attract Enhanced Investment for Short Term Solutions to Feed and Fodder Shortages	2.2.1 Number of Action Plans developed across member states
			2.2.2 Number of viable models recommended for up scaling
			2.2.3 Number of catalytic interventions identified and developed as business funding proposals
			2.2.4 Number of multi stakeholder platforms established / strengthened
			2.2.5 Number of innovative Funding, Financing and Insurance Mechanisms established to Promote Short Term Investments
		2.3 Women Empowered to Participate and Benefit from Feed and Fodder and Animal Sourced Food Supply Chains to Enhance their Food and Nutrition Security	2.3.1 Number of beneficiaries trained on Feed and Fodder production and feeding, Entrepreneurship, Marketing and Trade Skills (Disaggregated by type of training)
			2.3.2 Number women and youth benefiting from targeted financing and embedded insurance

	Outcome/ Impact	Data Domains	Indicators
		2.4 Policies, Regulations, and Institutions Reformed for the development of a more sustainable and resilient feed and fodder industry	2.4.1 Number of Continental Feed and Fodder Industry Guidelines developed
			2.4.2 The number of policies, regulations support the feed and fodder industry
			2.4.3 Existence of a mutual accountability policy monitoring and evaluation framework
			2.4.4 Number of Member States supported to Adopt, Domesticate and Implement the Feed and Fodder Industry Development Policy, Regulatory and Institutional Frameworks

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