

Renier van Vuuren, Tony Kazima and Christo Becker

Poultry Production For Smallholders

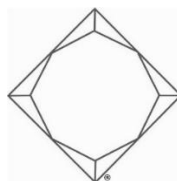
Poultry production

Developed by:

Renier van Vuuren – Impuls Africa

Tony Kazima – Livestock Development Department, Ministry of Fisheries and Livestock

Christo Becker – Diamond Cornerstone



Supported by:



This *Poultry Production for Smallholders* manual was produced with the financial support of *The Nature Conservancy* and the *Global Environment Facility (GEF)* Project. Its contents are the sole responsibility of Impuls Africa and do not necessarily reflect the views of GEF. All rights reserved. The content, including text, images, graphics, and any other material contained in the Impuls Africa Learning Manuals, is protected under applicable copyright laws. These materials are provided to the public for free access and download to support personal learning, educational purposes, and non-commercial use.

Users are encouraged to share these manuals in their original form to promote widespread learning and knowledge sharing. However, it is strictly prohibited to modify, alter, translate, adapt, or create derivative works based on the content of these manuals without obtaining prior written consent from Impuls Africa. This ensures the integrity and accuracy of the information provided and respects the intellectual property rights of the authors and contributors.

By accessing or downloading the Impuls Africa Learning Manuals, you agree to adhere to the terms of this copyright statement.

For permissions, inquiries, or further information regarding the use of these materials, please contact Impuls Africa at renier@impuls.africa.

Cover Image sourced from: Freepiks.com



Table of contents

Overview of the book	4
Purpose of this book	4
Introduction to successful poultry production	5
1.1. Difference between keeping and farming poultry	5
1.2. Successful Producers Follow a Process Cycle	6
1.3. Basic daily needs for chickens	9
1.3.1. The Farm	9
Poultry Housing Basics	12
Biosecurity in Feeding and Watering Chickens	18
1.4. Selecting your breed	20
Common Chicken Breeds in Zambia	20
1.4.1. Indigenous (Village) Chickens	20
1.4.2. Improved Village Chickens (Exotic/Crossbred Types)	21
1.4.3. Commercial Broilers and Layers	23
1.4.4. Choosing a Breed – What to Consider	24
1.5. Basic Principles of Poultry Management	25
Advanced practices for successful poultry production	28
2.1. Increasing Poultry Production.	28
2.1.1. When Can Chickens or Their Products Be Sold?	28
2.1.2. Factors that Limit Poultry Production	31
2.1.3. Managing the Key Areas of Poultry Production	33
2.2. Poultry Nutrition	37
2.2.1. Conventional Feed	39
2.2.2. Unconventional Feed Sources	40
2.2.2.1. Maggot Farms	40
2.2.2.2. Duckweed	44
2.2.2.3. Hydroponic Fodder	46
2.3 Animal Health	51
2.3.1. Importance of Animal Health in Poultry Production	51
2.3.2. Common Poultry Diseases (2.3.4. is our in depth discussion)	51
2.3.3. Signs of Healthy and Unhealthy Birds	53
2.3.4. Diseases, Symptoms and Treatments	54
2.3.5. Vaccination Schedule/Prevention Guide	62
2.3.6. Disease Prevention and Biosecurity	64
2.3.7. Early identification and treatment of diseases	64
2.3.8. Parasites and Parasite Control	67
2.3.9. Environmental Stress: Heat and Cold	70
2.3.10. Basic Poultry Vaccination Schedule	71
2.3.11. Poultry First Aid Kit: What Every Farmer Should Have	72
2.3.12. Treatment and Use of Medicines	72
2.3.13. Farmer Reflection Prompt	72

2.4. Reproduction and Genetics	73
2.4.1. Why Reproduction Matters	73
2.4.2. Poultry Reproductive Biology Basics	73
2.4.3. Natural Incubation vs. Artificial Incubation	74
2.4.4. Fertility and Hatchability	74
2.4.5. Selecting Breeding Stock (Genetic Selection)	74
2.4.6. Inbreeding and Line Management	74
2.4.7. Hatchery Tips for Small-Scale Farmers	75
2.4.8. Reflection Box	77
2.4.9. Poultry Breeding Calendar Plan (8-Week Cycle)	77
2.4.10. Chickens in Integrated Pest Management and Circular Systems	78
2.4.11 Poultry Tractor System for Field Use	81
Marketing and value adding	83
3.1. From Subsistence to Commercial Poultry Farming	83
3.2. Marketing and Value	84
The value of poultry as part of our diet	85
3.3. Economics of keeping poultry	86
Understanding the business, profitability, costs, and income	86
3.4. Observing, counting, recording, and monitoring	87
3.5. Selling your Poultry Products	90
3.6. Value Addition Opportunities	91
3.7. Market Opportunities	93



Introduction

Overview of the book

Purpose of this book

The primary purpose of this book is to guide and assist poultry owners in adopting a practical approach to enhancing the profitability and sustainability of their chicken flocks in a stepwise manner.

EVERYTHING STARTS WITH THE MARKET FIRST!

Farmers must start by understanding the needs of their target market (volumes and quality standards) and find the practices listed in this book that would best assist them in achieving the market requirements. Farmers who apply good poultry production practices explained in this book will find more success in accessing and delivering good quality and increased quantities to new and diverse markets. Farmers should constantly engage industry role players, including input suppliers, extension service providers, commercial breeders, government institutions, off-takers and agents to familiarise themselves with changes that take place in the market and opportunities that might arise.

The book is written so that readers can easily understand the explanations of the basic steps of poultry production.

The book is divided into three parts.

- Chapter 1 is an overview of poultry production. Becoming a successful poultry farmer. We discuss the differences between keeping poultry and farming with poultry, the need for process thinking and doing regarding the activities of poultry farming and the management of the daily basic needs of chickens. Different breeds of chickens have different purposes; some are good for egg production, others are good for meat, and then we get certain breeds that are good for both eggs and meat. We will be discussing and comparing different breeds in this section.
- Chapter 2 goes into more detail regarding producing poultry, the nutritional requirements for different stages and seasons of the year and health inspections. The chapter extensively discusses the diseases that most commonly afflict chickens. We conclude the chapter with a discussion on planned reproduction.



Chapter 1

Introduction to successful poultry production

1.1. Difference between keeping and farming poultry

■ Keeping poultry

For thousands of years, people have kept chickens, ducks, and geese as sources of food, feathers, and pest control.

In many rural households, chickens are often kept as a side activity. The chickens are often left alone to roam, find their food and water. Occasionally, they will be fed household scraps. The birds are only sold when there is a pressing need. The birds survive—but don't grow or lay many eggs. Birds may be valuable for social reasons or seen as a form of savings, but **production is low**.

This is “keeping” poultry.



No or low inputs = no or low outputs.

■ Farming poultry

A poultry farmer goes beyond just keeping birds alive. The poultry farmer makes intentional decisions regarding:

- What breed to raise and why?
- How to house, feed and protect the flock
- How to plan for selling, replacing stock, and increasing productivity.

Farming poultry means making changes to **improve growth, egg production, and profits**.

A real farmer plans and acts, building proper housing, providing good feed, giving clean water, preventing disease, and keeping records.

These actions require **effort and commitment**, but they lead to higher success.

Medium to high inputs = Medium to high outputs.

If you want better results, you must be willing to change what you do.



Medium to high inputs = medium to high outputs.

1.2. Successful Producers Follow a Process Cycle

“Free range chickens, or “village chickens”, as we have always called it – are hugely popular among Zambian consumers because of their distinct taste. These chickens are also what gives small-scale poultry farmers the chance to run a successful business.

The local poultry industry may have taken a dip, but demand is still largely unmet in the market. Zambia’s consumption of free-range chickens is estimated at 16 million chickens per year, against an annual production of 4 million. In addition, there is increased demand from regional markets like the Democratic Republic of Congo (DRC) and Angola.” (African Farming, 2017)

Poultry production and animal husbandry are the result of numerous micro-processes, including small tasks such as feeding, watering, reproduction, and checking, as well as taking preventative and reactive actions regarding pests and diseases. To achieve all the micro-processes, we need to become aware and implement a model of process thinking and action, with improvements and lessons being learnt.

To get something done, such as setting up a vaccination programme or adding supplemental feed, we need a process. The process that is recommended looks as follows:



Figure 1.1: Process Cycle

The task that must be performed must be defined. What are you going to do? Installing water points, fence maintenance, moving chickens from one area to another, or collecting eggs.

Planning: Here we create a mental bridge. Who must help? When must the task happen? Some tasks must be done more regularly than others. What are you going to need? Pliers, wire, spanners, injections, the task will help you build a kit list for the job.

Development: get the resources, list of equipment and people for doing the task.

Do: Roll up your sleeves and, at the right time, do the task.

Assess: How did it go? Was the task completed? Was it done correctly?



You will notice several CHECKLISTS throughout this training material. Each checklist is an Assessment Tool used to make sure that you have completed numerous little process cycles.

Reflect: What can we improve?

Learn from mistakes. Learn from your successes so that you can repeat these beneficial actions when doing the task again.

Character: Beliefs, values, attitude, and behaviour.

As we follow this process, you will become a better farmer. You will learn to become more aware of your poultry and their needs, you will start anticipating weather, environmental changes and the needs of your birds and the people working with you. With good Awareness and Anticipation your flock and environment can provide you with Abundance. Remember to always remain adaptable, you must continually improve and learn from your mistakes, successes, and the changes around you regarding your environment, your flock and the people working with you.

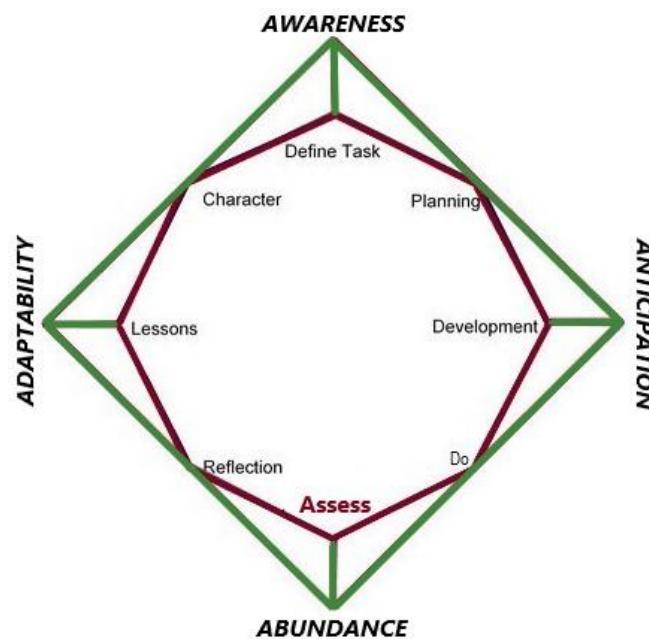


Figure 1.2: Four A's towards effective task completion

And so, as your flock and farm grow and improve, you can expand your farm and provide for more people. The provision of your farming is not only in terms of production but also employment and later empowerment as you teach and train others from the lessons you have learnt and the experience you have gained.

A good way to see your farming is as several interlocking Process Cycles. Feeding, watering, health and safety for yourself and your animals, looking after your environment (water sources, moving your chickens), reproduction strategies and then the raising of chicks for the expansion of your flock or sale.

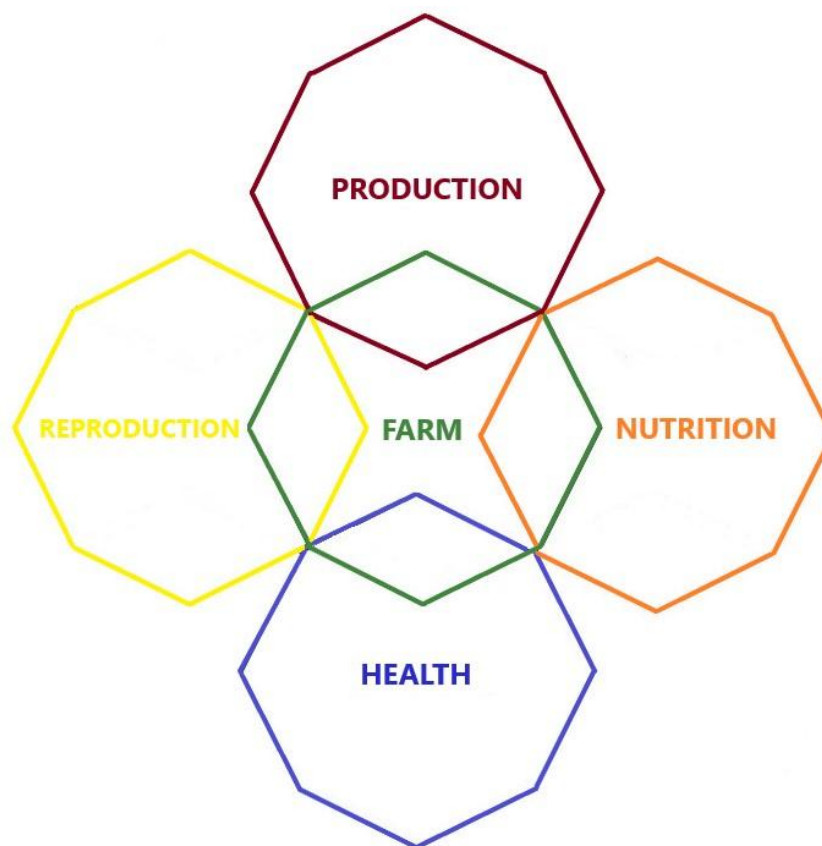


Figure 1.3: Poultry Production Processes Interlock

A good plan of action regarding each aspect of your chicken process can make all the difference. We are not in the business of keeping poultry as pets but rather as a lifestyle, improving our own lives and that of our communities at large.

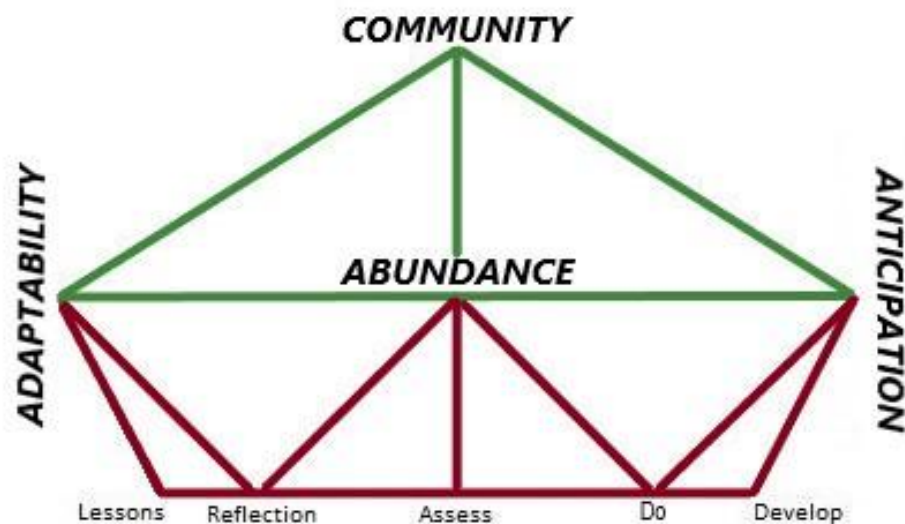


Figure 1.4: Improvement of self and community

Becker, C. 2011. *Diamond Governance*. KindleDirectPublishing.

1.3. Basic daily needs for chickens

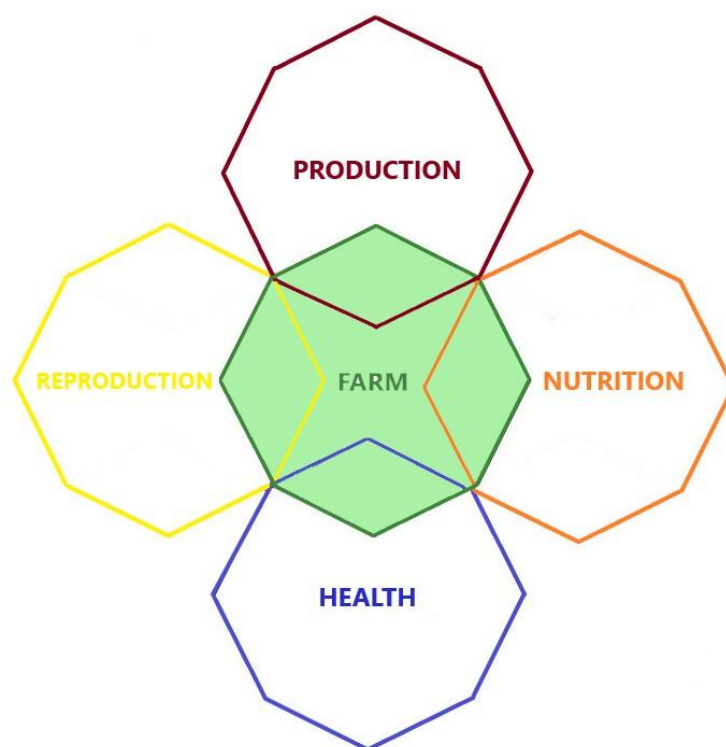


Figure 1.5: The farm and its location are central to your production

1.3.1. The Farm

For animals, chickens in this case, to survive, certain basic needs need to be met daily. All livestock owners understand the concept, and that is why poultry farmers spend most of their days letting chickens feed and getting them to water where they can drink.

Before you begin poultry production, ask yourself:

Will I raise chickens in a free-range or intensive system?

Free-Range Poultry Production

In a free-range system, chickens are allowed to roam freely in open spaces for at least part of the day. They forage for insects, seeds, and green matter while also receiving supplementary feed. This system is often used for village or indigenous chickens and is popular among Zambian consumers due to the taste and texture of the meat.

- Birds are usually enclosed at night for protection.
- Housing is simple and inexpensive.
- Requires adequate space and pasture management.

Intensive Poultry Production

In an intensive system, chickens are kept in controlled environments with limited or no outdoor access. They are fed high-quality formulated diets and their housing is optimised for maximum productivity, commonly used for commercial broilers or layers.

- Allows for better monitoring and disease control.
- Requires more investment in housing, feed, and equipment.
- Yields faster growth and higher egg/meat production.

Comparison Table: Free-Range vs. Intensive Poultry Systems

Feature	Free-Range System	Intensive System
Space Requirements	Large outdoor area needed	Limited space, high density
Feeding	Mostly scavenging + supplements	Fully controlled feed rations
Housing Cost	Low	High
Growth Rate	Slower	Faster
Egg Production	Moderate	High
Disease Exposure	Higher (due to outdoor risks)	Lower (if biosecurity is good)
Labour Needs	Lower (less monitoring)	Higher (constant care needed)
Consumer Demand	High for taste and tradition	High for volume and consistency
Startup Capital	Low	High
Environmental Impact	Lower if managed well	Higher (waste, energy use)
Control Over Production	Low to moderate	High

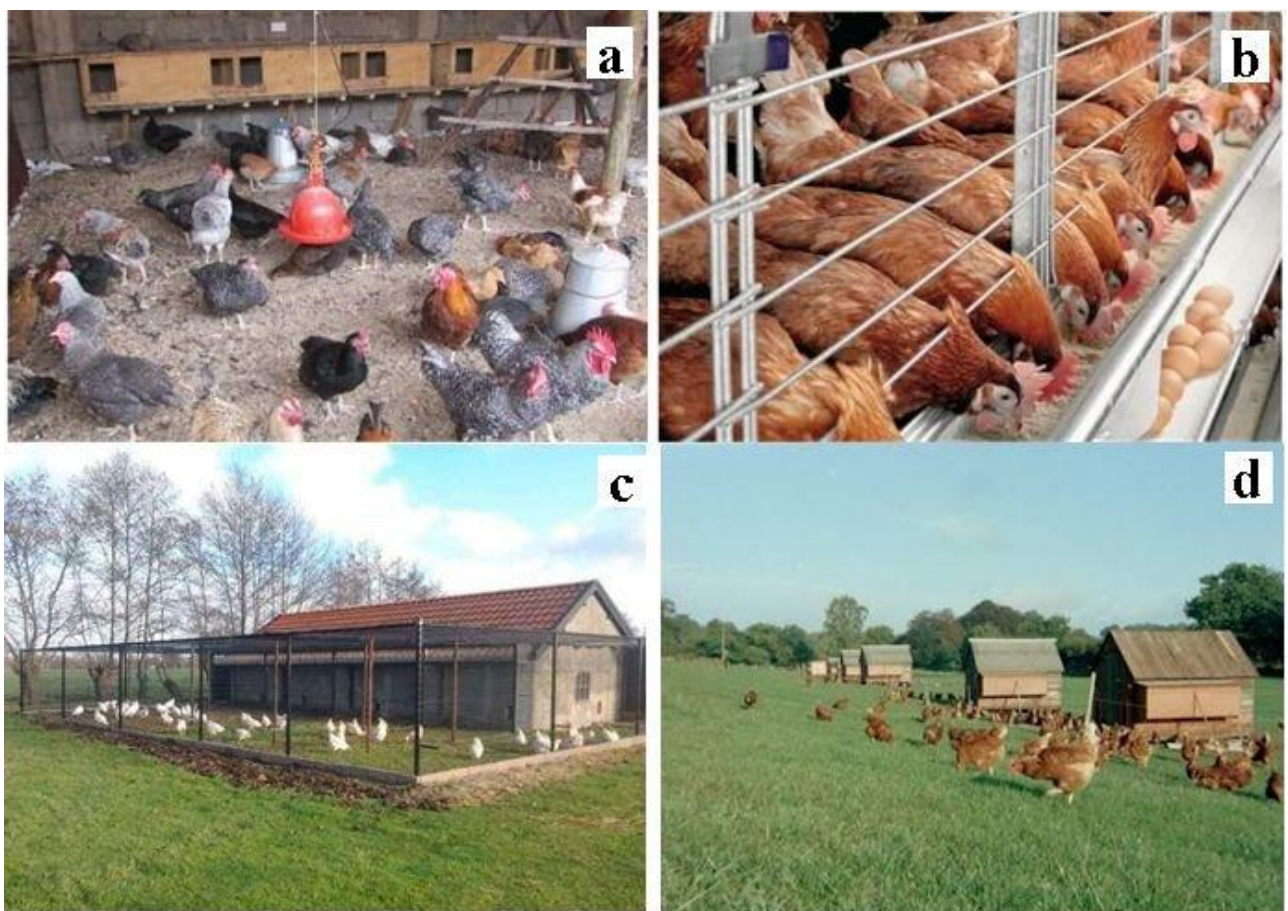


FIGURE 1.6: DIFFERENT TYPES OF POULTRY FARMING SYSTEMS: (A) INTENSIVE: DEEP LITTER SYSTEM, (B) INTENSIVE: BATTERY CAGES, (C) SEMI-INTENSIVE SYSTEM, AND (D) FREE-RANGE (EXTENSIVE) SYSTEM

(Source: [Different types of poultry farming systems: \(a\) intensive: deep litter... | Download Scientific Diagram](#))

11 Successful Poultry Production

When looking at poultry in nature, poultry lay their eggs in simple nests, perch in trees and spend the rest of the day looking for food. Chickens search for food by scratching the ground, exposing hidden food. In the case of backyard and semi-intensive production systems, poultry are usually enclosed at night to discourage thieves and predators.

When focusing on chickens. We need to know the difference between a chick run and a chicken coop.

- **Chicken run:** an enclosed yard for keeping chickens.
- **Chicken Coop:** is a small, enclosed area or structure where chickens are kept safe, usually at night when they are more vulnerable to theft and predators.

The coop is where you can manage your nesting, egg laying and sleeping area for your chickens. The chicken run is where you can manage your chickens' feeding and watering.

Hens should be given a choice of where to lay their eggs; hens will choose a soft litter base. The size of the nesting area should be a cube approximately 30cm x 30cm. The nesting area should be darkened with some privacy. Hens will inspect the nesting areas before laying. Perches should be provided as chickens naturally perch at night, probably a survival characteristic to avoid night predators.



FIGURE 1.7: INTENSIVE POULTRY SYSTEM
(freepik 2025)

As can be noted in the table above, intensive poultry production is more expensive to set up with building materials, cement, bricks, cages, labour, feeding and watering systems.



FIGURE 1.8: NATURAL MATERIAL CHICKEN COOP
(freepik 2025)

1.3.2. Poultry Housing Basics

A well-designed chicken house protects birds from **weather, predators, and disease**, while also supporting **good growth, egg laying, and health**. Housing doesn't have to be expensive, but it must meet some basic needs.

FOUR BASIC REQUIREMENTS FOR POULTRY HOUSING

Feature	What It Does
Space	Allows movement and reduces stress and injuries
Ventilation	Ensures fresh air, removes heat and moisture
Light	Supports feeding and egg production
Protection	Keeps out predators, rain, wind, and disease

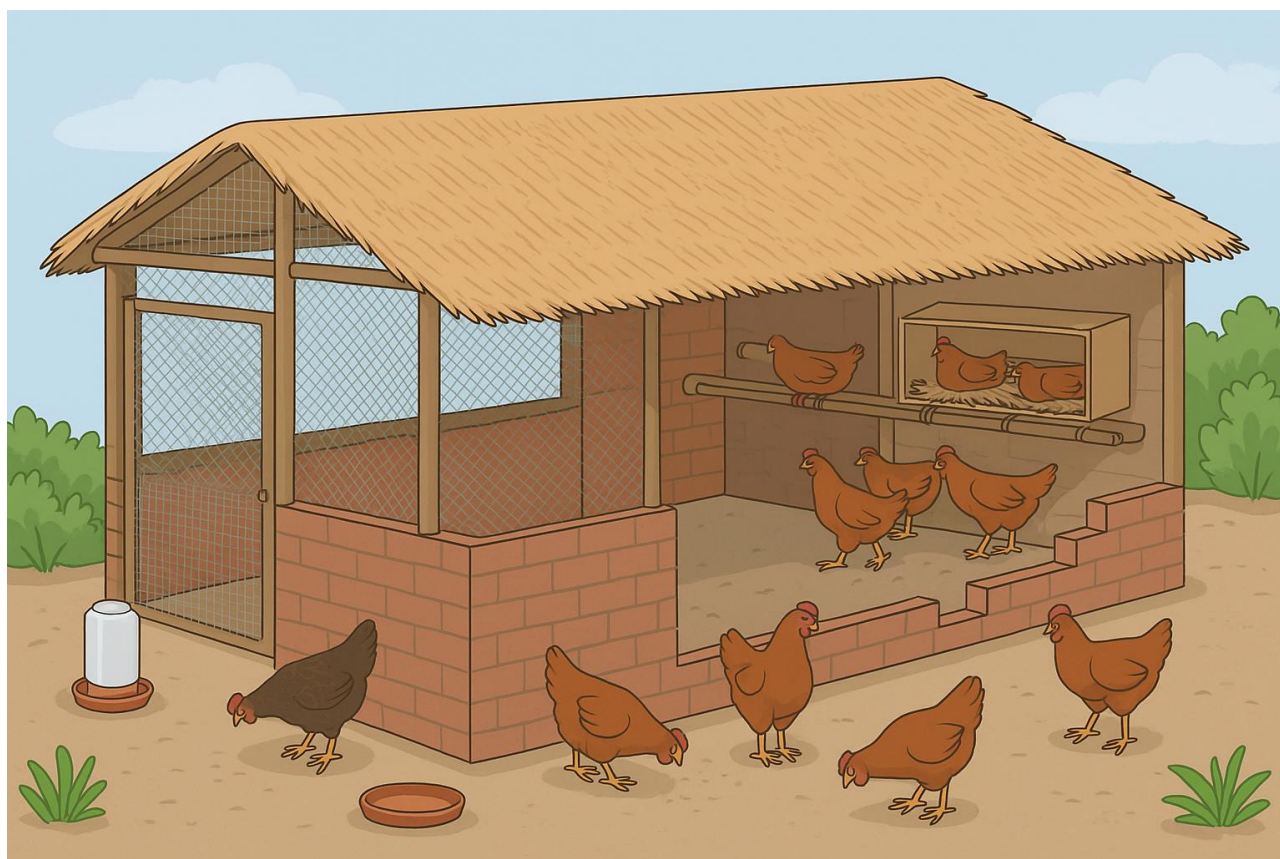


FIGURE 1.9: CHICKEN COOP ILLUSTRATION

(AI Generated)

1. SPACE: STOCKING DENSITY

Too many birds in a small space cause stress, injuries, and disease. Use this guide to decide how many birds your house can hold:

Type of Chicken Birds per m² Perch Space per Bird

Layers	3	25 cm
Dual-purpose	4	20 cm
Broilers (meat)	4–5	15–20 cm

- Give chickens room to move, perch, and behave naturally.
- Overcrowding leads to **fighting, sickness, and poor growth**.

2. VENTILATION: FRESH AIR MATTERS

Airflow is critical. Chickens can tolerate cold but not heat. Poor ventilation causes heat stress, ammonia buildup, and disease.

Tips:

- Use **open-sided houses** or windows with mesh.
- **Face the building toward the wind** to allow air to pass through.
- Avoid metal roofing unless painted white — it gets too hot.
- Keep building width under **8 meters** for proper airflow.

3. LIGHT: NATURAL OR CONTROLLED

Light helps chickens **eat, move, and lay eggs**.

- Use **natural daylight** whenever possible.
- If using artificial lights, **don't exceed 17 hours/day** — too much light causes stress.
- Bright, even lighting helps prevent birds from crowding in corners.

4. PROTECTION FROM WEATHER & PREDATORS

Your housing should:

- Keep birds **dry during rain** (raised floors and roof overhangs help).
- Be **sealed at night** to stop rats, snakes, mongooses, and thieves.
- Use **wire mesh on windows and doors**.
- Use **shade cloth or strings overhead** to protect from hawks or kites.

MATERIALS AND CONSTRUCTION TIPS

Part	What to Use	Why
Floor	Raised bamboo, wood, or clay	Prevents flooding and helps ventilation
Walls	Mud, bricks, planks, bamboo	Affordable, easy to maintain
Roof	Thatch, sheet metal (painted), tiles	Protects from rain and sun
Windows	Mesh-covered, shuttered	Improves air and keeps out pests
Doors	Strong wood or metal	Must resist weather and regular use

NEST BOXES & PERCHES

- 1 **nest box** per 5 hens (or large communal nests).
- Keep nests dark, clean, and comfortable.
- **Perch bars** help chickens roost naturally:
 - 2–3 cm thick
 - 15–20 cm space per bird
 - Install **droppings boards** beneath to collect manure for fertilizer.



Housing is more than shelter; it is the first line of defence against theft and disease.

DRINKING WATER

Drinking water is always the first limiting factor in poultry health and production.

Apart from daily feeding, poultry must also drink water regularly.

Water is needed and involved in every aspect of the animal's metabolism. Water plays an important part in regulating body temperature, food digestion and eliminating waste. At higher temperatures, water consumption can double or quadruple. Poultry flocks need water of adequate quality and quantity to stay healthy.

Drinking water should be clear, tasteless, odourless and colourless. Water that is contaminated will show different characteristics.

Water is then also needed for the rest of the digestion process, uptake of nutrients from the small intestine into the blood circulation, then also for the working of the different organs (metabolic functions).

Water must always be available. Both feed intake and growth rate are highly correlated to water intake. Precise requirements for water are difficult to state and can be influenced by numerous factors, including ambient conditions and the age and physiology of the birds. Under most conditions, water intake is assumed to be twice the amount of feed intake. The temperature of drinking water should be between 10 and 25 °C. Temperatures over 30°C will reduce consumption.

 **Chickens need clean water every day – no water, no growth, no eggs. If you wouldn't drink it, don't give it to your birds.”.**

If enough clean drinking water is not available, it will have an immediate effect on the digestion process and the production performance of your poultry, egg development, and weight gain.

Water should always be available. Preferably very near to the feeding areas. Water should be in the chicken run, not in the coop.

As with all livestock farming, drinking water is essential. Planning and developing a water system is crucial. You cannot run out of water. You will have to ensure timely construction of boreholes, dams, and piping systems with water points within your chicken runs.

Building a water infrastructure unlocks the potential for larger flocks far from natural water sources like streams and rivers.

 **The first responsibility of the poultry farmer is to ensure that the birds get enough drinking water daily.**



In Zambia empty cooking oil buckets are common and a store bought nipple can be attached



FIGURE 1.10: POULTRY WATER FOUNT, COMMERCIAL AND HOMEMADE
(CoPilot)

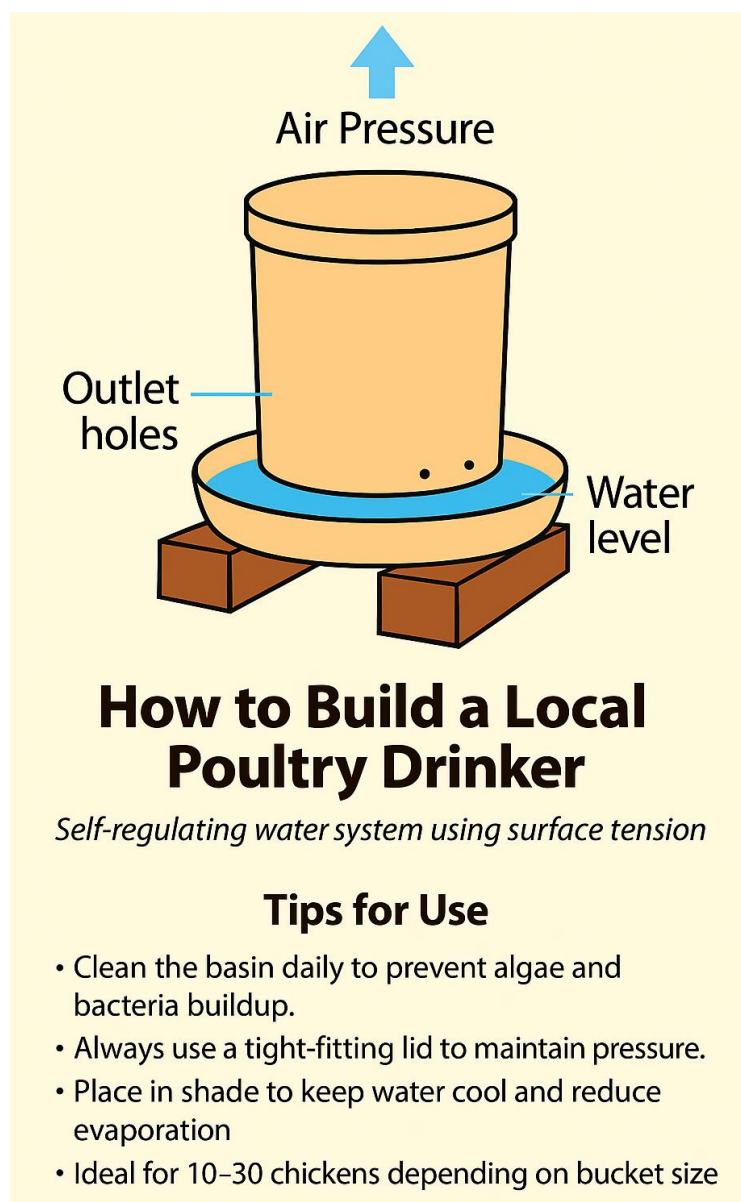


FIGURE 1.11: LOCAL POULTRY DRINKER
(CoPilot)

FEEDING

Village chickens require a balanced diet for optimal health, growth, and egg production.

Chickens are descended from jungle fowl. Jungle fowl are omnivores eating insects, seeds, fruit and leaves, but will also kill small reptiles and mammals. Similarly, chickens will eat the same diet. Foraging for food works, but depending on the size of your flock, the flock will clear an area of insects, grass and seeds quickly. If there is stress on the chickens' diet, they will lose weight and not produce eggs to their full potential.

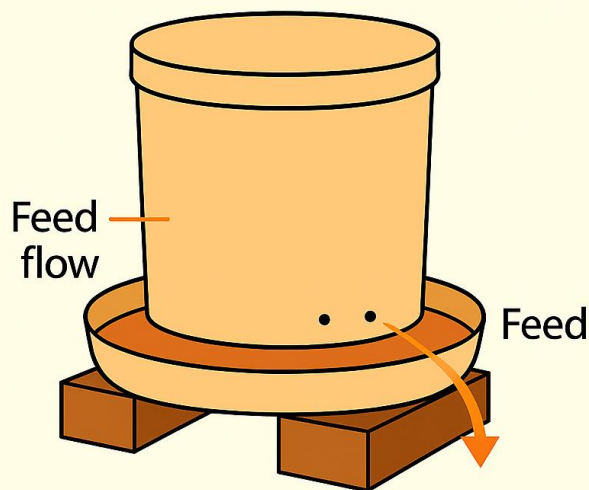
Modern chickens, Kuroiler and Black Australorps breeds, are bred to lay eggs and grow quickly. With optimal nutrition, hens can lay an egg almost every day. Supplementing feed to the normal foraging helps reduce animal stress, and this promotes growth and egg production.



The second responsibility of the poultry farmer is to ensure that the chickens get enough food each day.



FIGURE 1.12: POULTRY TUBE FEEDER
(CoPilot)



How to Build a Local Poultry Feeder

Gravity-based system

Tips for Use

- Use a lid to keep feed dry and clean.
- Clean the tray regularly to prevent mold or contamination.
- Ideal for 10-30 chickens depending on bucket size
- Works best with dry mash or pellets.

FIGURE 1.13: HOMEMADE FEEDER
(CoPilot)

1.3.3. Biosecurity in Feeding and Watering Chickens

Biosecurity means taking precautions to prevent the introduction and spread of diseases among your poultry. When it comes to feeding and watering, good biosecurity is essential to protect your flock from infections that can be spread by people, animals, or contaminated equipment.

FEEDING – BIOSECURITY MEASURES

1. Use Clean Feeders

- Always use clean, dry feeders to prevent mould and bacteria.
- Scrub and disinfect feeders regularly, especially after rain or high humidity.

2. Store Feed Properly

- Keep feed in sealed containers or sacks in a dry place.
- Protect from rodents, insects, and wild birds that can bring diseases.

3. Avoid Floor Feeding

- Do not scatter feed on the ground—it mixes with droppings and dirt, spreading disease.
- Use raised or suspended feeders to keep feed clean.

4. Don't Feed Spoiled or Wet Feed

- Spoiled feed can contain harmful fungi like aflatoxins, which are deadly to chickens.

5. Keep Other Animals Away

- Dogs, pigs, goats, and wild birds can contaminate feed with diseases like Newcastle disease or Avian influenza.
- Fence off the poultry area if possible.

WATERING – BIOSECURITY MEASURES

1. Provide Clean Drinking Water

- Use water from a safe, clean source—boil or treat if the water quality is uncertain.
- Avoid using stagnant or surface water (ponds, open dams) as it may carry parasites or bacteria.

2. Clean Drinkers Daily

- Wash and scrub water containers every day.
- Algae, droppings, or feed in waterers encourage bacterial growth.

3. Place Drinkers Properly

- Position drinkers in a shaded, raised area, away from where chickens roost or dust bathe.
- Don't place water inside coops at night—it gets dirty quickly and encourages pests.

4. Prevent Water Spillage

- Spilled water creates damp conditions that attract bacteria, mould, and flies, increasing disease risk.



FIGURE 1.14: TASK CYCLE

Quick Checklist

Task	Frequency	Why It Matters
Clean feeders & drinkers	Daily	Prevents the buildup of bacteria and mould
Store feed properly	Always	Keeps rodents and birds out
Use raised equipment	Always	Avoids contamination with droppings
Inspect feed & water quality	Weekly	Prevent health problems before they spread

1.4. Selecting your breed

In Zambia, farmers and poultry keepers have access to a variety of **chicken breeds** that suit both traditional and commercial systems. These breeds can be grouped into three main categories: **indigenous (village chickens)**, **dual-purpose breeds**, and **commercial hybrids**.

Breed choice affects how fast birds grow, the number of eggs that they lay, how resistant they are to disease, and what system suits them best. Each type of breed has different advantages and disadvantages depending on the farmer’s resources, production goals and the environment.

Consider the following when selecting your breed:

- Purpose (eggs, meat, or both)
- Growth rate and maturity age
- Feed efficiency
- Disease resistance
- Broodiness (natural hatching ability)
- Adaptability to local climate

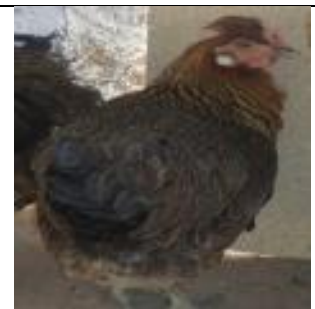
Common Chicken Breeds in Zambia

1.4.1. Indigenous (Village) Chickens

Indigenous chickens are traditional breeds kept in most rural homes. They are hardy, adapted to harsh conditions, and survive on scavenging with minimal inputs. These birds are excellent for smallholders needing self-reliant flocks that reproduce naturally. However, they grow slowly and reach smaller market weights.

- **Traits:**
 - Hardy and disease-resistant
 - Good foragers (ideal for free-range systems)
 - Low feed requirements
 - Lower egg and meat production
- **Common types:**
 - *Zambian village chickens* (no specific names; vary by region)
 - Often used in traditional ceremonies and favoured for its taste

Breed	Local Name & Language	Key Traits	Notes
 Naked Neck	Kalokoni" (Nyanja, Bemba)	Heat tolerant, good meat. Normal to big in body size Very good layers (up to 18 eggs/clutch) Good brooder, can hatch eggs up to 100%	Found widely in Eastern and Central Zambia.

 Short-legged	Chihuuli, Chifuuli or Kambwata	Adapted to local terrain. Low feed needs, but small body size. Lays 14 -18 eggs per batch	
 Guinea Fowl Spotted	Mabalankanga or Chibalankhanga	Speckled feathers like guinea fowls, used in crossbreeding, good size. Generally, big body size About 10-14 eggs per batch	Dual-purpose, breeding stock
 Frizzled Chickens	"wet look", mapepe a ntontola or Chinese chickens	Characteristically frizzled feathers Low resistance to diseases, hence tend to suffer high mortalities	Common in Muchinga and Northern Zambia. Kept for ornamental value
 Feather Hill on Head	Kasote (Hat)	Has raised feathers on the head, which look like a hat Hens have good egg laying and hatching abilities Lays 18 or more eggs per batch Generally big in size	Highly regarded in some communities for its "royal" look; sometimes used in traditional ceremonies.
 Feathered shanks	"Matoloshi" (Tonga, Soli)	Performs well in colder or highland areas; leg feathers may trap mud in rainy season	Has feathers on the shanks (look like chicken in trousers -talaushi)

1.4.2. Improved Village Chickens (Exotic/Crossbred Types)

Improved village chickens are crossbred or selectively developed breeds that combine the resilience of local birds with the productivity of commercial types. These chickens are ideal for farmers who want **better growth and egg performance** than indigenous birds, while still working within **free-range or semi-intensive systems**.

These birds are often referred to as **"dual-purpose"** because they provide both meat and eggs. They

are hardier than commercial broilers or layers and can tolerate outdoor systems, but still require better care, housing, and feeding than local chickens.

Below are examples of improved dual-purpose breeds found in Zambia and the region.

Breed	Origin	Key Traits	Notes
 Kuroiler	India	Fast growth, excellent egg layers (150–200 eggs/year), good meat production	Needs proper housing and feeding; does well in Eastern and Luapula provinces where adopted into improved village systems. Also found in most parts of Zambia
 Sasso	France	Bred primarily for meat; grows large quickly; attractive for short-cycle sales	Needs consistent feeding; ideal for farmers selling live or dressed birds locally The Sasso C341 is common in Zambia. Sold by some small-scale hatcheries.
 Black Australorp	Australia	Heavy egg layer (250–300 eggs/year), calm temperament, good for both open and confined systems	Performs best in intensive systems with proper management; less common but gaining popularity for egg-focused setups
 Potchefstroom Koekoek	South Africa	Dual-purpose, good mothers, moderately fast growth	Less common in Zambia but used in NGO-supported breeding projects for rural resilience due to their broodiness and hardiness

Improved Dual-Purpose Breeds

These breeds are raised for both meat and eggs and perform better than indigenous chickens while still being relatively hardy. Below are some recommendations, especially under smallholder conditions

- **Kalokoni (IC)** – Dual-purpose, strong broodiness
- **Chibalankanga (IC)** – Good meat, used in breeding
- **Kari Breed** – Fast-growing and lays well

- **Kuroiler** – High meat and egg output
- **Sasso T451** – Meat-focused, but acceptable layer



Choose a breed that matches your goals and environment. If you want to hatch your chicks and feed less, indigenous types work best. For quicker sales and higher egg output, improved breeds like Kari or Kuroiler are a good choice—but they need better care."

1.4.3. Commercial Broilers and Layers

Used mainly in intensive commercial production systems.

Broilers (Meat birds)

Breed	Traits
Cobb 500	Fast-growing (ready in 6–7 weeks), high feed conversion, white feathers
Ross 308	Very efficient, uniform growth, good carcass yield
Arbor Acres	Common in some commercial farms, balanced performance

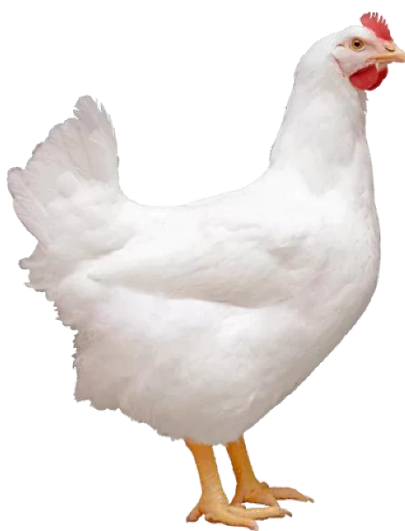


FIGURE 1.15: COBB 500
(cobbgenetics.com)

Layers (Egg producers)

Breed	Traits
Lohmann Brown	Lays ~300 eggs/year, calm temperament
ISA Brown	Early maturity, consistent layers
Hy-Line Brown	High egg production, efficient feed usage

1.4.4. Choosing a Breed – What to Consider

Factor	Ideal Breed Type
Low input, rural setup	Indigenous or Kuroiler/Sasso
Medium input, semi-intensive	Kuroiler, Kari Kienyeji, Sasso
High-input, intensive farming	Broilers (Cobb, Ross), Layers (Lohmann, ISA)
Market demand for taste	Village chickens or dual-purpose (free-range) breeds

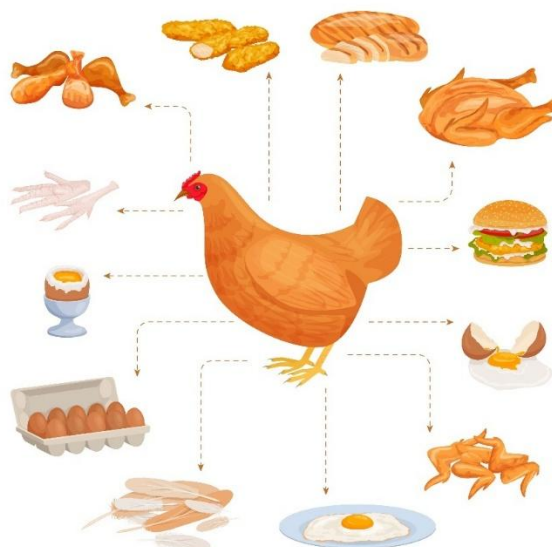


FIGURE 1.16: CHICKEN PRODUCTS

([Chicken products flat composition with set of isolated poultry food pointing to image of farm hen. vector illustration Stock Vector Image & Art - Alamy](#))



Market demand for taste: Village chickens or dual-purpose (free-range) breeds are a favourite in the Zambian market.

Dual-Purpose Chicken Breeds – Comparison Chart

Breed	Origin	Eggs per Year	Growth Rate	Hardiness	Feed Needs	Best for System	Notes
Kuroiler	India	180–220	Fast	 High	 Moderate	Semi-intensive, free-range	Popular in Africa, good meat yield, performs well on scavenging + feed
Sasso	France	150–180	Fast	 Moderate	 Moderate	Semi-intensive, backyard	Large frame, colourful, favoured for meat and hardiness
Kari Improved Kienyeji	Kenya	200–250	Moderate to fast	 High	 Low to moderate	Free-range, small-scale farms	Adapted to East Africa, strong layers, good brooders

Legend:

- **Hardiness**  : Resistance to diseases, predators, harsh weather
- **Feed Needs**  : How much commercial feed they need daily
- **System Suitability**: Where they perform best (village, backyard, commercial)

1.5. Basic Principles of Poultry Management

Definition of Poultry Management

Poultry management is the practice of applying proper techniques, knowledge, and care to ensure the **health, productivity, and profitability** of chickens and other domestic birds kept for eggs or meat.

It involves the **planning, organisation, and daily operation** of all aspects of poultry farming — from feeding and housing to disease prevention and marketing.



The primary skills for good poultry management are the skills of scouting, observation, and monitoring. With these three skills, we can raise awareness, anticipation, abundance and adaptability.

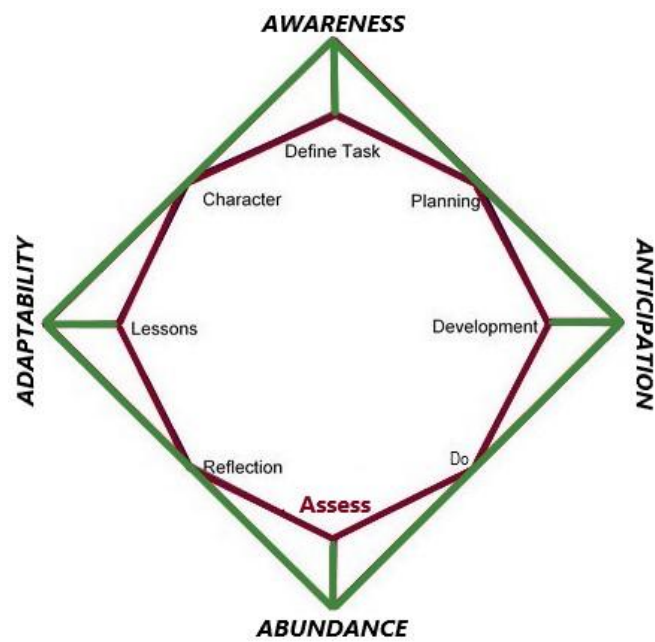


FIGURE 1.17: POULTRY MANAGEMENT CYCLE

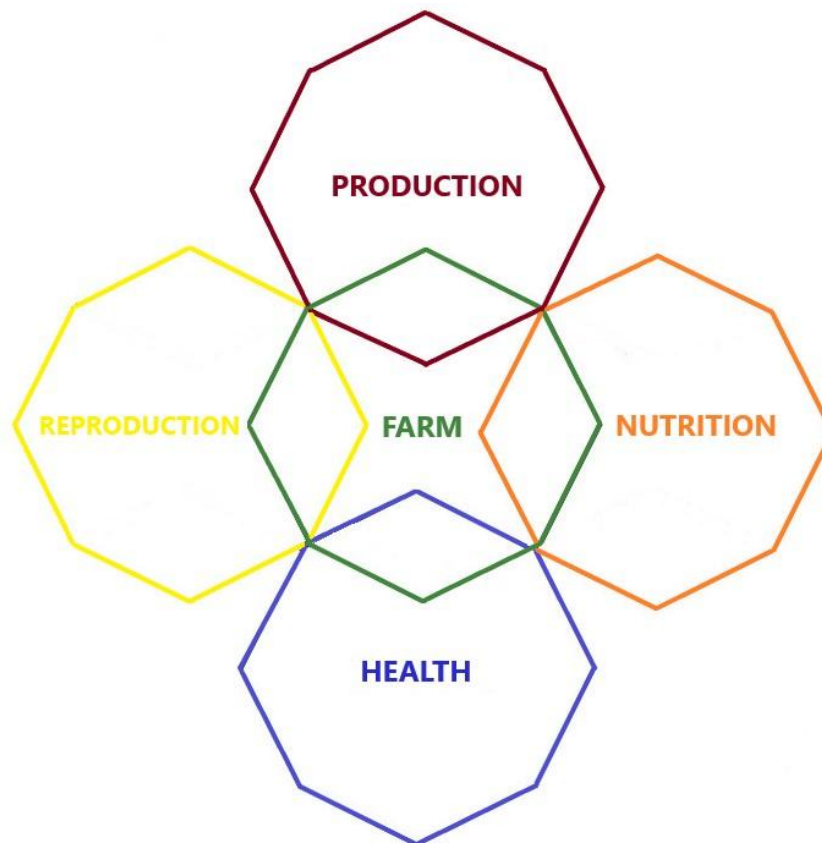


FIGURE 1.18: POULTRY MANAGEMENT INTERLOCK

Key Components of Poultry Management:

1. **Feeding and Nutrition (Nutrition)**
Providing a balanced diet suitable for the age, breed, and purpose of the poultry (meat or eggs).
2. **Housing and Environment**
Ensuring adequate space, ventilation, light, and protection from predators and weather.

3. **Health and Biosecurity**

Preventing and managing diseases through hygiene, vaccinations, and regular monitoring.

4. **Breeding and Reproduction**

Selecting quality birds and managing reproduction for flock improvement and sustainability.

5. **Recordkeeping**

Tracking feed use, growth, egg production, health treatments, and financial costs/income.

6. **Marketing and Economics**

Understanding markets, pricing, and value addition to make poultry farming financially viable.

Why It Matters:

Good poultry management increases **survival rates**, improves **egg and meat production**, reduces **costs**, and ensures that the farmer can run a **sustainable and profitable operation**, whether it is a small backyard flock or a commercial farm.

Success in poultry production depends on moving from casual chicken keeping to organised poultry farming. With the right mindset, breed selection, housing, and care, poultry can be a powerful tool for income and nutrition, especially when using dual-purpose breeds suited for Zambia.

Next, we explore how to develop a process-oriented production plan for your poultry enterprise.

Advanced practices for successful poultry production

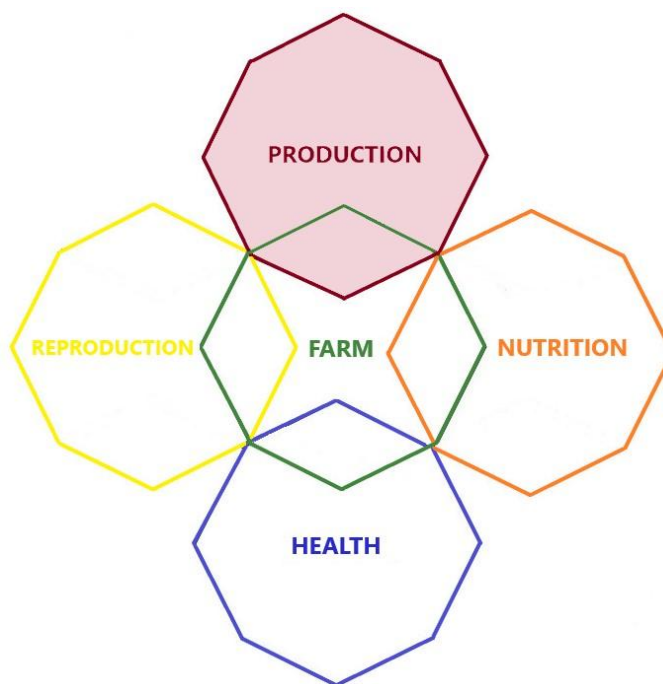


Figure 2.1: Production is the first pillar of poultry production

2.1. Increasing Poultry Production.

2.1.1. When Can Chickens or Their Products Be Sold?

Chickens offer farmers many opportunities to earn income, not only from meat, but also from eggs, chicks, and breeding stock. Knowing *when* you can sell poultry products helps you plan your feeding, housing, marketing, and cash flow. In this section, we explore the key stages in the production cycle where value can be added, and income generated

1. Eggs (From Layers or Indigenous Chickens)

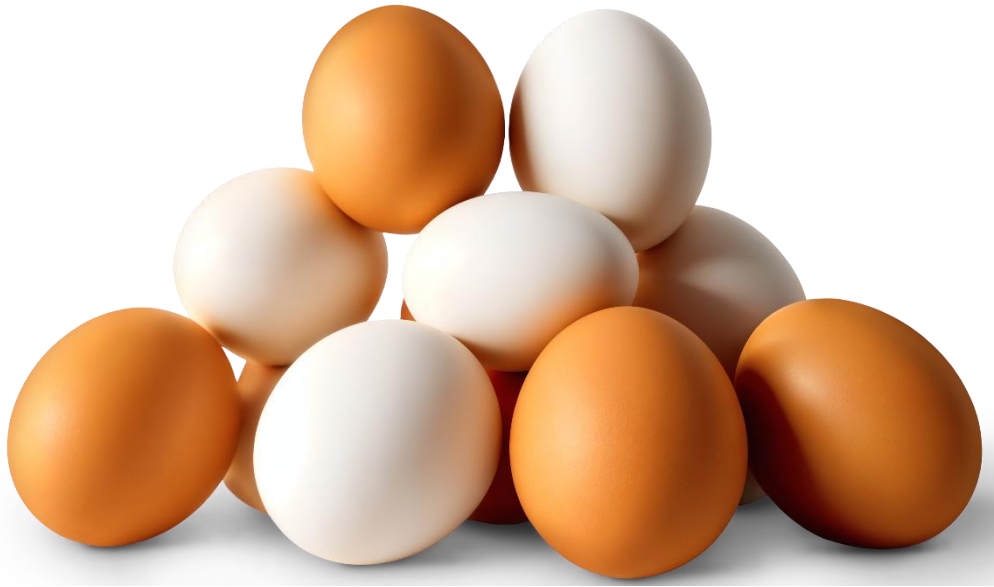


FIGURE 2.2: EGGS
(freepik.com)

Stage	Product	Typical Age	Who Buys It?	Notes
Table eggs	Edible eggs	18–20 weeks onward	Households, shops, vendors	From layers or village hens
Hatching eggs	Fertile eggs	6–12 months	Hatcheries, farmers	Must come from healthy, strong breeders



Caution:

If your housing or feed quality is poor, don't sell hatching eggs; they may fail in incubation

2. Day-Old Chicks (DOCs)



FIGURE 2.3: DAY OLD CHICKS
(Freepik.com)

Stage	Product	Typical Age	Who Buys It?	Notes
Day-old chicks	DOCs for rearing	1 day old	Farmers (broiler/layer growers)	Require a hatchery setup or supply contract
Indigenous chicks	DOCs or 1-week-old	1–7 days	Local farmers	Often sold locally; less common in formal hatcheries

3. Broilers for Meat



FIGURE 2.4: BROILER CHICKENS
(freepik.com)

Stage	Product	Typical Age	Who Buys It?	Notes
Live broilers	Ready for slaughter	6–8 weeks	Vendors, abattoirs, households	Must be well-fed and healthy
Processed broilers	Cleaned, packaged meat	6–8 weeks	Supermarkets, hotels	Requires hygiene, cold storage, and packaging



Farmer Tip:

Don't keep birds too long; selling at the right age saves on feed and increases profit.

4. Indigenous Chickens (Village or Free-Range)

Stage	Product	Typical Age	Who Buys It?	Notes
Mature chickens	Meat or breeding	4–6 months	Local markets, ceremonies	Popular for flavour, tradition
Growers	Reared for breeding	8–16 weeks	Small-scale farmers	Can be sold to start new flocks

5. Breeding Stock

Stage	Product	Typical Age	Who Buys It?	Notes
Pullets (young hens)	Future layers	16–20 weeks	Layer farms, households	Should be vaccinated, well grown
Cockerels/Roosters	For breeding/meat	4–6 months	Farmers, traditional use	Often sold before full maturity

Summary for Farmers

System	Sell What?	When?
Broiler	Meat birds	6–8 weeks
Layer	Eggs	18+ weeks
Breeding	DOCs, pullets, hatching eggs	1 day to 20 weeks
Free-range	Meat, chicks, eggs	3–6 months

2.1.2. Factors that Limit Poultry Production

For emerging poultry farmers, production goals like higher egg yield, faster growth, or increased off-take can be limited by several challenges. Here are the **main limiting factors**:

1. Poor Nutrition

- Unbalanced or low-quality feed leads to slow growth and fewer eggs.
- Lack of essential nutrients (protein, calcium, vitamins) affects body condition and fertility.

2. Inadequate Water Supply

- Water is critical for digestion, egg production, and regulating body temperature.
- Even short-term water shortages can reduce performance.

3. Disease and Poor Biosecurity

- Diseases like Newcastle, Coccidiosis, or Fowl Pox spread rapidly in unclean environments.
- Lack of vaccination or quarantine protocols increases losses.

4. Inadequate Housing

- Overcrowding, poor ventilation, and exposure to predators or weather stress birds.
- Stress reduces egg laying and growth.

5. Low-Quality Breeding Stock

- Starting with poor genetics limits productivity from the start.
- Some breeds are not suitable for specific production systems (e.g., layers used for meat).

6. Lack of Process Management

- No recordkeeping = no way to assess feed use, bird health, or egg numbers.
- Poor planning and irregular tasks (e.g., feeding, health checks) reduce efficiency.

7. Market Access and Timing

- Producing birds or eggs when demand is low leads to unsold stock or lower prices.
- Farmers without access to buyers or transport may be forced to sell below value.

8. Environmental Conditions

- Extreme heat, rain, or drought can cause stress and raise disease risks.
- Seasonal feed shortages also limit growth and production.

Checklist: What's Limiting Your Poultry Production?

Use this checklist to assess which factors might be holding back your farm's growth, egg yield, or profits. Tick off each item where you are confident and flag any **✗** for areas that need improvement.

Nutrition

Item	Yes 	No 
Are you feeding your chickens a balanced diet for their age and type?		
Do you provide regular access to supplementary feed (not just scavenging)?		
Is feed stored properly (dry, rodent-proof, safe)?		

Water

Item	Yes 	No 
Do your chickens have access to clean drinking water every day?		
Are your water containers cleaned regularly?		
Is your water source reliable during all seasons?		

Health & Biosecurity

Item	Yes 	No 
Do you vaccinate or follow a health schedule?		
Is the coop and surrounding area cleaned often?		
Do you separate sick birds from healthy ones?		

Housing

Item	Yes 	No 
Do your chickens have enough space to move freely?		
Is the house well-ventilated and dry?		
Is the coop protected from predators and weather?		

Breeding Stock

Item	Yes 	No 
Are you using breeds suited to your goals (meat or eggs)?		
Do your chickens come from strong, healthy parents?		
Are you replacing older, unproductive birds on time?		

Management & Records

Item	Yes 	No 
Do you track feed use, egg numbers, and flock health?		
Do you regularly review and plan your production cycle?		
Do you use checklists or calendars for tasks like feeding, cleaning, or selling?		

Market Access

Item	Yes 	No 
Do you know when demand is highest in your area?		
Do you have buyers, contracts, or reliable sales channels?		
Can you deliver your products to the market on time?		

2.1.3. Managing the Key Areas of Poultry Production

To run a productive poultry farm, you must manage the **six core areas**. Think of each one as a “mini system” that feeds into the overall success of your flock. Here’s how to approach each one:

1. Housing and Environment

- **Daily tasks:** Check ventilation, clean coop, secure from predators.
- **Weekly tasks:** Inspect structure (roof, doors, mesh), remove wet litter, repair any damage.
- **Long-term planning:** Upgrade housing before the rainy or hot season. Use local materials to improve cost-efficiency.



Tip: Good housing reduces stress, disease, and mortality.

2. Feeding and Nutrition

- **Daily tasks:** Provide fresh feed and water. Adjust feed based on age and breed.
- **Weekly tasks:** Check feed stock and storage. Clean feeding equipment.
- **Long-term planning:** Plan feed purchases based on flock size and growth stage.



Tip: Balanced feeding improves growth, egg laying, and disease resistance.

3. Water Management

- **Daily tasks:** Refill clean water containers.
- **Weekly tasks:** Scrub drinkers to prevent algae and bacteria.
- **Long-term planning:** Ensure reliable supply (e.g., borehole, rain tank).



Tip: Water shortages are the fastest way to lose production.

4. Health and Biosecurity

- **Daily tasks:** Observe birds for signs of illness or injury.
- **Weekly tasks:** Disinfect coop areas, review health records, clean equipment.
- **Long-term planning:** Follow vaccination schedules and biosecurity plans.



Tip: Prevention is cheaper than treatment.

5. Reproduction and Flock Planning

- **Daily tasks:** Collect eggs, monitor breeding behaviour.
- **Weekly tasks:** Inspect broody hens or incubators.
- **Long-term planning:** Plan replacement stock, sell excess birds, avoid inbreeding.



Tip: Replace non-productive birds early to maintain flock output.

6. Recordkeeping and Monitoring

- **Daily/weekly:** Record feed use, egg counts, mortalities, treatments.
- **Monthly:** Review records to identify trends and make changes.
- **Long-term:** Use records to plan restocking, sales, and expansions.



Tip: “If it’s not recorded, it didn’t happen.” Data helps you decide what to fix or repeat.

Summary Table

Area	Daily	Weekly	Long-Term
Housing	Check, clean	Inspect & fix	Plan for seasons
Feeding	Give fresh feed	Stock check, clean	Buy in bulk
Water	Refill, check	Scrub containers	Secure source
Health	Observe birds	Disinfect areas	Follow vaccine schedule
Breeding	Collect eggs	Watch breeders	Plan replacements
Recordkeeping	Note key data	Review trends	Plan production

Poultry farmers should plan their production in batches to match local market demand. For example, you may raise a batch of 100 broilers every 8 weeks, or schedule pullets for sale every month. Consistency in production helps build trust with buyers and makes cash flow more predictable.

Successful poultry farmers don't rely on luck. They plan their production process, follow daily routines, track results, and make changes where needed. Every step — feeding, health, housing, and sales — must follow a clear and repeatable process.

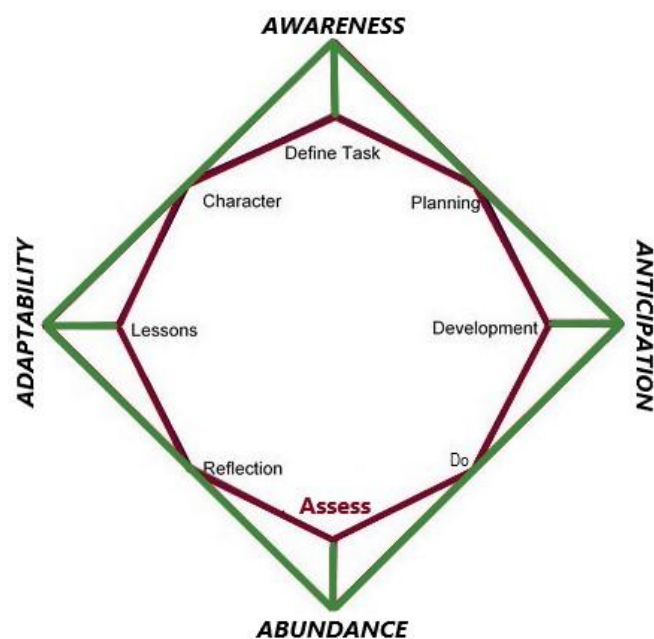


FIGURE 2.5: POULTRY MANAGEMENT CYCLE

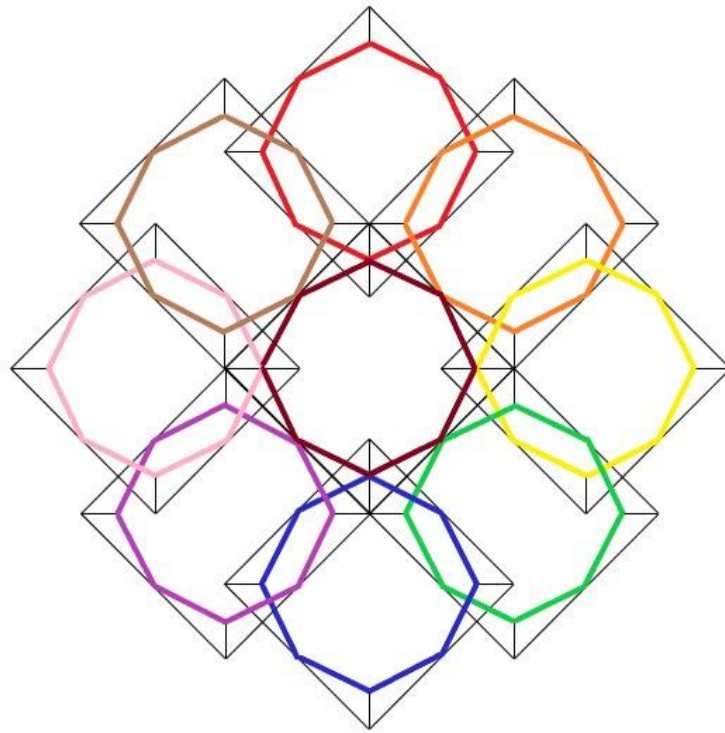


FIGURE 2.6: INTERLOCK OF KEY AREAS

2.2. Poultry Nutrition

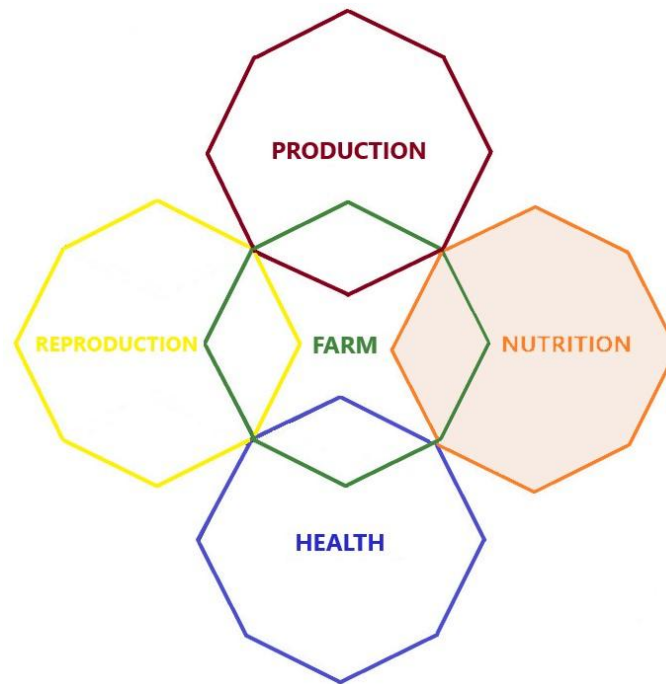


Figure 2.7: Nutrition, the second pillar towards poultry production

Nutrition is one of the most important factors in poultry farming. Chickens need a balanced diet of energy, protein, vitamins, and minerals to grow well, stay healthy, and produce eggs or meat. Whether you are raising broilers, layers, or indigenous birds, how you feed them and how consistently, determines your results. Poor nutrition leads to slow growth, weak immunity, and fewer eggs. In this section, we explore feeding by stage, conventional ingredients, and local alternatives that can help you reduce costs and improve performance.

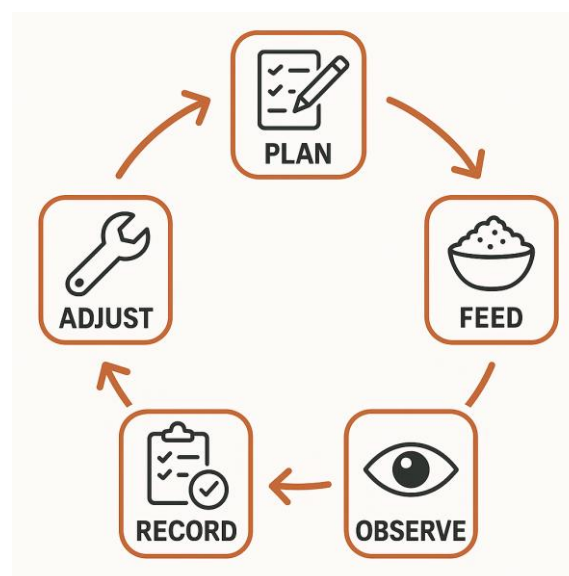


FIGURE 2.8: FEEDING PROCESS

The 5-Step Nutrition Management Cycle

Step Action

Plan Estimate how much feed you need based on bird age, number, and system.

Feed Provide the correct type of feed (starter, grower, layer) at the right time.

Observe Watch how the birds respond — are they finishing feed? Are they growing?

Record Note down how much feed was given, how much was left, and bird condition.

Adjust Change feeding amounts, feed type, or timing based on performance.

Table: Feed Needs by Age and Production Stage

Stage	Age (Weeks)	Feed Type	Feed Amount per Bird/Day	Notes
 Starter (Broiler)	0–2	Broiler Starter Mash	25–50 grams	High in protein (20–22%) for fast early growth
 Grower (Broiler)	3–5	Broiler Grower Mash	60–100 grams	Slightly less protein, more energy
 Finisher (Broiler)	6–8	Broiler Finisher Mash	110–150 grams	For meat development, reduce feed 12 hrs before slaughter
 Layer Chick (Pullet)	0–6	Chick Starter Mash	20–50 grams	High-protein feed; small, frequent meals
 Grower (Pullet)	7–17	Grower Mash	60–90 grams	Prepares pullets for laying
 Layer (Adult)	18+	Layer Mash	100–130 grams	Higher calcium for strong eggshells
 Indigenous Birds	All stages	Mixed grains + foraging + supplement	40–80 grams	Supplement with protein sources like termites, fishmeal



Additional Notes:

- **Clean water** must always be available. Water intake increases with feed intake.
- **Crushed shells or lime** can be added for laying hens to improve shell strength.
- If feed is **home-mixed**, balance energy (maize), protein (soya/fishmeal), and minerals (salt, premix).
- Avoid feeding **mouldy or spoiled feed**; it can kill birds quickly.

39 Nutrition

Nutrient	Function in Chickens	Source Example
Protein	Body growth, feather and egg formation	Soybean meal, fishmeal, maggots
Energy	Movement, heat, daily activities	Maize, sorghum, sunflower seed
Calcium	Strong bones and eggshells	Limestone, crushed shells
Vitamins (A, D, E)	Immune system, reproduction, metabolism	Premix, greens, duckweed
Minerals	Nerve, muscle, bone development	Salt, bone meal, dicalcium phosphate

Table: Nutrient Functions in Feed



If you notice that your broilers are eating less but growing slowly, check:

- Is the feed stale?
- Is the water clean?
- Is the coop too hot?

Then adjust feed type or schedule and record the result for next week.

2.2.1. Conventional Feed

Conventional feed sources are standard, widely used ingredients or compound feeds that are produced commercially and scientifically formulated to meet the nutritional needs of poultry. These include:

- Maize
- Soybean meal
- Fishmeal
- Sunflower cake
- Wheat bran
- Commercial premixes
- Limestone, salt, dicalcium phosphate
- Complete feeds like mash or pellets

Mash is considered as a **conventional feed** source because:

- It is formulated using conventional ingredients like maize, soya, and premix.
- It is processed and sold commercially through feed mills or agricultural supply shops.
- It is designed to meet the standard nutrient requirements for specific poultry types (e.g., broilers or layers).



FIGURE 2.9: CONVENTIONAL FEED
(Freepik.com)

2.2.2. Unconventional Feed Sources

These are non-traditional or alternative feed ingredients, such as:

- Maggot Farms – fly larvae
- Duckweed
- Hydroponic fodder production

These may be used to supplement or stretch feed, especially in smallholder systems, but they're not considered “conventional” unless balanced and tested.

2.2.2.1. Maggot Farms

Maggot farming is an **unconventional, low-cost, high-protein feed source**, and especially valuable for small-scale poultry farmers in Zambia.

1. What Are Maggots?

- Maggots are the **larvae of flies**, especially the common housefly (*Musca domestica*) and black soldier fly (*Hermetia illucens*).
- They are **rich in protein (up to 60%)**, fat, and essential amino acids.

2. Why Use Maggots for Poultry Feed?

- Maggots are **cheap to produce**, using waste like kitchen scraps, manure, or spoiled grain.
- They help reduce feed costs, especially in systems that rely on **supplementing scavenging birds**.
- They are part of a **circular farming system** — turning waste into feed.

3. Nutritional Benefits

- High in **crude protein (40–60%)**
- Contains essential fats and micronutrients
- Improves **growth rate** in broilers and **egg production** in layers when used as a supplement (not the only feed)



FIGURE 2.10: MAGGOT FARM

How to Build a Simple Maggot Farm

You can build a **basic maggot production unit** using affordable, local materials. Here's a simple setup:

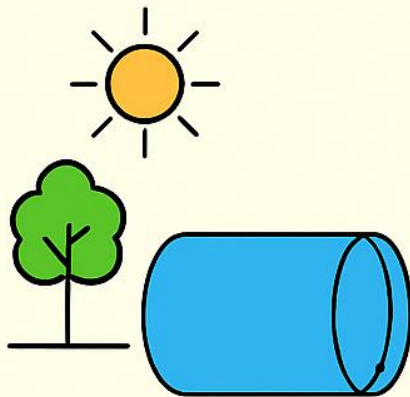
Materials Needed:

- Old plastic buckets or basins
- Wire mesh or old mosquito netting
- Wooden sticks or poles
- Animal waste (chicken droppings, slaughterhouse waste, cow dung)
- Food scraps (maize husks, vegetables, rotting fruits)
- A shaded, warm area with good air flow

Step-by-Step: Maggot Farm Construction

1. **Choose a Site**
 - Shaded, protected from rain
 - Close to the chicken house (but not inside)
2. **Prepare the Container**
 - Drill small holes at the bottom for drainage
 - Line the top with mesh to keep adult flies in and other pests out
3. **Add Waste Material**
 - Add 2–3 kg of animal manure and food scraps
 - Keep moist but not soaked
4. **Attract Flies**
 - Leave the container **open for a few hours daily** to attract flies to lay eggs
 - Once eggs hatch, cover with mesh to prevent other animals or excess rain
5. **Wait for Maggots**
 - Maggots appear in **3–5 days**, growing rapidly

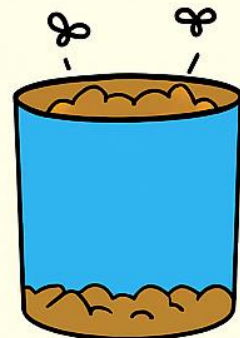
How to Build a Maggot Farm



Choose a plastic drum



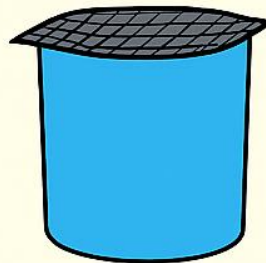
Drill the container



Add organic waste



Attract flies



Wait for maggots



Harvest the maggots

Tips for Success

- Always wear gloves or wash hands after handling waste.
- Never use human waste or chemically treated materials
- Keep the farm dry –cover during rain
- Introduce gradually into poultry diets to allow adaptation

FIGURE 2.11: MAGGOT FARM CONSTRUCTION
(CoPilot)

Harvesting Maggots

1. Self-Harvesting Method (Easiest)

- Tilt the container or insert a small ramp (banana leaves or sticks)
- Maggots naturally crawl away from the waste when mature — they fall into a bucket of water or feed tray
- Rinse them before feeding

2. Manual Harvesting

- Scoop the maggots out of the container
- Rinse with clean water to remove dirt and smell
- **Sun-dry** them for storage or feed them immediately

3. Feeding Chickens

- Feed **raw (wet) or dried** maggots
- Add to regular feed in small amounts: 10–15% of daily feed ration



Safety & Hygiene Tips

- **Always handle with gloves or wash hands afterwards**
- **Avoid using human waste or chemicals in the waste**
- **Keep the maggot farm clean and out of direct sun and heavy rain**

2.2.2.2. Duckweed

Duckweed (*Lemna* spp.) is an excellent unconventional feed source, especially for poultry farmers with access to water. It's fast-growing, protein-rich, and **costs very little to produce**.

What Is Duckweed?

- Duckweed is a **small floating aquatic plant** that grows on the surface of still water (ponds, tanks, or ditches).
- It is **rich in protein (25–40%)**, and contains minerals, vitamins, and amino acids essential for poultry growth.
- It grows **very fast** — doubling its biomass in 2–3 days under ideal conditions.

Why Use Duckweed for Poultry Feed?

- Grows with **minimal inputs** (sunlight + water + organic waste)
- Excellent **green protein supplement**
- Can be used fresh or dried, especially for **layers, broilers, and indigenous birds**
- Helps reduce feed costs and improves environmental sustainability



Farmer Tip: If your birds scavenge during the day, you can reduce feed cost by using maggots or duckweed to stretch commercial feed; just make sure it's balanced.



FIGURE 2.12: DUCKWEED PONDS

How to Build a Duckweed Pond

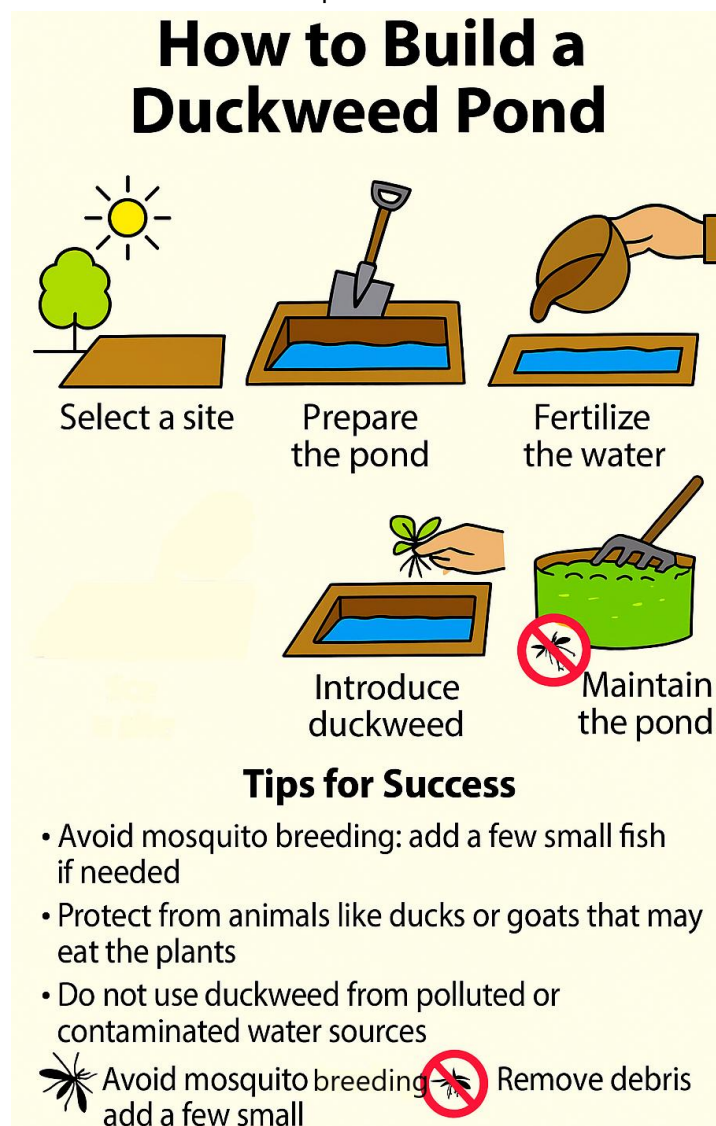
Duckweed is simple to grow — here's how to build a **basic production system** for smallholder use.

Materials Needed:

- A shallow **cement pond, plastic tank, or lined pit**
- **Water source** (rainwater, greywater, or fishpond water)
- **Cow dung or poultry droppings** (as a natural fertiliser)
- Optional: fine **mesh or netting** to protect against wind and animals

Step-by-Step: Duckweed Pond Setup

1. **Select a Site**
 - Shaded or semi-shaded area (too much sun may harm the plants)
 - Close to the poultry unit or kitchen
2. **Prepare the Pond**
 - Pond depth: 10–20 cm (shallow)
 - Use **plastic sheeting, concrete, or old bathtubs**
 - Add water and leave to settle for 2–3 days
3. **Fertilize the Water**
 - Add diluted **cow dung or poultry manure** (about 1 part manure to 5 parts water)
 - Stir and let settle for a day — this boosts nitrogen and phosphorus
4. **Add Duckweed**
 - Introduce a small amount of duckweed from another source
 - Within 1–2 weeks, it will spread across the surface
5. **Maintain the Pond**
 - Add small amounts of manure every 7–10 days
 - Remove floating debris or weeds
 - Prevent contamination with soaps or chemicals

**FIGURE 2.13: HOW TO BUILD A DUCKWEED POND**

Harvesting Duckweed

1. When to Harvest

- Harvest when duckweed **covers 70–90%** of the water surface
- Can be harvested **daily or every other day**

2. How to Harvest

- Use a **fine mesh scoop**, small sieve, or plastic container
- Drain the water, and rinse with clean water if needed

3. Feeding Chickens

- **Fresh:** Mix with mash or feed directly (best for layers and growers)
- **Dried:** Sun-dry on mats, crush, and mix with other feed ingredients

4. Feeding Rate

- Start with small amounts: **5–15% of total feed**
- Gradually increase as birds adapt



Tips for Success

- Avoid mosquito breeding: add a few small fish if needed
- Protect from animals like ducks or goats that may eat the plants
- Do not use duckweed from **polluted or contaminated** water sources

2.2.2.3. Hydroponic Fodder

Hydroponic fodder is a highly relevant, climate-smart feed option. It's especially useful in **areas with limited land or unreliable rainfall**.

What Is Hydroponic Fodder?

Hydroponic fodder is **young, sprouted grain (usually maize, wheat, barley, or sorghum)** grown **without soil**, using only water and light. It is harvested when the plants are 6–8 days old and fed fresh to chickens and other livestock.

Why Use Hydroponic Fodder?

- Grows quickly (in just **6–8 days**)
- Requires **no soil and little space**
- Grows year-round — **even during droughts**
- Contains **enzymes, vitamins, and digestible energy**
- Improves feed quality and reduces feed cost



FIGURE 2.14: HYDROPONIC FODDER

How to Cultivate Hydroponic Fodder

Materials Needed:

- **Grains:** maize, wheat, barley, or sorghum (clean and untreated)
- **Water:** clean and chlorine-free (rainwater is ideal)
- **Trays or shallow containers** (plastic or metal)
- **Shaded structure** or room with indirect sunlight or grow lights
- Optional: **rack/shelf system** to save space

Step-by-Step: Growing Hydroponic Fodder

1. **Soak the Seeds**
 - Soak 1–2 kg of grain in clean water for **12–24 hours**
 - Drain and rinse thoroughly
2. **Incubate:**
 - Place in a 20L bucket with holes in the lid
 - Place the bucket in the sun
 - Keep the seeds moist, turning twice a day
 - Check for germination
3. **Prepare Trays**
 - Place a **thin layer** of soaked seeds evenly across each tray
 - No need for soil, just spread the grains directly
4. **Water Daily**
 - Lightly sprinkle water **2–3 times per day**
 - Do **not flood**, keep the grains moist
5. **Provide Light**
 - Place trays in a well-lit but shaded area
 - Avoid direct sunlight or strong winds (which can dry out sprouts)

6. Control Temperature

- Ideal range: **20–30°C**
- Too cold = slow growth; too hot = mould risk

7. Wait for Growth

- By **day 6–8**, sprouts will be 10–20 cm tall and ready to harvest



FIGURE 2.15: STEP-BY-STEP PROCESS FOR HYDROPONIC FODDER
(CoPilot)



FIGURE 2.16: HYDROPONIC FODDER UNIT

Harvesting Hydroponic Fodder

1. When to Harvest

- Harvest at **6–8 days** (before stalks become too fibrous)
- Fodder should have **roots, green shoots, and some seed left**

2. How to Harvest

- Lift the entire mat of sprouts from the tray (**Refer Figure 2.14.**)
- Shake off excess water or trim as needed

3. Feeding Chickens

- Chop into smaller pieces (5–10 cm) if needed
- Feed **immediately after harvest**
- Start with **5–10%** of the total feed ration and increase gradually



Tips for Success

ENSURE THAT THE GRAIN THAT YOU USE HAS NOT BEEN TREATED WITH POISONS OR CHEMICALS

- Always use **clean trays and water** to avoid mould or rot
- If mould appears, **discard** the tray
- Use a **shelf system** to grow more trays in a small space
- Don't let the fodder **grow too long** — older fodder becomes hard and fibrous

Recommended Crops for Hydroponic Fodder (Zambian context)

Grain	Growth Rate	Notes
Maize	Fast	Cheap and widely available
Sorghum	Moderate	Drought-tolerant, good for poultry
Wheat	Fast	High quality, more expensive
Barley	Fast	Ideal in cooler climates

Comparison Chart: Hydroponic Fodder vs Duckweed vs Maggots

Feature	Hydroponic Fodder	Duckweed	Maggots
Feed Type	Green sprouts (maize, wheat)	Floating aquatic plant	Larvae of flies
Growth Time	6–8 days	3–5 days (under good conditions)	3–5 days after fly eggs hatch
Protein Content	15–20%	25–40%	40–60%
Energy Content	Moderate	Moderate	High
Water Requirements	Medium (mist 2–3x daily)	High (must stay in shallow water)	Low (moist waste only)
Space Needed	Small (can be vertical)	Small–medium pond	Very small (a few containers)
Input Cost	Low–Medium (grains, trays)	Very low (uses water + manure)	Very low (uses waste materials)
Technical Skill Needed	Low to medium	Low	Low
Feeding Form	Chopped fresh	Fresh or sun-dried	Fresh or dried
Best For	Layers, broilers	Layers, growers, indigenous chickens	All types — especially broilers & growers
Main Risk	Mould or rot from overwatering	Mosquito breeding, algae overgrowth	Smell or hygiene issues if unmanaged

Summary:

- **Hydroponic Fodder** is ideal for farms with limited space and reliable water.
- **Duckweed** is excellent where small ponds are available.
- **Maggots** are best for high-protein supplementation, especially where organic waste is available.

2.3 Animal Health

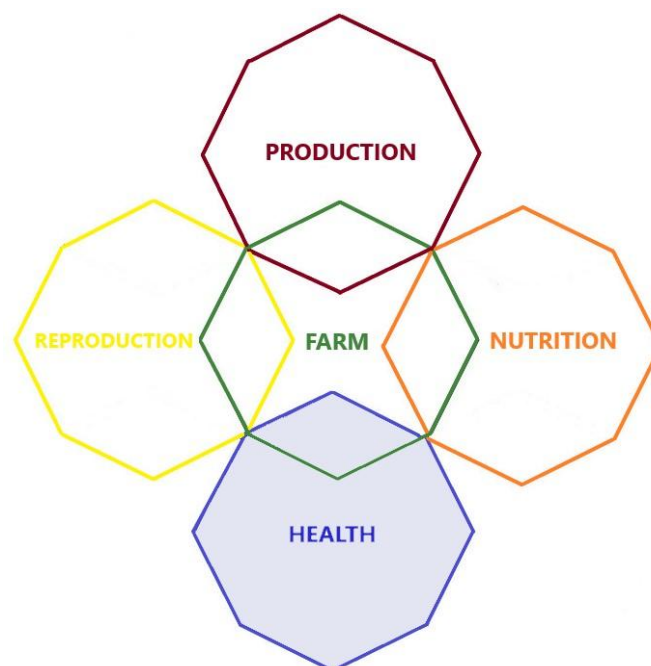


Figure 2.17: Animal Health is our third pillar for poultry production

2.3.1. Importance of Animal Health in Poultry Production

Animal health is one of the most important pillars of successful poultry farming. Even with good breeds, housing, and feed, diseases and parasites can wipe out entire flocks if not well managed. In Zambia, smallholder poultry is mostly raised in free-range or semi-intensive systems, where birds scavenge and encounter wild birds, contaminated soil, and parasites. This increases the risk of infections.

Healthy birds are essential for successful poultry farming. Good health ensures better growth, higher egg production, improved feed conversion, and reduces losses from disease and mortality. Maintaining animal health also protects public health by preventing zoonotic diseases (diseases that can transfer from animals to humans).

2.3.2. Common Poultry Diseases (2.3.4. is our in-depth discussion)

Poultry are susceptible to various diseases caused by bacteria, viruses, parasites, and fungi. Some common poultry diseases include:

- **Infectious Bursal Disease (Gumboro Disease)**
A viral disease that suppresses the immune system, making birds vulnerable to other infections.
- **Newcastle Disease**
A highly contagious viral disease, causing respiratory distress, nervous symptoms, and high mortality.
- **Avian Influenza (Bird Flu)**
A viral infection that can cause severe illness and death; some strains are zoonotic.

- **Marek's Disease**

A viral disease, causing tumours and paralysis.

- **Coccidiosis**

A parasitic infection of the gut caused by protozoa, leading to diarrhoea and poor growth.

- **Fowl Cholera**

A bacterial infection causing sudden death or chronic symptoms.

- **Fowl Pox**

A slow-spreading viral disease-causing wart-like lesions, white or yellowish scabs on the comb, wattles, and around the eyes; spread by mosquitoes and direct contact, it affects both village and exotic birds.

- **Chronic Respiratory Disease (CRD)**

A bacterial infection often triggered by stress or poor housing, leading to sneezing, nasal discharge, watery eyes, and reduced growth or egg laying in affected flocks.

DID YOU KNOW? ZOONOTIC DISEASES

Some poultry diseases can be passed from birds to humans. These are called **zoonotic diseases**. Farmers and handlers must take special care to protect themselves and others.

Examples:

- **Avian Influenza**
- **Salmonella**
- **Campylobacter**

Safety Measures:

- Wash hands after handling birds
- Use gloves when treating sick birds
- Cook poultry products thoroughly
- Keep poultry areas clean and separate from living spaces

⊘ Never allow children to play with sick birds or dead poultry.

2.3.3. Signs of Healthy and Unhealthy Birds



FIGURE 2.18: HEALTH OBSERVATION POINTS (adapted from freepik.com)

Healthy birds usually have:

- Bright eyes
- Clean feathers
- Active and alert behaviour
- Good appetite
- Normal droppings

Unhealthy birds may show:

- Lethargy or weakness
- Loss of appetite
- Ruffled feathers or feather loss
- Swollen eyes or beak discharge
- Coughing, sneezing, or nasal discharge
- Diarrhoea or abnormal droppings
- Sudden deaths

2.3.4. Diseases, Symptoms and Treatments

2.3.4.1. INFECTIOUS BURSAL DISEASE (GUMBORO DISEASE)

A viral disease that suppresses the immune system, making birds vulnerable to other infections.



FIGURE 2.19: INFECTIOUS BURSAL DISEASE

(<https://www.cabidigitallibrary.org/doi/full/10.1079/cabicompendium.80665>)

- **Cause:** Viral infection (Infectious Bursal Disease Virus – IBDV)
- **Transmission:** Highly contagious; spreads via droppings, contaminated feed, water, equipment, and clothing

Symptoms

- Sudden onset of depression and ruffled feathers
- Watery diarrhoea and soiled vent feathers
- Unsteady gait or trembling
- Dehydration and weight loss
- Swollen or haemorrhagic bursa (internal sign)
- High mortality in chicks aged 3–6 weeks

Treatment

- No specific cure
- Supportive care: isolate affected birds, keep warm and hydrated

Prevention:

- Vaccinate chicks at 14–18 days of age
- Maintain strict hygiene and biosecurity
- Disinfect housing and equipment thoroughly

2.3.4.2. NEWCASTLE DISEASE

A highly contagious viral disease, causing respiratory distress, nervous symptoms, and high mortality.



FIGURE 2.20: NEWCASTLE DISEASE

(<http://www.lidiski.org/distinctive-symptoms-of-newcastle-disease/>)

- **Cause:** Viral infection (paramyxovirus)
- **Transmission:** Airborne, contaminated feed/water, contact with infected birds

Symptoms

- Twisted neck (torticollis)
- Paralysis of legs or wings
- Greenish diarrhoea
- Drop in egg production
- Sneezing, coughing, and nasal discharge
- Sudden death in severe cases

Treatment

- No cure available
- Supportive care: isolate sick birds, keep warm and hydrated

Prevention:

- Vaccinate chicks at day-old;
- maintain strict biosecurity

2.3.4.3. AVIAN INFLUENZA (BIRD FLU)

A viral infection that can cause severe illness and death; some strains are zoonotic.

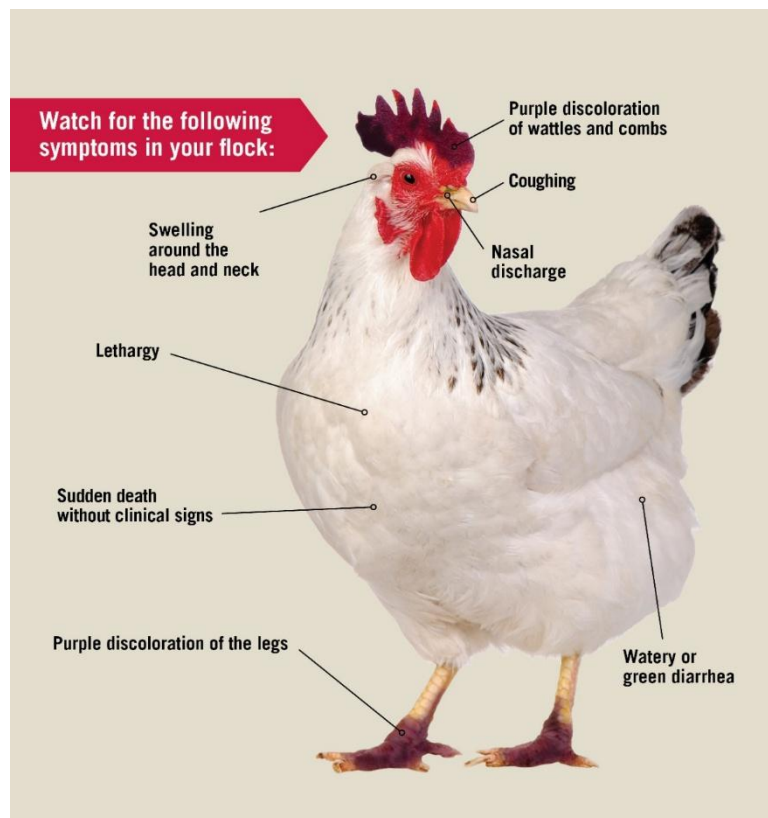


FIGURE 2.21: AVIAN INFLUENZA

(<https://vet.uga.edu/diagnostic-service-labs/pdrc-diagnostic-services/avian-influenza-flu/>)

- **Cause:** Viral infection (Influenza A virus, commonly H5N1 or H7N9)
- **Transmission:** Highly contagious; spreads through contact with infected birds, droppings, secretions, or contaminated surfaces

Symptoms in Poultry

- Sudden death without warning
- Swollen head, comb, or wattles
- Purple discolouration of comb and wattles
- Coughing, sneezing, nasal discharge
- Drop in egg production or soft-shelled eggs
- Diarrhoea and lethargy
- Nervous signs (tremors, incoordination)

Treatment

- No specific cure
- Supportive care: isolate affected birds, improve ventilation, and reduce stress

Prevention:

- Strict biosecurity: limit access to poultry houses
- Avoid contact with wild birds
- Disinfect equipment and footwear
- Report suspected outbreaks to veterinary authorities
- Vaccination may be used in some regions under official guidance

2.3.4.4. MAREK'S DISEASE

A viral disease, causing tumours and paralysis.



Figure2.22: Marek's Disease

(<https://www.backyardchickencoops.com.au/blogs/learning-centre/mareks-disease-in-chickens>)

- **Cause:** Viral infection (Gallid herpesvirus 2)
- **Transmission:** Highly contagious; spreads through feather dander, dust, and direct contact with infected birds or contaminated equipment

Symptoms

- One leg stretched forward and the other back (classic paralysis)
- Drooping wings or twisted neck (torticollis)
- Weight loss and lethargy
- Loss of appetite and dehydration
- Irregular pupils or grey, cloudy eyes (ocular form)
- Tumours in internal organs (visceral form)
- Enlarged feather follicles or skin nodules (cutaneous form)

Treatment

- No cure available
- Supportive care: isolate affected birds, provide warmth, hydration, and high-protein feed

Prevention:

- Vaccinate chicks at day-old (ideally before exposure)
- Maintain strict hygiene and biosecurity
- Avoid mixing vaccinated and unvaccinated birds

2.3.4.5. COCCIDIOSIS

A parasitic infection of the gut caused by protozoa, leading to diarrhoea and poor growth.

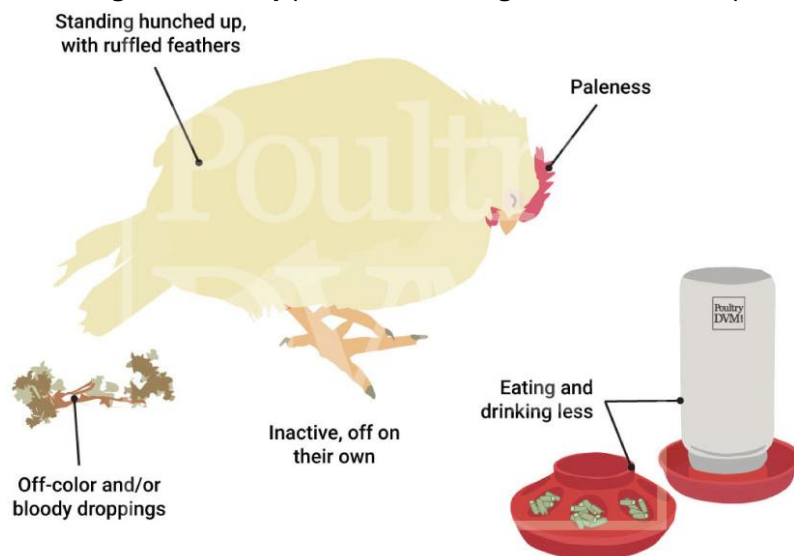


FIGURE 2.23: COCCIDIOSIS

(<https://poultrydvm.com/condition/coccidiosis>)

- **Cause:** Parasitic infection caused by *Eimeria* species (protozoa)
- **Transmission:** Ingestion of sporulated oocysts from contaminated litter, feed, water, or droppings

Symptoms

- Bloody or watery diarrhoea
- Droopiness and huddling
- Ruffled feathers and pale combs
- Loss of appetite and weight
- Dehydration and stunted growth
- Reduced feed conversion and productivity
- In severe cases: sudden death, especially in young chicks (3–6 weeks)

Treatment

- **Medications:**
 - *Amprolium* (e.g. Amprol, Corid) in drinking water for 5–7 days
 - *Toltrazuril* or *Sulfa drugs* (e.g. Sulfadimethoxine) as prescribed
- **Supportive care:**
 - Provide clean water with electrolytes and vitamins
 - Isolate affected birds and reduce stress
- **Environmental control:**
 - Keep litter dry and clean
 - Avoid overcrowding
 - Rotate pens and disinfect housing regularly

Prevention

- Use medicated starter feed with coccidiostats
- Vaccinate chicks where available
- Maintain strict hygiene and dry bedding
- Avoid mixing age groups

2.3.4.6. FOWL CHOLERA

A bacterial infection causing sudden death or chronic symptoms.

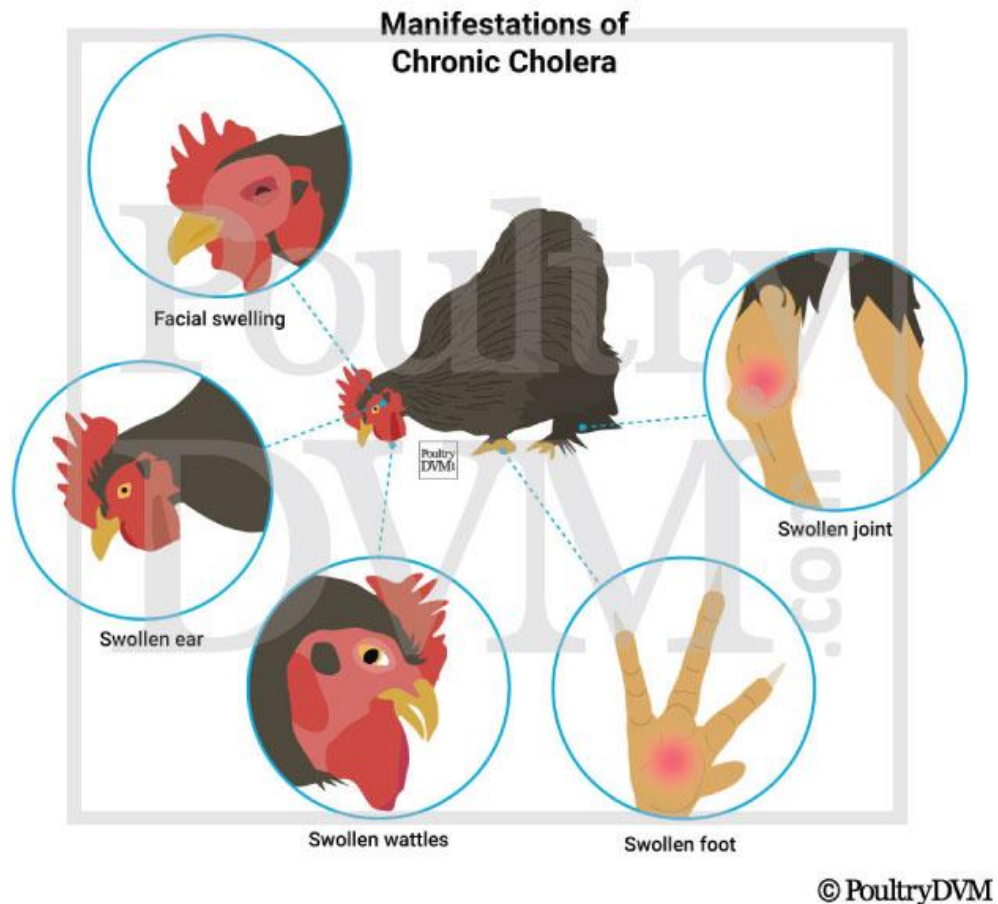


FIGURE 2.24: FOWL CHOLERA

(<https://poultrydvm.com/condition/fowl-cholera>)

- **Cause:** Bacterial infection caused by *Pasteurella multocida*
- **Transmission:** Highly contagious; spreads via contaminated feed, water, equipment, wild birds, rodents, or direct contact with infected birds

Symptoms

- Sudden death with no prior signs (acute form)
- Fever, ruffled feathers, lethargy
- Yellowish or greenish diarrhoea
- Mucous discharge from the mouth or nostrils
- Swollen wattles, joints, footpads, or sinuses
- Lameness and difficulty walking
- Cyanosis (darkened comb and wattles)
- Wry neck (torticollis) in chronic cases

Treatment

- **Antibiotics:**
 - Sulfonamides (e.g. sulfadimethoxine)
 - Tetracyclines (e.g. oxytetracycline)
 - Penicillin, streptomycin, or tylosin as prescribed
 -

■ **Supportive care:**

- Isolate affected birds
- Provide warmth, hydration, and clean feed

■ **Note:** Treatment may reduce mortality but not eliminate carriers



If in doubt regarding diagnosis or treatment seek professional advice. The vet or professional will have a wider view of the movement of diseases through the area. The professional can also warn you of preventative action before a disease reaches your smallholding.

Prevention

- Vaccinate flocks using live or inactivated vaccines
- Maintain strict biosecurity:
 - Control rodents and wild birds
 - Disinfect equipment and housing
 - Avoid introducing new birds without quarantine
- **Promptly remove and safely dispose of dead birds**

2.3.4.7. FOWL POX



FIGURE 2.25: FOWL POX
(poultrydvm.com)

Fowl pox is a viral disease that affects chickens and other poultry. It spreads slowly and usually causes sores on the skin (dry form) or lesions inside the mouth and throat (wet form). It is transmitted through the bite of infected mosquitoes, open wounds, and direct contact with infected birds.

It is **not usually fatal** in healthy birds, but it reduces feed intake, growth, and egg production.

Symptoms

- **Dry form** (most common):
 - Scabby **white-to-yellow spots** on comb, wattles, eyelids, beak, and legs
 - Crusts that may turn black as they dry

■ **Wet form** (more severe):

- Yellowish plaques inside the **mouth, throat, and windpipe**
- **Difficulty breathing**, swallowing, or eating
- Reduced feed intake and poor weight gain
- Drop in egg production

Treatment and Control

- **No specific treatment** for the virus — focus is on prevention and care
- Apply **iodine or antiseptic** to dry sores to prevent infection
- For wet form, **soften lesions** with warm saline and give supportive care
- **Isolate affected birds**
- Maintain strict **biosecurity** and reduce mosquito exposure

Prevention:

- **Vaccinate** at 6–10 weeks of age with fowl pox vaccine (wing stab method)
- Eliminate standing water to reduce mosquito breeding
- Disinfect housing regularly and control pests

2.3.4.8. CHRONIC RESPIRATORY DISEASE (CRD)

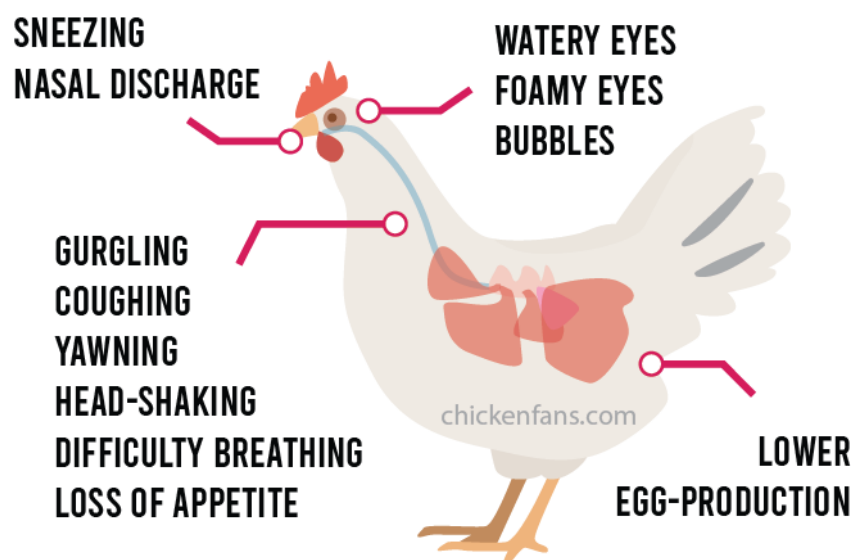


FIGURE 2.26: CHRONIC RESPIRATORY DISEASE
(chickenfans.com)

Chronic Respiratory Disease (CRD) is a **bacterial infection** caused by *Mycoplasma gallisepticum*. It mostly affects the **respiratory system** of chickens, especially those under stress or living in poor housing conditions. CRD spreads slowly but can cause long-term loss of **productivity and flock health** if not controlled.

It often appears in **older birds**, or in combination with **viral infections** like Infectious Bronchitis or Newcastle Disease, making symptoms worse.

Symptoms

- **Coughing**, sneezing, nasal discharge
- **Gurgling** or rattling sounds when breathing
- **Swollen sinuses** and foamy eyes

- Poor feed conversion and **slow growth**
- Drop in egg production
- **Loss of appetite** and weight loss in severe cases

Treatment and Control

- Treat with **broad-spectrum antibiotics** such as:
- Tylosin, Tetracycline, or Erythromycin (added to water/feed as directed)
- Use **immune boosters** and multivitamins during recovery
- Improve **ventilation and reduce stress** in the poultry house
- **Cull chronic cases** in commercial flocks

Prevention:

- Buy birds from **Mycoplasma-free** sources
- Quarantine new birds before mixing with existing flock
- Keep houses **clean, dry, and well-ventilated**
- Avoid overcrowding and **sudden temperature changes**

2.3.5. Vaccination Schedule/Prevention Guide

Village Chicken and Free-Range Birds

Disease / Condition	Age / Time	Vaccine / Products	Route of Administration
Newcastle + Infectious Bronchitis (IB)	Day Old	Ma5 + Clone 30 / Vitabron	Hatchery Spray
Gumboro	Day 10	Gumboro MB/I	Drinking Water
Newcastle + IB	Day 12	VH + H120 / Ma5 + Clone30 / Vitabron (Pick one)	Drinking Water
Gumboro	Day 18	Gumboro MB/I	Drinking Water
Newcastle + IB	Day 21	VH + H120 / Ma5 + Clone30 / Vitabron (Pick one)	Drinking Water
Fowl Pox	Day 42 (Week 6)	Fowl Pox / Fowl Pox + AE	Wing Stab
Infectious Coryza	Day 49 (Week 7)	Vaxxon / Corvac / Nobilis	Intramuscular Injection
Newcastle + IB	Day 52 (Week 8)	VH + H120 / Ma5 + Clone30 / Vitabron (Pick one)	Spray
Newcastle + IB	Vaccinate every 4 to 6 weeks, and alternate strains	VH + H120 / Ma5 + Clone30 / Vitabron (Pick one)	Spray

(Source; Livestock Services cooperative society)

Parasite Prevention and Control

Parasite Type	Age / Time	Product / Treatment	Application Method
Internal Parasites (Worms)	Week 6, Week 10, Week 14, etc. \n Deworm once every 4 weeks	- Piperin (powder) \n - Ecomintic (liquid) \n - Promectin (liquid)	Drinking Water
external Parasites (Fleas, Mites, Lice, Ticks)	Once every 2–4 weeks , depending on level of infestation	- Promectin \n - Tick and Flea Powder (Kyron) \n - Akheri Spray \n - Akheri Powder	- Drinking Water \n - Dusting \n - Spray \n - Dusting

(Source; Livestock Services cooperative society)

Vaccination Guidance for Broilers and Layers

Broilers and layers, especially exotic and hybrid types like Cobb 500, Ross, ISA Brown, or Lohmann, are more sensitive to disease and stress than indigenous chickens. Their success depends heavily on good vaccination and management from the very beginning.



Unlike free-range village chickens, broilers and layers are raised intensively and have specific health needs that match their fast growth or high egg-laying potential.

While the general diseases (like Newcastle, Gambaro, Fowl Pox, Infectious Bronchitis) still affect them, the timing, strain, and type of vaccine can vary depending on the breed and source.

What Farmers Should Do

- **Always follow the vaccination program recommended by the hatchery or supplier** where the chicks or point-of-lay birds were purchased.
- Many reputable hatcheries include a **vaccination card** or **starter health plan** at the point of sale.
- If buying from feed stores or agro-vets, **ask for the correct vaccine brands and handling advice.**
- Maintain a **cold chain** for vaccines and apply them at the right time and method (e.g., drinking water, spray, wing stab, or injection).



IMPORTANT REMINDER

“Avoid mixing birds of different ages or unknown health status in the same pen and always consult a veterinary officer or livestock assistant before using antibiotics or new vaccines.”

2.3.6. Disease Prevention and Biosecurity

Prevention is better than cure. Farmers should adopt good management practices to prevent disease outbreaks.

- **Cleanliness and hygiene:** Regular cleaning of poultry houses and equipment.
- **Proper ventilation:** To reduce moisture and ammonia buildup.
- **Quarantine new birds:** Isolate new birds for at least two weeks before mixing with the flock.
- **Control visitor access:** Limit farm visitors and disinfect footwear and hands.
- **Rodent and pest control:** Rodents and wild birds can carry diseases.
- **Vaccination:** Use vaccines appropriate for the common diseases in the region.

2.3.7. Early identification and treatment of diseases

Diseases and health conditions in poultry can arise at any time, and while good management can reduce their occurrence, it is impossible to prevent all diseases entirely. Therefore, early identification and swift response are essential for minimising damage and mortality.

One of the key challenges is that many deadly or damaging poultry diseases can kill birds or cause irreversible damage within **12 to 24 hours** of the first signs appearing. Effective treatment or control depends on how quickly these signs are observed and action is taken.



Important: Delays in observation and treatment are the leading causes of preventable poultry deaths.

Observation Is the First Line of Defence

The most valuable tools available to a poultry caretaker are **sharp observation, attentive monitoring**, and good recordkeeping. The flock handler must be trained to notice early warning signs such as:

- Changes in behaviour or activity
- Loss of appetite
- Drooping wings or ruffled feathers
- Diarrhoea or abnormal droppings
- Swollen eyes, nasal discharge, coughing

Treat Early, or Prevent Entirely

- If a disease **is treatable, early treatment** greatly increases the chances of recovery.
- If a disease **cannot be treated**, then **vaccination, biosecurity**, and **management practices** are the only reliable defences.
- Isolation of sick birds (quarantine) helps protect the rest of the flock.

The Daily Observation Card (DOC)

A helpful tool for disease monitoring is the **Daily Observation Card (DOC)**. This card is a structured checklist used by the poultry handler every day to track flock health, including:

- **Eyes**
- **Feathers**
- **Activity level**
- **Appetite**
- **Droppings**

In addition to health, the DOC can also track key management tasks:

- Was feeding and watering done?
- Did all birds get access to feed and drink?
- Are there signs of stress or injury?



Tip: Consistent use of the DOC builds habits of careful observation and provides a daily record that helps detect patterns and prevent losses.

Daily Tasks for Disease Detection

- Provide clean food and water or check scavenging access.
- Observe each bird using DOC criteria.
- Note any abnormalities immediately.
- Take swift action (treatment or isolation) if symptoms are present.

Below you will find an example of a **Daily Observation Card (DOC) template**. It's designed for ease of use, and it encourages structured observation and recordkeeping.

Recordkeeping Beyond the DOC

While the Daily Observation Card helps monitor daily health, poultry farmers should keep **additional records** for better flock management.

Useful records include:

- Vaccination dates and batch numbers
- Deworming and treatments
- Mortality and culling records
- Feed usage and changes
- Egg production and weights



Why it matters: Accurate records help track performance, spot trends, and make better decisions during disease outbreaks or when seeking veterinary help.

Daily Observation Card (DOC) Template		
Date: _____		Time of observation: _____
Flock ID / Pen Number: _____		Observer Name: _____
Section A: General Management Checks		
Management Task	Completed? (✓/X)	Notes or Action Required
Feed available		
Clean drinking water		
Feed and water containers clean		
Housing clean and dry		
Adequate ventilation		
Lights functioning (if applicable)		
Rodent/pest signs checked		

Section B: Health Observation Checklist (Sample 10–20 birds randomly)			
Observation Point	Normal? (✓/X)	Abnormal Findings (tick if observed)	Notes or Action Taken
Eyes		☐ Swollen ☐ Discharge ☐ Closed	
Feathers		☐ Ruffled ☐ Loss ☐ Dirty patches	
Activity		☐ Lethargic ☐ Isolated ☐ Shivering	
Appetite		☐ Not eating ☐ Less feeding interest	
Droppings		☐ Diarrhoea ☐ Blood ☐ Unusual colour	

Section C: Summary and Action
■ Were any sick birds identified? ☐ Yes ☐ No If yes, number: _____ Removed/Isolated? ☐ Yes ☐ No
■ Medications or treatments given today:
■ Other observations or remarks:
■ Next steps/follow-up required:



Keep DOCs in a binder or folder for easy reference. Reviewing records helps detect trends and recurring issues early.

2.3.8. Parasites and Parasite Control

Parasites are organisms that live in or on poultry and feed off them, causing harm. They can lead to poor growth, reduced egg production, irritation, and in severe cases, death. Parasites are often overlooked until their effects become serious.

Types of Poultry Parasites

1. External Parasites (Ectoparasites)

Live on the skin and feathers of birds.

Parasite Signs in Birds	Control Measures
Lice Restlessness, feather loss, pale comb	Dusting with insecticides; clean bedding
Mites Night-time irritation, pale comb, scabs	Clean coop, treat birds and coop
Fleas Red spots, itching, reduced feeding	Insecticide treatment

Cause: Infestation by ectoparasites such as poultry lice, red mites, northern fowl mites, and sticktight fleas

Transmission: Spread through contact with infested birds, wild birds, rodents, bedding, or equipment

Symptoms

- Constant scratching or pecking at skin
- Feather loss, especially around vent, neck, and wader wings
- Pale combs and wattles (due to blood loss)
- Scabs or crusts on skin (especially face and and comb)
- Reduced egg production
- Restlessness, especially at night (mites feed in the dark)
- Visible parasites or eggs on feathers or skin

Treatment

- Topical treatments:
 - Dust birds with poultry-safe insecticidal powder (e.g., permethrin)

Prevention

- Regularly inspect birds and housing
- Quarantine new birds before introducing to flock

Visible parasites or eggs on feathers or skin (especially around vent)

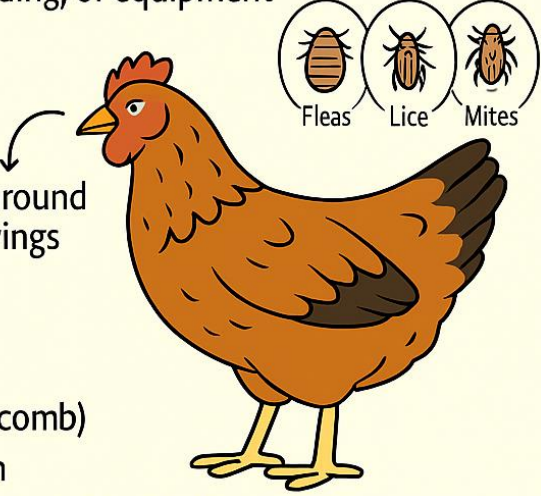


FIGURE 2.27: EXTERNAL PARASITES

(CoPilot)

2. Internal Parasites (Endoparasites)

Live inside the bird's digestive system or organs.

Parasite	Signs in Birds	Control Measures
Roundworms	Weight loss, diarrhoea, poor growth	Deworming with veterinary-approved medication
Tapeworms	Visible segments in droppings	Regular deworming, hygiene
Cecal worms	Diarrhoea, poor feed efficiency	Proper sanitation, medication



Note: Heavy parasite loads can weaken the immune system and make birds more vulnerable to other diseases.

Parasite Control Practices

- **Routine deworming** (every 2–3 months depending on risk)
- **Clean litter and housing regularly**
- **Use dry bedding to reduce mite breeding**
- **Avoid overcrowding**
- **Prevent contact with wild birds and pests**
- **Rotate pastures or scavenging areas**, if using free-range systems



Tip: Monitor droppings and feather condition during your daily observation routine. Early signs of parasites often show up there.



FIGURE 2.28: CHICKEN MOULTING

([Chicken Molting: What Is It and How to Help Your Hens With It - The Happy Chicken Coop](#))

Distinguishing Moulting from Disease or Parasites

Moulting is a **natural process** where chickens shed old feathers and grow new ones. It usually occurs once a year, often in late summer or early autumn, and can last from **4 to 12 weeks**, depending on breed, nutrition, and environment.

Normal Signs of Moulting:

- Gradual feather loss, starting from the head and neck.
- New feather shafts (called “pin feathers”) visible on the skin.
- Slight drop in egg production.
- Bird remains active, eating, and alert.
- No signs of wounds, parasites, or discharge.

How Moulting Differs from Disease or Parasites:

Feature	Moulting	Parasites or Disease
Feather Loss Pattern	Even, symmetrical	Patchy or localised
Bird Behaviour	Normal	Lethargic, scratching, restlessness
Skin Condition	Clean with pin feathers	Red, inflamed, scabby, or crawling parasites
Appetite & Activity	Slight decrease (normal)	Often drastically reduced
Other Symptoms	None	Diarrhoea, coughing, weight loss, etc.



Reminder: Do **not** treat birds for parasites or diseases unless symptoms clearly match. Misdiagnosing a natural moult can waste money and disrupt the flock unnecessarily.

Supporting Healthy Moulting:

- Provide a **high-protein diet** to support new feather growth.
- Reduce stress (limit handling and changes in routine).
- Allow birds space and time to recover before expecting full egg production again.

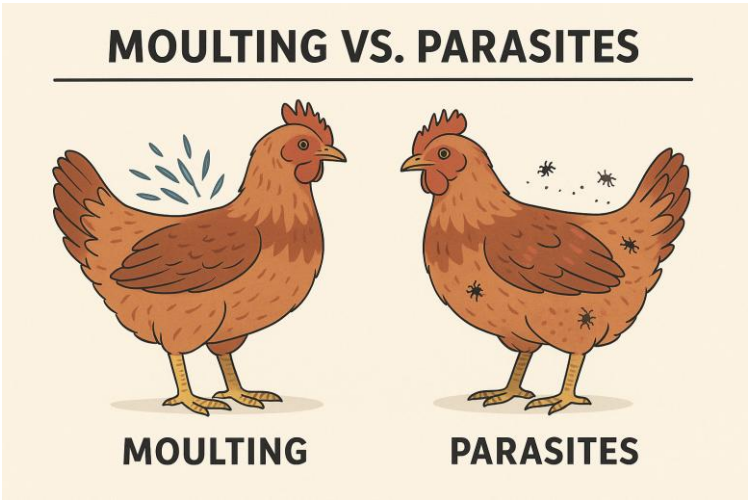


FIGURE 2.29: MOULTING VS. PARASITES (AI Generated)

2.3.9. Environmental Stress: Heat and Cold

Environmental conditions affect bird health, especially temperature extremes. Birds are sensitive to both heat stress and cold stress, which can reduce productivity, increase disease risk, and even cause death.

HEAT STRESS

Occurs when temperatures are too high, especially above 30°C.

Signs:

- Panting and open-mouth breathing
- Wings spread away from body
- Lethargy and reduced feed intake
- Drop in egg production
- Pale combs and wattles

Prevention:

- Provide cool, clean water at all times
- Increase ventilation or add fans
- Provide shade (for outdoor birds)
- Avoid overcrowding

COLD STRESS

Occurs when temperatures are too low, especially below 15°C for young birds.

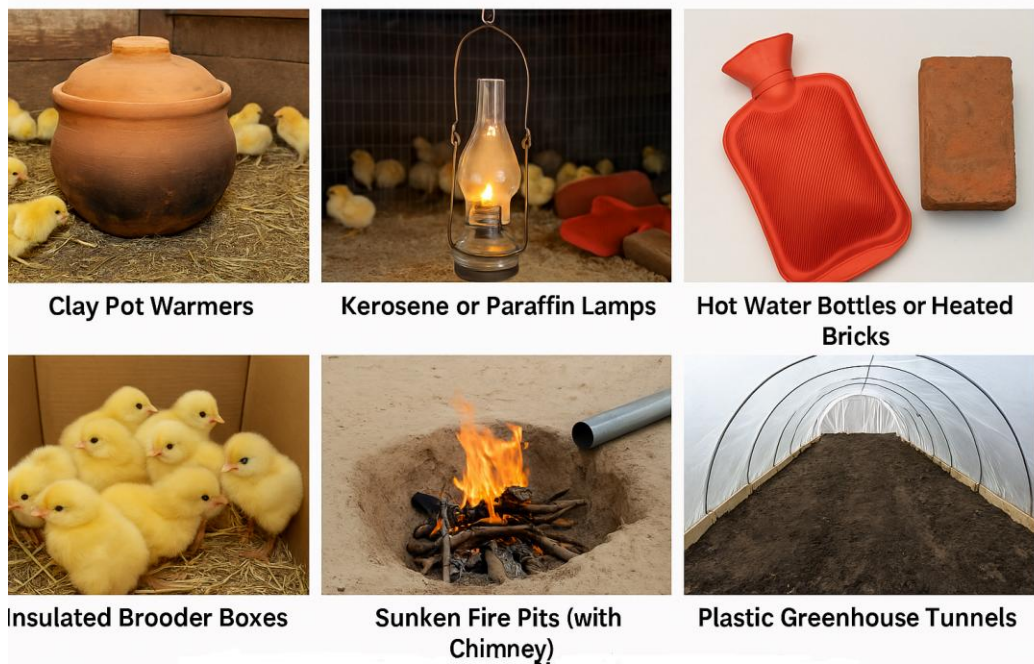


FIGURE 2.30: TRADITIONAL WAYS OF HEATING POULTRY

(CoPilot)

Signs:

- Huddling together
- Shivering or reduced movement
- Poor feather condition
- Slow growth and low feed intake

Prevention:

- Use heating (brooders) for chicks
- Insulate housing (especially floors and walls)
- Avoid drafts and moisture buildup



Note: Chicks are most vulnerable to both heat and cold. Monitor them closely during brooding.

2.3.10. Basic Poultry Vaccination Schedule

Vaccination helps build immunity and reduce the incidence of disease. Typical vaccines include:

Disease	Age to Vaccinate	Method
Newcastle Disease	Day-old, 2 weeks, 4 weeks	Eye drop or spray
Marek's Disease	Day-old	Injection
Infectious Bronchitis	1 week and 3 weeks	Spray or drinking water
Coccidiosis	Depending on region and risk	In feed or water



Note: Follow veterinary advice and local regulations.

Chicks can be vaccinated and given medicine through several methods, depending on the disease being targeted, the age of the chicks, and the scale of the operation. Here's a clear breakdown of the most common methods.

How Chicks Are Vaccinated and Given Medicine

1. Spray Vaccination

- **How it works:** Vaccine is mixed with clean water and sprayed into the air over the chicks.
- **Absorption:** Chicks inhale the mist or ingest droplets while preening.
- **Used for:** Infectious bronchitis, Newcastle disease.
- **Tip:** Use a fine mist for better absorption.

2. Drinking Water Method

- **How it works:** Vaccine is mixed into the chicks' drinking water.
- **Preparation:** Chicks are usually withheld from water for 2 hours to ensure they drink the medicated water.
- **Used for:** Gumboro (Infectious Bursal Disease), Newcastle disease.
- **Tip:** Ensure all chicks have access and drink within 1–2 hours.

3. Eye-Drop Method

- **How it works:** A drop of vaccine solution is placed directly into the chick's eye.
- **Absorption:** Through the mucous membrane.
- **Used for:** Newcastle disease, infectious bronchitis.
- **Pros:** Very effective; ensures each chick receives the full dose.
- **Cons:** Labour-intensive.

4. Injection (Intramuscular or Subcutaneous)

- **How it works:** Vaccine is injected into the breast muscle or under the skin (usually at the back of the neck).
- **Used for:** Marek's disease (often given at hatchery), fowl pox.
- **Tip:** Requires sterile technique and trained personnel.

5. Medication in Feed or Water

- **How it works:** Antibiotics, vitamins, or anticoccidials are mixed into feed or water.
- **Used for:** Treating or preventing bacterial infections, coccidiosis, or stress.
- **Examples:** Amprolium for coccidiosis, multivitamins for stress recovery.

Best Practices

- Only vaccinate healthy chicks.
- Follow vaccine storage and mixing instructions carefully.
- Keep records of vaccination dates and products used.
- Maintain hygiene to avoid contamination or stress.



REMEMBER: Make a note of vaccination and medical interventions on the Daily Observation Checklist

2.3.11. Poultry First Aid Kit: What Every Farmer Should Have

Keeping a simple poultry first aid kit on the farm helps manage minor injuries and early disease signs effectively.

Recommended Items:

- Disposable gloves
- Antiseptic solution (iodine or chlorhexidine)
- Scissors and tweezers
- Thermometer
- Wound spray or antibiotic ointment
- Electrolyte powder for water
- Vitamin supplements
- Syringes or droppers for oral dosing
- Notebook for recording treatments



Keep your kit dry, clean, and easily accessible. Always label items clearly and note expiry dates.

2.3.12. Treatment and Use of Medicines

- Use antibiotics only when prescribed by a veterinarian to avoid resistance.
- Avoid self-medicating or overdosing.
- Follow withdrawal periods to ensure meat and eggs are safe for consumption.
- Keep records of treatments and outcomes.

2.3.13. Farmer Reflection Prompt

- How do you currently monitor the health of your birds?
- What biosecurity measures can you improve on your farm?
- What challenges have you faced with poultry diseases?

2.4. Reproduction and Genetics

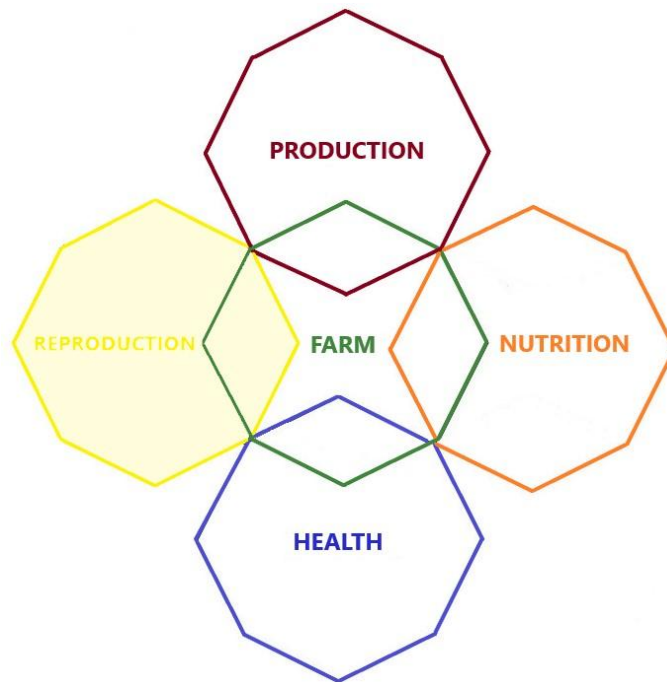


Figure 2.31: Reproduction, the fourth pillar to animal production

2.4.1. Why Reproduction Matters

Reproduction ensures the sustainability and growth of your poultry flock. Whether you raise chickens for meat, eggs, or breeding stock, successful reproduction:

- Replaces ageing or unproductive birds
- Reduces reliance on external chick purchases
- Allows selection of strong genetic traits for your system

Farmers who plan their reproduction cycles can ensure a consistent supply of eggs, chicks, or meat birds to meet market demand.

2.4.2. Poultry Reproductive Biology Basics

Understanding how chickens reproduce helps you manage breeding more effectively.

- Hens lay eggs regardless of mating, but only fertile eggs (after mating with a rooster) can develop into chicks.
- A rooster can fertilize multiple hens (1:8 to 1:12 ratio).
- Fertility depends on nutrition, age, breed, health, and environment.



Fertile eggs must be collected, stored correctly (not washed), and incubated within 7–10 days.

2.4.3. Natural Incubation vs. Artificial Incubation

Feature	Natural Incubation (Broody Hen)	Artificial Incubation
Brooding	Hen sits on eggs	Incubator maintains temperature/humidity
Hatch Rate	Depends on hen's health	Higher with correct setup
Flock Disruption	Hen stops laying	No disruption to layers
Cost	Free	Requires electricity and equipment

- Broody breeds (e.g. Indigenous, Kari) are better for natural hatching.
- Layers and hybrids often lack broodiness due to breeding selection.

2.4.4. Fertility and Hatchability

Key factors for high hatch rates:

- Strong genetics (select healthy, productive parent birds)
- Correct age (hens: 6–18 months; roosters: 6–12 months optimal)
- Balanced feed (especially vitamins A, E, and selenium)
- Clean nest boxes or incubation trays
- Avoid inbreeding (rotate breeding roosters)

2.4.5. Selecting Breeding Stock (Genetic Selection)

Genetic traits are passed from parent to chick. Choose breeders based on:

- Growth rate (for broilers)
- Egg production (for layers)
- Health and resistance to local diseases
- Foraging ability (for free-range systems)
- Temperament (calm birds reduce stress in flocks)



Good genetics = less feed waste, better survival, higher profits.

Avoid using:

- Birds with deformities (twisted toes, crooked beaks)
- Chickens with frequent illness or poor laying performance
- Aggressive or antisocial roosters

2.4.6. Inbreeding and Line Management

In smallholder systems, inbreeding can reduce productivity over generations.

To avoid this:

- Introduce new roosters from outside flocks every 1–2 years.
- Avoid mating siblings or parents with offspring.
- Use basic linebreeding (e.g. rotating rooster groups among hen pens).

2.4.7. Hatchery Tips for Small-Scale Farmers

Small-scale farmers may use either:

- **Artificial incubation** (with electric incubators), or
- **Natural incubation** (with a broody hen sitting on eggs).

Both methods have their place depending on your resources, goals, and flock management style.

2.4.7.1. NATURAL INCUBATION WITH BROODY HENS

Some chicken breeds — especially indigenous and dual-purpose types like **Kari Kienyeji**, and local village chickens — are naturally **broody**, meaning they sit on eggs and care for their chicks.

How to Know a Hen is Broody:

- She sits in the nest box for long periods, even without eggs.
- She growls or pecks when disturbed.
- She fluffs her feathers and may pluck her breast feathers to keep eggs warm.
- She stops laying eggs and becomes more secretive.

Best Practices for Using Broody Hens:

Task	Tip
Nest Setup	Provide a quiet, dark, clean space. Use soft bedding like straw or dry grass. Keep the nest away from traffic or disturbances.
Egg Collection	Select clean, medium-sized fertile eggs (not older than 7 days). Place 8–12 eggs under one hen depending on her size.
Marking Eggs	Use a pencil to mark the eggs she is sitting on to avoid adding new eggs later.
Food and Water	Keep feed and water nearby so the hen can eat and drink when she takes a short daily break.
Protection	Make sure other hens don't disturb the broody hen — separate her if needed.
Candling	Optional, but can be done on Day 7 to remove infertile eggs. Gently lift the hen for a short time.
Hatch Time	Chicks hatch after 21 days . Let the hen care for them naturally.



Tip: Let the hen raise her chicks in a safe area for at least **4–6 weeks** before reintroducing her to the main flock.

2.4.7.2. ARTIFICIAL INCUBATION WITH AN ELECTRIC OR MANUAL INCUBATOR



FIGURE 2.32: MANUAL INCUBATOR

(<https://www.agico.com.cn/news/manual-vs-full-automated-incubators.html>)

For farmers with access to incubators:

Task	Tip
------	-----

Egg Selection	Use clean, well-shaped, fertile eggs (collected within 7 days).
----------------------	---

Temperature	Maintain 37.5°C (99.5°F) consistently.
--------------------	--

Humidity	Keep at 45–55% early, 65–70% for final 3 days.
-----------------	--

Turning Eggs	Turn 3–5 times per day until Day 18.
---------------------	--------------------------------------

Candling	Check at Day 7 and 14 for infertile eggs.
-----------------	---

Hatch Time	Stop turning on Day 18. Chicks hatch around Day 21.
-------------------	---

Cleaning	Disinfect the incubator between batches.
-----------------	--



Avoid opening the incubator during the last 3 days, it affects humidity and hatch rate.

Choosing the Best Method for Your Farm

Situation	Recommended Method
Low electricity or rural area	Natural incubation with broody hens
Need large chick numbers regularly	Artificial incubation
Want to preserve local traits	Natural incubation
Breeding commercial hybrids	Artificial preferred (as layers don't brood)

2.4.8. Reflection Box

- How do you currently reproduce your chickens — by hen or incubator?
- Have you ever selected chickens for specific traits?
- What are the signs of a good breeder rooster or hen?
- Could you improve fertility or chick survival with a few small changes?

2.4.9. Poultry Breeding Calendar Plan (8-Week Cycle)

Use this as a rolling system. Every 8 weeks, you can repeat or stagger batches for a consistent chick or meat bird supply.

Week 1: Breeding & Egg Collection

- Select healthy, productive hens and roosters.
- Ensure a mating ratio of ~1 rooster to 8–10 hens.
- Mark and collect fertile eggs daily.
- Store eggs at room temp (13–18°C), pointed end down.
- Turn stored eggs daily.
- Set aside eggs for up to 7 days max for best hatchability.

Week 2–4: Incubation (21 Days)

- Place eggs in incubator or under broody hen.
- Turn incubator eggs 3–5 times/day until Day 18.
- Check humidity (45–55%) and temperature (37.5°C).
- Candle eggs on Day 7 and 14 to remove infertile or dead embryos.
- Stop turning after Day 18.
- Hatch day: Day 21 – Move chicks to brooder.

Week 4–8: Brooding and Chick Rearing

- Keep chicks warm (start at 32–35°C, reduce by ~3°C per week).
- Provide starter mash and clean water.
- Monitor growth, health, and signs of disease.
- Vaccinate (Newcastle, Gumboro) as scheduled.
- Begin separating keepers from sale or meat stock.

Every 8 Weeks: Restart or Stagger a New Batch

- Plan to collect eggs again from best-performing hens.
- Replace roosters every 12–18 months to avoid inbreeding.
- Rotate lines if keeping breeding groups.

EXAMPLE TIMELINE

Week Tasks	Notes
1 Collect eggs, mate selected birds	Store max 7 days
2–4 Incubate eggs (21 days)	Natural or artificial methods
4 Hatch chicks	Day 21
4–8 Brood chicks	Monitor heat and feeding
8 Sell or grow chicks further / restart	Replace hens, keep good pullets



Tips for Farmers:

- Keep a breeding diary (dates, parent birds, hatch rate).
- Replace unproductive hens every 12–18 months.
- Schedule breeding cycles to align with market demand (e.g. holiday or festive seasons).
- Consider overlapping batches for continuous output.

2.4.10. Chickens in Integrated Pest Management and Circular Systems

Chickens are more than egg or meat producers. They can play an active role in a farm's pest management, soil health, and waste recycling systems. This is especially powerful in mixed farming systems where vegetables, grains, and livestock coexist.

2.4.10.1. NATURAL PEST CONTROL

Chickens are excellent for managing insect pests and weeds. In controlled free-range systems or rotational paddocks, they help reduce pests such as:

- Grasshoppers, cutworms, beetles, weevils
- Locust eggs in the soil
- Fly larvae and ticks in livestock dung
- Weed seeds on topsoil



Chickens scratch the soil surface, breaking pest cycles without chemicals.

2.4.10.2. MANURE MANAGEMENT AND SOIL FERTILITY

ORGANIC FERTILISER MIXTURES

Organic fertilisers can be classified into manures of plant origin, animal origin or a composite derived from both plants and animals.

MANURES OF PLANT ORIGIN

Oil cakes: The solid residue that is left after the extraction of oil from seeds is known as 'oil cake'. Oil cakes are applied to soil to give it nutrients as well as improve soil structure.

Plant residues: Straw, husks, stalks, saw dust and wood ash also add nutrients to the soil.

Green manures: Green manure crops are grown then turned into the soil for decomposition. Green manure improves the physical structure of the soil and improves soil fertility.

MANURES OF ANIMAL ORIGIN

This includes animal's settled dry sludge, fish manure bonemeal, various types of animal dung such as cow dung, sheep dung, pig manure, poultry manure and so on.

COMPOSITE MANURES

This is made up of material from both plant and animal origin.

Farmyard manure (FYM): This is a well-decomposed dung of cattle, urine along with litter. The dung of animals is collected and placed in a trench which is covered with soil. Only after two to three months, then only can it be used for crop production.

Compost: Plant waste such as sugarcane trash, plant debris, weeds and other waste materials are used by farmers to get compost.

Vermicompost: This type of manure is developed using earthworms. Earthworms consume organic matter and excrete it as cast. This cast is used as vermicompost. This is rich in plant nutrients and contains beneficial bacteria for soil and crop production.



FIGURE 2.33: COMPOSITE MANURE MOUND
(Impuls Africa)

■ Application of fertilisers

Generally, organic manures are applied while you are preparing the soil for planting the crops. This is so that they improve the structure and water-holding capacity of the soil.

Fertilisers are normally applied just before or soon after planting. The frequency and amount of

80 Reproduction

application depends on the type of crop you are planting, type of soil and the season.

With concentrated manures such as fish manure, oil cakes and bloodmeal – these manures should be applied early on before planting happens as they are not available easily and still have to be broken down by soil microbes to make it useful for the crops.

With FYM that is well-rotten, you can apply just before sowing. Partially rotten FYM must be applied 20–30 days before sowing. Usually, 10–20 tonne FYM is applied per hectare. It is advisable to make sure that FYM is applied at least two weeks before sowing – this is to avoid immobilisation of nitrogen.

Chicken droppings are rich in nitrogen, phosphorus, and potassium, key nutrients for plant growth.

Use	How
Compost making	Mix manure with crop waste or bedding (carbon-rich) and turn regularly.
Field application	Age the manure for 3–6 weeks to reduce ammonia and pathogens. Spread before planting crops.
Biosecurity Note	Never apply fresh manure directly near root crops or leafy greens without ageing it first.

2.4.10.3. POULTRY IN CIRCULAR SYSTEMS

In a circular farm system, nothing is wasted:

Input	Output/Use
Kitchen/market waste	Feeds chickens or maggot farm
Chicken manure	Feeds compost or fertilizes crops
Spoiled grain or damaged produce	Chicken feed or maggot feed
Maggots	Chicken protein supplement
Crop residues	Bedding or compost material



Farmer Tip: Plan your chicken movements, compost cycles, and vegetable plantings together to maximise synergy and reduce input costs.

2.4.11 Poultry Tractor System for Field Use

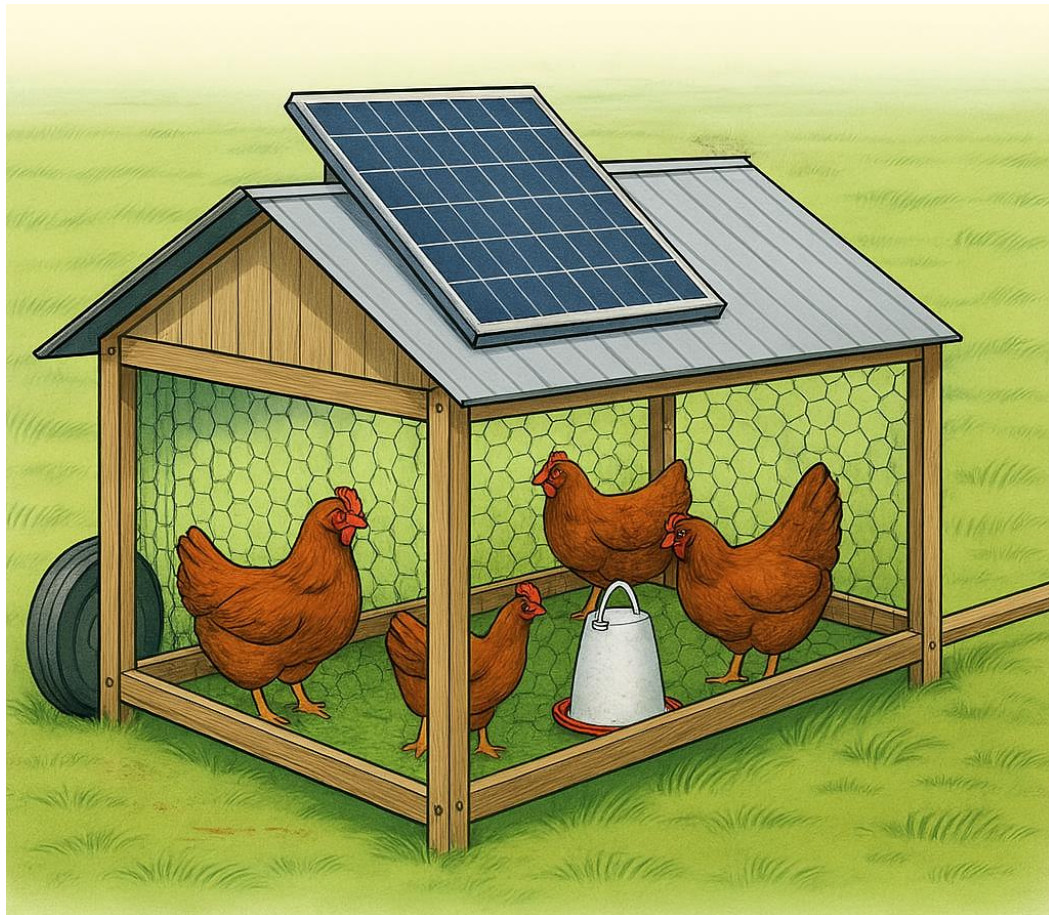


FIGURE 2.34: TRACTOR SYSTEM FOR FIELD USE
(CoPilot)

A poultry tractor is a movable chicken enclosure, often a lightweight pen or coop on wheels or skids, used to rotate chickens across a field or garden area.

How It Works

- Chickens are placed in a mobile pen that can be moved daily or weekly.
- They scratch, fertilise, eat weeds and insects, and loosen the soil.
- Used before or after planting, or during fallow periods in crop cycles.

Benefits of the Tractor System

Benefit	Description
Natural tillage	Chickens loosen the topsoil with scratching — no machinery needed
Fertilisation	Manure is spread evenly and directly on the field
Weed control	Chickens eat young weeds and seeds
Pest reduction	Reduce pest larvae and eggs before crop planting
Pasture health	Helps regenerate grasses in fallow paddocks

82 Reproduction

Ideal Deployment Areas

- Market gardens and vegetable beds (move tractor between rows)
- Maize or sorghum fields after harvest
- Pasture paddocks or orchard rows
- Fallows in agroecological systems



Note: Always protect birds from predators, provide shade, and move regularly to avoid over-concentration of manure.

Design Tips

- Floorless design lets chickens contact soil.
- Use lightweight timber or PVC, mesh, and a tarp roof.
- Include feed, water, and perches inside.
- Size for 5–15 birds per unit depending on breed and space.
- A solar panel can power lights, fans, or automated feeders



Chapter 3

Marketing and value adding

3.1. From Subsistence to Commercial Poultry Farming

Marketing is not just about selling it's about planning when, where, and how to sell your poultry or poultry products to get the best return. Whether you raise chickens for meat, eggs, breeding, or hatching, you must understand the market and look for ways to add value to increase your income.

Many smallholder farmers begin with just a few backyard birds to meet household needs. Scaling up to a full-blown poultry business involves systematic improvements in management, genetics, infrastructure and marketing. Below is a clear, four-stage journey you can follow.

1. Backyard Subsistence Keeping

- Start with 5–10 local “village” chickens
- Focus on free-range scavenging and kitchen scraps as feed
- Simple night shelter (lean-to or recycled materials)
- No formal records—eggs and meat go to the family table



Key goal: Learn basic chicken behaviour, health challenges and market demand for eggs/meat.

2. Household-Level Improvement

- Introduce improved breeds or hybrids (dual-purpose layers/broilers)
- Upgrade housing: dust-bathing area, perches, nesting boxes
- Adopt simple record-keeping: feed consumption, egg counts, mortality
- Implement basic biosecurity: footbath, rodent control, isolate sick birds
- Add value: sell excess eggs boiled or pickled at local spots



Key goal: Boost productivity per bird and generate small cash income.

3. Small-Scale Production

- Expand flock to 50–200 birds in purpose-built pens or tractors
- Install feeders, drinkers and basic heating if needed
- Use formulated commercial feed and vaccination schedules
- Begin batch production: staggered hatches or pullet batches
- Strengthen marketing: local shops, farm-gate sales, small contracts



Key goal: Turn a profit by optimising feed conversion, egg production and labour efficiency.

4. Full Commercial Farming

- Scale up to 1,000+ birds with dedicated broiler and layer houses
- Implement automation: climate control, mechanical egg collection, automatic feeders
- Employ advanced genetics and parent stock sourcing for uniformity
- Develop value chains: vacuum-packaged eggs, smoked/frozen poultry, branded products
- Formalise the business: budgeting, financial planning, staff training and compliance



Key goal: Establish a sustainable, scalable enterprise with consistent quality, brand recognition and reliable market channels.

3.2. Marketing and Value

To be successful when farming with poultry, you must understand a few important factors related to marketing and value adding. You must understand the benefits of the different production systems. What would be the best composition of poultry for each area and farmer to have? Understanding your expenses, what type of income to expect and how profitable is poultry production depending on what the purpose of your poultry's production, beef or dairy, is. Different breeds of poultry can have different strengths.



“You don’t need a big shop to start selling. If you plan well and communicate with buyers, even your backyard flock can earn a decent income.”

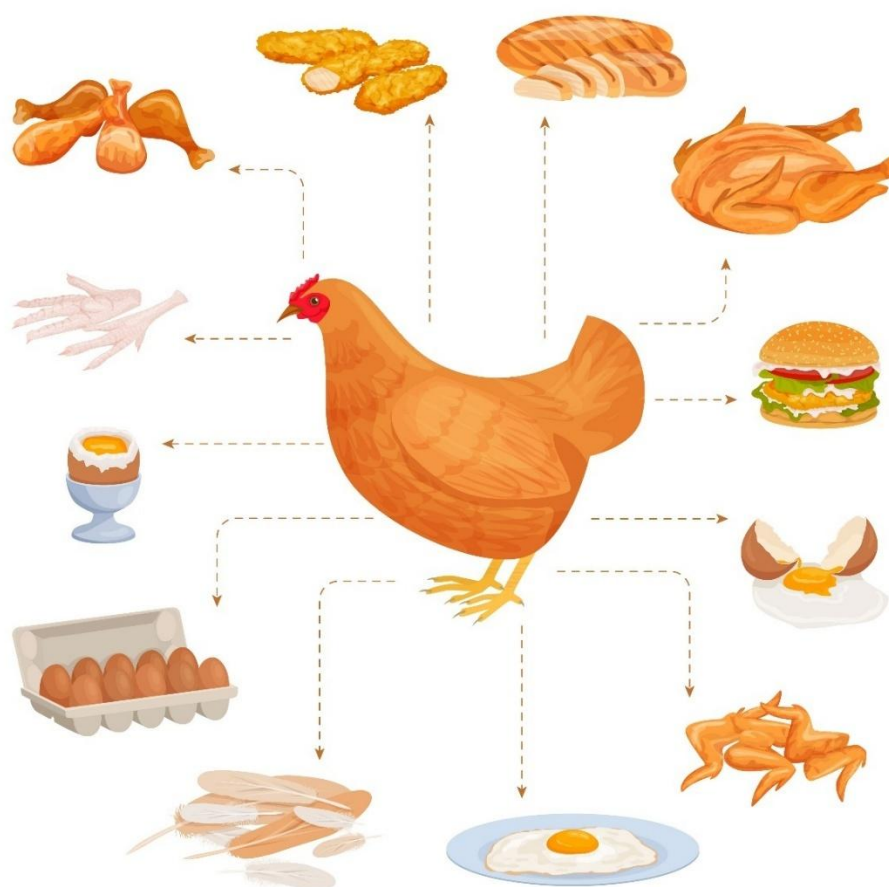


FIGURE 3.1: CHICKEN AS A PROTEIN SOURCE

The value of poultry as part of our diet

Poultry have always been a critical part of African culture. In our modern society, poultry meat and eggs is a primary source of vitamins and minerals especially iron and zinc. Chicken as part of a balanced diet can help with muscle growth and maintenance of the human body.

Meat is mainly composed of protein. Animal protein is usually of a high quality, containing all nine essential amino acids needed for growth and maintenance.

The following vitamins and minerals can also be found in meat:

- Vitamin B12 (blood formation, helps your brain and nervous system)
- Zinc (growth and maintenance)
- Selenium (support a variety of bodily functions)
- Iron (red blood cells, these transport oxygen around the body)
- Niacin (heart support)
- Vitamin B6 (blood formation and energy metabolism)
- Phosphorus (growth and maintenance)
- Other meat compounds
- Creatine (energy source for muscles)
- Taurine (antioxidant, heart, and muscle function)
- Glutathione (antioxidant)
- Conjugated linoleic acid (CLA) ruminant trans-fat that may have various health benefits
- Cholesterol (serves a variety of functions)

3.3. Economics of keeping poultry

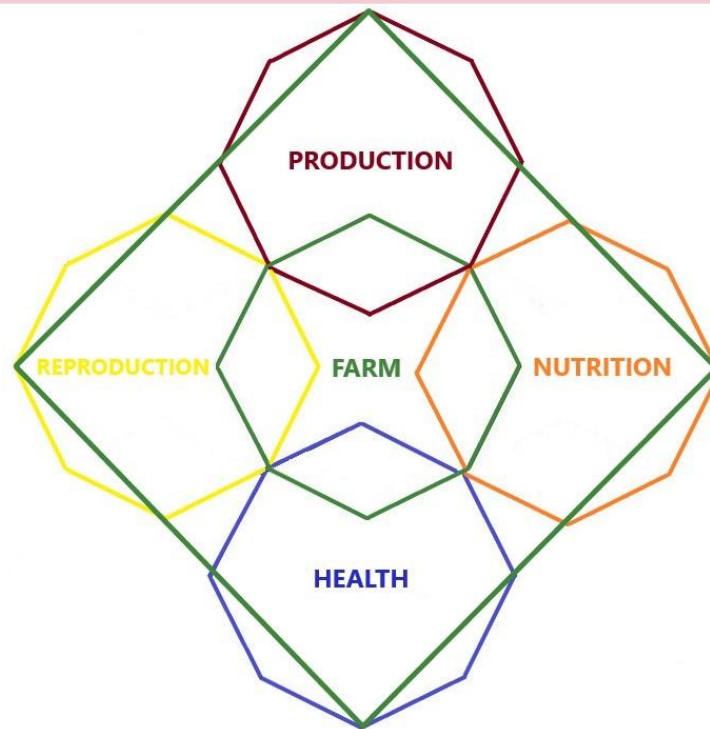


Figure 3.2: Pulling the processes together.

3.3.1. Understanding the business, profitability, costs, and income

As per our process cycle:



Figure 3.3: Process Cycle

Keeping chickens can be profitable, but success depends on good planning, budgeting, and understanding your costs and income. Many smallholder farmers in Zambia start poultry farming without knowing their break-even point or actual profit. This section provides a basic introduction to poultry farm economics.

Understanding Profit

Profit is the money you make after subtracting all costs from your total income.

$$\text{Profit} = \text{Total Income} - \text{Total Costs}$$

Total Costs include:

- Chicks or hatching eggs
- Feed (starter, grower, finisher, or layer mash)
- Vaccinations and medicines
- Housing and equipment
- Water and electricity
- Transport
- Labour (even family labour has value)

Total Income includes:

- Sale of live birds
- Sale of eggs
- Sale of manure or feathers

Example: If you spend K2,000 to raise 50 broilers and sell them for K3,000, your profit is K1,000.



Note: Costs vary by region and scale. Always update your figures.

3.4. Observing, counting, recording, and monitoring

Keeping good records helps you identify problems, measure success, and make better decisions.

Key Records to Keep:

- Daily feed given and feed left over
- Eggs collected (for layers)
- Chick mortality or illness
- Sales and income
- Expenses (feed, transport, vet, labour)



Why it matters: Without records, you may be losing money without knowing. Good records help with future planning and getting loans or partnerships.

Tools for Recordkeeping

- A small farm diary or notebook
- Feed and egg charts
- Income and expense ledger
- Daily Observation Card (DOC)



Encourage youth or literate family members to help with data capture. Paper doesn't forget.

Why Budgeting and Preparation Matter Especially for Smallholder Poultry Farmers

Starting a poultry business without a plan is like building a house without a foundation. Budgeting helps you know how much money you need, what you'll spend on, and what profit to expect. It protects you from running out of feed, medicine, or cash when the birds need you most.

Many poultry farmers in Zambia, especially those keeping village chickens, start with what they have: a few birds, local materials, and limited funds. While this approach works at small scale, once you aim to grow, lack of budgeting and preparation often leads to poor results birds dying, feed running out, or no profits after sales.



“You can lose money even if all your birds survive just by not knowing what you’re spending.”

A simple **budget** helps you.

- Estimate what you need before starting (cost of chicks, feed, housing, etc.)
- Avoid overspending or borrowing midway
- See if the project will be profitable
- Plan sales and restocking cycles

Even for village chickens, where many inputs are low or natural (like scavenging feed or broody hens), a **basic record of spending and sales** improves decision-making. This becomes even more important when switching to improved breeds like **Kari or Kuroiler**, which need more care and feeding.

Get the Basics Right Before You Start

Whether rearing broilers, layers, or village chickens, proper preparation and thought prevents early losses and stress.

Prepare the following before birds arrive:

- Housing (dry, clean, predator-proof)
- Feed plan and accessibility in time
- Clean water containers
- Chick brooder (for young chicks, if applicable)
- Bedding/litter (e.g., wood shavings, rice husks)
- Vaccines and medicines (especially for broilers and improved breeds)
- Notebook for keeping basic records
- Gloves, disinfectants, and handwashing station

Simple Poultry Enterprise Cost and Income Template (for Broilers, Layers, or Village Chickens)**Section A: Costs**

Cost Item	Unit (Qty)	Unit Cost (ZMW)	Total Cost (ZMW)
Day-old Chicks or growers			
Feed (Starter)			
Feed (Grower)			
Feed (Finisher/Layer/Scavenger)			
Vaccines			
Medicines/Vitamins			
Bedding/Litter			
Charcoal/Energy (brooding/cooking)			
Transport			
Cleaning/Disinfection			
Equipment (per flock)			
Housing Repairs (if any)			
Labour (if hired)			
Other (specify)			
TOTAL COSTS (A)			ZMW:

Section B: Revenues

Product Sold	Qty Sold	Unit Price (ZMW)	Total Revenue (ZMW)
Live birds			
Eggs			
Manure			
Dressed Chickens (if processed)			
Day-old Chicks (if hatched)			
Other (e.g. feathers, feet)			
TOTAL REVENUE (B)			ZMW

Section C: Performance Indicators

Indicator	Formula	Result
Cost per Bird	Total cost ÷ No. of Birds Sold	ZMW:
Cost per Kilogram	Total Cost ÷ Total Kg Sold	ZMW:
Feed Conversion Ratio (FCR)	Total Feed Used (kg) ÷ Total Bird Weight (kg)	
Average Body Weight	Total Bird Weight (kg) ÷ No. of Birds Sold	Kg:
Gross Profit	Total Revenue – Total Cost	ZMW:
Break-even Point per Bird	Total Cost ÷ No. of Birds	ZMW:
Profit per Bird	(Revenue ÷ Birds) – (Cost ÷ Birds)	ZMW:



Use this template for each batch/flock. Keep accurate records for all your activities that will be very helpful for this tool. Adjust item names depending on your type of birds. Costs vary by region and scale. Always update your figures.

3.5. Selling your Poultry Products

Selling poultry is more than just finding a buyer. You need to know **what to sell, when to sell, and how to sell.**

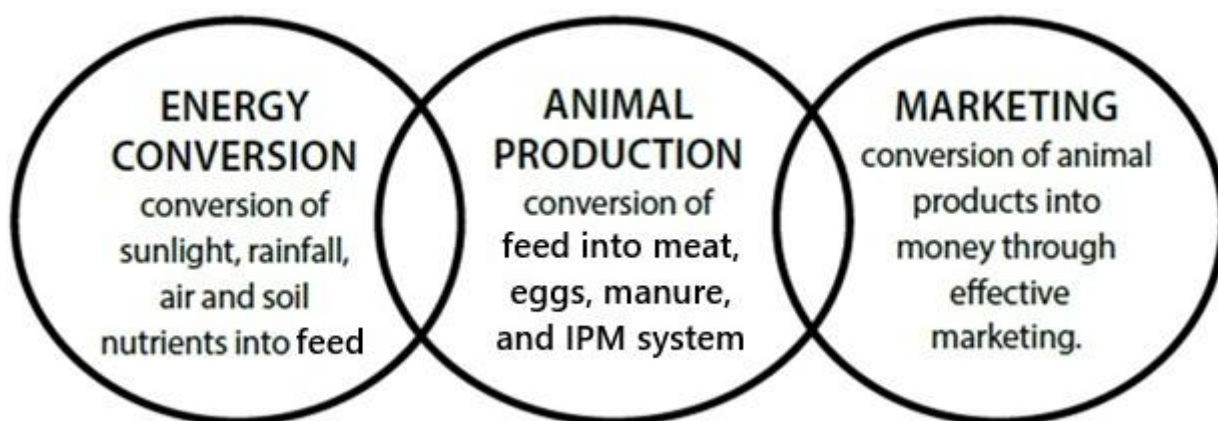


Figure 3.4: Process flow

The profit generated is calculated through a simple equation:



$$\text{PROFIT} = \text{INCOME (Kg produced x Price)} - \text{EXPENSES}$$

What to Sell

- Live birds (broilers, indigenous chickens, cockerels)
- Eggs (table eggs, fertile eggs)
- Processed birds (dressed, smoked, or cut-up)
- Chicken manure (used in gardens)

Where to Sell

- Local markets
- Roadside stalls
- Restaurants or hotels
- Schools and institutions
- Direct-to-customer (home delivery)



Tip: Get to know your community. Churches, weddings, and events are good seasonal markets.

How to Sell

- Clean, healthy birds attract better prices
- Use attractive and clean packaging
- Be honest about bird age, weight, or egg freshness
- Build relationships with regular buyers



Timing matters: Plan your production around peak demand times (e.g., December, Easter).

3.6. Value Addition Opportunities

Adding value means improving a product before selling it so that you earn more.

Examples:

- Boiled eggs sold at bus stations or schools
- Smoked or frozen chicken for local shops
- Vacuum-sealed packaging with farm logo
- Pickled eggs or spicy cuts for urban markets



Figure 3.5: Value Adding
(CoPilot)

Value addition increases shelf life, improves appearance, and allows you to reach distant markets.

Simple Processing Steps:

- Slaughtering and scalding
- Plucking and cleaning
- Evisceration (removing organs)
- Cooling or freezing
- Packaging and labelling



Make sure to follow food safety and hygiene practices.

Clean water, disinfected surfaces, gloves, and refrigeration are key.



It's also important to appear neat and presentable when handling or selling poultry products.

3.7. Market Opportunities

Farmers who study their market make more informed decisions.

Questions to Ask:

- What breeds or products do people want?
- Are customers willing to pay more for free-range?
- When is demand highest? (e.g., holidays, school terms)
- What are competitors charging?

Planning Ahead

- Match your **production cycle** with peak demand.
- Estimate feed needs and costs ahead of time.
- Diversify income: eggs + manure + occasional meat sales.



Tip: Attend local agri-shows, markets, or cooperative meetings to learn more about trends.

