DUAL-PURPOSE POULTRY (DPP) MANUAL

LESOTHO

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Disclaimer

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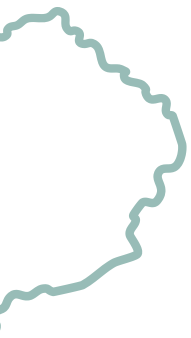


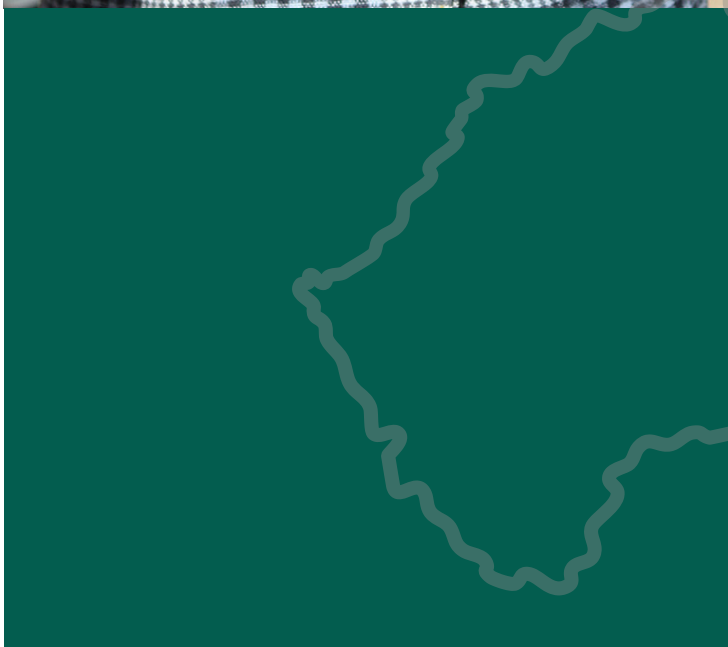
Introduction

‘STEPS’ Project Overview

Venture37 is implementing the United States Department of Agriculture (USDA) Food for Progress-funded Sustainable Transformation of Enterprises in the Poultry Sector (STEPS) in 7 districts in Lesotho (Maseru, Berea, Leribe, Butha-Buthe, Mafeteng, Mohale’s Hoek, and Quthing). STEPS aims to improve productivity and the business enabling environment in the poultry sector of Lesotho by segmenting the complex poultry market, supporting actors regardless of their current capacity, organizing producers in Buyer Hubs to unlock economies of scale, and spurring innovation across the poultry sector to provide inputs and markets to poultry producers.

Venture 37

Land O'Lakes Venture37 (hereafter “Venture37”) is a nonprofit organization committed to helping communities around the world build economies by strengthening local agriculture, helping agribusinesses create jobs, and linking farmers to markets. Since 1981, it has implemented over 315 integrated dairy, livestock, and crop development programs in nearly 80 countries —creating lasting impact by linking farmers, businesses, and the public and private sectors in local and global contexts.



Rural Self-Help Development Association

Rural Self-Help Development Association (RSDA) was established in 1991 as a Lesotho-registered non-governmental organization. Its aim is the eradicate hunger and improve livelihoods of rural Basotho. Their vision is to assist farmers and community organizations to run their own affairs and improve their livelihoods through sustainable agricultural practices. They do so by activating and supporting self-help to then ensure sustainable livelihoods. RSDA is an important partner in the STEPS project, overseeing the growth and development of the dual-purpose value chain in Lesotho, as well as leading farmer training in the field.

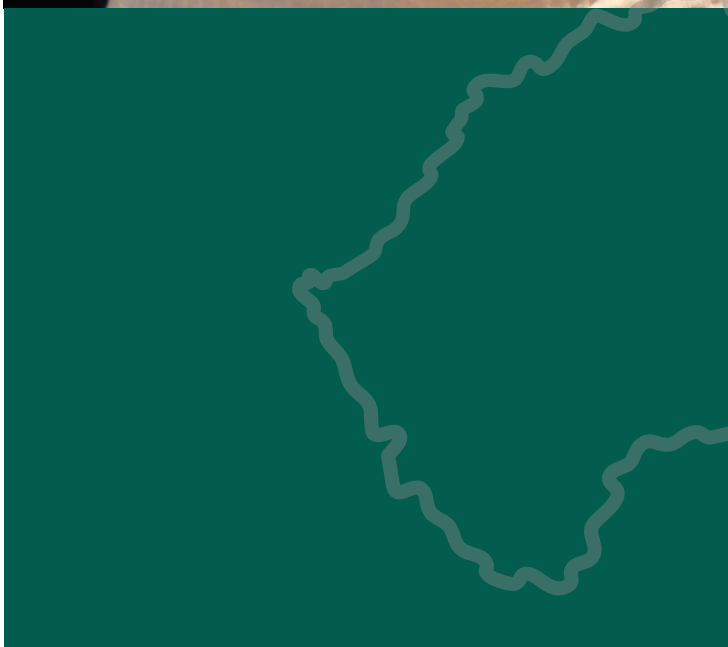
World Poultry Foundation

The World Poultry Foundation (WPF) is made up of a team of experts in poultry and sustainable development dedicated to building access to poultry and empowering farmers worldwide. Simply put, we're poultry people helping poultry people—focused on creating long-term impact in rural communities through innovative and sustainable poultry programs.

At the World Poultry Foundation, we envision a world with efficient, self-sustaining poultry value chains, where farmers have access to the resources, knowledge, and support needed for their poultry enterprises to thrive, ultimately leading to improved livelihoods and a brighter future for farming communities.

International Livestock Research Institute (ILRI)

The International Livestock Research Institute (ILRI) was established in 1994 as an international not-for-profit livestock research organization. ILRI works to improve food security and nutrition and reduce poverty in developing countries through research for efficient, safe, and sustainable use of livestock. ILRI is a CGIAR research centre, a global research partnership for a food-secure future. CGIAR science is dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources and ecosystem services.



Curriculum Development Background

As part of the STEPS project, the WPF led activities to improve access to relevant, quality poultry information, increase poultry production, and strengthen the capacity of poultry producers to scale up egg and poultry meat production. The WPF facilitated the development of a curriculum tailored to the Lesotho context to improve poultry rearing and production practices across several breed types: layers, broilers, and dual-purpose birds.

To support the curriculum development process, the WPF formed a Working Group (WG) comprised of relevant organizations and government ministries in Lesotho. While the broader WG was comprised of a wide range of relevant parties, there was also a core group to provide detailed feedback on the approach and tailoring of curriculum content. Those core member organizations included:

- Lesotho Agricultural College
- Department of Livestock Services
- National University of Lesotho
- National Curriculum Development Centre
- Department of Marketing

The primary objective of the WPF + STEPS Poultry Curriculum Development Working Group was to collaboratively develop context-specific curricula for poultry farmers in Lesotho. This helped to ensure the curricula aligned with the unique needs and realities of the local poultry sector in Lesotho, supporting farmers in improving their production practices and business outcomes. The WPF is grateful for the time, energy, and input the Working Group provided throughout the development process.

The content of this manual was also reviewed by several external experts for validity and consistency. Content was inspired by and fact-checked through interviews with Basotho farmers. Content is also grounded in the WPF team's knowledge and experience developing Dual-Purpose Poultry value chains across Africa. Finally, this content will be refined and further tailored based on the training pilot with farmers planned for 2025.

Manual Overview

The manual is intended to address the whole process of dual-purpose poultry (DPP) production, from farm to fork, as part of a food system; the network required to ensure food is produced to reach the consumer in an effort to reach zero hunger. The main topic areas covered:

- Definition of Dual-Purpose Poultry
- Housing
- Brooding
- Teen and Adult Birds
- Biosecurity
- On-Farm Business Skills

This curriculum could also be integrated into vocational training programs for youth.

1. Introduction to Dual-Purpose Poultry

Chickens were domesticated to provide both meat and eggs. Over time, commercialization led to the selection and breeding of chickens with specific qualities. This resulted in the development of single-purpose breeds, specialized either for rapid growth and meat production (broilers) or for efficient egg production (layers). Dual-purpose poultry (DPP), birds raised for both meat and eggs, have been common in less commercialized systems.

Definition

Dual-purpose poultry are chickens reared for both meat and eggs.

Local Basotho chickens are traditionally considered "dual-purpose" because they are raised for both meat and eggs. However, they fall short in performance compared to improved breeds. DPP in this context refers to improved breeds that outperform local Basotho chickens, while still thriving in a free-range system with minimal supplementation.

These improved breeds are naturally bred to retain the desirable traits of local chickens, such as hardiness, colored plumage, and good meat quality, while incorporating some of the advantages of commercial single-purpose chickens, such as livability and improved productivity. Unlike the small Basotho chickens that produce few eggs, dual-purpose birds grow faster and lay significantly more eggs. Additionally, while some dual-purpose birds can brood their eggs, others cannot. Importantly, most dual-purpose poultry lay consistently throughout the production cycle, unlike local chickens, which produce eggs in clutches.

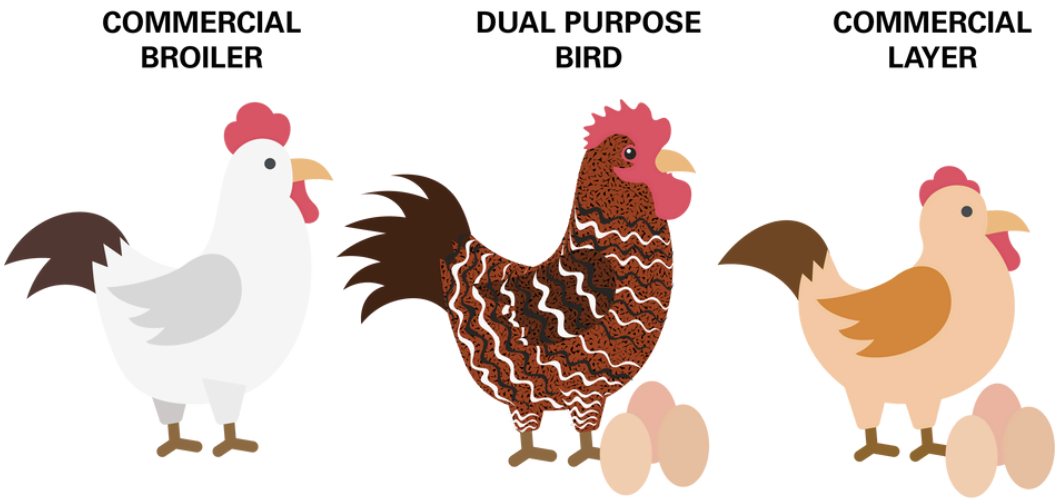


FIGURE 1.1
Comparison of a Broiler, DPP and Layer

Benefits of Rearing Dual-Purpose Poultry

Raising dual-purpose chickens offers numerous advantages, making them an excellent choice for small-scale and rural farmers. Here is why they are a recommended choice:

1

Sustainable food security

These chickens contribute significantly to household food security by providing both meat and eggs. Families can consume these products as a rich source of essential proteins, vitamins, and minerals. Their nutritional benefits are particularly important for young children, pregnant women, and lactating mothers.

2

Income generation

Brooder units, farmers who raise birds from day-old, can sell teen birds at four weeks of age. Small-scale producers can sell surplus birds and eggs or barter them for other essential items needed by the family. Dual-purpose birds offer the potential for multiple income streams: cocks can be sold for meat, eggs produced by hens can generate revenue, and hens can be sold as spent hens after their egg-laying cycle ends.

3

Higher Egg Production

Compared to indigenous chicken varieties, such as Basotho birds, dual-purpose chickens lay more eggs, providing households with a consistent source of protein. Their eggs are also larger, making them more marketable and appealing to consumers.

4

Early Meat Production

Male dual-purpose chickens grow faster than Basotho cocks, making them ready for meat production earlier. Males can thrive in a free-range system from four weeks of age, and reach a standard market weight (roughly two kilograms) by 12-14 weeks. This provides households with quicker access to high-quality protein and an additional source of income.

5

Cost-Effective Free-Range Rearing

Dual-purpose chickens thrive under free-ranging conditions. They need little supplementation, thus reducing the cost of keeping these birds compared to commercial varieties. Their ability to forage makes them a cost-effective option, particularly in rural settings with limited resources.

6 Cultural Acceptance

These chickens are easily accepted in rural households due to their colored plumage and natural foraging behaviour, traits that closely resemble indigenous Basotho chickens. Culturally, there is a belief that DPPs can be used for medicinal purposes and home security. The gizzards are believed to treat stomach aches. Because the chickens recognize their owners, they are used to alert the family in the presence of an intruder.

7 Lean, High-Quality Meat

The meat from dual-purpose chickens is leaner and cooks faster than that of Basotho chickens, making it more desirable for household consumption. At the same time, the flavor and firmness of the meat closely resembles a Basotho chicken, particularly when compared to the softer, blander meat of a broiler.

8 Hardiness and Adaptability

Dual-purpose chickens are hardy and well-suited to local conditions, thriving in both low-input, free-range systems. Their resilience to diseases and harsh environments ensures reliability for farmers.

9 Year-Round Egg Production

Unlike Basotho chickens, which produce eggs in clutches, dual-purpose breeds lay eggs throughout their production cycle. This ensures a steady supply of eggs for household nutrition and income.

10 Market Preference and Profitability

Their larger eggs and lean meat with a flavour similar to local chickens make dual-purpose breeds highly marketable. This creates an opportunity for rural households to generate income while meeting local consumer preferences.

11 Vaccination for Disease Prevention

Dual-purpose chicks purchased from a reputable hatchery, such as the one operated by RSDA, are also vaccinated at day of hatch, providing them important protection from disease, and helping to ensure a successful brooding period. This improves the overall livability of these birds.

Types of Farmers Who Would Rear Dual-Purpose Poultry

While any poultry farmer would have the ability to rear a dual-purpose bird, there are two profiles of farmers for which the dual-purpose bird is best suited: **Brooder Units (BU)** and **small-scale producers (SSP).**

Brooder Unit Farmers

A brooder unit farmer takes care of day-old chicks intensively until they reach four weeks of age, when they become "teen birds" (Figure 1.2) This phase is critical because the chicks are vulnerable to harsh conditions and have a higher risk of mortality. During this time, the chicks are housed and depend on commercial feed. Chicks do not free-range during this period as they are too small to run from predators, and require more specialized care, the same as a layer or broiler chick would need.

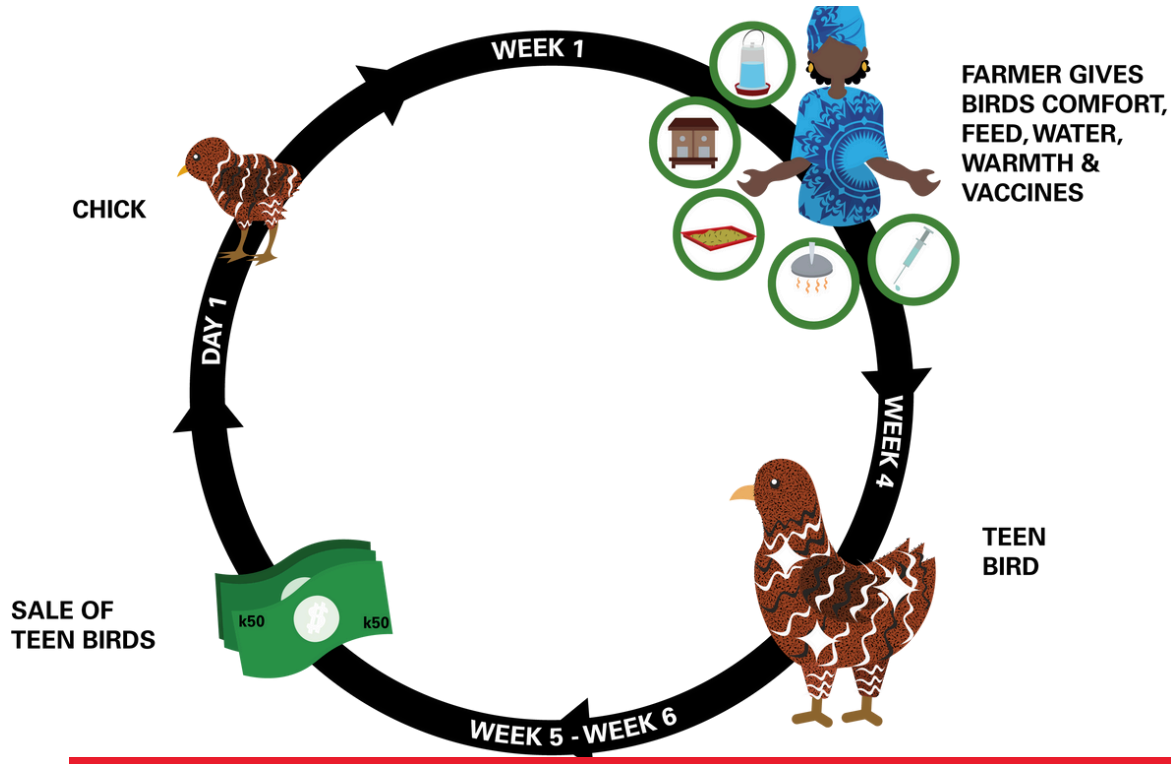


FIGURE 1.2
Graphic Depicting Chick Lifecycle for Brooder Unit

To become a BU, one must have the capital to construct proper housing for the chicks. They should also have access to vaccines, feeding and drinking equipment, brooders, and feed. It is recommended that prospective BUs have prior experience in poultry production; otherwise, they should seek support and guidance from extension officers or other poultry field agents. Recordkeeping is essential, so the farmer must be literate. Additionally, they should approach poultry management with a business mindset and a passion for the work.

By properly brooding DPP chicks, BUs can ensure that the teen birds then sold to SSPs are well prepared for the free-range system where they will next live. Additionally, BUs can raise multiple cycles and flocks each year due to the shorter production cycle, providing an excellent entrepreneurial opportunity.

Small-Scale Producers

Small-scale producers rear chickens primarily to provide nutrition for their families through the consumption of meat and eggs. They also sell surplus eggs and chickens to generate income for household expenses.

PHOTO 1.1
Small-Scale Producer

These farmers buy teen birds from BUs and raise them to adulthood. The chickens are keptunder free-range conditions, with minimal supplementation provided by the farmer. To qualify as an SSP, one must have access to sufficient land where the birds can forage and scavenge to meet their daily nutritional needs.

Success Story: Mr. Ntsokoane Thrives with Dual-Purpose Poultry

Mr. Ntsokoane Ntsokoane, a 45-year-old farmer from Khubetsoana near Maqalika Dam in Maseru, has been rearing Boschveld chickens from RSDA farm for the past four years. Initially raising them for his family, he soon recognized the growing demand from neighbors and farmers. Seizing the opportunity, he expanded his flock and invested in a 2,500-capacity incubator to supply day-old chicks. Starting with 100 hens and 20 cockerels, he adjusted his stock over time, selling five cockerels to reduce competition. He now maintains 96 layers and 15 cockerels on his farm.

PHOTO 1.2
Mr. Ntsokoane Ntsokoane

"When I first started rearing chicken, it was just for my family. I started small in the backyard. But as I harvesting eggs and meat, our neighbours started asking why we are not selling to them and the locals, because the birds seem to be productive in terms of laying eggs," he said. His customers are the villagers and people from afar as a result of spread of word of mouth.

Producing 50 eggs daily, Ntsokoane incubates and hatches around 290 chicks per week, achieving an 83% hatch rate. Selling each day-old chick at M15.00, his market has grown through word of mouth, ensuring he consistently sells out. Generating a monthly turnover of at least M10,000, he considers poultry farming a highly profitable venture and a rewarding business opportunity.

Common Breeds of Dual-Purpose Chickens in Lesotho

Some of the most common breeds of dual-purpose chickens in Lesotho include the Potchefstroom Koekoek, Boschveld, Orpington and Brahma.

Potchefstroom Koekoek

The Potchefstroom Koekoek (PK) is a locally developed chicken breed well-suited to the Southern African environment. It was created by crossbreeding three exotic breeds: Black Australorp, White Leghorn, and Barred Plymouth Rock. The PK is known for its distinctive striped black and white plumage and deep yellow skin colour. The male and female chicks can be easily identified shortly after hatching by their feather colour patterns.

Roosters weigh around 2.4 kg at 20 weeks and can reach up to 4 kg when fully mature. Hens weigh approximately 1.7 kg at 20 weeks and can grow up to 3.5 kg. The hens begin laying eggs at about 18 weeks of age and produce an average of 192 eggs per year. The eggs are large and brown, which are generally well-accepted by Basotho consumers. The PK is also known for its excellent mothering ability and can sit on its eggs.

PHOTO 1.3
Potchefstroom Koekoek

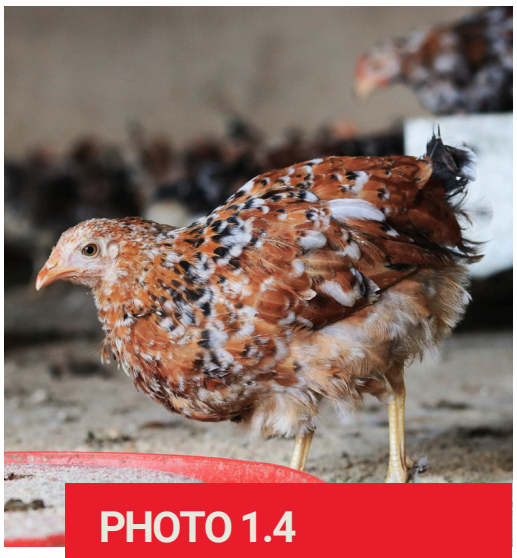


PHOTO 1.4
The Boschveld

The Boschveld

The Boschveld chicken was developed in Limpopo, South Africa, by crossbreeding the Ovambo from Namibia, the Venda from Limpopo, and the Matebele chicken from Zimbabwe. This breed is characterized by brown plumage with a mix of light white feathers. The Boschveld is hardy and resilient to many poultry diseases.

It starts laying eggs at around 24 weeks of age, producing about four eggs per week when raised under free-range conditions. At 12 weeks, roosters and hens weigh approximately 1.7 kg and 1.6 kg, respectively. By 20 weeks, roosters weigh around 2.6 kg, while hens weigh about 1.7 kg. The Boschveld is well adapted to the Southern African environment.

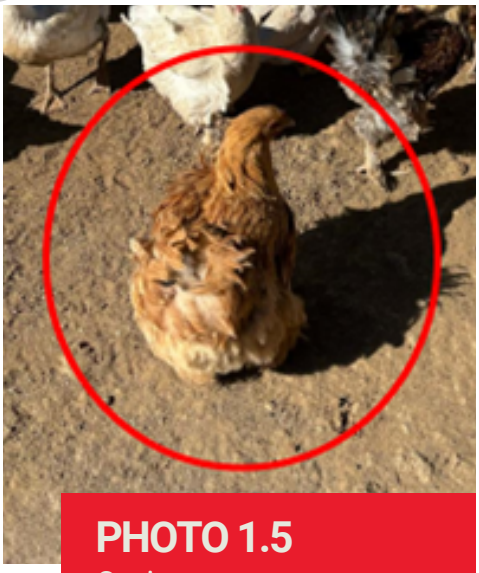


PHOTO 1.5
Orpington

Orpington

The Orpington is a large chicken breed that originated in England. It is characterized by a well-rounded, plump body with soft, fluffy feathers and a broad chest. Orpingtons have white skin and come in various colors, including black, white, mottled (a mix of black, white, or golden-brown), brown, golden-yellow, and black with gold lacing. This breed is sometimes chosen for its striking appearance.

The Orpington is well-suited for hot environments, especially the cold winters of Lesotho, due to its dense feathers. It is a calm and gentle breed, making it ideal for free-range farming. Orpingtons produce large brown eggs, which are well-accepted in the Lesotho market.

Because they are fast-growing, Orpingtons are also a good meat breed. They typically lay 3 to 5 eggs per week and have excellent mothering abilities and foraging skills. The mature weight of roosters can reach up to 5.5 kg, while hens grow to around 4 kg. They reach market weight at 22 weeks and can lay approximately 200 eggs per year, year-round, if provided with adequate forage. Their eggs are medium to jumbo-sized.

Brahma

The Brahma is a heavy breed of chicken with origins in China and the United States. It has distinct colour variations, including light, dark, gold, and buff, with yellow skin and dense feathers covering its legs and toes. These feathers provide excellent protection, making the Brahma well-suited to cold environments. Brahmas are large birds, with males reaching a maximum weight of around 5.5 to 6.8 kg and females weighing between 4 to 5 kg. Additionally, Brahmas take a longer time to reach sexual maturity and begin laying eggs, usually starting at about 6 to 7 months.

Brahmas are known for their calm temperament, which makes them easy to domesticate, especially in environments where there are many birds. While they are great foragers, they tend not to roam far from their home. They lay brown eggs, which are accepted in the Lesotho market, producing between 150 and 200 eggs per year. Despite their slower growth and delayed start to laying, Brahmas' hardiness, calm nature, and good egg production make them a suitable option for small-scale farmers in regions with colder climates.

PHOTO 1.6
Brahma

PHOTO 1.7
Sasso

Sasso

SASSO is a hybrid dual-purpose breed developed initially for tropical regions. The breed has been improved to suit the Southern African environment, although further tests are underway. Smallholder farmers in Southern Africa have successfully raised the Rainbow T and the C431, particularly in Zimbabwe. It has been accepted in many African regions due to its adaptability and the multi-coloured plumage synonymous with traditional African chickens. Certain SASSO birds exhibit a mix of red, black, and white feathers. The SASSO is a great scavenger making it conducive for small-scale extensive production. It is a calm bird, making it manageable even with large flock numbers. It reaches maturity at 18-22 weeks and lays 120 – 250 eggs per year, which are brown. Under optimal conditions, the male reaches 2.60 kg in 12 weeks. The SASSO has low brooding ability making it difficult for them to sit on the eggs.

2. Housing

Introduction

Housing plays a crucial role in protecting poultry from harsh weather conditions such as direct sunlight, gusty winds, and rain. It also shelters the birds from predators and thieves while safeguarding them from exposure to disease-causing agents. During the delicate brooding phase, housing provides a comfortable environment, ensuring the birds' well-being, and that they are best set up for a successful and productive future.

This chapter provides an overview of key considerations that are important to consider for poultry housing and discusses best practices. Not all best practices will be affordable or realistic, depending on a farmer's specific circumstances. Thus, also included are 'next best' ideas, particularly as birds are old enough to free-range.

Lesotho Context

Lesotho's climate is characterized by very cold winters and hot summers. Summer temperatures in the lowlands typically range between 20°C and 30°C, with afternoon thunderstorms common. In contrast, winter temperatures can drop below 0°C, with the highlands experiencing snowfall on mountain peaks and frost that affects water availability. Autumn and spring are transitional seasons, with moderate temperatures and fluctuating rainfall, while spring often brings strong winds and occasional late frost. Therefore, poultry housing must be designed to shelter the birds from these extreme weather conditions. Even after birds are old enough to free-range, they will still require somewhere safe to roost for the night and shelter from inclement weather.

Lesotho, surrounded on all sides by South Africa, is home to over 350 species of migratory birds, attracted by the mountainous terrain. Rodent issues have also been reported. Poultry houses should be constructed to prevent contact between chickens and wild birds or rodents before birds are old enough to free-range, as these can introduce diseases and pests, leading to mortality.

Dual-Purpose Context

For dual-purpose production systems, open-sided housing is often the most cost-effective option, providing the necessary shelter while allowing for ventilation. While general housing considerations apply across production systems, each system, such as brooding and free-range, has specific requirements.

Before constructing a poultry house or adapting an existing structure, several factors must be considered, including future growth projections, bird spacing, building materials, cost, durability, and climate. These considerations will ensure that the poultry house meets both the birds' needs and the farmer's long-term objectives.

Key Features of an Ideal Poultry House

The brooding phase refers to the first 4–6 weeks of a chick's life. During this period, chicks are unable to regulate their body temperature effectively and rely on external heat sources and a carefully managed environment. The goal is to provide conditions that mimic the warmth and safety of a mother hen. For a DPP house to adequately provide shelter and protection to the birds, it should have the following:

1 Correct Orientation

The poultry house should ideally be situated along the east-west orientation. This helps prevent direct sunlight from entering the poultry house. In Lesotho where gusty, cold winds are experienced during some periods of the year, the house should be built to minimize the direct impact of the wind. While wind is essential for natural ventilation in a poultry house, direct exposure to strong winds from the windward side should be avoided. Instead, position the house strategically to allow controlled airflow while protecting the birds from drafts, dust, and rain.

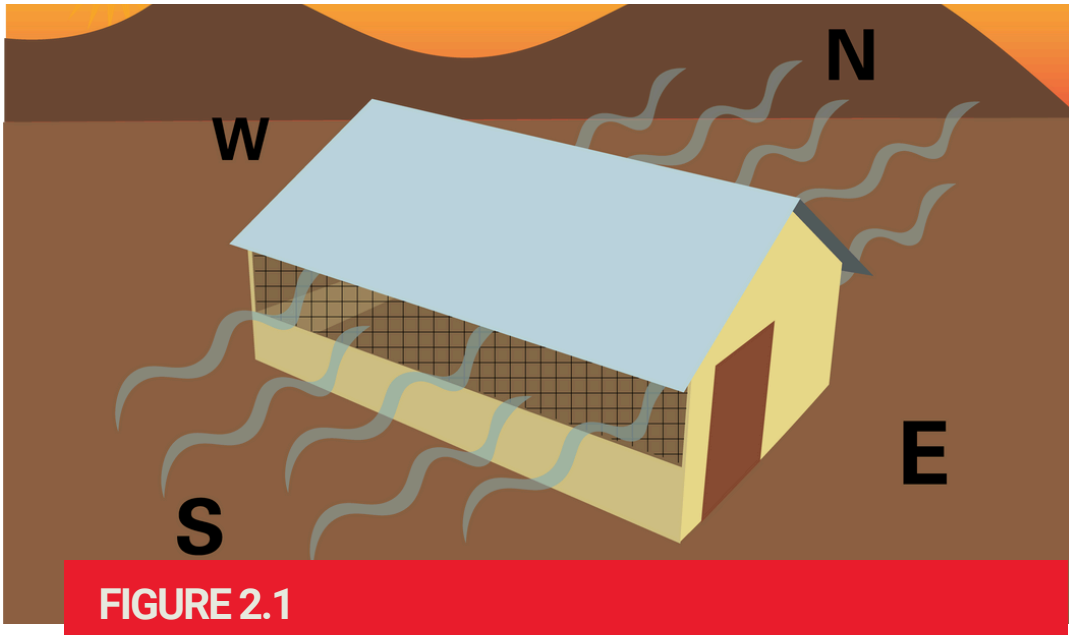


FIGURE 2.1
Figure Modeling Correct Orientation

2 Drainage, Soil and Slope

Proper drainage and suitable soil are essential when constructing a poultry house to ensure a stable structure, a dry environment, and healthy birds. Good drainage prevents water accumulating around and inside the house, reducing the risk of damp conditions that can lead to diseases. The site should have a slight slope to allow natural water runoff. Inside the house, a slightly sloped floor (1–2%) towards the door facilitates water drainage during cleaning.

Sandy or sandy-loam soil is ideal because it drains well, reducing waterlogging risks, while also providing a firm foundation. In contrast, clay soil should be avoided as it retains water and can expand or shrink, causing structural instability. Loose, excessively sandy soil may require reinforcement to support the building adequately. A site with clay soil should be reinforced with stones.

3 Roof

The roof of the poultry house should be elevated 2.5 to 3 meters above the ground to ensure proper air circulation within the structure. Additionally, it should include an overhang extending 1 meter beyond the walls. This overhang plays a crucial role in redirecting rainwater away from the walls, thereby preventing water damage, stains, and erosion. It also reduces the likelihood of water pooling near the foundation, which can lead to structural weakening and damp conditions inside the house. Furthermore, the overhang provides essential shade, protecting the birds from direct sunlight, especially during the summer when high temperatures can pose a risk of heat stress. These design features help create a more comfortable and healthier environment for the birds while enhancing the durability of the poultry house.

PHOTO 2.1
Appropriate Overhang on a Roof

The roof should be made from material that can regulate the temperature inside the house. While cost of the materials is a major factor in the choice among smallholder farmers, the insulation capacity of the material should be considered. Insulation will allow heat to be contained inside the house during the cold winters and will block the heat from getting into the house during summer. The materials that can be used include thatch, and corrugated metal sheets:

The advantages and disadvantages of the different materials are as follows:

PHOTO 2.2 Corrugated Metal Roof

Corrugated Metal Sheets

These are made of galvanized steel or aluminium and are widely used across Lesotho due to their affordability. In Lesotho, where the winters are cold and summer are hot, the inside of the corrugated metal sheets should be lined with an insulation material such as polyurethane spray foam or double thick weatherproof aluminium foil. In addition, the corrugated sheets should be painted with a light colour that reflects light such as white so that heat is reflected away from the house during summer. This material is suitable for both BUs and SSP although the insulation may be costly for financially constrained farmers.

Advantages of corrugated metal sheets:

- Durable and long-lasting.
- Reflects sunlight, keeping the interior cool if painted.
- Easy to clean and maintain.
- Resistant to pests and weather damage.

Disadvantages of corrugated metal sheets:

- Can get very hot during summer unless insulated.
- Prone to noise during heavy rain or hailstorms. The noise can stress the birds.
- Insulation can be costly

PHOTO 2.3 Thatch Roof

Thatch

Thatch roofing is made from dried grass. It is a great insulator provided the grass is well compacted. Include a thin tarpaulin lining to allow the roof to be pressure washed during the clean-out phase. The tarpaulin provides a waterproof layer in the event the grass is not compacted well. Empty feed bags can be repurposed to provide lining for a thatched roof. Of note, this material must be regularly replaced and has a shorter lifespan than other options. For this reason, this can be a reasonable option in rural areas where grass is easily accessible. This material is suitable for both BUs and SSP.

Advantages of thatch:

- Provides excellent insulation, keeping the house warm during winter and cool in hot weather.
- Environmentally friendly and low cost, especially in areas where grass is locally available.

Disadvantages of thatch:

- Short lifespan and requires regular maintenance.
- Vulnerable to fire, pests, and decay if not properly treated.
- Can be hard to clean.

TIP

Empty feed bags can be repurposed to provide lining for thatched roof

4 Walls

The role of the side walls is to provide structural support of the whole house, protect the birds from predators and harsh weather, and facilitate proper ventilation and lighting.

Important Note:

Farmers often respond to the cold Lesotho winters by building very high walls with only small openings. This is not ideal as it results in poor ventilation.

The lower solid section of the side walls should not exceed 1 meter to ensure proper ventilation. Materials such as concrete, bricks, or treated wood can be used. Resources permitting, further insulation of the walls may be done by lining the inside with polyurethane spray foam. Above the low solid wall, wire mesh or netting extends upward to ensure airflow. This will prevent birds from entering the house. Heavy duty tarpaulin curtains should be used to control the ventilation.

PHOTO 2.4
Ideal Side Walls which do not Exceed One Meter in Height

5 Floors

The floor should be smooth and free from any cracks. Non-slip, cleanable materials should be used to reduce injuries and maintain hygiene. Concrete floors are ideal because they can be washed with water and detergent during the cleaning phase (Photo 2.5). However, compacted dirt floor can also be used where resources are not available. There should be no cracks which can harbor pests and diseases. Additionally, the floor should be constructed above the ground level, with a slight slope towards the door to ensure that all water does not pool up inside.

PHOTO 2.5
Ideal Floor Types for Poultry Houses

Adequate floor space is important for the health and productivity of dual-purpose birds. One square metre of floor space should be occupied by 15 birds (Figure 2.2). Floor space should allow birds to move freely. Overcrowding results in stress, aggression, reduced productivity and increases the risk of diseases (Photo 2.6).

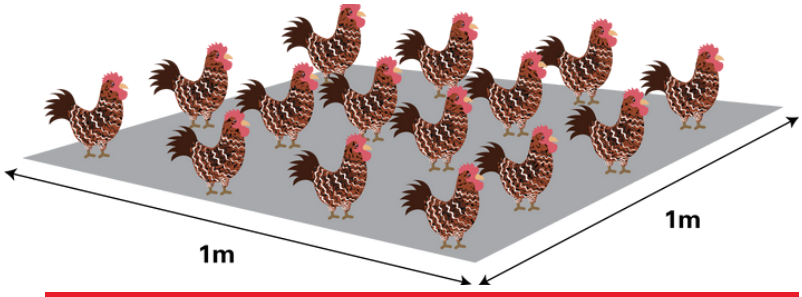


FIGURE 2.2
15 Birds Occupying 1 m2

PHOTO 2.6
An Example of Layers Overcrowding

6 Feed Storage Area

Feed should be stored separately from where the chickens live, in a cool, dry place to ensure its quality is not compromised. It is also important to store feed off the ground to prevent damage in the event of flooding (Photo 2.7). Additionally, feed should be kept in a container with a secure lid to prevent pests from accessing it. A bucket with a lid is a simple and effective option for storing feed.

PHOTO 2.7
Feed bags stored on pallets to prevent them from absorbing moisture.

7 Security

The poultry house should have a single, securely lockable door. The door must be free from any damage or defects that could allow unauthorized access.

8 A Concrete Apron Around the House

A one-meter concrete apron can be constructed around the house to facilitate drainage and direct water away from the walls (Photo 2.8). If resources are limited, the soil covering a one-meter width around the house should be cleared and compacted to achieve a similar effect.

PHOTO 2.8 Poultry House with Concrete Apron

Poultry House Considerations for Teen and Adult Dual-Purpose Birds

Teen and adult DPP birds are typically reared under a free-range system. While many of the housing considerations mentioned above remain relevant for these birds, there are some key differences.

First, teen and adult birds spend most of the day foraging and scavenging for food. However, in the evening, they should be housed to protect them from predators and theft during the night. Housing also becomes essential during periods of inclement weather. Unlike chicks, adult birds can regulate their body temperature, so heaters and confined spaces are not necessary.

Additionally, because adult birds are larger and will eventually begin laying eggs, there are further design considerations to accommodate their needs. The most important elements are highlighted below:

General Requirements

When constructing the house, a spacing of six birds per square meter is ideal. The house should have a roof, walls, a concrete or compacted soil floor, and a secure door. Additional fixtures such as nest boxes and perches can enhance the functionality of the coop.

Nest Boxes

Nest boxes should be placed inside the poultry house in a safe, quiet, and dimly lit area where hens can comfortably lay their eggs. The nest boxes should be positioned off the ground to reduce contamination and minimize the risk of egg breakage. A standard nest box measuring 30 cm x 30 cm can accommodate 4 to 5 hens. Repurposed materials can often be used to construct nest boxes. The images below provide examples of various nest box models.

PHOTO 2.9
Nest Box Example

PHOTO 2.11
Nest Box Example

PHOTO 2.10
Nest Box Example

PHOTO 2.12
Nest Box Example

Perches

Perching is a natural behavior for birds, as they seek elevated spots to roost at night for protection from predators. Providing perches inside the house allows birds to exhibit this natural behavior. Perches should be long enough to allow approximately 15 centimeters per bird and should be elevated at least 40 centimeters above the ground (Photo 2.13).

PHOTO 2.13
Perch Example

Teen and Adult Bird Coop Examples

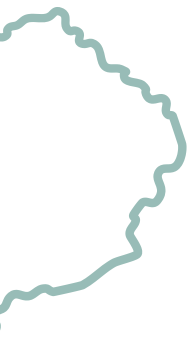
Below are several real-life examples of coops that farmers have successfully used to house teen and adult birds. Each example demonstrates key attributes highlighted in the housing considerations above.

PHOTO 2.14
Coop Example

PHOTO 2.16
Coop Example

PHOTO 2.15
Coop Example

PHOTO 2.17
Coop Example



3. Dual-Purpose Poultry Brooding

Introduction

Brooding refers to the period during the first four to six weeks of a chick's life when they require warmth and optimal care to survive. Chicks cannot regulate their body temperature during this critical stage. Warmth is provided naturally by the mother hen or artificially using heaters. The brooding stage is vital for dual-purpose producers, as chicks are also vaccinated to prepare them for the risks associated with free-ranging. In natural environments, the highest mortality occurs during this phase, highlighting the need to rear chicks intensively until they can forage and scavenge independently.

Chicks are fragile from the time of hatching. Any stress exerted on the chick can have lasting implications. The following section provides guidance on how to manage the environment and care for the chicks until they are ready to forage.

Management of the Chick Environment

Before placing the chicks, the environment should be clean and fully prepared. A ready environment ensures that chicks transition comfortably into their new space.

Zone of Comfort

The zone of comfort refers to a localized area within the poultry house that provides optimal conditions for the comfort and growth of chicks. It is maintained until chicks can regulate their own body temperature. The zone of comfort should be set up at least 48 hours before the chicks arrive. The following preparations should be made prior to their arrival:

1

Spacing

Spacing Before chick placement, accurately calculate spacing to avoid overstocking. Overstocking leads to poor bird uniformity due to increased competition for resources such as space, feed, and water. In Lesotho, where high altitudes and poor ventilation are common, overstocking can exacerbate oxygen shortages, increasing the risk of conditions like ascites (water belly).

To determine the appropriate stocking density, calculate the available floor space in the poultry house and multiply it by the recommended stocking density of 15 birds per square meter. Subtract any areas used for storage or other purposes before making your calculation.

2 Brooder Guards

Brooder guards are barriers that confine chicks within a designated zone of comfort (Photo 3.1). These guards can be made from materials such as masonite, wood, cardboard boxes, or other suitable repurposed materials. Their purpose is to retain heat and prevent chicks from wandering too far from heat sources.

PHOTO 3.1
Example of a Brooder Guard

Brooder guards should be at least 30 cm high to effectively contain heat. These can be adjusted or removed after the first week as chicks grow. For optimal results, brooder guards should be arranged in a circular shape to prevent chicks from piling up in corners, which can cause suffocation or injury. If the brooder chamber is square or rectangular, round out the corners using cardboard or other safe materials.

3 Bedding

Twenty-four hours before the chicks arrive, cover the floor with bedding to provide a soft, comfortable landing. Bedding also absorbs moisture from droppings, keeping the brooder chamber dry. Suitable materials include shredded paper (Photo 3.2), wood shavings (Photo 3.3), grass, pine leaves, or sand. However, sand is not recommended in winter, as it does not retain warmth. Bedding should be evenly spread to a depth of 10 cm.

PHOTO 3.2
Shredded Paper Bedding

PHOTO 3.3
Pine Shavings Bedding

4 Heaters

One of the leading causes of mortality during brooding is inadequate warmth. Safe heat sources should be used to maintain the zone of comfort temperature. Chicks are unable to regulate their body temperature during the first 5–7 days. With underdeveloped feathers and fluff that provides insufficient insulation, chicks require an optimal temperature of 32°C on the day of placement. Reduce this temperature gradually by 2–3°C per week until the chicks are fully feathered. Monitor chick behavior and adjust temperatures accordingly.

Heaters can be powered by electricity, charcoal, wood, paraffin, or gas. When using charcoal or wood, set up fires outside the poultry house to prevent smoke inhalation. Position heaters to distribute heat evenly across the brooder chamber to avoid poor uniformity in the flock.

TIP

Position infra-red lamps close to the chicks to ensure the heat reaches them; adjust them according to chick behavior.

Examples of heaters suitable for dual-purpose chicken production include:

PHOTO 3.4
A broken clay pot with charcoal

PHOTO 3.5
Charcoal heater with a chimney

PHOTO 3.6
A repurposed drum using firewood

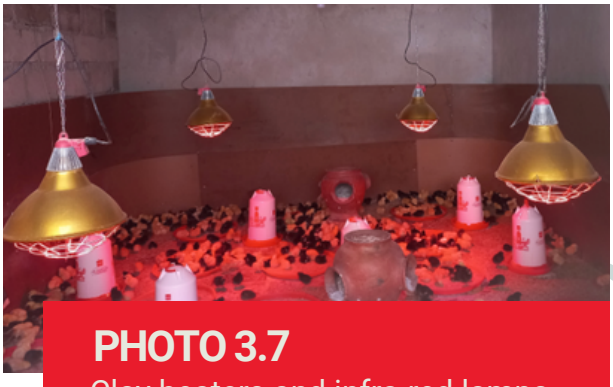


PHOTO 3.7
Clay heaters and infra-red lamps

5 Thermometer

A thermometer inside the brooder chamber at chick level to monitor temperature. If no thermometer is available, observe chick behavior. Huddling indicates that they are cold, while chicks moving away from heat sources suggests it is too hot.

PHOTO 3.8
Example of Digital Thermometer

6 Lighting

Provide a source of light in the brooder chamber. Chicks eat and drink mainly during daylight, and prolonged darkness can reduce feed intake. Solar or battery-powered lights can be used in areas without electricity.

Battery and solar-powered lights can be used in rural areas where there is little or no electricity.

PHOTO 3.9
Example of Battery-Powered Lights
Credit: Benwei Lighting

PHOTO 3.10
Use of Solar Power

7 Scale

Use a portable scale to monitor chick growth weekly. Weighing ensures the chicks are developing appropriately.

PHOTO 3.11
Scale example

8 Feed

Feed is a cornerstone of successful production for dual-purpose poultry. Before chicks arrive, it is recommended to source all the feed needed for the entire production cycle (28 days) from a reputable supplier. High-quality feed should contain the correct proportions of nutrients necessary for the chicks' growth. These nutrients are broken down during digestion to provide energy for growth and movement, proteins for muscle development (later harvested as meat), and minerals essential for skeletal development and egg production.

Farmers must ensure that the feed provided is of an appropriate particle size for the chicks, as this directly impacts feed intake and growth. Feed that is too coarse can lead to reduced intake and stunted growth. Feed is generally available in three forms: mash, crumble, and pellets.

PHOTO 3.12
Mash

PHOTO 3.13
Crumble

PHOTO 3.14
Pellets

Feed Forms & Their Uses

- **Mash**: Small particles, suitable for chicks but prone to wastage
- **Crumbles**: Intermediate-sized particles, ideal for minimizing waste and promoting uniform nutrient intake
- **Pellets**: Larger particles, preferred by older birds but often unsuitable for young chicks

For the brooding phase, provide layer starter mash for the first two weeks, transitioning to crumble until day 28. Store feed in a cool, dry, rodent-free area. Place feed in chick trays and on paper 24 hours before chick arrival.

Proper storage is essential to preserve the quality and nutritional value of feed. Feed bags should be stored on pallets in a cool, dry area that is free from rodents. Twenty-four hours before the chicks' arrival, feed should be placed in chick trays and spread on paper around the brooder chamber to prepare for their arrival. This ensures the chicks can start eating immediately upon arrival.

TIP

Each chick should consume 15-20 grams in their first feed.

Layer Starter Feed Plan for 100 Birds

With proper management, the following feed is recommended for rearing 100 dual-purpose birds during the brooding phase:

Before Placement:

- 1 bag of layer starter mash
- 2 bags of starter crumble

These feed quantities will adequately support the birds through their early growth stage. Any unused feed should be stored properly to maintain quality and can be utilized for the next batch of chicks.

PHOTO 3.15
Dual Purpose chickens eating from trough feeder

9 Feeders

Feeders should be clean and appropriately sized. Ensure enough feeders are available to minimize competition. Initially, use low-lying feeders and gradually transition to larger feeders as chicks grow. Common feeders include:

- **Chick Tray (Day 1–5):** 1 tray per 50 chicks
- **Round Feed Tray (Day 1–7):** 3 trays per 100 chicks
- **Chick Oval Hole Feeder (Day 1–7):** 4 feeders per 100 chicks
- **Bulk Chick Feeder (Day 1–7):** 4 feeders per 100 chicks (5 kg capacity)
- **Hanging Tube Feeder (7+ days):** 3 feeders per 100 birds (15 kg capacity)

PHOTO 3.16
Chick Tray

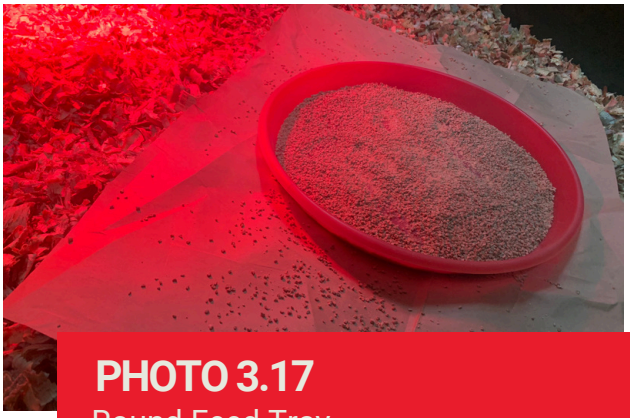


PHOTO 3.17
Round Feed Tray

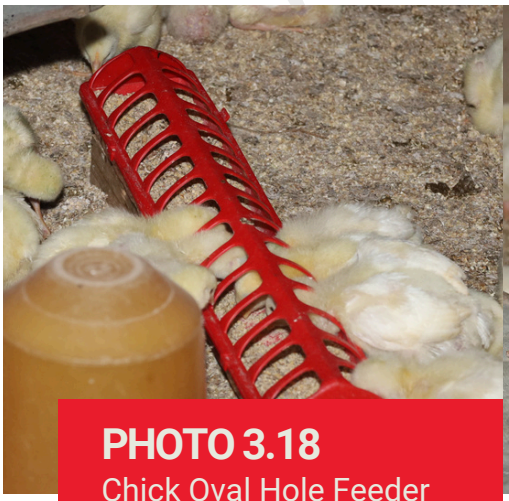


PHOTO 3.18
Chick Oval Hole Feeder

PHOTO 3.19
Bulk Chick Feeder

PHOTO 3.20
Hanging Tube Feeder

10 Drinkers

Chicks cannot survive without water. Like feeders, drinkers should be suitable for chicks depending on age. Examples of drinkers on the market are as follows:

- **Chick Font (Day 1–7):** 3 fonts per 100 chicks (3L or 4L capacity) (Photo 3.21)
- **Water Font or Bell Drinker (Older chicks):** 1 fontper 70–100 birds (10L capacity) (Photo 3.22)

PHOTO 3.21
Chick Font

PHOTO 3.22
Bell Drinker

12 Repurposed Materials

Repurposed materials can also be used as feeders and drinkers.

PHOTO 3.23
Repurposed Drinker Example

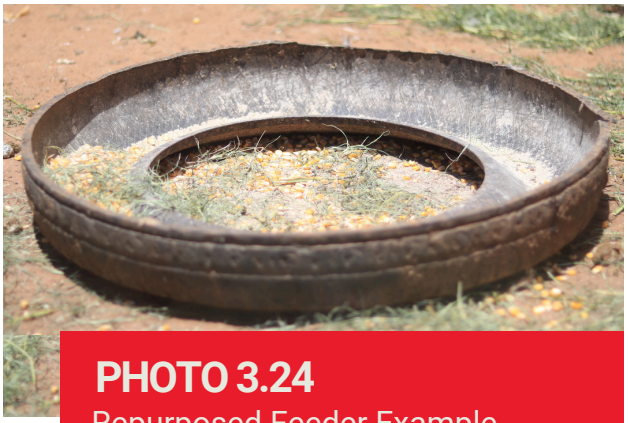


PHOTO 3.24
Repurposed Feeder Example

PHOTO 3.25
A farmer feeds his Dual-Purpose chickens by hand.

11

Paper

Before chicks arrive, lay paper over the bedding and sprinkle feed on it (Photo 3.26). This encourages chicks to start feeding. Remove the paper after 2–3 days once chicks consistently feed from feeders.

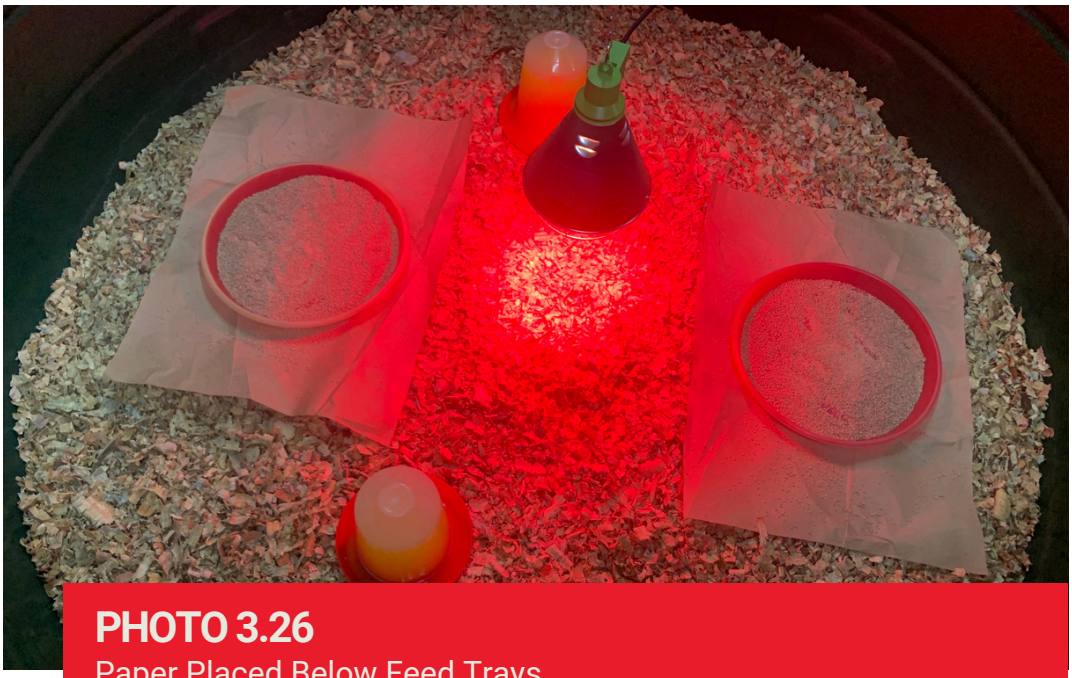


PHOTO 3.26
Paper Placed Below Feed Trays

Management of the Chicks

Transportation from the Hatchery

The journey from the hatchery or collection point to the poultry house should be as seamless as possible. Preplanning is necessary to determine the routes that will be used. The birds should be collected during the cooler periods of the day. Upon receipt of the chicks, the receiver should wash their hands with soap and running water. Next, they should inspect the chicks to ensure they are alive and healthy. While chicks from a hatchery are already checked for quality, rechecking will help ensure that only the best quality chicks are placed on the farm. Some of the critical signs of a healthy chick are as follows:

PHOTO 3.27
Transportation Example

PHOTO 3.28
Transportation Example

TIP

Avoid using taxis (public transport) to transport chicks.

Signs of Good Health	Answer
Active and Alert	It should stand up within three seconds after being placed on the palm on its back
Bright, Clear Eyes	The eyes should be bright, clear, and free from any discharge or swelling.
Clean and Dry	The chick's feathers should be clean and dry, with no signs of dirt, stains, or wetness. It should be free of any fecal matter on the body.
Vocal	It should be vocal, chirping when handled or in response to its surroundings, showing a normal level of energy.
Smooth and Soft Beak and Feet	The beak and feet should be smooth and soft, without cracks or deformities.
Properly Formed Navel	The navel should be clean and healed, with no signs of infection or swelling. It should not be bleeding or oozing.

After inspecting a small sample of the chicks, ensure that the box is lined with sufficient soft bedding to provide comfort for the chicks. There is no need to provide feed or water during the journey, as the chicks can sustain themselves using the nourishment from the yolk. However, feed and water should be readily available upon arrival. During the journey, the chicks should be well-ventilated by avoiding stacking boxes on top of each other where multiple boxes are ordered. In the event of a breakdown, place the chicks in a well-ventilated, shaded area until alternative transport arrives.

PHOTO 3.29
Farmers should inspect chicks upon delivery to ensure they are in good health.

Chick Placement to Teen Birds

The first activity upon chick arrival is counting the chicks, followed by weighing.

1

Weighing

Chicks are weighed upon arrival and weekly thereafter. The initial weigh-in at placement establishes a base weight, serving as a reference for future comparisons. Subsequent weigh-ins should occur in the morning before replenishing feeders to ensure accurate measurements.

To begin, an empty bucket is weighed, and its weight is recorded. A sample of birds is selected based on flock size. The sample size increases as follows:

Flock Size	Number of birds sampled
100 and less	10
150	15
200	20
250	25
300	30

In the following weeks, sample birds should be chosen from different sections of the brooder chamber to ensure representative data. The selected birds are weighed together in the bucket, and the combined weight is recorded. The weight of the empty bucket is subtracted from this total. The resulting weight is divided by the number of birds in the sample to calculate the average weight per bird.

Key Weighing Steps

- Weigh empty bucket and record weight
- Select sample size based on flock size
- Weigh sample birds together in the bucket
- Subtract bucket weight from total
- Divide by number of birds to determine average weight per bird

2 Feeding and Drinking

Chicks should start feeding and drinking immediately upon placement. Place chicks close to the feed on paper to stimulate their natural pecking behavior. Providing a stress pack containing essential vitamins helps reduce stress effects.

Crop Filling: Check whether chicks are eating and drinking by assessing crop fill (Photo 3.30) at 2, 8, 12, 24, and 48 hours after placement. Gently feel the crop (at the base of the neck). A soft, full crop indicates proper feeding and hydration. Sample 10 birds from different sections; by 12 hours, 8 out of 10 should have full crops.

PHOTO 3.30
Checking Crop Fill

Time After Delivery	Target % of Flock with Full Crop
2 Hours	75%
8 Hours	80%
12 Hours	85%
24 Hours	95%
48 Hours	100%

If the crop is empty, encourage feeding by placing chicks near feed. A rough, hard crop indicates dehydration; dip beaks into water to promote drinking.

Feed and water must be available continuously. Water should be clean and fresh. Water should always be clean and fresh, as it is essential for digestion and overall health. Optimal house temperature and disease-free conditions are essential. In winter, heaters prevent birds from using feed energy to stay warm, reducing feed costs.

Feed particle size should promote intake and digestion. Adjust feeders and drinkers to bird height. Avoid overfilling feeders to prevent spillage.

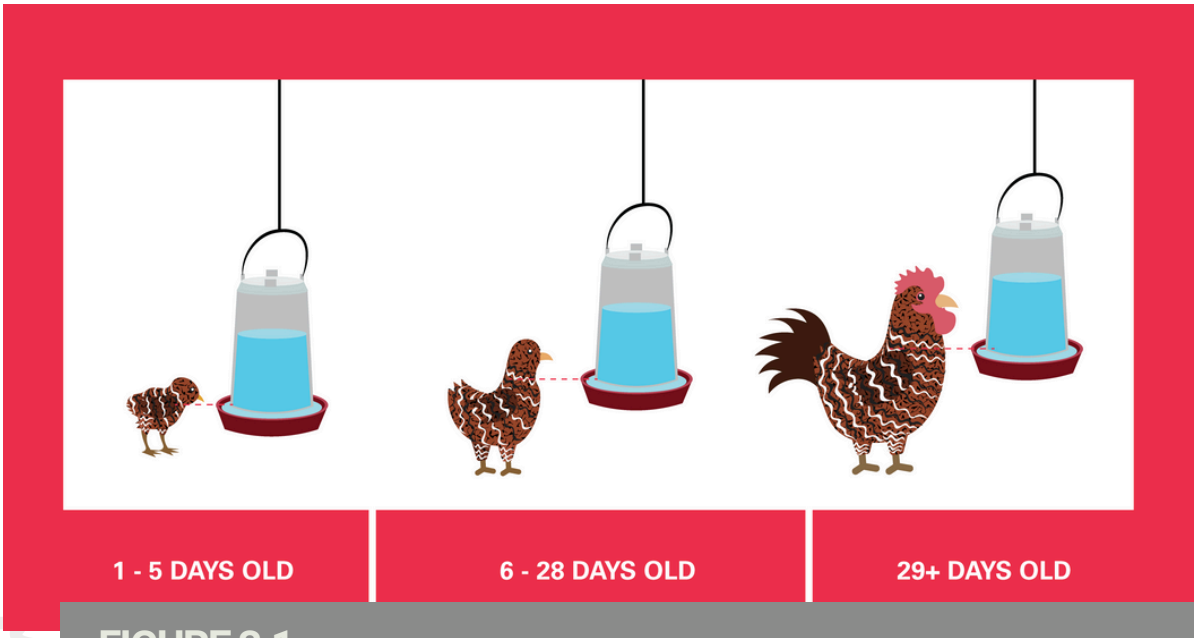


FIGURE 3.1
Ideal Drinker Heights with Age of Birds

Feeders should not be filled to the rim as this will result in spillage. Additionally, an adequate number of feeders should be distributed evenly across the house to avoid competition among birds. Transitioning chicks from mash to crumble feed should be done gradually to ensure they adapt comfortably. On day 12, introduce a mixture of 25% crumble and 75% mash. By day 13, adjust the ratio to 50% crumble and 50% mash. On day 14, the chicks should be consuming a fully crumble diet.

Throughout this process, monitor their feed intake closely. If the chicks appear hesitant or their consumption decreases, slow the transition by maintaining a higher proportion of mash for a few more days until they adapt fully to the new feed type. By managing these factors, brooder units can ensure that they use sufficient feed for optimal productivity without cutting into their profits.

Feed Transition from Mash to Crumble

- **Day 12:** 25% Crumble, 75% Mash
- **Day 13:** 50% Crumble, 50% Mash
- **Day 14:** 100% Crumble

3 Temperature

On arrival, brooder chamber temperature should be 30-33°C. Use a thermometer or monitor chick behavior:

Condition	Behavior	Remedy
Too Cold	They will huddle together close to the heater	• Lower the infra-red lamps • Increase the coals in traditional heaters
Too Hot	The chicks pant and move away from the heater	• Lift the infra-red lamps • Reduce the coal for traditional heaters
Draughty	Huddle together in a corner opposite the direction of the draught.	• Close the hole that is the source of the draught
Normal	They are distributed evenly across the brooder chamber	✓

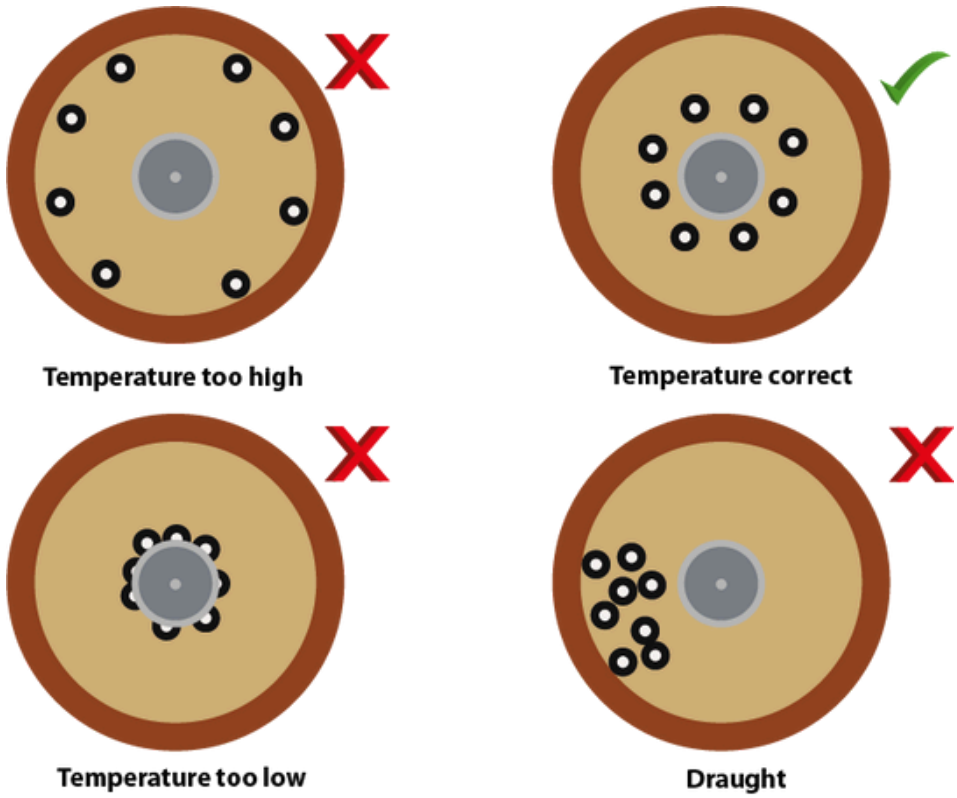


FIGURE 3.2
Chick Behavior Examples in Brooder Chamber

As chicks grow and feather, reduce heating.

4 Ventilation

Proper air circulation is essential for the healthy growth of chickens, especially after the birds are fully feathered. Good ventilation helps remove excess moisture from the litter, reducing ammonia accumulation, and allows fresh oxygen to enter the poultry house while expelling harmful carbon dioxide, ammonia, germs, and dust. However, in Lesotho's cold winters, farmers sometimes prioritize warmth over proper ventilation, leading to poor air quality in poultry houses. This compromises flock health, often resulting in stunted growth, higher disease incidences, and a lack of uniformity among the birds.

A non-uniform flock presents several challenges. Larger or stronger birds dominate access to feed, water, and space, leaving smaller birds undernourished. This uneven growth makes it harder to meet production targets, complicates management due to varying nutritional and space requirements, and increases susceptibility to stress and disease in weaker birds. Ultimately, non-uniformity leads to reduced productivity, higher feed conversion ratios, and economic losses as buyers and processors often reject inconsistent birds.

The issue is further intensified by Lesotho's high altitude, where lower oxygen levels make adequate ventilation even more critical. To address this, poultry houses should feature large openings on the sides instead of high walls with small openings. These openings can be covered with heavy-duty tarpaulin, closed at night to retain warmth, and opened during the day to ensure proper ventilation. This approach ensures the litter remains dry, expels dirty air, and allows sufficient oxygen into the house, reducing the risk of conditions like water belly. Balancing ventilation and temperature are vital for a healthy, uniform flock that meets production goals.

PHOTO 3.31
Properly Ventilated House
Credit: Boschveld Farm, South Africa

5 Bedding

Bedding in a poultry house can become a breeding ground for pests and diseases if not properly maintained. Wet litter promotes the production of ammonia gas, recognizable by its sharp, pungent smell. Additionally, wet litter makes the poultry house colder, especially during winter, when some farmers may prioritize warmth over proper ventilation.

To ensure a healthy environment, it is crucial to maintain the quality of the litter until the birds are sold as teen birds. This involves regularly turning the bedding to prevent compaction and replacing any wet or soiled sections. As the litter becomes compacted over time, fresh dry bedding should be added and mixed with the existing litter to maintain its effectiveness. Proper litter management helps to minimize ammonia levels, keep the house warm and dry, and ensure the health and comfort of the birds.

6 Lighting

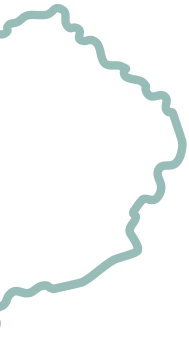
Provide 23 hours of light on day one, reducing by one hour daily until day 9 to prepare chicks for future production systems. This lighting program ensures chicks are used to darkness in preparation for the stage where they must change the production system. The one hour of darkness also allows them to rest.

Age	Duration of Light	Duration of Dark	Light Off	Light On
Day 1	23h	1h	Midnight	1:00 AM
Day 2	22h	2h	Midnight	2:00 AM
Day 3	21h	3h	Midnight	3:00 AM
Day 4	20h	4h	Midnight	4: 00 AM
Day 5	19 h	5h	11:00 PM	4:00 AM
Day 6	18 h	6h	10:00 PM	4:00 AM
Day 7	17 h	7h	9:00 PM	4: 00 AM
Day 8	16 h	8h	8:00 PM	4:00 AM
From Day 9	Natural light + 2 hours extra light (11:00 PM - 1:00 AM)			

Trouble shooting: Management from Chicks to Teen Birds

Problem	Possible Cause	Solution
Stunted Growth	Inadequate feed quality or quantity	Ensure high-quality feed with proper nutrients is provided all the time.
	Poor quality chick	Ensure chick placed are of high quality from a reputable hatchery; Ensure transportation is comfortable and seamless.
	Poor water availability	Ensure clean, fresh water is always accessible.
	Overcrowding	Maintain proper stocking density as per guidelines.
Uneven flock size/ Poor uniformity	Inconsistent access to feed and water	Ensure feeders and drinkers are evenly distributed across the house.
	Overcrowding	Follow recommended stocking density to reduce competition for resources.
	Environmental variation (temperature, ventilation)	Maintain consistent conditions throughout the poultry house.
Wet litter	Poor ventilation	Ensure proper ventilation by opening the curtains.
	Leaking drinkers	Regularly check and repair drinkers
	High humidity levels	Turn and replace wet bedding; add fresh, dry bedding regularly.
Cold birds	Lack of adequate heating	Invest in reliable heaters and maintain recommended house temperatures.
	Poor insulation	Use appropriate materials to insulate the house and reduce heat loss.
	Draught	Close open holes or gaps on the wall or ceiling.
Cold birds	Wet litter	Replace or dry wet litter promptly; turn bedding frequently.
	Poor ventilation	Increase airflow by opening curtains appropriately.

Problem	Possible Cause	Solution
Feather picking or aggression	Overcrowding	Provide adequate space.
	Insufficient feeder space	Provide sufficient feeders to minimize competition.
	Nutritional deficiencies	Provide recommended commercial feed from reputable supplier.
Dehydrated birds	Insufficient drinkers	Regularly check and clean drinkers; provide enough for the flock size.
	Poor water quality	Use clean, fresh water and regularly clean drinkers.
Sudden chick mortality	Disease outbreak	Ensure vaccination schedules are followed and biosecurity measures upheld.
	Temperature extremes	Monitor and maintain consistent brooder temperatures.



4. Management of Teen and Adult Birds

Introduction

Managing teen and adult birds is a critical phase in poultry production, as this stage determines the flock's overall health, productivity, and profitability. Proper care during this period ensures optimal growth, egg production, and meat yield. Around 28 days of age, teen birds transition from the brooding house, where they were reared intensively, to a free-range system. This process involves transporting them to the free-range area, followed by an acclimatization period before they are released to forage and scavenge. Unlike the brooding phase, where feed and conditions are fully controlled, the free-range system allows birds to supplement their diet by scavenging for food. Roosters are kept for meat production, while hens provide eggs and are sold or slaughtered for meat once they stop laying. This chapter provides practical guidelines on housing, feeding, and other measures tailored for teen and adult birds.

Preparation for the Arrival of Teen Birds

1 The Chicken Coop

The housing coop for teen and adult dual-purpose birds should be properly prepared before their arrival. This coop serves as a secure shelter where birds can rest, lay eggs, and stay protected from predators and harsh weather conditions. It should be well-ventilated to ensure good airflow and maintain a comfortable environment. The space must be sufficient to allow birds to perch and move freely during resting periods, with nesting boxes provided specifically for egg-laying.

Prior to the arrival of the birds, the coop should be thoroughly cleaned to prevent diseases and pests. A concrete or compacted soil floor is suitable for the structure. Convenient access should be provided, with a door leading directly to the free-range area. The coop must protect against extreme temperatures by providing warmth during cold weather and shade during hot seasons. For example, a thatched roof can offer insulation against cold nights.

The house can be constructed using locally available and cost-effective materials. Unlike the brooding phase, where heaters are essential, teen and adult birds are fully feathered and capable of regulating their body temperature, eliminating the need for artificial heating.

2 The Environment

Outside the poultry coop, chickens should have a designated space to forage and scavenge. This area should be enclosed with a fence to prevent the birds from mixing with other flocks, which could expose them to diseases. The environment must be kept clean, with regular maintenance to ensure hygiene. Additionally, any potential breeding sites for rodents or other pests should be eliminated to maintain a healthy environment for the birds.

PHOTO 4.1
Example of Poultry Scavenging Area

3 Feed and Water

The first week after placement serves as an acclimatization period for the teen birds. During this time, they are kept inside the coop to help them familiarize themselves with their new home. Feed and water are provided exclusively within the coop to ensure their comfort and ease of adjustment. In the second week, the birds are gradually introduced to the free-range system, where they are allowed to forage and scavenge for food during the day. Each bird should be allocated at least ten square meters of yard space with sufficient forage, worms, and insects to feed on.

PHOTO 4.2
Crushed Maize

Water should also be provided within the free-range area to ensure the birds remain hydrated as they forage. In the evening, the birds should be called back to the coop with grains placed just outside the coop to encourage their return. Supplementary feeding is then provided inside the coop as part of their training to associate the coop with safety and food. More supplementary feeding may be necessary during winter when natural forage is limited.

Supplementary feed can be blended to provide a balanced diet containing all essential nutrients:

Additionally, the birds can consume household waste such as vegetable stalks and leftover food scraps. A handful of commercial feed should be provided daily to ensure adequate nutrition for optimal health, growth, and productivity.

Nutrient	Purpose	Source
Starch	Provides energy for growth, movement, and production of meat and eggs.	Maize grains, sorghum, millet, wheat bran
Protein	Supports muscle development, egg production, and feather growth.	Soybean, groundnut, sunflower seed
Fats and Oils	Provide concentrated energy, warmth, and aid in absorbing fat-soluble vitamins (A, D, E, K).	Soybean, sunflower seeds
Vitamins	Support metabolic functions, immune system, and overall health.	Green leafy vegetables (e.g., spinach, kale, cabbage)
Minerals	Critical for bone formation, eggshell production, and overall health.	Limestone or shell grit (calcium), bone meal (calcium and phosphorus)
Fiber	Aids digestion and improves gut health.	Wheat bran, oat hulls, sunflower husks
Water	Essential for hydration, digestion, and bodily functions.	Clean and fresh water should be supplied at all times.

4 Drinkers and Feeders

Clean water should always be available in the coop. Various materials can be repurposed into drinkers and feeders, such as plastic containers, old buckets, and tin cans. These should be cleaned regularly to avoid contamination.

PHOTO 4.3
An Old Tire Repurposed as a Feeder

5 Other Management Aspects

Transportation of Teen and Adult Birds

Catching and transporting birds can be stressful, so careful handling is essential to minimize stress. A masonite sheet can be used to gently confine the birds to a smaller area. Birds should be handled one at a time by holding their legs with one hand and supporting their wings with the other.

PHOTO 4.4
Perforated Cardboard Box

Birds are placed in a cage or container for transport from the brooding house to the free-range area. The container should be spacious, ventilated, and prevent birds' heads, wings, or legs from protruding. Cardboard boxes (Photo 4.4), woven baskets, and wire cages can be repurposed for this purpose. According to the South African Poultry Association (SAPA, 2012), a container measuring 77 cm in length, 50 cm in width, and 30 cm in height is recommended for carrying six adult birds.

In preparation for transportation, the weather forecast should be checked to ensure favorable conditions. Rainy days should be avoided, especially when transporting chickens by bicycle or motorbike. Transportation is best carried out during the cooler hours of the day to minimize heat stress. Selecting the quickest and smoothest route to the destination is recommended. Containers carrying the birds must be securely strapped to ensure a safe and stable journey.

Transportation should occur during cool hours to reduce heat stress. For journeys longer than eight hours, vegetables like cucumbers, watermelons, or cabbage can serve as hydration sources. Birds should be monitored for stress signs such as panting and excessive vocalizations.

PHOTO 4.5
A Plastic Live Chicken Crate

PHOTO 4.6
DPPs Under Shade at a Market

Upon arrival, teenage birds should be transferred directly to the coop. In cases where adult birds are transported for sale at markets, they should be placed in a shaded, well-ventilated area, if possible, away from loud noises. At the market, adequate feed and water should be provided, and the cages must be spacious enough to allow the birds to stand and move comfortably (Photo 4.5).

6 Identification

Upon arrival, birds should be identified using a colored thread or a thin strip of colored cloth loosely tied around their leg. Care should be taken not to restrict blood circulation (Photo 4.7).

PHOTO 4.7
Example of ID Tag

7 Acclimatization to the New Environment

During the acclimatization period, in addition to keeping the birds inside the coop for a week, they should be trained to recognize a unique call. Each day during this period, the owner should bring food at the same time and, before feeding the birds, use the same call consistently. This routine helps the birds associate the call with food and the coop.

The schedule for calling should continue even after the birds are allowed to scavenge. Over time, the birds will learn to return to the coop whenever they hear the call.

8 Meat and Egg Production

One of the two primary products in this production system is meat, which can be harvested as early as 12 weeks if the birds are well-managed. Roosters grow faster than hens and typically reach market weight sooner. Some roosters can be slaughtered for household meat consumption, while others can be sold to generate income.

Hens, on the other hand, are retained for egg production, which typically begins around 20 weeks of age until around 70 – 75 weeks under optimal management conditions. The exact age of first lay depends on the breed and how well they are managed. At this stage, the hens will start using nests to lay their eggs. Nests should be lined with soft bedding to provide a safe and comfortable environment and to prevent egg breakage. Once one hen starts laying in a nest, others will often follow suit. Eggs should be collected frequently to encourage consistent laying, reduce breakage, and prevent hens from sitting on the eggs. Collected eggs can either be sold for income or consumed by the household. The income generated from selling birds and eggs will be explained in more detail in the business chapter.

9 Breeding and Incubation

In a model where the farmer's objective is to increase flock size by breeding commercial hybrid chickens, there is a risk that the resulting offspring will exhibit lower performance compared to their parents. Most improved breeds, are hybrids, meaning they combine the best traits of two or more chicken breeds, such as good mothering ability, disease resistance, and fast growth. Breeding these hybrids often leads to genetic dilution, causing a decline in performance over successive generations.

Additionally, in community settings, there is a significant risk of inbreeding, which occurs when closely related birds, mate. Inbreeding often results in inbreeding depression, leading to reduced productivity, and health in the offspring. Consequently, relying on hybrids for breeding purposes is counterproductive and unsustainable over time. Instead, farmers are encouraged to source new stock from reputable hatcheries to maintain high-performing flocks.

If a farmer intends to breed their own chicks, there are two methods for hatching fertile eggs: artificial or natural incubation. Natural incubation refers to using hens to brood fertile eggs until they hatch. This method works better with breeds that lay their eggs in clutches. However, most dual-purpose hybrids do not lay in clutches. Artificial incubation, on the other hand, is carried out using a machine that mimics the hen's brooding behavior. Artificial incubation is practical where there is a reliable power supply.

10 Slaughtering

The males are normally ready for slaughter from 12 weeks. The hens can be slaughtered at the end of their cycle at 75 weeks as spent. The process of slaughtering should be done in a humane way to ensure the process is efficient and stress-free for the birds. The slaughtering is also supposed to produce carcasses that are clean and that are acceptable to the consumer and competitive broiler carcasses on the formal market.

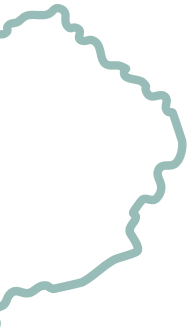
FIGURE 4.1
Slaughter chickens away from the poultry house.

The process begins with preparing the bird a day before slaughter by withholding feed for about 12 hours to empty their digestive systems. Access to clean water should be maintained to prevent dehydration. This step is conducted to ensure that there is no spoilage of the carcass from spillage of gut contents.

On the day of slaughter, the chicken should be handled gently to minimize stress. The process of slaughtering should be conducted at an abattoir which observes high health and safety standards.

NOTE

It is NOT recommended to slaughter birds on-site as this could present risks for disease transmission.



5. Biosecurity, Cleaning and Vaccination

Introduction

Maintaining the health and productivity of a poultry flock requires a proactive approach to disease prevention. Central to this effort are the pillars of biosecurity, vaccination, and cleaning—three critical components that work synergistically to protect poultry from pathogens and minimize disease outbreaks.

Biosecurity serves as the first line of defense, encompassing practices designed to create barriers against the entry and spread of diseases. From controlling access to poultry farms to ensuring proper hygiene protocols for workers and equipment, biosecurity measures are fundamental for safeguarding flock health.

Cleaning and disinfection are indispensable for maintaining a healthy farm environment. These practices eliminate harmful microorganisms from surfaces, equipment, and housing areas, reducing the risk of infection and reinfection.

Vaccination, on the other hand, is a targeted strategy that enhances the birds' immunity to specific diseases. When implemented correctly, vaccination programs can significantly reduce the prevalence and severity of infectious diseases, bolstering the overall resilience of the flock.

Together, these three strategies form a defense system that not only protects individual birds but also contributes to the long-term sustainability and profitability of poultry operations. This chapter explores the principles, techniques, and best practices associated with biosecurity, vaccination, and cleaning, equipping poultry farmers with the knowledge to implement effective disease prevention measures.

Biosecurity

Bio means ‘life’ and security means ‘the state of being safe’. Biosecurity is crucial for maintaining the integrity of Lesotho's national poultry flock. It is not just a single practice but a system of multiple measures that must be implemented across farms to prevent the introduction and spread of diseases.

Definition

Bisecurity refers to the state of protecting chickens from disease.

While dual-purpose birds are highly resilient to diseases, they are not entirely resistant. They can carry diseases without showing any signs of illness, which may lead to the spread of these diseases to other types of chickens. Diseases are extremely costly to farmers, as they reduce productivity, increase production costs, and cause high mortality rates. Some poultry diseases can even affect human health, as they can be transmitted from chickens to humans. If diseases are not properly managed, it can lead to a shortage of protein, which is essential for feeding families.

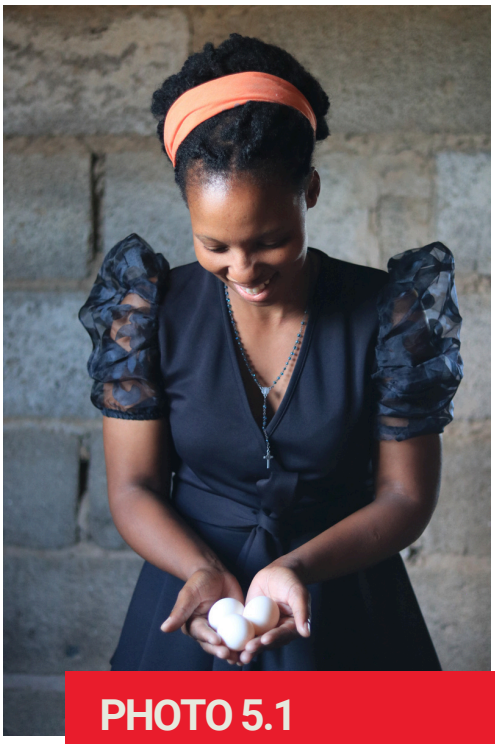


PHOTO 5.1
A biosecure DPP business ensures a constant supply of chicken and eggs to the family.

In September 2023, a bird flu outbreak in South Africa led to a ban on importing chickens and eggs into Lesotho. This caused a significant shortage of poultry products in the country, leaving many small-scale farmers who relied on chickens for their livelihoods unable to continue their businesses. As a result, the poultry industry suffered a severe setback, and many farmers have been unable to return to farming. This highlights the importance of preventing diseases to protect farmers' income and the food supply. To avoid the devastating losses caused by poultry diseases, it is essential to maintain a clean environment for chickens, even for those kept free-range.

Recap

Dual-purpose chickens provide meat and eggs which are good for pregnant women, breastfeeding mothers, and children. Any extra can be sold to make money for other family needs.

1 The Importance of Biosecurity for Dual-Purpose Poultry Farmers

Biosecurity is critical for rural farmers raising dual-purpose poultry because it protects the health of their flocks and ensures sustainable farming. Here's why it matters:

1. Prevents disease spread

Diseases like Newcastle disease or bird flu can wipe out entire flocks, leading to devastating losses. Good biosecurity practices—such as keeping poultry houses clean, limiting visitors, and disinfecting equipment—stop diseases from entering the farm.

2. Protects human health

Some poultry diseases, like avian influenza and salmonellosis (food poisoning), can spread to humans. Biosecurity measures reduce the risk of zoonotic diseases, keeping farmers and their families safe.

3. Improves productivity

Healthy chickens produce more eggs and grow better. By preventing diseases, farmers can increase both egg and meat production, ensuring a reliable source of food and income.

4. Reduces costs

Treating sick chickens is expensive, and losing birds to disease means lost investments. Biosecurity is a cost-effective way to avoid these financial setbacks.

5. Supports long-term livelihoods

Many rural families depend on poultry for their livelihoods. When diseases are controlled, farmers can sustain their operations, maintain steady income, and provide for their families.

6. Prepares for disease outbreaks

During disease outbreaks, like the 2023 bird flu, farmers with strong biosecurity measures are better positioned to protect their flocks and continue farming.

Key Biosecurity Tip

- Limit visitors to your poultry house and always disinfect shoes and equipment before entering

2 Causes of Disease

Some diseases are caused by germs. These are small organisms that cannot be seen by the naked eye but are able to grow, multiply and spread under the right conditions. There are many germs in the air, on surfaces, in the poultry house, on equipment and in many spaces. When allowed to multiply and grow, these germs can cause diseases. Germs can be killed by chemicals such as detergents and disinfectant.

Conditions necessary for the growth and multiplication of germs

Germs can grow where there is a source of food, moisture, warmth and given enough time. All these conditions are found in the poultry house. The food can be in the form of feed, litter or the birds themselves. The poultry house is always warm, since the birds require the warmth for them to grow. Moisture is found in the litter or the drinkers which are used to contain drinking water for the chickens. If a lot of time passes by without cleaning surfaces, then the germs can spread and infect other birds.

PHOTO 5.2
Conditions necessary for the growth of germs - warmth, food and moisture - are all found in the chicken house.

3 Ways Diseases Spread

There are many ways in which diseases can spread. Germs are spread by different agents.

1. Contact with sick birds
Direct contact between healthy and infected birds is one of the fastest ways diseases spread. Sharing feeders, drinkers, or nesting boxes can transfer pathogens.

2. Contaminated equipment and tools
Using dirty equipment (e.g., feeders, drinkers, and cleaning tools) can transfer germs from one area to another.

3. Visitors and farmer
People can carry germs on their clothing, shoes, or hands after visiting other farms or markets. Shoes may step on droppings that are infected and spread the infection. Hands that are not washed have a potential of spreading infections. Clothing can also carry diseases.

4. Wild birds, flies, cats, rodents and snakes
Wild birds, cats, rodents, and other animals can carry diseases such as avian influenza and Newcastle disease. More than 350 different kinds of birds visit Lesotho every year. They can potentially bring diseases. Free-range chickens are especially exposed to interactions.

5. Contaminated feed and water
Poorly stored or dirty feed and water can harbor germs. Feed that is exposed to moist environments can develop germs that produce poisons which when ingested by the chickens cause sickness. Water from uncovered sources can also carry germs.

6. Unclean environment

Dirty bedding, accumulated manure, and poorly ventilated poultry houses create an environment for germs to thrive. The environment around the poultry house can harbor pests and diseases. An environment that has pools of water can harbor rats, flies and mosquitoes. These can spread diseases to chickens and humans. Roofing material can also harbour diseases and parasites. A thatched roof is difficult to clean.

PHOTO 5.3
A Dirty Yard Can Harbor Diseases

7. Bringing in new birds

Introducing new birds without quarantine can introduce diseases to the flock. Lesotho relies on imports from South Africa. Some of the birds are illegally imported by 'agents' who transport them without compliance with import regulations and without import permits. These birds are at risk of carrying diseases into Lesotho. There are also reports of farmers buying dual-purpose birds from other provinces in Lesotho. These again are not vetted for and cleared of diseases before they are moved to new areas.

8. Movement between farms

Vehicles, equipment, and people moving between farms can carry germs. In rural communities, the lack of fencing allows free-ranging chickens to get in contact with different flocks thereby exposing them to diseases.

9. Airborne diseases

Some diseases, like avian influenza, can spread through the air, especially in densely populated areas. Poor ventilated poultry houses quicken the spread of diseases through a flock. Airborne transmission is also a problem in densely populated flocks where spacing requirements are not followed.

4 Diseases and Parasites that May Affect Chickens in Lesotho

Where poultry is kept intensively, such as during the brooding phase, disease problems will inadvertently arise. Diseases of poultry may be broadly defined as:

1. Diseases of the digestive system

The digestive system is a system which comprises the mouth, crop, stomach, intestines and involves the breaking down of feed. The diseases normally cause diarrhea and sometimes death such as in the case of Coccidiosis or bloody diarrhea.

2. Diseases of the respiratory system

These diseases affect breathing. These typically are characterized by sneezing, wheezing, congestion and nasal discharge.

3. Diseases caused by parasites

A parasite is a living organism which lives off another organism. These parasites feed on the birds and can be found inside the body (internal parasites) or outside the body (external parasites). Internal parasites include worms, and external parasites include mites and fleas, among others.

4. Locomotor diseases

Locomotor diseases in chickens affect their ability to move, stand, or walk properly. These conditions can result from nutritional deficiencies, infections, genetic factors, or management issues. These diseases are characterized by deformed legs, fragile bones, swollen joints and difficulty (lack of) in standing or walking.

5. Cancers

Are diseases which result in tumors or growth. These tumors are non-infectious meaning they are not spread from one bird to another.

6. Non disease issues caused by environmental factors

Environmental factors can significantly impact the health and productivity of chickens. While these issues are not caused by diseases, they can lead to poor growth, stress, reduced egg production, and even mortality if not properly managed. Such issues include heat and cold stress, poor air quality, wet or dusty litter, poor nutrition and overcrowding.

Tip

Clean and disinfect feeders, drinkers, and tools regularly. Germs thrive in dirty environments!

5 Notifiable Diseases

A notifiable disease is one that MUST be reported to government authorities by law. These diseases can spread quickly and cause major problems, such as mass chicken deaths affecting human health and disrupting the poultry industry. Reporting helps the government take action to stop the disease from spreading.

The notifiable diseases in chickens in Lesotho are:

1. Newcastle Disease
2. Avian Influenza (Bird Flu)
3. Salmonellosis

Steps to Report a Notifiable Disease

1. **Recognize Signs:**
   - Sudden deaths.
   - Severe coughing, sneezing, or breathing issues.
   - Swelling of the head or face.
   - Purple or bluish discoloration on legs or comb.
   - Bloody diarrhea or unusual behavior.
2. **Separate Sick Birds:**
   - Isolate symptomatic birds from the healthy flock.
3. **Contact Local Veterinary Authority:**
   - Report the situation to the District Veterinary Officer.
   - Provide details on symptoms, the number of sick birds, and recent events.
4. **Follow Instructions from Authorities:**
   - Officials may inspect the farm and test samples.
   - Eggs, meat, or live chickens may be restricted from sale.
5. **Cooperate with Disease Control Efforts:**
   - Quarantine may be imposed.
   - Infected or exposed birds may need to be culled.
   - The farm may require disinfection.
6. **Report New Cases:**
   - Continue notifying authorities of any new illnesses or deaths during the investigation.

Reporting protects other farms from getting the disease. It helps to keep the poultry industry safe and running smoothly. It further reduces the risk of the disease spreading to humans in the case of Salmonellosis and avian influenza (bird flu).

6 Common Diseases

It is always important to consult a veterinarian for an accurate disease diagnosis and appropriate treatment recommendations (insert link to contact information). However, the signs of the most common diseases affecting poultry are described below:

Newcastle Disease

- Caused by a virus.
- Can result in 100% mortality in unvaccinated flocks.
- Prevention through vaccination:
  - Hitchner B1 and La Sota vaccines: administered via aerosol spray, drinking water, or eye drop.
  - Oil-based vaccine: administered as an intramuscular injection.
- Nervous symptoms: drooping wings, lack of coordination, falling over, twisted necks.
- Respiratory symptoms: birds struggle to breathe.
- Birds stop eating and drinking.
- No treatment available.

PHOTO 5.4
Layer with Newcastle Disease
Photo Credit: Hendrix Genetics

Infectious Bronchitis

- Caused by a rapidly spreading virus.
- Respiratory symptoms: snicking, sneezing, gasping, watery eyes, head shaking, nasal discharge.
- Increased mortality.
- Birds may recover within 1-2 weeks if no other pathogens are present.
- Secondary bacterial infections, commonly E. coli, often occur.
- Live vaccines are commonly used for prevention.

Coryza

- Caused by a bacterium
- Acute onset, incubation period 2-3 days
- Spreads rapidly in a flock
- Symptoms are like the common cold in humans: swelling around eyes and nose, discharge
- Can vaccinate layers and breeders
- Treat with antibiotics.

PHOTO 5.5
Layer with Coryza
Photo Credit: Hendrix Genetics

PHOTO 5.6
A layer infected with Gumboro demonstrating extreme listlessness, ruffled feathers, and crouched stance.
Photo Credit: Hendrix Genetics

Gumboro (Infectious Bursal Disease; IBD)

- Caused by a persistent virus that is difficult to kill with disinfectants.
- Often affects young broilers.
- Sudden (acute) onset.
- Damages the immune system by attacking the bursa of Fabricius.
- Symptoms: sudden increase in mortality, loss of appetite, stunted growth, depression, huddling, ruffled feathers, vent pecking, diarrhea, trembling, lack of coordination.
- Prevention through vaccination via drinking water.
- Secondary bacterial infections can be treated with antibiotics.

Fowl pox

- Caused by a virus
- Cutaneous form causes lesions on the skin, mortality usually low
- Diphtheritic form can also affect the upper gastrointestinal tract and the respiratory tract and mortality rates are higher with this form
- he birds take a long time to recover and egg production will drop can vaccinate

PHOTO 5.7
Layer with Fowl Pox
Photo Credit: Hendrix Genetics

Egg peritonitis

- In the process of egg formation, sometimes the yolk ends up in the body of the hen instead of in the reproductive tract
- This can cause inflammation of the peritoneum (lining of abdomen)
- The yolk is an excellent source of food for bacteria, which causes infection but usually antibiotics don't help
- Avoid increasing light if pullets are underweight as this makes them prone to egg peritonitis

Vent pecking

- Not an infectious disease but may cause problems in a flock
- Gentle pecking is a normal social interaction
- Becomes abnormal when it becomes severe and causes injury
- Often associated with poor environmental conditions and stress in hens such as lights too bright or overcrowding
- Can be due to pecking at parasites

Parasites

While parasites may not necessarily transfer a disease, they can cause anaemia and irritation to the bird. Hens are susceptible to internal parasites (worms/nematodes) and external parasites (mites and lice).

Hens in free-range systems are more prone to nematode infestations (helminthiasis) and may need to be dewormed.

External parasites bite and suck blood from birds, causing itching and discomfort. Heavy infestations can lead to blood loss and anemia. Birds may peck at their own feathers, damaging their skin.

Red mites are more common when hens are on the floor. The mites spend the day hiding in dark cracks and corners of the house. At night they become active and feed on the birds. Northern fowl mites live on the birds and are often concentrated around the vent area.

7 Disease Prevention

While some diseases can be treated, they leave a lot of impact. It is always better to prevent the introduction and spread of a disease. Biosecurity ensures that diseases are prevented from being introduced to a flock or spreading from bird to bird or flock to flock.

Common Diseases in Backyard Chickens

Disease	Spread	Signs and Symptoms	Treatment	Notifiable	Vacccination
New Castle Disease	Contact with infected birds; droppings; contaminated materials; airborne.	Difficulty breathing; green diarrhea, twisted neck; decreased egg production; sudden death.	No Cure	**Yes**	**Yes**
Avian Influenza (Bird Flu)	Contact with infected birds; contaminated water; airborne in closed spaces.	Swollen head; purple legs; coughing; nasal discharge; drop in egg production; sudden death.	No treatment. Culling affected birds. Strict biosecurity.	**Yes**	**Yes**
Fowl Pox	Mosquito bites; contact with infected birds.	Scab-like spots on comb and wattles; yellow plaques in throat; tiredness; reduced appetite.	Supportive care for lesions.	No	Yes
Coccidiosis	Ingestion of infected droppings; contaminated feed/water.	Bloody diarrhea; pale combs, weight loss; lethargy; reduced egg production.	Anticoccidial drugs (e.g. amprolium); maintain dry, clean housing.	No	No
Salmonellosis (Food poisoning)	Contaminated feed, water, or contact with infected birds.	Diarrhea; soiled vent feathers; dehydration; loss of appetite; sudden death in severe cases.	Antibiotics prescribed by a vet; strict hygiene practices.	**Yes**	
Marek's Disease and Avian Leucosis	Airborne; contaminated environments.	Paralysis of wings/legs; weight loss; tumors; enlarged feather follicles.	No cure. Cull affected birds.	No	Yes
Infectious Bronchitis	Airborne in poorly ventilated houses; contaminated equipment or feed.	Coughing; sneezing; watery nasal discharge; reduced egg production, poor egg quality.	Supportive care.	No	Yes
Infectious coryza	Airborne, contaminate feed and water	Swollen face, mucopurulent nasal and ocular discharge, deaths	Antibiotic therapy	No	Yes
Parasites (Internal and External)	Close contact with infected birds; contaminated environments.	Internal: Diarrhea; weight loss.External: Feather loss; scabs; itching; reduced eggs.	Internal: Dewormers (e.g., fenbendazole). External: Insecticides/dusting powder.	No	No

***Diseases in **bold** are notifiable diseases

8 Biosecurity Measures

Biosecurity can be approached by setting up infrastructure that helps in stopping diseases from spreading or being introduced. Additionally, some procedures can be put in place to safeguard the dual-purpose birds. The following can be used to ensure biosecurity of the birds:

1. Fencing Around the Poultry House

A fence with one lockable gate will ensure that there is no unauthorized entry into the brooder house (Photo 5.8).

2. Footbath

A footbath is placed at the entrance of the poultry house, ensuring that everyone steps into it to disinfect their shoes before entering. The footbath helps prevent the introduction and spread of diseases by removing germs that may be carried on footwear.

PHOTO 5.8
Fencing Example

A footbath can be constructed using concrete. A container or tray large enough to fit the soles of shoes, with sides high enough to hold a disinfectant solution may also be used. Non-slip mats or grass can be added inside to enhance cleaning. The disinfectant used should always be prepared according to the manufacturer's guidelines.

PHOTO 5.9
Concrete Footbath

PHOTO 5.10
Plastic Footbath

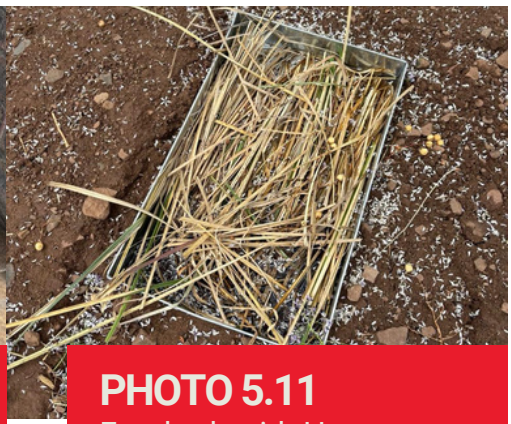


PHOTO 5.11
Footbath with Hay

The footbath should be maintained well for it to be effective the disinfectant should be replaced regularly, as dirt and organic matter like mud and manure can reduce its strength. The footbath should be cleaned daily, and everyone entering the poultry house must be encouraged to use it. A dirty, poorly maintained footbath is dangerous.

3. Handwashing Station

Hands should be washed before and after handling the birds. A tap with running water should be installed near the poultry house to facilitate handwashing. Soap should also be provided for use during handwashing (Photo 5.12).

PHOTO 5.12
Handwashing Station

4. Open-Sided Poultry House with Curtains

One of the major causes of disease spread is poor ventilation. Proper air circulation is essential to remove dust, ammonia, and germs, keeping the air fresh and reducing the risk of diseases. Even in winter, curtains should be opened to allow adequate air circulation.

PHOTO 5.13
Designated inexpensive plastic shoes which can be used in the poultry house.

5. Shoes for Use in the Poultry House

Inexpensive plastic shoes can be placed at the entrance of the poultry house to be used specifically in the poultry house (Photo 5.13). The shoes should be washed with soap and water after every use.

6. Feed Storage

Feed should be stored in a cool, dry place. The feed should be placed on top of a pallet (Photo 5.14). The feed should be stored in closed bags. Any spillages should be removed so as not to attract rats.

PHOTO 5.14
Feed Storage

7. Traps Against Organisms Carrying Germs

Flies, rats, snakes, wild birds and mosquitos should be trapped so that they do not have contact with the chickens. Rat traps should be placed around the poultry house, 15 m apart. Fly traps should be hung outside the poultry house. Snakes and wild birds can be kept outside by putting snake fence on the side openings of the poultry house. Pools of water should be removed since they breed mosquitoes. Grass should always be short.

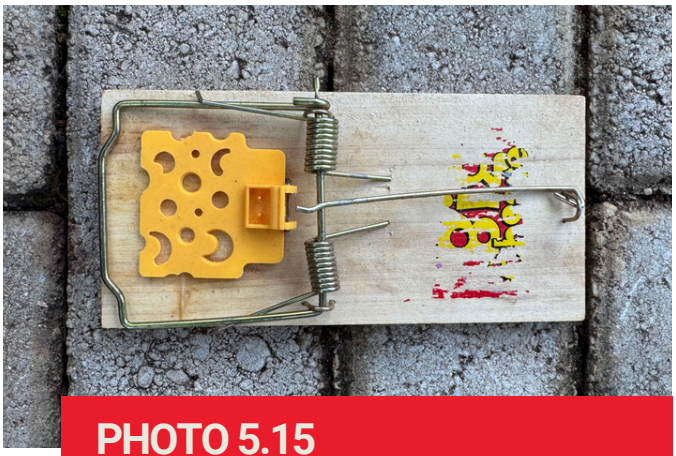


PHOTO 5.15
Rat Trap

PHOTO 5.16
Fly Trap

8. Handling Dead Birds

Dead birds should be removed from the poultry house or the surrounding area as soon as possible. They should be buried or burnt as soon as possible.

9. Disposing of Litter

Litter should be removed from the poultry house in bags and placed far away from the poultry house and coop. Litter can harbor germs, and if stored close to the house, it may cause reinfection.

10. Buy Birds from Reputable Hatcheries

Some diseases can be passed from the egg to the chick and then to adult birds. Purchasing fertile eggs from unreputable breeders can expose the flock to diseases such as Salmonellosis, which can be transmitted through eggs. Day-old chicks should be bought from hatcheries that comply with health standards. It is recommended that farmers purchase vaccinated day-old chicks.

11. Use Clean Feeding and Drinking Equipment Specific to that Poultry House

All feeders and drinkers used by the birds should be cleaned regularly. Drinkers should be cleaned daily before adding fresh water, while feeders should be washed at least twice a week. If there is more than one poultry house, the equipment should be designated for use in a specific poultry house only.

12. Cleaning the Poultry House and Surrounding

For brooder units, the poultry house should be cleaned after every batch. For SSPs, the coop should be cleaned when it is dirty. Droppings in the yard should be removed.

Cleaning and Disinfection

Cleaning is done to reduce the number of germs in the chickens' environment. If germs are allowed to reproduce and multiply, they can cause diseases. Effective cleaning is essential for both chicks and adult birds. It is recommended to use an 'all-in, all-out' system in brooder units. In this system, the production phase lasts 28 days, followed by a clean-out phase and a rest period. The clean-out phase and rest period are designed to reduce germs on the farm, preparing it for the next batch of chicks.

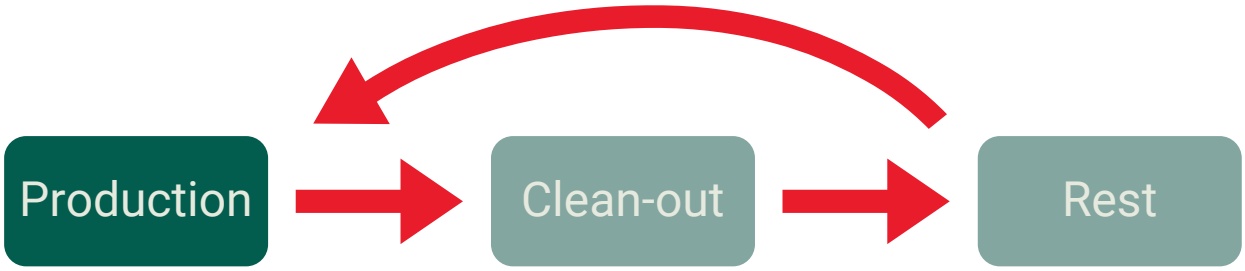


FIGURE 5.1
Cleaning and Disinfection Cycle

1 Dry Clean

The clean-out phase begins with removal of litter and movable equipment such as heaters, feeders and drinkers. The litter is placed in bags which are tied and moved away from the farm. The litter is removed by a spade first and then the remaining small fragments of litter are swept using a broom. Old feed that would have been left over in the feeds is removed from the room and disposed. Repairs are done at this stage. An inspection of the floor, walls, roofs, wire mesh etc is performed.

2 Wet Cleaning

The wet cleaning begins by rinsing the room with water to remove dust and spider webs that may have accumulated during the production phase. This is followed by washing with a detergent. The soapy water is used to scrub the room, starting from the roof, then cleaning the walls at the back of the house, working towards the entrance. The house is then rinsed again with water, following the same procedure: roof to walls, moving towards the entrance. Since most detergents are harsh on the skin, protective clothing such as overalls and gloves are essential. The house is then left to dry. Meanwhile, the equipment is also washed using the same process: rinsing with water, detergent wash, and rinsing.

3 Rest

The rest period lasts between 10 – 14 days. The poultry house is left without any birds or equipment. This is done to break the cycle of germs and parasites.

Vaccination

Vaccination is a process that involves introducing a weakened form of specific germs (vaccines) into the body to prepare it in case harmful germs later attack. Vaccination produces 'soldiers' (antibodies) that remain in the body for a long time, ready to defend against the actual threat. Therefore, the effectiveness of a vaccination is determined by the number of 'soldiers' that are produced. Sometimes, vaccination needs to be done more than once (boosters) for the body to achieve full immunity. Vaccination is another method of preventing the introduction and spread of germs within the flock.

Note

Vaccines are not medicine. Vaccines are used to prevent infection NOT to cure an infection.

Vaccines are disease specific. A vaccine for Newcastle does not safeguard against Infectious Bronchitis. For vaccination to be effective, the quality of the vaccine should be maintained from the time it is manufactured to the time it is placed into the body. For the vaccine to remain viable they should:

1. Be kept between a temperature of 2 – 8°C

During transportation, the vaccine should be carried in a cooler box with an ice pack. However, the ice pack should not touch the vial (container which contains the vaccine). If they get into contact, the ice pack may make the vial temperature to go below 2°C and it would kill the vaccine. A layer of insulation material, such as a cloth, paper, or bubble wrap, should be placed between the ice pack and the vials. On arrival at the farm, the vials should be kept in a fridge. High temperatures above 8°C.

2. Do not expose the vials to direct sunlight

The vials should not be placed in direct sunlight since it kills the vaccine inside.

PHOTO 5.17
Vaccines Help Prevent Diseases

3. The vaccines should not be used after the expiry date

4. The vaccines should not be used with chlorinated water
Chlorine binds the vaccines and reduces its effectiveness.

5. The vaccine should be mixed in a plastic container
Metal equipment may affect the vaccines. A wooden or plastic spoon and a plastic bucket should be used to mix the vaccine.

C.H.E.S.T Can Help You Remember Key Steps to Ensure Vaccines Remain Effective:

- **C – Cool Storage:** Keep vaccines between 2°C and 8°C. Use a cooler box with insulation during transport
- **H - Handle Carefully:** Avoid direct contact between ice packs and vaccine vials to prevent freezing
- **E - Expiry Check:** Always check and avoid using expired vaccines
- **S - Sunlight Protection:** Keep vaccines away from direct sunlight, which can destroy their effectiveness
- **T - Tools Matter:** Use plastic tools (containers and spoons) to mix vaccines, avoiding metal and chlorinated water

Other Factors that Support Effective Vaccinations

1. Vaccinate Healthy Birds
Vaccination should only be done to birds that have no signs of diseases.

2. Vaccinate Birds at the Recommended Time
A vaccination program should be provided by local veterinary services and tailored to the prevalent diseases in the area. Since disease threats vary from one region to another, a vaccination schedule suitable for one country (e.g., Malawi) may not be applicable to another (e.g., Lesotho). Additionally, vaccination programs may change over time due to evolving disease patterns, so farmers should regularly check for updates from relevant authorities. To ensure effectiveness, vaccinations must also be conducted at the recommended times. Further, advice on the local vaccination program is provided at resource centres across the country.

PHOTO 5.18
Follow the Steps Outlined in C.H.E.S.T to Ensure Vaccine Efficacy

3. Use the Recommended Method of Application

Vaccines can be applied through drinking water, injection, spray, eye drop or wing web stab. Each vaccine has a recommended mode of application. The mode of application of a vaccine is typically provided in the vaccine's packaging insert. This insert contains detailed instructions, including:

a. The method of administration: This will specify whether the vaccine should be applied via drinking water, injection, spray, eye drop, wing-web stab, or any other method.

b. Dosage: The exact amount of the vaccine to be administered per flock depends on the dosage. The 1000-dose vaccine is the smallest available dosage. If the flock size is less than 1000, the entire vial should be used. There is no risk of overdose when it comes to vaccination. However, a 1000-dose vaccine cannot be used for a flock of 1500 birds.

c. Frequency: Whether the vaccine needs to be given as a single dose or in multiple doses.

d. Precautions: Any special instructions regarding storage, handling, and potential side effects.

e. Storage requirements: Information on temperature and how to store the vaccine to maintain its efficacy.

4. Birds Should be Encouraged to Drink the Vacccine

For vaccines that are applied in drinking water, the water should be restricted for an hour in winter and 30 minutes in summer to encourage the birds to drink the water with the vaccine.

5. Mix the Vaccine and the Water Well

The vial is opened under water to prevent the vaccine from losing quality due to exposure to air and also to rehydrate the vaccine. The water should be mixed with a wooden or plastic spoon. A chlorine neutralizer, such as skimmed milk, and an indicator can be added to the water before administering it to the chickens.

6. Allow Two Hours for the Birds to Drink the Vaccination Water

PHOTO 5.19
A wing web vaccination of a layer bird.

6. Business Skills for Dual-Purpose Farming

Context and Challenges in Lesotho's Poultry Sector

The poultry industry in Lesotho faces several challenges that can be addressed by improving business skills among dual-purpose poultry farmers. Many farmers do not keep records or calculate profits and use earnings from selling DPP meat and eggs for other household needs instead of growing their businesses. Many farmers only intermittently invest in the purchase of chicks or other inputs. By adopting a business mindset, dual-purpose poultry farmers have the opportunity to generate meaningful income for their households.

Improved business skills can help farmers manage finances better, understand the importance of reinvestment, and plan for long-term success. Poor flock management, such as low egg production and high mortality rates, can also be addressed by keeping records and analyzing data, which allows farmers to identify and fix inefficiencies in their operations. A business approach to poultry farming can help farmers attract financial support, make smart investment decisions, and adjust production costs. Challenges like poor infrastructure can be overcome through better financial planning and investment in necessary technologies.

PHOTO 6.1
Business skills can help farmers manage finances better.

To fully unlock this potential, farmers must shift from subsistence farming to viewing poultry production as a viable business. This will help them maximize income, manage risks, and make informed decisions for sustainable growth. This chapter focuses on equipping farmers with essential business skills such as financial management and marketing strategies to help them succeed in dual-purpose poultry farming.

1 Role of Dual-Purpose Chickens in Lesotho's Poultry Industry

Dual-purpose (DPP) chickens offer solutions to many of Lesotho's poultry industry challenges. Unlike broilers and layers, which require expensive inputs and are heavily reliant on imports, DPPs thrive under local conditions. The Rural Self-Development Association (RSDA) has established a parent farm for DPPs, ensuring a steady supply of quality chicks that is accessible to local farmers. This empowers small-scale farmers to produce poultry sustainably, while reducing dependence on imports. DPP meat, known for its leaner and healthier quality, is increasingly popular among Basotho consumers. Additionally, DPP eggs provide an affordable, nutritious, and steady supply of protein for families. These advantages create profitable opportunities for farmers.

DPP farming is also cost-effective, as these birds are hardy and require fewer inputs than broilers or layers. They are well-suited to Lesotho's cold winters and high altitudes, making them a climate-resilient option. By focusing on good management practices, farmers can reduce risks and increase their returns. Treating DPP farming as a business enables farmers to diversify their income streams, including meat, eggs, and live bird sales. By improving production quality and adopting a business mindset, farmers can meet growing demand and establish DPP farming as a sustainable source of income, contributing to food security and a stronger local poultry industry.

2 Opportunities for Growth

The DPP poultry sector in Lesotho has significant growth potential. Improving carcass and egg quality, along with adhering to strict production standards, will make products more marketable and profitable. Furthermore, targeted skills development can help small-scale farmers increase production capacity and efficiency. Upscaling operations will reduce Lesotho's reliance on poultry imports and build a more self-sufficient industry.

The Rural Self-Development Association (RSDA) has established the only dual-purpose poultry parent farm in Lesotho, where optimal management practices ensure the production of high-quality chicks. The parent stock at the RSDA farm is well cared for: farm management follows strict biosecurity and feeding protocols to maintain genetic excellence and closely monitor operations to ensure the production and distribution of a high-quality DPP chick. The chicks produced are 'protected': they are vaccinated against major diseases such as Newcastle Disease, Marek's Disease, Infectious Bursal Disease (IBD), and Infectious Bronchitis, ensuring they meet high health standards, which means higher livability even under foraging conditions.

3 The Brooder Unit

These good quality chicks are sold to a network of BUs that care for them until they reach 4-6 weeks of age. The chicks are intensively reared, with all their needs provided for. The profitability of BUs depends on selling the birds at the recommended time. Keeping the birds longer results in higher feed costs, reducing their profits. Selling the birds at four weeks of age allows BUs to achieve up to eight full cycles per year, compared to six cycles for broilers.

During the winter months in Lesotho, broilers often take up to 10 weeks to reach market weight, which makes dual-purpose birds more profitable in such conditions. For BUs, it is crucial to maintain high management standards to ensure the birds are ready for sale at the four-week mark, maximizing profitability.

Paramater	DPP	Broilers
Days per cycle	**28**	42
Rest preiod (days)	**14**	14
Total days per cycle [days per cycle + rest period]	**42**	56
Number of days in a year	**365**	365
Number of cycles in a year	**8**	6

FIGURE 6.1
A Comparison of Cycles for Dual-Purpose Chickens and Broilers

4 The Small-Scale Producer

Between 4 and 6 weeks of age, teen birds are sold to Small-Scale Producers (SSPs) who will raise them to adulthood. At this stage, the birds begin foraging and scavenging, but it is recommended to provide a small amount of grain daily as a supplement. When purchasing from BUs, it is advisable to buy an equal number of roosters and hens. By 12 weeks, the roosters will be ready for sale or slaughter, and the income from selling them should be used to purchase more birds.

The hens will start laying eggs around 20 weeks of age. These eggs can be used for household consumption, with the surplus sold to generate additional income. It is recommended to reinvest the money earned from egg sales into purchasing more teen birds. Over time, the flock size will gradually increase, while the males continue to serve as a source of income along with the sale of eggs.

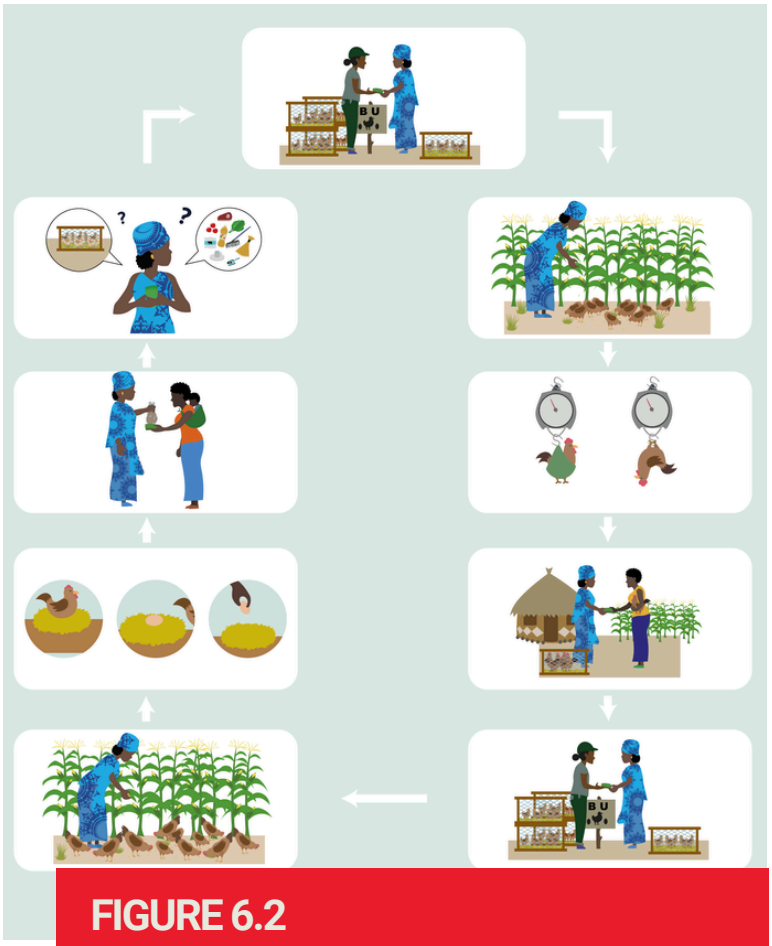


FIGURE 6.2
Cyclic Representation of the SSP's model

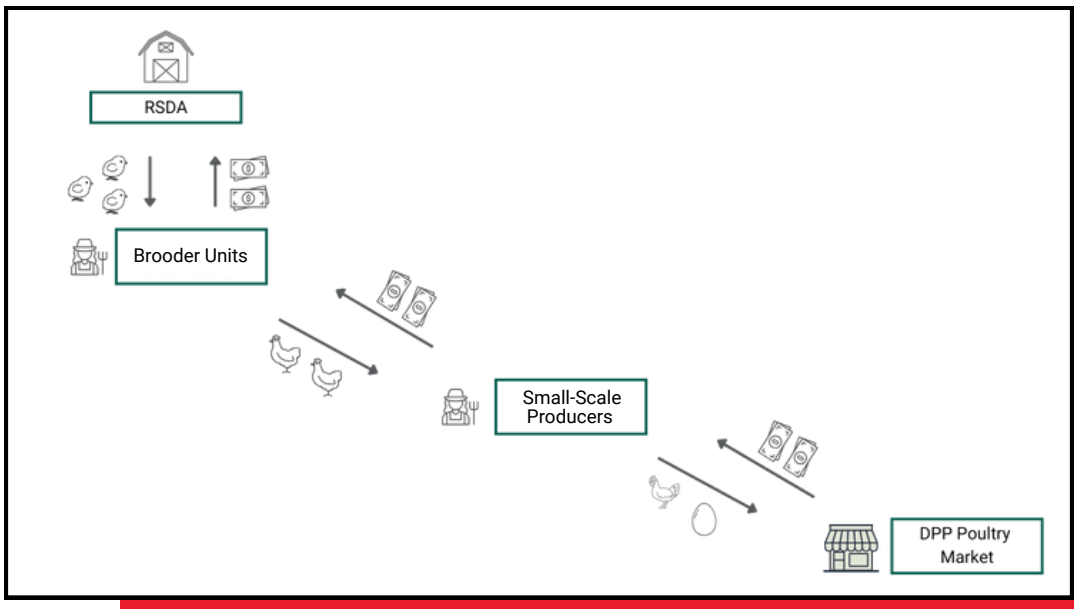


FIGURE 6.3
Dual-purpose Value Chain Model

The sustainability of this model relies on SSPs consistently restocking teen birds from brooder units, who in turn source day-old chicks from RSDA. This approach addresses the challenges of farmers hatching their own chicks, as chicks bred from hybrid birds often have lower performance compared to their parents. Most dual-purpose birds are hybrids, and the chicks they produce tend to be less productive. Additionally, mating hens and roosters within the community increases the risk of inbreeding, leading to even weaker offspring. **RSDA plays a crucial role in maintaining a reliable supply of high-quality dual-purpose chicks to support this model effectively.**

Understanding the Model: A Seed Example

Think of dual-purpose poultry farming like planting maize. Farmers often buy hybrid maize seeds from seed companies each season because they produce higher yields and better quality crops. Saving seeds from the previous harvest often results in weaker plants and lower yields. Similarly, dual-purpose poultry are hybrids. Chicks hatched from home-bred birds often grow slower and produce fewer eggs compared to chicks purchased from a reliable supplier like RSDA. Regularly restocking high-quality chicks ensures better performance, higher profits, and a healthier flock.

5 Record Keeping

A business approach to dual-purpose poultry farming begins with good recordkeeping. Records help farmers track farm performance, such as earnings from egg and meat sales, household consumption, and costs for feed and medicine. Accurate records enable farmers to assess whether their farm is making a profit or loss, which is crucial for planning and improving operations. By maintaining clear and complete records, farmers can make better decisions to grow their business.

1. Reasons for Keeping Records

For DPP farmers, brooder units, and small-scale producers, keeping records is essential for managing and growing the business. Here are some key reasons:

2. To assist in financial planning decisions

Records help farmers track income and expenses, such as feed, medicine, and labor costs, and calculate profits from meat and egg sales. This is crucial for making informed financial decisions.

3.To assist in land management decisions

Records help farmers plan and manage land for poultry production. They can decide the best layout for chicken housing and plan for future expansion.

4. To inform poultry management decisions

Records of individual birds, including health, growth, and feed usage, allow farmers to track performance and identify areas for improvement. They also help in disease management and reporting.

5. To evaluate past performance

Records help farmers track income and expenses, such as feed, medicine, and labor costs, and calculate profits from meat and egg sales. This is crucial for making informed financial decisions.

6. To serve as a planning guide for future decisions

Well-maintained records guide farmers in planning future investments, such as purchasing new brooder units or expanding the flock. They help set goals, budget, and prepare for growth, ensuring long-term sustainability.

6 Types of Records

There are two types of records that can be kept namely financial and production records.

1. Financial Records

These are important in assessing financial performance to determine whether the farm is making money or not. These records are used to keep information on purchases (expenses) and sales (income). Profit is calculated by deducting expenses from income.

Type of DPP Farmer	Example Expenses	Sales
Brooder Unit (BU)	Day-Old Chicks	Teen Birds
	Gas/Charcoal/Firewood/Electricity	Manure
	Vaccines & Medication	
	Labor	
	Cleaning Materials	
	Disinfectants	
	Commercial Feed	
	Wood Shavings	
	Transport Costs	
Small-Scale Producer (SSP)	Teen birds	Eggs
	Packaging Materials for Eggs and Meat	Spent Hens
	Commercial Feed	Live Roosters

Expenses and Income

- **Expenses:** Money spent on things needed for the farm to run.
- **Income:** Money a farmer earns from selling things like eggs, meat, or live birds

One of the financial records that are essential especially for BU is the budget. A budget is a financial tool used to plan for future expenses and help make decisions about affordability. It involves listing all costs incurred over a specific period. For a new farmer, a budget can help identify set-up expenses such as equipment and housing. For an established farmer, it would include operational costs like feed, chicks, and maintenance. When used effectively, a budget can help farmers make informed decisions about their birds before placing them on the farm, minimizing the risk of losses.

Expense	Price per unit	Number of units	Total price
Day-old Chicks			
Gas/Charcoal/Firewood/Electricity			
Vaccines & Medication			
Labor			
Cleaning Materials			
Disinfectants			
Commercial Feed (starter)			
Wood shavings			
Transport costs			

Basic Definitions

Fixed Costs - Costs that do not change with the number of birds.
Examples: Housing, equipment, licenses, salaries.

Variable Costs - Costs that change per bird.
Examples: Feed, vaccines, transport per bird.

Break-even price - The minimum price you must charge per bird so that your total income covers all costs.

The break-even is the point where expenses equal sales, meaning there is neither a profit nor a loss. A farmer should aim for sales that exceed this point to generate profit. Knowing the break-even point helps BUs to set a minimum price for their birds. It also shows how changes in costs or production scale can affect pricing. It is essential for profit planning and sustainability of the poultry business.

Generating the break-even point for a BU requires calculating both fixed and variable costs. Fixed costs include expenses that remain constant, such as equipment and housing, while variable costs fluctuate based on the number of birds and include feed and chicks. The formula that can be used by a BU to calculate the break-even point is as follows:

How to Calculate Break-Even Point:

Break-even price per bird = (Fixed Costs ÷ Number of Birds Sold) + Variable Cost per Bird

This formula helps determine the minimum price you need to sell each bird for in order to cover both your fixed and variable costs.

Example:
Let's say you're raising 500 dual-purpose poultry (DPPs).
Fixed Costs (housing, lighting, equipment depreciation, etc.) = 2,600
Variable Cost per Saleable Bird (feed, medicine, transport) = 33
However, only 485 birds are expected to be sold (accounting for some loss).
Now, let's plug in the numbers:
Break-even price per bird = 2,600 ÷ 485 + 33
= 5.36 + 33
= 38.36 per bird

What This Means:
You must sell each bird for at least 38.36 just to break even.

- If you sell a bird for 45, you earn a profit of 6.64 per bird.
- If you sell for 35, you lose 3.36 per bird.

Common Financial Mistakes that Cause Losses in DPP Businesses

a. **Keeping birds for too long reduces profitability.**
The success of a BU depends on completing multiple production cycles each year. With good management, farmers can achieve up to eight 28-day cycles annually. However, when birds are kept beyond the recommended 28 days, the number of cycles is reduced, which limits income potential. Additionally, keeping birds longer increases feed consumption, and since feed is usually the largest cost in poultry production, this significantly cuts into profits.

b. Poor management practices increase production costs.

Issues such as poor ventilation, extreme temperatures, overcrowding, inadequate nutrition, and disease can negatively affect bird health and growth. When birds fail to reach their target market weight on time, farmers are forced to keep them longer than planned. This not only increases feed costs but also disrupts the production schedule, reducing the number of possible cycles per year and leading to lower overall profitability.

c. Poor record keeping leads to uninformed decision-making.

Keeping accurate records is essential for monitoring both the financial and production aspects of a poultry business. When farmers do not track inputs, sales, growth rates, and expenses, they cannot properly evaluate performance or identify areas of loss. Good record keeping enables timely and informed decisions that help reduce losses, improve efficiency, and support the long-term sustainability of the business.

d. Spending business money on personal expenses.

Many smallholder farmers use the income from selling birds and eggs for personal expenses and do not separate their finances. They often fail to then reinvest it in their operations. This makes it difficult to buy feed, chicks, or improve infrastructure for the next cycle. Without reinvestment, the business cannot grow and may even fail to continue. Sustained growth requires disciplined financial planning, where care is taken to only withdraw profits on an occasional basis and to maintain the working capital necessary to sustain, strengthen and expand the enterprise.

More records need to be kept about the sales by both BUs and SSPs such as:

a. Order and delivery records

Date ordered	Price per chick (LSL)	Number of chicks orderdered	Total paid (LSL)	Expected Date of Delivery	Expected Time of Delivery
10 March	12.50	200	2500	12 March	0830am
15 May	13.00	150	1950	17 May	9 am
22 July	12.75	180	2295	27 July	7 am
30 Sept	12.75	250	2550	7 Oct	8 am

PHOTO 6.2
Record of Delivery

b Customer Records (names and contact numbers)

Customer Name	Contact Number
Thabo Nofokeng	5801 1234
Lerato Moshoeshoe	5812 5678
Palesa Ramathe	5823 9101
Teboho Ntlhoki	5834 8765
Nthabiseng Seutloali	5845 4321
Mpho Lekhanya	5856 6789
Khotso Mohapi	5867 3456
Boitumelo Mohlatsi	5878 9876

PHOTO 6.3
Record of Customers

c. Dates of Sale

Date of egg and bird sale, the age of the birds when sold, the sex of the birds sold, and the price at which each bird was sold.

Date of Sale	Product Sold	Age of birds (Weeks)	Number of birds sold	Price per bird (LSL)	Total (LSL)	Number of eggs sold	Price per egg (LSL)	Total from eggs (LSL)
5 March	Birds	18	20	90	1800	-	-	-
5 March	Eggs	-	-	-	-	30	4	120
2 April	Egg	-	-	-	-	18	4	72
14 April	Birds	25	3	90	270	-	-	-
15 April	Birds	25	4	90	360	12	4	48

PHOTO 6.4
Sale Records

d. Record of Gifts

Record any birds or eggs given as gifts, including the date; birds and eggs consumed by the household, along with the date; and any birds that were stolen.

Date	Product (Live birds/ eggs)	Quantity	Reason (Gift/Stolen/ Consumed)	Estimated value (LSL)	Notes
10 March	Birds	3	Gift	270	Given to relative as gift
17 March	Birds	1	Consumed	90	Slaughtered for meat family
28 April	Eggs	6	Consumed	18	Consumed
20 May	Birds	3	Stolen	270	Stolen from the coop
21 May	Eggs	6	Consumed	18	Consumed

PHOTO 6.5
Record of Gifts

2. Production Records

These records have to do with the performance of the birds. The following records can be kept:

a. Delivery Records

Upon delivery, record the following: the number of chicks delivered compared to the number ordered, mortality (dead on arrival) how many, if any, had physical defects (twisted legs, cross beaks).

Date of Delivery	Number of Chicks Ordered	Number of Chicks Delivered	Mortality Count (Dead on Arrival)	Chicks with Physical Defects	Remarks
25/10/2020	100	100	5	0	Delayed Delivery
10/12/2020	150	150	0	0	All chicks were healthy

This record will help a BUs file a complaint with the supplier if there are any issues with the delivery. It can also be used to trace whether the order that was placed is the same as what was delivered.

b. After Placement: Daily and Weekly Records

Daily mortality records should be kept, including the reasons for any deaths. Recording mortalities helps identify the cause of deaths. For example, if deaths occur shortly after arrival, it might indicate stress during transportation. Mortalities occurring after three days could suggest issues with the heating system, feed, or water supply.

c. Record as Events Occur

These include vaccination records. Record details such as the vaccination date, the disease vaccinated against, the vaccine's expiry date, the batch number, the number of birds vaccinated, and the vaccination method used.

Remember: Records Should be C.L.E.A.R

- **C: Clarity –** Ensure records are easy to understand and use
- **L: Legibility –** Records should be readable and well-organized
- **E: Efficiency** – Keep the process simple and not time-consuming
- **A: Actionable –** Ensure records lead to decisions and actions for improvement
- **R: Reviewable** – Use records to review past performance and guide future decisions

7 Marketing Strategies

To run a poultry business successfully, a farmer must have customers. In developing a customer base, it is important to keep two key principles in mind: 1) no one is going to buy a product they have never heard of, and 2) it is easier to keep an existing customer than find a new one.

There are many ways to market or sell chicken meat and eggs, but if people are not aware of the business, sales will not occur. From the moment birds are placed, it is crucial to consider the target market and develop strategies to reach them effectively.

PHOTO 6.6
Community Marketing Meeting

Here are some ideas to engage with potential customers:

- Keeping a WhatsApp group of customers where updates and announcements about the availability of the next batch of teen birds for BUs, or eggs and spent hens for SSPs are made.
- Marketing teen birds in advance is crucial. It is advisable that BUs secure commitments from SSPs to purchase teen birds before they are fully brooded. This ensures that all birds are sold in a timely manner and reduces the risk of unsold inventory.
- Organizing marketing meetings with community members provides an excellent opportunity to introduce DPPs and answer questions. These meetings can also serve as platforms for training SSP farmers on proper DPP management and showcasing samples of eggs and birds to potential buyers.
- Targeted advertising through using posters, flyers, and community radio stations can help spread the word about DPPs and their benefits. These methods are cost-effective and reach a wide audience within rural areas.
- Brooder units and RSDA can attend farmers' markets, agricultural shows, and community fairs to showcase DPP products. These events create opportunities to interact with potential customers and build brand recognition.

Acknowledgment

We would like to express our sincere gratitude to all those who contributed to the creation of this manual.

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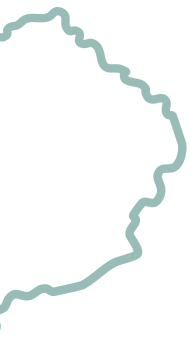
Our heartfelt thanks go to the farmers who graciously consented to be featured in the photos, allowing us to showcase best practices throughout this manual.

Lastly, we extend our appreciation to everyone involved in the creation of this resource. Your efforts have been invaluable.



Appendices

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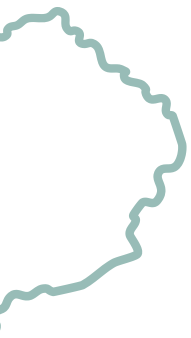


Appendix i

Senses Used by a Good Stockman

1

Hearing

A good stockman should be able to listen to the sounds in the poultry house, whether they come from the birds or the surrounding environment. Strong listening skills allow a stockman to detect breathing difficulties that may indicate disease, signs of discomfort due to danger, and general vocalizations that can provide insight into the flock's well-being.

2

Sight

A good stockman uses sight to observe the birds and their environment. This includes identifying issues such as poor litter quality, changes in the color and consistency of droppings, dust and cobwebs, pests and parasites, leaking drinkers, and feed wastage. Sight also enables the stockman to assess bird behavior, supporting informed decisions for corrective actions. It allows for the early detection of diseases by spotting visible signs of illness.

3

Smell

A good stockman uses their sense of smell to detect unpleasant or unusual odors in the poultry house. For example, a strong ammonia smell indicates poor ventilation and requires immediate attention.

4

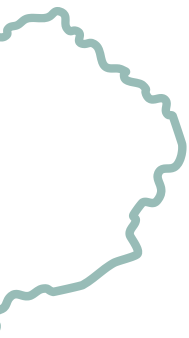
Touch

The sense of touch is essential for assessing various conditions in the poultry house. A stockman can perform a crop fill check to determine whether a chick has been feeding and drinking properly. Touch is also used to check the temperature of drinking water and assess the texture of bedding and surfaces.

5

Taste

Yes, a good stockman may taste the feed and water to evaluate their quality. This helps detect abnormalities, such as feed contamination or water issues, that could affect bird health and performance



Appendix ii

Stocking Density Activity

Example Scenario: Calculating Stocking Density

Lebohang is preparing to raise dual-purpose poultry and needs to determine how many birds her poultry house can comfortably accommodate. The poultry house has a total floor space of **20 square meters,** but **2 square meters are used for storage**, leaving her with **18 square meters of usable floor space.**

The recommended stocking density is **15 birds per square meter.**

Lebohang uses the following formula to calculate the number of birds she can stock:

Number of Birds = Usable Floor Space × Stocking Density
= 18 m^2 × 15 birds/m^2
= 270 birds

Result

Lebohang can safely raise 270 birds in her poultry house. This ensures the birds have adequate space, reducing stress, minimizing competition for food and water, and promoting healthy growth.

It's Your Turn!

Practice Scenario: Stocking Density Calculation

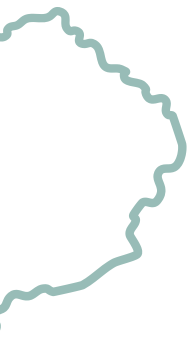
Rethabile is getting ready to house a new batch of chicks. Her poultry house measures **30 square meters in total,** but **5 square meters** are reserved for storage. The recommended stocking density is **15 birds per square meter.**

Can you calculate how many birds Rethabile can safely raise?

Lebohang uses the following formula to calculate the number of birds she can stock:

Use the worksheet below to guide you.

Practice Worksheet	Answer
1. Total Floor Space (m^2):	
2. Storage Space (m^2):	
3. Usable Floor Space (m^2): *(Formula: Total Floor Space – Storage Space)*	
4. Stocking Density (birds/m^2):	
5. Number of Birds: *(Formula: Usable Floor Space × Stocking Density)*	



Appendix iii

Weighing Activity

Example Scenario: Weighing

Thabo, a small-scale farmer with a flock of 50 Boschveld chicks, needs to perform the first weigh-in to monitor their growth:

1. **Prepare Equipment:** Thabo places an empty bucket on the weighing scale and records its weight as 2.0 kg.
2. **Select Sample:** Since Thabo has 50 chicks, he selects 10 chicks as a representative sample for weighing.
3. **Weigh Birds:** Thabo gently places the 10 chicks into the bucket and weighs them together. The scale shows 5.35 kg (5350 g).
4. **Calculate Chick Weight:** Thabo subtracts the weight of the empty bucket from the total weight: 5350 g (bucket + chicks) - 2000 g (bucket) = 3350 g (chicks).
5. **Determine Average Weight:** He divides the total weight of the chicks by the number of chicks in the sample: 3350 g ÷ 10 chicks = 335 g per chick.
6. **Record Base Weight:** Since this is the first weigh-in at placement, Thabo records 335 g as the base weight to compare with future weekly weigh-ins.

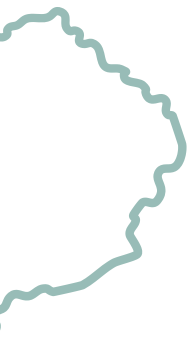
Now, it's Your Turn!

Practice Scenario: Weighing

Use the details provided to complete the table below. Calculate the total weight of the chicks and their average weight.

1. **Total number of chicks in the flock:** 200
2. **Sample size for the weigh-in:**
3. **Weight of the empty bucket:** 2.5 kg (2500 g)
4. **Total weight of the bucket with chicks:** 7.3 kg (7300 g)

Step	Calculation	Answer
Total number of chicks in the flock		**200**
Sample size		
Weight of the empty bucket (g)		**2500 g**
Total weight of bucket + chicks (g)		**7300 g**
Weight of the chicks (g)	7300 g - 2500 g	
Average weight per chick (g)	Weight of chicks ÷ ___ chicks	



Appendix iv

Example of Vaccination Program

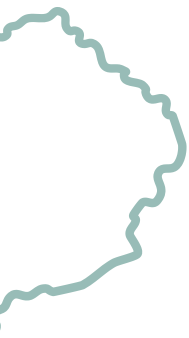
(please consult your vet for any updates to your area)

Age	Disease	Method
Day 0	Marek's NCD	Subcutaneous Injection Eye Drop / Water
Day 10	NCD/IB	Drinking Water
Day 17	Gumboro/IBD	Drinking Water
Day 24	Gumboro/IBD NCD/IB	Drinking Water Drinking Water
Day 28	ILT Primer NCD	Subcutaneous Injection Eye Drop
Week 4	NCD	Drinking Water
Week 7	Coccidia* Worms	Drinking Water Drinking Water
Week 8	NCD/IB ILT Strong Vaccine ND, IB, Gumboro/IBD** Fowl Box + AE	Drinking Water Eye Drop Injection Wing Web
Week 12	ND, IB MG** EDS + Coryza	Injection Injection
Week 15	NCD/IB	Drinking Water
Week 16	Coccidia* Worms	Drinking Water Drinking Water
Week 17	Respiratory, Intestinal, and Systemic Infections	Feed
Week 19	NCD/IB	Drinking Water
Week 21	Worms	Drinking Water
Week 23	NCD	Drinking Water

Adapted from Boschveld Ranching (Pvt) Limited

*treat when blood in droppings seen, do not wait until vaccination week

**inactivated



Appendix v

Example Profit and Loss Statement

To assist in understanding potential net earnings from being a brooding unit, the World Poultry Foundation has created a simple illustrative Profit & Loss Statement.

Example 1 Assumptions:

- A flock of 500 birds per cycle (3000 birds per year)
- A 30 to 35-day cycle from receipt of the DOCs to sale of all brooded chicks
- That the mortality rate of the chicks will be 5% (per flock)
- That you will need to vaccinate for Newcastle Disease and Fowl Pox
- That you will produce 6 flocks per year
- Amounts are shown in USD (all prices are estimated)

At 500 birds per flock, this example would generate estimated net earnings (profit) of $148.50 US per flock, or $891 per year. If the flock is not profitable, evaluate the records for the cause. For example, was the mortality high? Was the sales price too low? Did you have to purchase additional inputs such as supplemental feed? Utilize this information to assist in improving the next flock.

The most important assumption in this example is that you can sell all of the birds within 35 days. The longer the chicks are held past 35 days the greater the feed costs you will have, and the lower the income received.

Brooder Unit Income and Expenses (based on WPF analysis of 1,079 historical records of Brooder Units).

	Item	Detail	Quantity	Cost/Price	Total	Fill in your total here
Revenue	Birds	Teen Birds	485	45	21,825	
Revenue	Other sales	Manures	-	-	-	
Total Sales					**21,825**	

Variable	Bedding	Wood shavings	60	35	2,100	
Variable	DPP	Day-old chick	15	500	7,500	
Variable	Feed	Starter meal (50 kg)	390	10	3,900	
Variable		Grower meal (50kg)	385	2	770	
Variable						
Variable	Heating	Cost for 14d of heating	1,176	1	1,176	
Variable	Water	All purpose	60	2	120	
Variable						
Variable	Medication	Antibiotic- Fosbac (25g packet)	60	2	120	
Variable		Multivitamin (100g packet)	47	2	94	
Variable		Cocciostat (ESB3) 100g	50	2	100	
Variable	Transport of sales	Van	150	2	300	
Variable	Sales Taxes	If Applicable				
Total Variable Costs					16,180	

Gross Margin (Sales - Variable Costs)	**5,645**

Semi Variable	Lighting	Electricity 50units@105	105	4	420	
Semi Variable	Cleaning material	Detergent 2kg	70	1	70	
Semi Variable		Disinfectants 200ml madubula	18	2	36	
Semi Variable	Rat bait	Superkill 100g	130	1	130	
Fixed	Protective clothing	Overall/gumboots	950	1.00	950	
Fixed	Labour	Permanent labour	500	1.00	500	
Fixed	Repairs and Maintenance	Lines, equipment etc	500	1	500	
Total Overheads Costs (fixed and semi variable costs excluding interest taxes and depreciation)					2,606	

Earnings before Interest, taxes or depreciation* (Gross Margin - Fixed costs)	**3,039**

	Depreciation	Equipment and housing				
	Depreciation	Birds				
	Interest	E.G 15% on loan				
	Non-sales related taxes					
Total Interest, taxes and depreciation						

Net Profit	**3,039**

Please note that this is just an example and figures will change based on different situations.

Cost per sales unit

A		Total Sales	21,825
B		Sales Volume	485
C		Sales Price	45
D		Variable Costs	16,180
E		Fixed Costs	2,606
F		Interest, taxes and depreciation	-
G	A-D	Gross Margin	21,340.00
H	G-E	EBITDA	18,734.00
I	H-F	Net Profits	18,734.00
Break Even Price (Fixed volume)			
L	B/D	Variable Cost	33.36
M	((E+F)/B)+L	Break Even Sales price	38.73
Break Even Volume (fixed Price)			
N	C-L	Contribution	11.64
O	(E+F)/N	Break Even Volume	223.90

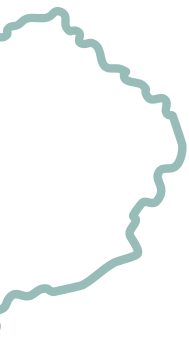
Gross margin is the difference between a company's revenue and its cost of goods sold (COGS) or total variable costs. It represents the income a company retains after incurring the direct costs associated with producing the goods and services it sells.

EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) is a financial metric that shows a company's profitability before deducting interest expenses, taxes, depreciation,

Net profit (also called net income or bottom line) is the total profit of a company after all expenses have been deducted from total revenue. This includes operating expenses, interest, taxes, depreciation, and amortization.

Interest is the cost incurred by a business for borrowed funds. It is the expense paid on any loans or credit facilities the company uses.

Depreciation is the systematic allocation of the cost of a tangible fixed asset (like machinery, buildings, vehicles) over its useful life. It represents the reduction in the value of assets due to usage, wear and tear, or obsolescence.

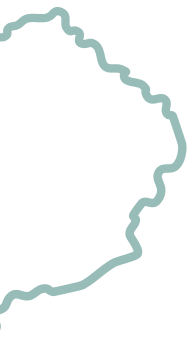


Appendix vi

Production Record for a Brooder Unit: Deaths and Culls

	Day of the week							
Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total No. of Birds**
1								
2								
3								
4								
5								
6								
7								
Total No. of Bird								

Notes (record possible causes of death/anything which may be out of the ordinary):



Appendix vii

Production Record for a Brooder Unit: Feed

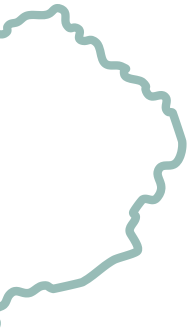
Number of bags bought: _____

Amount of feed from the previous cycle: _____

Total number of bags available for the current cycle: _____

Number of birds in the current cycle: _____

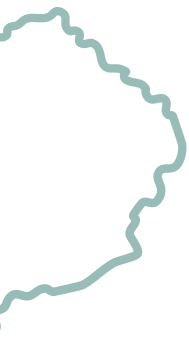
	Feed Consumed by the Birds							Total
Week	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
1								
2								
3								
4								
5								
6								
Total No. of Bird								



Appendix viii

Production Record for a Brooder Unit: Egg Production

Date	Eggs Collected	Eggs Broken	Total (Total from yesterday + eggs collected today



Appendix ix

Production Record for a Small-Scale Producer: Chickens Brought into the Flock and Deaths and Culls

Number of Birds at the Beginning _____

Date	New Birds Brought into the Flock	Number of Birds Dead	Possible Reason for Death	Number of Birds Sold	Number of Birds Slaughtered for Home Consumption	Number of Birds Given Away as Gifts	Total Birds Remaining

Notes (record possible causes of death/anything which may be out of the ordinary):

_____

_____

_____