



PROfeeds
The Performance Feed



POULTRY MANAGEMENT
GUIDE

Introduction

Profeeds is pleased to demonstrate its commitment to contribute to poultry production knowledge development in Zimbabwe through investment in developing this Poultry Management Guide. This Profeeds Poultry Management Guide is a reference guide for the management of poultry – broilers and layers. These two species of chicken are discussed in separate sections – Broiler Management and Layer Management. The manual is meant to be a reference guide for any breed of poultry that is kept in Zimbabwe for the purposes of assisting farmers to achieve top performance levels. Readers and users of this manual are urged to adopt a holistic approach to managing poultry, because if any item of management is not handled properly, the overall productivity target might not be achieved. Poultry managers are advised to strive to meet at least these standards in order to achieve acceptable performance levels within their flocks. This Profeeds Poultry Management Guide has attempted to cover the most important subjects on poultry management, however, the users' comments will be appreciated in order to improve the next versions of this guide.



Table of Contents

PART ONE: BROILER MANAGEMENT

Goals	6
Poultry Housing	6
Furnishing/Kitting the House	7
Litter/Bedding	8
Poultry Equipment and Hardware	8
Drinker/Water system	8
Feeding Systems	10
Heat Supply Equipment	11
Lighting Equipment	13
Data collection Equipment	13
House Preparation: House Used Before	14
Creating a Brooding Chamber for Placing	14
Pre-Placement Checklist	15
Equipment Check	15
Floor Temperature Check	16
The Chicks	17
Chick Sources	17
Chick Quality	17
Chick Ordering and Transportation	17
Chick Placement	17
Post Placement Checklist	18
Other Routine Checks	18
Brooding Management	19
Internal Chick Temperature	20
Brooding Ventilation	20
Growing Phase Management	20
Temperature	20
Air quality	21
Light Management in Broilers	21
Ventilation Management	22
Effective Temperature	23

Water Management	24
Broiler Feed and Nutrition Management	25
The Profeeds Range of Broiler Feeds	26
Performance Measurements	28
Important Points About Broiler Feeds and Feeding	29
Harvesting Procedure	30
Vaccination and Health Management	31
Record Keeping	33
Ten Point Summary: Broiler Production	35

PART TWO: LAYER MANAGEMENT

The Primary Inputs	38
Models of Table Eggs Production	38
Model One: Raising Layer Pullets from Day-Old Chicks	38
Layer Chick Brooding	39
Preparation for Placing	39
Chick Placement	40
Water	40
Feed	41
Light Management & Lighting Programmes	42
Management Events for the Growing Pullets	43
Health Management	44
Transfer to Laying House/Cages	46
Management of the Birds During Lay	47
Profeeds Layer Feed Management	47
Bodyweight Management During Lay	48
Record Keeping	48
Ten Point Summary: Layer Production	50



Part One



BROILER MANAGEMENT

Goals

Broilers are chickens raised for their meat, and the goal of broiler production is to successfully raise a day old chick to a marketable weight that is specified by the market. This must be done in the shortest possible time.

Some markets require small birds that dress at an average of 1kg whilst others like live markets demand larger birds weighing around 2-2.5 kg live-weight.

Broiler management involves the day-to-day tasks that enable a young chick to be raised from about 30-40 grams live-weight to the desired weight of around 1.4-2.52kg depending on market.

During the period from day old to slaughter, the birds will likely meet many challenges that will militate against their growth and hence achievement of these goals. These challenges include, amongst others, management short-falls, unfavourable weather and disease challenges.

Successful raising of a broiler entails correct managing of the bird itself, housing, feed, water, diseases, temperatures, lighting and equipment.

This manual will address each of these units of management and this forms the core of broiler management.

“Housing, therefore, is key towards proper poultry management.”

Poultry Housing

Provision of proper housing for the poultry - either layers or broilers, is the very first step necessary towards achieving proper management and hence performance of your flock. The type of housing will determine how you protect the birds from unfavourable weather and environmental conditions that normally elicit diseases and dis-comfort in your flock.

Planning Housing Construction

The very first task to address housing is to select a proper ground site for the chicken house. In selecting the site for the chicken house, one should be guided by the following factors:

- The site should preferably be on a level ground.
- The soil must be well-drained so that during rain there is no water clogging
- The area must have plenty of natural air movement in order to aid ventilation.
- The house should be oriented on an east-west axis to reduce the effect of direct sunlight on the sidewalls during the hottest part of the day. The objective here is to reduce the temperature fluctuation during any 24-hour period. Good temperature control always enhances feed conversion and growth rate.
- The ground must be big enough to accommodate the number of birds one wants to keep. This is guided by the stocking density of adult birds which should be 10 -12 birds per m². However, for layers another consideration is if the birds will be housed in cages, in which case the floor space could be smaller.
- The broiler house should be at least 1.5 km away from other types of poultry production.

After identifying a proper site for the chicken house, one then needs to design and construct the chicken house.

A well-designed house will ensure that the chickens have maximum comfort, so will perform to the best provided all other factors are favourable.

The following considerations are important for coming up with a proper housing design.

Poultry Housing Specifications

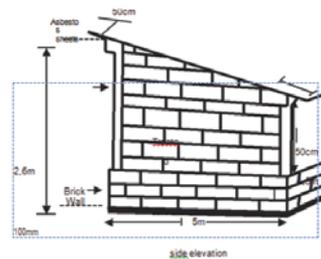
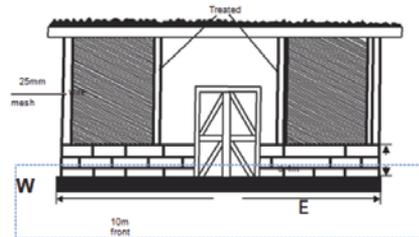
- The width of the house should not exceed 12 m in open sided houses.
- Height should be at least 2.4 – 2.6 m on the higher side of a flat roofed house
- Brick wall on length side should be 40 - 50 cm and a 25-mm chick mesh wire to cover the gap between the wall and the roof.
- All brick surfaces should be plastered for ease of cleaning after every flock.
- Roof overlap should be 50 cm to prevent wetting of birds and litter by rain showers coming from the sides.
- Routinely treat all gum poles and timber with creosote.
- Roofing material should have a reflective surface on the outside to help reduce the conduction of solar heat and should be well insulated.
- Heating systems should have ample heating capacity in accordance with the climate.
- Ventilation systems should be designed to provide ample oxygen and to maintain optimum temperature and relative humidity conditions for the birds.
- Lighting should be oriented to provide an even distribution of light at the floor level.
- It is important provide winches in order to facilitate the curtain management.
- The material of outside curtain can be sacs, but must be well sealed.
- All holes and tears in sidewall and/or inlet curtains must be repaired.
- Curtains need to be sealed at the base

to prevent air leaks at floor level.

It must be noted that there are many construction companies that now specialize in constructing poultry houses. As long as they understand the above specifications, and provided one can afford them, it is acceptable to get them to construct chicken houses for you.

These sketches illustrate these main housing basics.

Illustrations Showing Housing Basics



Furnishing/Kitting the House

When the poultry house has been properly constructed, the next thing is to properly kit or furnish it out. This stage involves installing the equipment and facilities that will complement the structure in creating comfort for the birds.

The first stage in furnishing the house is to install the correct, comfortable litter, or bedding.

Litter/ Bedding

Litter or bedding refers to the material that is laid out on the ground to insulate the birds from the floor conditions.

Important to consider here is the type and amount /depth of litter used because this affects the microenvironment created for the chickens in the house. Correct litter management is fundamental to bird health, performance and final carcass quality which subsequently impacts the profit.

Functions of Litter

Litter plays a very important role in poultry houses. Its functions are:

- To absorb moisture.
- To dilute excreta, thus minimizing bird to manure contact.
- To provide an insulation from cold floor temperatures.

Litter Types

- Wood Shavings – the best, with excellent absorptive qualities.
- Rice husk – medium absorptive qualities.
- Sawdust - often high in moisture, prone to mold growth and chicks may consume it, which may cause aspergillosis.
- Chopped straw - wheat straw is preferred to barley straw for absorptive qualities. Coarse chopped straw has a tendency to cake in the first few weeks.
- Grass – often high in moisture and the absorptive qualities are not very good.
- Cotton Husks – low absorptive qualities.

Litter Type	Minimum Depth or Volume
Wood Shavings	5-7cm (1in)
Dry Sawdust	5-7cm (1in)
Chopped Straw	1kg/m ² (0.2lb/ft ²)
Rice Hulls	5-7cm (2in)
Sunflower Husks	5-7cm (2in)

Having installed the correct type and depth of bedding, the next important part of the house kit is the hardware, or equipment.

Poultry Equipment or Hardware

Poultry equipment or hardware are pieces of equipment which the birds will use to access resources in their day-to-day lives. These are installed to avail water, feed and appropriate warmth for the birds. Other equipment is installed for the benefit of you the chicken farmer to collect condition data from the house.

These hardware pieces include the water delivery system, feed delivery system, heat delivery systems and data collection system.

Drinker / Water System

The drinker system is the equipment that is installed to hold and supply water for the birds. Providing clean, cool water with adequate flow rate is fundamental to good poultry production. Without adequate water intake, feed consumption will decline and bird performance will be compromised.

Drinker systems are either of open or closed type.

Open Systems: Bell or Cup Drinkers

The open drinker systems are those in which the water is exposed to the environment. These include cup drinkers and bell drinkers. These are normally made of plastic and are coloured red or blue and white.

In many communities there are some drinkers that are locally made, usually by small scale metalworkers, using zinc metal. These are normally coloured in grey and or white. Whilst these may be cheaper, they have the disadvantage of being susceptible to rust, are heavy, and are not coloured in the colours that attract chickens.

Open systems are quite cheap and easy to install and can be managed by almost anyone. However, whilst there is a cost advantage of installing an open drinker system, problems associated with litter quality, condemnations and water hygiene are more prevalent. Water purity with open systems is difficult to maintain as birds will introduce contaminants into the reservoirs resulting in the need for daily cleaning. This is not only labour intensive but also wastes water.

Litter conditions are an excellent means of assessing the effectiveness of water drinker settings. Damp litter under the water source indicates drinkers are set too low, the pressure is too high or there is inadequate ballast in the drinker. If litter under the drinkers is excessively dry, it may indicate water pressure is too low.

Installation recommendations

From Day 1 to Day 7, use chick fonts – either 3 litre or 4 litre size.

The rate is 3 fonts per 100 chicks.

From Day 7 to the end of the cycle, start using 12 Litre fonts or Bell Drinkers. The rate for these is 50 birds per drinker.

Management recommendations

Bell and cup drinkers should be suspended to ensure that the level of the lip of the drinker is equal to the height of the birds' back when standing normally.

Height should be adjusted as the birds grow in order to minimize contamination.

Closed Water Systems: Nipple Systems

Nipple drinker systems are normally installed in big commercial poultry systems but more portable kits are now available in the country. These normally consist of a water holding system, usually a tank that has got small pipes feeding through the poultry house with nipples with or without cups available at regular

“Litter conditions are an excellent means of assessing the effectiveness of water drinker settings”

intervals for the birds to drink from.

Nipple drinkers are of two types:

- Low flow rate nipple drinkers operate at a flow rate of 50-60 ml/min. They typically do not have cups, and pressure is adjusted to maintain water flow to meet the broiler's requirements. Generally, 10 - 12 birds per nipple with low flow rate systems are recommended.
- High flow rate nipple drinkers operate at a flow rate of 80-90ml/min, usually they have cups to catch any excess of water that may leak from the nipple. Generally, 12 birds per nipple are recommended.

It is important for the nipple system to have an appropriate flow rate depending on the age of the birds. This will maximise the birds' accessibility to the water. Table 2 shows the recommended nipple pressure levels for each age of bird.

Nipple pressure recommendations for various ages of bird:

Age (Weeks)	Nipple Pressure
1	40-60ml/min
2	60-70ml/min
3	70-80ml/min
4	80-90ml/min
5	100ml/min
6	100-120ml/min

The brooding area must have 23 birds/ nipple (partial brooding). The final ratio must have 12 birds/ nipple. The rule is that birds should not have to travel more than 3 meters to find water.

Water Consumption Monitoring

Water is no longer a free commodity therefore, like all scarce resources, its use needs monitoring. If you are on the manual system of cup drinkers or bell drinkers, you need to put in systems of measuring how much water your birds use per unit time.

In nipple drinker systems, monitoring water consumption through the use of water meters is an excellent means of gauging feed consumption, as the two are highly correlated. Water meters should be sized the same as the incoming water supply line to ensure adequate flow rate. Water consumption should be evaluated at the same time each day to best determine general performance trends and bird well-being.

Note: install a water meter bypass, to be utilized during flushing – water used during regular flushing procedures should not be included in the daily water intake reading.

Any substantial change in water usage should be investigated as this may indicate a water leak, health challenge or feed issue. A drop in water consumption is often the first indicator of a flock problem. Water consumption should equal approximately 1.6-2 times that of feed by mass, but will vary depending on environmental temperature, feed quality and bird health.

A few guidelines are as follows:

- Water consumption increases by 6% for every increase in 1 degree in temperature between 20-32 °C.

- Water consumption increases by 5% for every increase in 1 degree in temperature between 32-38 °C.
- Feed consumption decreases by 1.23% for every increase in 1 degree in temperature above 20 °C.

Relation between ambient temperature and water feed ratio:

Temperature °c/°F	Ratio Water and Feed
4 °c/39 °F	1.7:1
20 °c/68 °F	2:1
27 °c/78°F	2.5:1
37 °c/99 °F	5:1

Water Storage Tanks

Adequate water storage should be provided on the farm in the event that the main system fails. A farm supply of water equal to the maximum 48hour demand is ideal. The storage capacity is based on the number of birds plus the volume required for the evaporative cooling system, about 500ml per bird placed.

Storage tanks should be purged between flocks. In hot climates tanks, should be shaded because elevated water temperatures will decrease consumption. The ideal water temperature to maintain adequate water consumption is between 10 - 14 °C).

Feeding Systems

Feeding systems refers to equipment units that are installed to present feed to the birds.

Regardless of which type of feeding system is used, feeding space is absolutely critical. If feeder space is insufficient, growth rates will be reduced and uniformity severely compromised. Feed distribution and the proximity of the feeder to the birds are key to achieving target feed consumption rates.

Again, feed equipment can either be

manual or automatic.

Manual Feeders:

- **Chick Trays:** Round or Square Trays are necessary from placement from day 1 to Day 7; the quantity must be 3 trays / 100 chicks.
- **Tube feeders:** From Day 7 to the end of the cycle, start using tube feeders. The recommended rate is 50 birds per Feeder.

Automatic Feeders:

- 50 birds per Feeder is the recommended rate.

The quantity of feed inside the plate must be: full at first 2 weeks, 50% of the plate between 2nd and 3rd weeks and 1/3 of the plate after 3rd week.

Feeders are generally recommended as they allow for unrestricted bird movement throughout the house, and have a lower incidence of feed spillage and improved feed conversion.

If birds are “tipping” the pans to reach the feed, then the pans are set too high. The guideline is to set these such that the nipples are at the same level as the bird’s main back line.

Guideline on Number of Feedlines

House Width	Number of Feedlines
Less than 12m	2
Up to 12m	3
14-15m	4
16-20m	5
21-25m	6

Heating Systems

It is an absolute requirement that birds be provided with an appropriate temperature range in the poultry house.

Any major deviations from the ideal range will result in many production problems. Too high temperatures will bring discomfort to the birds and they will stop feeding, start drinking too much water and if this continues, they start getting dehydrated, eventually dying. Too low temperatures will result in the birds slowing down their metabolism and this starts many production problems as well.

The appropriate temperatures for the birds varies with age, the younger the birds, the more the warmth required. Therefore, if the birds are still young, the farmer will be obliged to supply extra heat over and above that provided by the warmth of the house. This is done during brooding.

The supply of this heat / warmth is through several mechanisms and equipment.

“Any major deviations from the ideal range will result in many production problems.”

Heat Supply Equipment

Heat supply equipment is very varied, from the smallest and simplest, to the largest, and most complicated. These are as follows:

Infra-red Lamp

This is an electric lamp that emits infra-red light hence supplying warmth to the birds. One such lamp will warm 100 birds on average.

The advantage is that this is quite simple to install – it just needs a connection to an

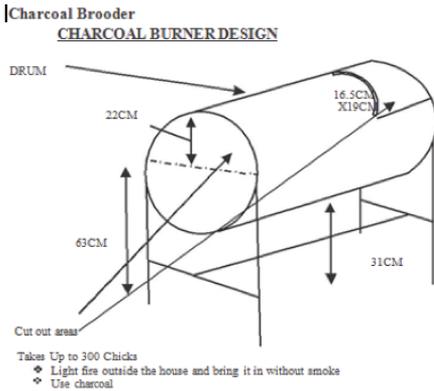
electricity source.

The disadvantage is that it needs a reliable source of electricity to ensure the birds are warmed consistently.

Electric Heaters

The normal electric heater can also be used to warm birds during brooding. One such heater can warm 100 birds. This carries the same advantages and disadvantages as the infra-red lamp.

Braziers/Mbaura



These are normally produced from sheet metal, the commonest being a drum cut into a shape that will allow wood, charcoal or coal to be burnt inside, allowing the heat to be transferred to the environment. If it is the common drum size and shape, one will warm about 500 birds.

It is also quite easy to put together, however, it needs constant monitoring because the wood or coal emit smoke which, if allowed to accumulate in the poultry house, will be very dangerous for the birds. Later in the bird's life, this can also cause late mortalities called ascites especially if the ventilation in the house is not done correctly. The trick therefore is to burn the fuel whilst the brazier is outside, and when the smoke has subsided and all gone, move it into the poultry

house.

Pancake/Gas Brooders

These are either round or square pans that have got gas elements that are gas heated to supply the heat. One such brooder warms up to 1000 chicks at a time.

The advantage is that the heat is very effective and it warms a large number of birds at a time.

The downside is that there must be consistent supplies of gas.

The gas must also be affordable, otherwise the brooding costs will go up.



Dry Heat Conveyors

These are normally systems of metal piping that conveys heat blown into a poultry house from heated chambers outside a poultry house. The source of the heat is normally wood or coal or any other fuel, depending on the system.

The heat is normally blown by a blower or can be manually blown.

These are now being commercially made mostly for large poultry houses.



Boiler Heating System

This system uses coal to heat water in a chamber boiler, and the hot water will then heat air which is then blown into the poultry house through fans. This kind of system is becoming common in environmentally controlled houses.

The advantage is that such systems are very efficient and easily adjustable. The disadvantages are that they are costly, hence the justification of using them in environmentally controlled houses.



Lighting Equipment

Broilers will require light in order to locate water and feed, so light equipment must be installed in a chicken house. If the house is electrified, then normal light bulbs will do. If there are no electricity connections, you are encouraged to install solar lights, which are quite affordable now.

Should these be not available, then you can consider even candles, but these need care because if they fall onto the bedding, a fire can easily result.

Also, the candles must not be emitting smoke because this might affect air quality in the house.

Data Collection Equipment

This is the equipment that is installed in a poultry house to collect data that the owner can use to manage the birds properly. Such equipment includes thermometers and hygrometers.

Thermometers

Thermometers must be installed in a chicken house to measure and report on temperature. This is because chickens are very sensitive to temperature extremes, so the movement of temperature must be closely monitored.

The best thermometer is the Min/ Max Thermometer, also called a Six's Thermometer. This measures the minimum and maximum temperatures for a period and so the owner will have an idea of how low or how high the air temperatures went over a particular time phase.

Hygrometer

This instrument measures humidity. It is important to understand how humidity is fluctuating in a chicken house because it affect bird comfort and temperatures.

Bio-Security Dip

Having finished preparing the house interior, the final task is to create the bio-security system. Basically this requires the installing of either a concrete dip or a bowl which will be filled with disinfecting chemicals.

Disinfecting chemicals for use in dips are varied, and Profeeds distributes some including Virukill.

This would be for people to dip their feed in before they access the poultry house.

After this, you are now ready for your next placing. However, the first thing is to prepare the house and make it ready to receive the birds.

This is the time to make your order of chicks and feed and associated chemicals!

House Preparation: House Used Before

All the preceding information tips assume that the house is newly built. However, if the house has already been used before for raising chickens, then there is specific preparation related to bio-security that is required.

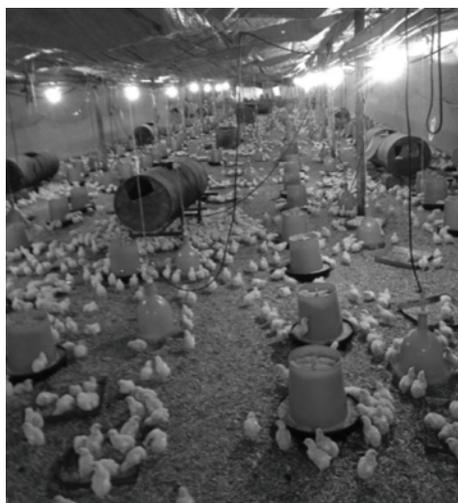
- The house needs to be rested for at least 10-14 days from the last flock.
- The house needs to be dry-cleaned thoroughly to remove any bedding, manure and dirt. These should be disposed of as far away as possible from the poultry house, at least 300 metres.
- Then it needs wet-cleaning using detergents.
- Then wash and clean all the equipment – feeders and drinkers and curtains.
- Then white-wash the walls.
- Then spray with sanitizers like Virukill
- Then allow the house to rest for at least 10-14 days before new placement.

Creating a Brooding Chamber for Placing

For the comfort of the young chicks, it is important that you create what is called a “brooding chamber” inside the main chicken house.

This “brooding chamber” is a “mini” tent inside the house in which temperature fluctuations are minimised. This brooding chamber is very vital for the young birds from the date of placement to day 21 – a period in the life of the bird called brooding.

This is created by the insertion of a false ceiling that runs from eave to eave. This false ceiling will greatly reduce heat loss and make temperature control easier. The internal curtain will completely seal from the floor to the false ceiling at the eaves. This curtain must open from the top and never from the bottom. The slightest air movement at floor level will cause chilling on the chicks. The internal curtain is used for early ventilation. This brooding chamber will only be used for the first 21 days for every flock placed.



In setting up a house for placement/brooding, factors such as housing design, environmental conditions and resource availability will be considered.

However, the most important objective is to produce an environment with the right comfort, temperature and air draught.

Normally the house is prepared in stages, gradually increasing until the whole house is covered. This is also referred to as partial house brooding.

Partial house brooding is commonly practiced in an attempt to reduce heating costs. By reducing the amount of space dedicated to brooding, one can conserve the amount of heat required and reduce energy costs. In addition, correct temperatures are more easily maintained in a small area.

Pre-Warm the house 48 hrs before the placement.

Up to 7 days - 1/2 of the house
8 to 10 days - 1/2 to 3/4 of the house
11 to 14 days - 3/4 of the whole house

Several strategies for house division are employed worldwide. Floor to ceiling curtains are most commonly used to divide a house. A solid 20 cm (8 in.) barrier should be placed on the floor in front of the curtain ensuring that no drafts disturb the chicks. Partial house brooding can be managed similarly to whole house brooding with the use of a centrally located heat source and attraction lights.

The placement density will depend on the brooding area being utilized. Stocking should not exceed more than 50 - 60 birds/m² during the winter and 40 - 50 birds/m² during the summer (but you must consider the quantity of equipment to calculate the possible density).

Pre-Placement Checklist

The key to successful broiler rearing starts with having a systematic and efficient management program in place. This program must start well before the chicks arrive on-site. Pre-placement house preparation as part of a management program provides a basis for an efficient and profitable flock of broilers. The following checks need to be made:

Equipment Checks

After confirming that the brooding equipment capabilities meet the number of chicks to be placed, install them and check that all are functional. Ensure that all water, feed, heat and ventilation systems are properly adjusted.

Drinker Check

- 50 chicks per font should be provided.
- All drinkers should be flushed to remove any residual sanitizer.
- In case of nipple drinkers, adjust pressure to produce a droplet of water visible on each nipple without dripping.
- The nipple lines must be flat, if the floor is not flat, provide the slope regulator (the pressure must be the same in all nipple line).
- Check for water leaks and air locks.
- Ensure that nipple drinkers are at the chicks' eye level.
- Water must be clean and fresh.

“Correct temperatures are more easily maintained in a small area.”

Feeder Check

- Remove all water remaining from cleanout prior to filling.
- Supplemental feeders should be provided for the first 12 days in the form of paper, trays or lids.
- Trays should be provided at a rate of one per 50 chicks or Small Tubular one per 100 chicks.
- Supplemental feeders should be placed between the main feed and drinker lines and adjacent to the brooders.
- It is of utmost importance that the supplementary feeding system does not run empty as this will place great stress on the chick and reduce yolk sac absorption.
- The supplementary feeders should never be empty - keep full at all times!
- Supplemental feeders should be refreshed three times daily until all the chicks are able to gain access to the main feeding system. This generally occurs at the end of the first week.
- Feed should be provided as a good quality crumble.
- Do not place feed or water directly under the heat source as this may reduce feed and water intake.
- Paper is recommended, the feed area should be a minimum of 50% of the brooding area. 10 grams of feed per chick per time on the paper is recommended, provided as many times as necessary. The paper should be placed near the automatic drinking system so the chick can have easy access to both feed and water.

Brooder Checks

Verify that all heaters are installed at the recommended height and are operating at maximum output. Heaters should be checked and serviced an adequate time BEFORE pre-heating commences.

Thermometer Check:

- Placed at bird height and in the centre of the brooding area.
- Temperature ranges should be recorded daily and not deviate by more than 2 °C over a 24-hour period. The best thermometer is a Max. Min. Thermometer.
- A data Logger is important to check the temperature graphics all the time.

Floor temperature Check

- Houses should be preheated so that both the floor and ambient temperatures and humidity are stabilized 24 hours before placement.
- To achieve the above targets, pre-heating needs to commence at least 48 hours before chick placement.
- Pre-heating time is dependent on climate conditions, house insulation and heating capacity and will vary from farm to farm.
- Chicks do not have the ability to regulate body temperature for the first 5 days and thermoregulation is not fully developed until 14 days of age. The chick is highly dependent upon the manager to provide the correct litter temperature. If the litter and air temperatures are too cold, internal body temperature will decrease, leading to increased huddling, reduced feed and water intake, stunted growth and susceptibility to disease.
- At placement, floor temperatures should be at least 32 °C with forced air heating. If radiant heaters / brooder stoves are used, floor temperatures should be 40.5 °C under the heat source.

Litter temperature should be recorded before each placement. This will help to evaluate the effectiveness of pre-heating.

The Chicks

Chick Sources

The Zimbabwean poultry industry rears three main breeds of broiler. These are

- Cobb
- Ross
- Hubbard

These breeds are bred and hatched by different hatcheries of varying size. All these breeds have been proven to grow well in Zimbabwe and it is up to the producer to make a choice of one of the above breeds to work with.

These hatcheries operate a system of pre-booking therefore considerable planning is required on the side of the producer to ensure the chicks come at the right time when the facilities are ready.

Chick Quality

Hatcheries can have a tremendous impact on the success of broiler rearing and they have an obligation to supply good quality chicks.

Characteristics of a good quality chick:

- Well-dried, long-fluffed down.
- Bright round active eyes.
- Look active and alert.
- Have completely healed navels.
- Legs should be bright and waxy to the touch.
- Free of red hocks.
- Chicks should be free from deformities (i.e. crooked legs, twisted necks and cross beaks).

Chick Ordering and Transportation

Having made you order in time, and having prepared the house, the next important task is to plan the transport of

the chicks to the farm.

If the breeder offers transport, then the vehicle is likely to be the appropriate one for the purpose.

However, if transport is not offered, the onus is on you to select the best transport vehicle. Ideally, it must be a truck designed for the transportation of the chicks from hatchery to farm.

The truck should be environmentally controlled and be able to maintain a temperature range of 30-32 degrees Celsius. The relative humidity, as measured inside each chick box, must be around 70%.

Ensure there is space between stacks of chick boxes to allow for air-flow.

If you do not have the designed truck for the job, then preferably use a truck with a closed space where one would stack the chick boxes and allow for that ventilation enough to allow air flow, but preventing draught.

The back of an open truck is not ideal.

Collect the chicks as early in the morning as possible and drive straight to the farm avoiding heavy traffic and congested routes.

Chick Placement

As soon as you arrive at the farm, open the boxes gently and allow the chicks to carefully move out and into the prepared, pre-heated brooding area.

During these first few days, constantly watch the young chicks as they go about their lives.

Adjust brooding temperature according to relative humidity at 33-36 degrees Celsius and 70% humidity.

After the first week, reduce the temperature weekly by 2-3 Degrees Celsius until you reach 21 Degrees Celsius by Day 42, the end of the brooding phase.

Post Placement Checklist

Two very important “Chick Checks” should be made 24 hours post-placement. These two checks are simple & effective ways to evaluate pre-placement management.

Chick Check 1: 4 to 6 Hours Post-Placement

- Sample 100 chicks per brood area.
- Check: temperature of feet against cheek.
- If the feet are cold, reevaluate pre-heating temperature.
- Results of Cold Litter:
 - Poor early feed intake
 - Poor growth
 - Poor uniformity

An excellent indicator of floor temperature is the temperature of the chick's feet. If the chick's feet are cold, the internal body temperature of the chick is also reduced. Cold chicks will be seen huddling with reduced activity and resulting in reduced feed and water intake and therefore reduced growth rate. By placing the feet against your neck or cheek one can readily learn how warm or cold the chick is. If they are comfortably warm, the chicks should be actively moving around the brooding area.

Chick Check 2: 24 Hours Post-Placement

The crops of chicks should be checked the morning after placement to ensure they have found feed and water. At this time, a minimum of 95% of the crops should feel soft and pliable indicating chicks have successfully located feed and water. Hard crops indicate chicks have not found adequate water and water availability should be checked immediately. Swollen and distended crops indicate chicks have located water but insufficient feed. In this case the availability and consistency of

- Sample 100 chicks per brood area.
- The desirable result is 95% crops with both feed & water.
- Evaluate crop fill & indicate results in the Crop Fill chart form as below:

Crop Fill Record Chart

Crop Fill	Full - Pliable	Full - Hard	Full - Soft	Empty
	Feed & Water	Only Feed	Only Water	
Evaluation	95%	?	?	?

Ensure that both the feeders and drinkers are in adequate supply relative to the stocking density and are appropriately placed. Feeders and drinkers should be placed in close proximity to each other and within the “thermal comfort zone.”

Bell Drinker Check

- Height should be maintained such that the lip is at the level of the birds' back.
- Frequent assessment and adjustment is essential.
- Must be cleaned as many times as necessary to prevent build-up of contaminants. If necessary, in hot climates, flush the water system at least twice daily to maintain a good water temperature.
- All bell drinkers should be ballasted to reduce spillage.

Nipple Drinker Check

- Height should be at chicks' eye level for the first 2-3 hours of age and then maintained slightly above chicks' head.
- Pressure should be such that there is a droplet of water suspended from the nipple but no leakage, about 40 ml/min.
- The birds' feet should always be flat on the litter and a bird should never have to stand on its toes to drink.
- Flush the lines as needed.

Feeder Check

- Feed should be provided in crumb form and placed on trays, lids or paper.
- Feeders should be raised incrementally throughout the growing period so that the lip of the trough or pan is level with the birds back at all times.
- The feed level within the feeders should be set so that feed is readily available while spillage is minimized.
- Start the feeder full of feed (without waft), and decrease the quantity of feed until 1/3 of feed inside the plate after 20 days.

Seven Day Bodyweight and Feed Conversion Check

Seven-day weights and feed conversion are excellent overall indicators of how successful the brooding management has been. Failure to achieve optimal seven-day weights and feed conversion will result in poor broiler performance.

Therefore, at 7 days of age, randomly select 10% of the birds from the house and weight them, then calculate the average weight.

Compare this average weight against the breed average for the particular breed you are raising.

If your weights are way off lower than the breed average, you need to look at the total conditions prevailing in the house, including feed, to ensure everything is as it should be.

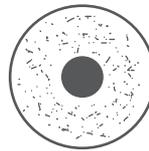
Make adjustments on anything found not to be in order.

“The importance of the brooding period cannot be overemphasized.”

Brooding Management

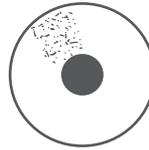
The importance of the brooding period cannot be overemphasized. The first 14 days of a chick's life sets the precedent for good performance. Extra effort during the brooding phase will be rewarded in the final flock performance.

Check chicks 2 hours after placement. Ensure they are comfortable. See the Proper Brooding Illustrations:



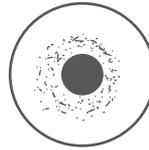
Just Right

Constantly cheeping chicks evenly spread



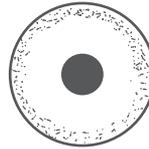
Too Drafty

Noisy chicks huddled together away from draft



Too Cold

Noisy chicks huddled under brooder



Too Hot

Drowsy chicks spread around perimeter



Influence of Bright Light, Draft or Noise



Chicks



Brooder

Internal Chick Temperature

- Chick internal temperature can be measured using a child ear thermometer.
- Hatched chick internal temperature should be 40 - 41 °C (104 - 106 °F).
- Chick internal temperature increases over the first five days to 41 - 42 °C (106 - 108 °F).
- Chick internal temperature above 41 °C (106 °F) will lead to panting.
- Chick internal temperature below 40 °C (104 °F) indicates that the chick is too cold.
- Higher relative humidity will reduce moisture loss but also impair heat loss, so correct temperature is vital.
- Chicks from smaller eggs (younger breeder flocks) require higher brooding temperatures because they produce less heat.
- If early feed consumption doesn't take place the chick will use both fat and protein in the yolk for energy resulting in adequate protein levels for growth.

Brooding Ventilation

In addition to the correct temperature, ventilation needs to be considered. Ventilation distributes heat throughout the house and maintains good air quality in the brooding area.

Young birds are also very susceptible to drafts. Air speeds as slow as 0.5 m/s can cause a significant wind-chill effect on day old birds. If circulation fans are in use, they should be directed towards the ceiling to minimize downward drafts.

Age of Birds	Metres per Second
0-14 Days	0.3
15-21 Days	0.5
22-28 Days	0.875
28+ Days	1.75-3.0

Growing Phase Management

Temperature

Activity Check: Every time you enter a poultry house you should always observe the following activities:

- Birds eating
- Birds resting
- Birds "talking"
- Birds drinking
- Birds playing
- Birds should never be huddling

Birds should be eating/drinking most of the time. If there is feed in the troughs and water in the drinkers but the birds are not consuming, check the conditions in the house. If most of the birds are huddled, you need to check the temperatures.

Age (Days)	Relative Humidity (%)	Temperature (°C) for chicks from 30 week old parent flocks or younger	Temperature (°C) for chicks from 30 week old parent flocks or older
0	30-50	34	33
7	40-60	31	31
14	40-60	27	27
21	40-60	24	24
28	50-70	21	21
35	50-70	19	19
42	50-70	18	18

If humidity is less than above, increase temperature 0.5 to 1 °C . If humidity is greater than above, reduce house temperature by 0.5 to 1 °C . Always use birds' behaviour and effective temperature as the ultimate guide to determine the correct temperature for the birds

Chicks from younger breeder flocks require higher brooding temperatures because they produce less heat about 1 °C for the first seven days.

Air Quality

Besides the air quality in the house needing to be at the correct temperature for the age of the birds, it also needs to have the right composition. This is because the house design and the type of heating system used will impact on the constituents of the air in the poultry house. For example, when you use any kind of radiant/ spot brooder or gas brooder inside the poultry house, you need to pay attention on the air quality, mostly carbon dioxide.

The main purpose of minimum ventilation is to provide good air quality. It is important that the birds always have adequate oxygen, optimum relative humidity and minimum amounts of carbon dioxide (CO₂), carbon monoxide (CO), ammonia (NH₃) and dust.

Inadequate minimum ventilation and the resulting poor air quality in the poultry house can cause increased levels of NH₃, CO₂, moisture levels and an increase in production related syndromes such as ascites.

You can gauge the air quality by the behaviour of the chicks and their movements.

You can also smell the air for any abnormal smells like the dampness (humidity) and the pungent smell of ammonia. However, carbon dioxide and carbon monoxide do not smell, but their presence has implications on the comfort and health of the birds.

Although it is not easy to measure the chemical composition of air, the technical guidelines of good quality air are as follows.

Air Quality Guidelines	
Oxygen	> 19.6%
Carbon Dioxide	< 0.3%/3000ppm
Carbon Monoxide	< 10ppm
Ammonia	< 10ppm
Relative Humidity	45-65%
Inspirable Dust	< 3.4mg/m ³

“You can gauge the air quality by the behaviour of the chicks and their movements.”

Light Management in Broilers

As the bird grows, it might be necessary to manage the lighting regime in the house to prevent late mortalities. Here are the facts surrounding light management in broiler production.

- The rate of growth of modern breeds of chicken is so high that, when fed on high density diets, a proper light management has to be put in place.
- This involves switching off lights at set times during the course of the day, particularly at night, to give the birds a set period of darkness.
- This is against the old system of broiler management which required that lights be on at all times.

- It is worth noting that naturally, a period of darkness is a natural requirement for all animals.
- Energy is conserved during resting and this leads to improved feed conversion.
- It has been observed that when a proper light management system is used, skeletal defects, particularly leg problems, and late mortalities (water belly and flip overs) are reduced.
- Scientifically, the light-dark rhythm stimulates the production of a chemical called melatonin, which is important in the immune system development of an animal.
- It has also been observed that bird uniformity is improved.
- The general rule is to start a light restriction programme at day 8 once the 7 day live weights are above 150 grams.
- It is very important that when a light restriction programme is implemented, the lights are switched off at the same time every day.
- It is important to recognize that there is no strict rule as to which lighting programme to use since farmer circumstances vary.
- However, at Profeeds, we have a light restriction programme that we recommend, which is as in the table below:

Age of Birds	Hours of Light	Hours of Darkness
0-7 days	24	0
8-14 days	14	10
15-22 days	16	8
23-28 days	18	6
29-35 days	20	4
36-42 days	24	0

Lighting Program Benefits

- A period of darkness is a natural requirement for all animals.
- Energy is conserved during resting, leading to an improvement in feed conversion.
- Mortality is reduced, and skeletal defects are reduced.
- The light/dark period increases melatonin production, which is important in immune system development.
- Bird uniformity is improved.
- Growth rate can be equal to or better than that of birds reared on continuous light when compensatory gain is attained.

Ventilation Management

Minimum Ventilation

This is the minimum amount of ventilation (air volume) required to maintain full genetic potential by ensuring an adequate supply of oxygen while removing the waste products of growth and combustion from the environment. The requirements of a correctly operated minimum ventilation system include:

- Moisture removal.
- The provision of oxygen to meet the birds metabolic demand.
- The control of relative humidity.
- The maintenance of good litter conditions.
- Open the Curtain on the opposite side of wind.

This system should be independent of any temperature control system and works best if operated by a cycle timer with a temperature override. The maximum level of CO₂ at any time in the chicken house is

“The maximum level of CO₂ at any time in the chicken house is 3000ppm.”

3000ppm. If the house environment exceeds 3,000 ppm of CO₂, then the ventilation rate must be increased.

Effective Temperature

Effective temperature is the combined effect of the following factors:

- Ambient temperature
- Relative Humidity %
- Air Speed m/s
- Stocking density and feather cover
- Radiant heat

During high temperatures, heat loss associated with non-evaporative cooling declines as the temperature differential between the bird and the environment is reduced. Evaporative heat loss becomes the prominent mode of heat loss during heat stress. High relative humidity decreases the amount of water evaporation. If relative humidity cannot be reduced below 70%, the only solution is to maintain an air velocity of at least 3.0 m/s or more.

Management Techniques in Hot Conditions

Key points when installing cooling fans in a naturally ventilated house:

- In hot climates if necessary turn on the fans during the first two weeks to remove heat from the house in sidewall curtain houses with stir fan; the fans should be placed at an angle of 120° to the side wall or close to the roof. Do not generate air speed directly across the birds.
- Maximum distance from the side wall, 1m.
- Fans should be suspended perpendicular and 1 m above the floor.



Curtain Management

In open sided houses, the curtain management is fundamental to obtaining a healthy flock status throughout the whole production period. Good ventilation management requires minimal temperature fluctuations.

- In different sections of the house you could have temperatures variations.
- Ventilation at all ages is needed to

remove excess heat, humidity and/or CO₂. CO₂ is important in the first week when the house is well sealed. The level of CO₂ should never exceed 3,000 ppm. See air quality guidelines.

- Good curtain management is vital to avoid respiratory conditions and ascites in cold climatic conditions.
- Minimize 24hour temperature fluctuations, especially at night. Better temperature control will improve feed conversion and enhance growth rate.
- Take the wind direction into account in the morning, opening the curtain on the leeward side first.
- To improve air exchange and increase the air speed entering the house, the curtain on the windward side should be open 25% of the opening on the leeward side.
- To lower the house air exchange and slow the air entering the house, the windward side should be open four times the leeward side.
- To achieve maximum air speed across the birds, the curtain should be open the same on both sides and as low as possible.
- Until 14 days of age, the curtains should be opened to provide air exchange in the house but no air speed at chick or floor level. Air speed across the chicks in the first fourteen days of age leads to chilling, decreased feed and water consumption and increased energy consumption for heat production.

Water Management

Water is an essential nutrient that impacts virtually all physiological functions. Water comprises 65-78% of the body composition of a bird depending on age. Factors including temperature, relative humidity, diet composition and rate of body weight gain influence water intake. Good water quality is vital to efficient broiler production. Measurements of water quality

include pH, mineral levels and the degree of microbial contamination. It is essential that water consumption increases over time. If water consumption decreases at any point, bird health, environment and/or managerial techniques should be re-assessed.

It is important make one water analysis per year at least.

“It is essential that water consumption increases over time.”

Water Sanitation and System Cleanout

For commercial systems using nipple drinkers, a regular water sanitation and water line cleaning program can provide protection against microbial contamination and the build-up of slimy bio-films in water lines. While bio-films may not be a source of problem to birds, once established in water lines, bio-films provide a place for more detrimental bacteria and viruses to hide from disinfectants and also act as a food source for harmful bacteria. Products which contain hydrogen peroxide have proven to be outstanding for the removal of bio-films in water lines. Biofilms have influence on natural contaminants, - iron, sulphur, etc., - vitamins, electrolytes, organic acids, vaccines and stabilizers, antibiotics and probiotics.

Flushing

All modern poultry watering systems need to be flushed, best practiced on a daily basis to remove bio film, but as a minimum three times per week. High pressure flushing requires having adequate volume and pressure. The open drinker system also

must be flushed. In warm/hot climates it might be necessary to flush more than once a day to cool the water temperature. There are automatic flushing systems that make the flushing job easier, saving the grower time and ensuring the water flushing happens.

Drinking System Cleanout Between Flocks

- Drain drinking system and header tanks.
- Determine the capacity of the drinking system.
- Prepare the cleaning solution to the manufacturer's recommendation.
- Where possible, remove header tank and scrub it clean.
- Introduce the solution into the water system, usually in the header tank.
- Make sure protective clothing and eyewear are worn when using chemicals.
- Turn on the tap at the end of the drinking line and let the water run through until the sanitizing solution appears, then close the end tap.
- Raise each drinker line.
- Allow the solution to circulate through the drinking system.
- If circulation is not possible, let the sanitizing solution stand for at least 12 hours.
- After draining the system, flush the system thoroughly to remove bio-film and sanitizing chemical.

Broiler Feed & Nutrition Management

Successful broiler farming at any level is all about successful day-today management of all aspects of the broiler's life. Of all these management aspects required to successfully grow broilers, feed is the most significant from a cost perspective.

In fact, feed makes up a minimum of 65-70% of the total cost of producing broiler meat.

Therefore, it is very important that the feed is right and the feed management is appropriate for the system in order to maximize on the growth potential of the birds.

Marks of a Good Feed

A good feed has got the following properties:

- The correct raw materials are carefully selected for use in its manufacture.
- These raw materials are put through a rigorous quality control process.
- The nutrient requirements of the birds at every stage of growth are correctly identified and quantified.
- The correct feed formula is therefore derived.
- The correct raw materials are put into the feed formula to make a recipe which is processed using the correct product ion process and technologies.
- The feed has to be made in the right form for the kind of bird being fed.
- The produced feed is put through a rigorous quality control process to confirm the final quality before being distributed.
- The feed must supply the right quantity of nutrients to the bird appropriate for each stage of growth of the bird.

The Feed Forms of Profeeds Broiler Feeds

In keeping with the best practice the world over, we at Profeeds produce our broiler feeds largely in the form of crumbles and pellets. However, we take cognizance of the fact that some farmers get access to cheap maize and want to utilize it, so we also produce broiler feed concentrates which are mixed with maize on-farm in recommended ratios.

Use of Pelleted Feed

Nutritionally, it has been proven beyond reasonable doubt that with pelleted feed, there is a noted improvement in flock efficiency and growth rates when compared with the use of mash feed.

The basic advantages of pelleted feed over mash feed are as follows:

- There is an improvement in feed intake.
- Birds spend less time consuming feed.
- The birds waste less feed.
- The birds have an improved feed intake.
- The birds feed conversion rate improves by about 6-7%.
- The birds achieve an improved average daily gain in the order of 6%
- The birds utilize energy better by about 30%.
- The feed itself is produced under much better hygiene since the pelleting process involves the use of heat.

The Profeeds Range of Broiler Feeds

The Profeeds range of broiler feeds is in two:

- The crumbled and/or pelleted straight feeds that are fed as is.
- The concentrate range of feeds that require mixing with milled maize in given ratios to achieve the same specifications as the crumbled/pelleted feeds, though in mash form. This range of feeds is recommended for those customers with cheap quality maize on-farm.

The Profeeds 3-Phase Broiler Feeds

These are the Profeeds Premium broiler feeds that are formulated to more precisely follow the growth curve of the modern broiler bird.

The Broiler Starter Crumbles (21.5% Crude Protein)

This feed is designed to give the day-old chick that much-needed early nutritional boost necessary for the development of the young bird's organs and general growth.

This is designed to be fed from day old to the 14th day (two weeks).

For feed budgeting purposes, work on 500 grams (0.5kg) of feed per bird for the two weeks. However, with good management, this allowance can be reduced slightly down from the 500grams of Broiler Starter Crumbles for this period.

Use of Broiler Starter Concentrate (41% Crude protein)

Should one have cheap maize, you can mix our Broiler Starter Concentrate with maize in the ratio 2 parts Broiler Starter Concentrate to 3 parts milled maize.

This mixing ratio must be by weight (kg), not by volume.

The maize must be milled fine (through a 3mm screen) – not crushed!

To work on feed requirements, use the same values as for the Broiler Starter Crumbles, but remember that since this is mash, the birds might eat more.

The Broiler Grower Crumbles/Pellets (19.5% Crude Protein)

This feed is designed to finalize the development of the bird organs and to stabilize growth in general whilst initiating the laying of muscle (meat).

This is designed to be fed from the 15th day to the 28th day (two weeks).

For feed budgeting purposes, work on 1500 grams (1.5kg) of feed per bird for the two weeks, split into 500grams Broiler Grower Crumbles and 1 kg Broiler Grower Pellets. This is designed to allow smooth transition from smaller crumbles to pellets for the young birds.

Use of Broiler Grower Concentrate (40% Crude protein)

Should one have cheap maize, you can mix our Broiler Grower Concentrate with maize in the ratio 2 parts Broiler Grower Concentrate to 3 parts milled maize.

This mixing ratio must be by weight (kg), not by volume.

The maize must be milled fine (through a 3mm screen) – not crushed!

To work on feed requirements, use the same values as for the Broiler Grower pellets, but remember that since this is mash, the birds might eat more.

The Broiler Finisher Pellets (18.0% Crude Protein)

This feed is designed to finalize the laying of muscle (meat) - to finish them off.

This is designed to be fed from the 29th day to the slaughter stage. The slaughter stage depends on the market of the producer, but at day 35 + 3 days one must be able to slaughter their birds if they are targeting around 1.8kg to 2kg live-weight. For feed budgeting purposes, work on 1600 grams (1.6kg) of feed per bird for the 7 + 3 days required to finish the bird. However, it must be noted that the finishing phase period is wholly dependent on the target weight for the market intended, and will therefore vary a lot.

Use of Broiler Finisher Concentrate (39% Crude protein)

Should one have readily available and affordable maize, you can mix our Broiler Finisher Concentrate with maize in the ratio 1-part Broiler Finisher Concentrate to 2 parts milled maize.

This mixing ratio must be by weight (kg), not by volume.

The maize must be milled fine (through a 3mm screen) – not crushed! To work on feed requirements, use the same values as for the Broiler Finisher pellets, but

remember that since this is mash, the birds might eat more.

Feed Allowances Summary - Straight Feeds

Broiler Stage of Growth	Feed Type	Mixing Instructions	Amount of Feed for the Phase	Planning Amount of Seed for 100 Birds
0-14 Days	Broiler Starter Crumbles	N/A	500g	50kg
15-21 Days	Broiler Grower Crumbles	N/A	500g	50kg
22-28 Days	Broiler Grower Pellets	N/A	1000g	100kg
29+ Days	Broiler Finisher Pellets	N/A	1500g	150kg

Feed Allowances Summary - Concentrates

Broiler Stage of Growth	Feed Type	Mixing Instructions	Amount of Feed for the Phase	Planning Amount of Seed for 100 Birds
0-14 Days	Broiler Starter Mash	2 Parts Conc. 3 Parts Maize	500g	20kg + 30kg Maize
15-28 Days	Broiler Grower Mash	2 Parts Conc. 3 Parts Maize	1500g	60kg + 90kg Maize
29+ Days	Broiler Grower Mash	1 Parts Conc. 2 Parts Maize	1600g	55kg + 105kg Maize

Please note that the Finisher requirements have been rounded off upwards to allow for the expected increase in consumption for the mash feed.

Performance Measurements

It is important for a broiler farmer to be measuring performance periodically to ensure success of the project. The question is, how?

Performance criteria must be measured from the first day the day old chicks are placed to the last day. Amongst many, the key criteria that are considered are as follows:

Bird live-weights: Feed conversion rates (FCR) and Mortalities

Bird Live-Weights

It is greatly advisable to check on performance progress of your birds by periodically weighing them. Ideally, one should take day old weights, 7-day weights, 14-day weights, 21-day weights, 28-day weights, 35-day weights and slaughter weights. Then compare these weights to the standard recommended for the breed. How well you are doing is determined by how far off the standard your actual weights are.

One cannot just feed birds for 5-6 weeks without checking these weights only to discover at the last day that the weights are well under target. In that case, it will be impossible to pin-point the problems with the particular flock, and where it happened so that corrective action is taken.

The following table indicates the approximate weight targets of the three breeds of broiler that are reared in the country. These weight targets were extracted from the current (as at April 2016) manuals of Cobb, Ross and Hubbard respectively.

You need to compare the weekly weight you get with these to see how well you are performing as indicated in table

Age	Cobb Broiler (g)	Ross Broiler (g)	Hubbard Broiler (g)
1 Day	42	42	42
7 Days	164	182	179
14 Days	430	455	473
21 Days	843	874	925
28 Days	1397	1412	1472
35 Days	2017	2021	2098
42 Days	2625	2652	2754

Taking Bird Live-Weights

If the flock size is small, say under 100, one can easily weigh the birds individually. However, for large flocks running into thousands and scores of thousands this is not practically possible. In this case, it is recommended that weights are taken by way of sampling 1% of the flock or 100 birds whichever is larger and then averaging the weights of this sample. Obviously, the bigger the sample size that you can practically weigh, the more accurate the average weight taken. The key to the accuracy of this method is in the sample size and randomness of the selection so that the sample to be weighed is truly representative of the whole flock.

Therefore, randomly select from as many points and corners of the house as possible without picking on any individual birds.

Feed Conversion Rates

The feed conversion rate (FCR) is a measure of the rate at which feed is converted into muscle (meat) by the bird.

To calculate this, you need to account for the weight of the feed used to feed the bird for a particular period, then weigh the bird at the beginning and end to account for the gain in weight. Therefore, if a bird was fed from Day Old at 40grams live-

weight and slaughtered at 2.4kg at 42 days and seen to have consumed 3.6kg of feed, the FCR would be:

$3.6\text{kg feed} / (2.4 - 0.040)\text{ kg live-weight} = 3.6 / 2.36 = 1.525$.

This means that the bird needed 1.525kg of feed to produce 1 kg of meat.

The lower the FCR figure, the more efficient the bird on the particular feed. The importance of the FCR figure is that it also captures the feed consumption index as well.

Mortality

Mortality is the number of deaths as a percentage of the total placed. This index is an indication of how well the overall management is in preventing diseases and other death-causing conditions. Obviously the lower this figure the better – one does not want to lose any birds once placed

Important Points About Broiler Feeds & Feeding

- It is very important to ensure the birds are actually EATING the feed! The poultry feeding game is all about ensuring that the birds are eating the feed!
- The next thing is to quantify the feed that is being consumed by the birds. The birds are meant to eat a certain amount of feed of a given quality over a given time period therefore make sure that is happening! If one is feeding a poor quality feed, the birds could be eating too much without the return in weight gain at the expense of the farmer's pocket!
- Feed must be available at all times – the birds must not go without feed for any period of time except in the case of a managed darkness period.
- The feed must be the same – there must not be a chopping and changing of the feed! The feed must come from one

source and produced using the same range of raw materials and produced in the same form. Should there be an unavoidable change, then the two different feeds must be fed mixed for a period to allow a smooth breaking in from the old feed to the new feed.

- If one is to use concentrates mixed with maize, then the ratios must be based on weights, not on volume. The concentrate and maize must be mixed thoroughly because the uniformity of the mix will determine the quality of the mix.
- The birds must not be fed any rotten or contaminated feed. If there is anything amiss about the feed, DO NOT feed it! The general rule is that if you cannot put that feed into your mouth for any visual or perceived reason, and then it is worse for the bird!
- Always check the expiry date of the feed from the bag label. Generally, poultry feeds can be kept for 6 months if under very good storage conditions. Any period over that, the quality of the feed needs verification by a competent person. Qualification
- Do not borrow feed from another poultry farmer. This is an easy way to spread infectious poultry diseases.
- Always make a distinction between cheap feed and cost-effective feed! Cheap feed is not necessarily cheap feed. Cheap feed is mostly expensive feed!
- Do your numbers all the time. Calculate your (feed) costs after every flock to see where your project is going!

“Always make a distinction between cheap feed and cost-effective feed.”

Harvesting Procedure

If your chicken project is small, harvesting procedure might not be too much of a task needing planning, but as the scale gets bigger, some serious planning is required for the harvesting process.

The goal of the planning and coordination of the harvesting process is to ensure low DOA [dead on arrival], minimal shrink, and high animal welfare standards. If done properly this is a very complex process that will require the coordination of farm starting times, multiple catching crews and processing plant schedules. The benefits of good planning in terms of improved mortality shrink and plant yield are very real and make it worth the effort.

The catching process requires good communication and planning that must include the following key areas:

- Plant processing schedule - To insure that birds are available to slaughter with minimal holding time.
- Transportation and driving distance from farm to plant - Coordinate the transportation assets to maximize their utilization.
- Catching crew schedule - Ensure that crews are scheduled to catch the birds.
- Farm set up - Time frames to shut off and raise feeders and water.

Feed and Water Withdrawal

The feed withdrawal and water withdrawal process is critical in optimizing feed conversion, plant yield, and preventing holding shrink and plant contamination. The purpose of feed withdrawal is to empty the digestive tract, preventing ingested feed and faecal material from

contaminating the carcasses during the evisceration process.

Always allow access to water as long as possible prior to catching. Only raise the water after the catchers get to the house and start setting up. On multiple house farms only withdraw water just prior to commencing catching.

Optimum recommended time off feed is a window of 8 hours to 12 hours (windows between the feed withdraw and the processing). This is a waste of the undigested feed as there will be no conversion to meat. The excess feed residue will cause yield and processing problems in the plant. Faecal residues cause contamination of plant equipment. Feed withdrawal in excess of 12 hours causes the intestines to lose their tensile strength, making them easy to tear and rupture. The intestinal contents will very viscous due to the start of intestinal cell necrosis. This condition will cause major equipment contamination in the plant and continue to get worse with time.

In a properly planned program the feeders should be raised in the broiler house so the first load from the house will be unloaded and started kill as close to the 8-hour mark as possible with the last load from the house being killed as close to being inside the 12-hour mark as possible. Remember the water must remain down to the start of catch

Preparation

Regardless of method of catch or type of containers used there are some common general operating procedures that should be followed.

- Birds should be carefully placed in clean crates or modules to a density that complies with manufacturer's recomme-

ndations.

- Minimize light intensity reduce bird activity. Light in the house should be only enough to see to do the job. If dimming is not feasible, the use of blue or green lights will calm birds and reduce activity.
- When catching during the day it is recommended to utilize curtains and other methods to keep the houses as dark as possible. In cases where light cannot be restricted migration fences and gates must be used to restrict bird crowding. Coops can be used with great effect by building pens from the coops to restrict bird movement. Calm birds facilitate better ventilation, reduce bird stress and diminish the risk of piling.
- Reduce as much as possible pre catch activity. Make sure all feeders and water are rolled up. Make sure any unnecessary equipment or items that might interfere are out of the house.
- Ensure ventilation is maintained.

Manual Catching

The two most common methods of manual catching are by the feet or by the back. With both machine & manual catching, crew training is essential to ensure correct bird handling with minimal damage.

The following handling limits need to be enforced:

- Grip only the shank to limit drum bruising
- Handling limits - depends on bird size and crate/module design:
- No more than 3 birds per hand
- Limit handling birds more than once – do not pass birds between catchers.
- Back catching is limited to 2 birds – common practice when coops are used. This limits wing damage and follow most of animal welfare regulations.

Vaccination

Vaccination is the administration of a chemical/ agent called a vaccine that will give the bird the ability to mobilize antibodies against a particular disease should it be exposed to it. It serves to give the bird's defence mechanism a "memory" system against that disease.

Vaccinations are given to broiler chickens against such common diseases as Newcastle, Infectious Bursal disease and these depend on many factors such as geographical areas, climate of the area, and peculiar disease challenges. It is therefore important to check with your veterinary doctors before adopting a system.

It should also be mentioned that some hatcheries do some of the vaccinations before selling the day old chicks, therefore it is important for you to check with your hatchery which vaccinations you need to do.

Usually one good vaccination program has at least one New castle vaccine at about 11 days and another one at 18 days in high challenge regions, in low challenge regions you can use just one vaccine at 15 days.

Zimbabwe is a high challenge region, given the frequency of outbreaks over the last few years.

The Gumboro vaccine against Infectious Bursal Disease (IBD) is another important one, but most hatcheries in Zimbabwe are now vaccinating against this disease at the hatchery, directly into the egg so this might not be required.

The most important thing here is PLEASE CHECK WITH YOUR CHICK SUPPLIER ON WHAT VACCINATIONS YOU NEED TO DO!

“Zimbabwe is a high risk region.”

The Vaccination Process: Guidelines

- Flocks should ingest all vaccine within 1-2 hours of administration, the Gumboro vaccination 1.5 hours and the Infectious Bronchitis vaccination about 1 hour, if the consumption of those vaccines are less time than recommended, some birds didn't drink the vaccine and if it is more time than recommended the vaccine will be dead.
- Ensure that the vaccine is stored at the manufacturer's recommended temperature.
- Vaccinate early in the morning to reduce stress, especially in times of warm weather.
- Water pH should be 5.5-7.5. High pH water can taste bitter to the birds and so reduce water and vaccine intake.
- Ensure rapid uptake of vaccine by depriving the birds of water a maximum of 1 hour before administration of vaccine begins.
- Prepare vaccine and stabilizer mixture in clean containers free of any chemicals, disinfectants, cleaners or organic materials.
- Use of a vaccine manufacturer's approved dye or colour stabilizer may help in determining when water lines are primed and how many birds have consumed vaccine, you must achieve 95% of efficiency.
- Turn off chlorinator 72 hours before administering the vaccine.
- Clean water filters 72 hours before vaccination commences to remove any

detergent residues. Clean filters using plain water.

- Turn ultra-violet light off, if used, as this may inactivate the vaccine.

Calculate the needed amount of water by using 30% of the previous day's total consumed water. If no water meter is available, use the following calculation:

Number of birds in thousands multiplied by their age in days multiplied by two. This equals the amount of water in litres needed to vaccinate about 2-hour period.

- Mix 2.5 g (2 teaspoons) of powdered skimmed milk per litre (1.05 quarts) of water. Alternatively, commercial stabilizers can be used per manufacturer's recommendations.
- Prepare skimmed milk solution 20 min. before administering the vaccine to ensure the skimmed milk powder has neutralized any chlorine present in the water.
- Record vaccine product type, serial number and expiration date on pen charts or some other permanent flock record.
- Open each vial of vaccine while submerged under the water-stabilizer mixture.
- Rinse each vial of vaccine completely.
- Raise drinker lines.
- Pour the prepared vaccine, stabilizer and colour solution into the header tank or storage tank.
- Prime the lines until the stabilizer or dyed water comes through the far ends of the lines.
- Lower drinker lines and allow birds to consume vaccine, making sure to turn water back on into the header tank just before the tank runs dry.
- Walk through the birds gently to encourage drinking and uniformity of

application.

- Note the vaccine consumption time in the records and any adjustments needed for next application of similar age birds and equipment to reach the ideal time of 1-2 hours.

Open-Bell Drinker System

- Two people are needed to carry out the vaccination procedure. One person is needed to mix the vaccine solution and the other person is needed to administer the vaccine.
- Clean each drinker, emptying it of water and litter. Do not use a disinfectant to clean the drinkers.
- Carefully fill each drinker in a predetermined fashion, making sure not to over fill the drinker or spill the mixed vaccine solution.

Monitoring water vaccination intake:

- Start to monitor after birds receive vaccine.
- Select 100 birds per house and check how many have dyed tongues, beak or crops.
- Divide the house into four parts and check for staining from 25 birds per house division.
- Calculate number of birds on a percent age basis with staining.
- Vaccination is considered successful when 95% of birds show staining.

Percentage of Birds with Blue Staining	Hour(s) After Administration of Vaccine
75%	1
95%	2

If anything happens out of the ordinary during or after vaccination, closely monitor birds and contact your local veterinarian.



Record Keeping

Accurate record keeping is essential to enable the manager/ owner to monitor the day-to-day performance of the flock. This in turn will assist the owner to get the best results and hence achieve profitability.

In other words, the quality of record-keeping sometimes indicates how well a poultry unit is run, because records assist smart managing.

It is prudent to say “you cannot record what you do not measure, and you cannot manage what you do not record”

Accurate records also enable forecasting, programming and cash flow projections to be made. They also serve to provide an early warning of potential problems.

Records are broadly in two classes: daily flock records and summary flock records.

Daily Flock Records

Daily records should be on display for each house, and some of the daily records recommended include the following:

- Mortality and culls by house and sex
- Daily feed consumption
- Daily water consumption
- Water to feed ratio
- Water treatments
- Minimum and maximum daily temperatures

- Minimum and maximum daily humidity
- Number of birds taken for processing
- Management changes
- Type of culls

Flock Records

Flock summary records are normally a summary at the end of the flock and include the following:

- Feed deliveries (Supplier/amount/type/date of consumption)
- Feed sample from each delivery
- Live weight (daily/weekly/daily gain)
- Medication (type/batch/amount/date of administration/date of withdrawal)
- Vaccination (type/batch/amount/date of administration)
- Lighting program
- Litter (type/date of delivery/amount delivered/visual inspection)
- Chick delivery (number/date/time/count in boxes/truck temperature and humidity)
- Stocking density
- Chick Source (hatchery/breed/donor breeder code/chick weight)
- Weights of each load at processing plant
- Downgrades
- Date and time feed withdrawn
- Date and time catching started and finished
- Cleanout (total bacterial counts/visual inspection)
- Post-mortem results
- Repairs and maintenance
- Controlling sensors and thermostats (date calibrated)
- Technical visits

Annual Records

- Water (tested at source and at the drinker)

10 Point Summary

1. The major breeds of broiler in Zimbabwe are the Cobb, Hubbard and Ross breeds.
2. Correctly sited, designed and constructed housing is key to producing broilers hassle-free.
3. The type of equipment, particularly the heaters, in the poultry house is vital in determining the efficiency of brooding and growth of your broilers.
4. Weight management is key to producing broilers efficiently, hence should be monitored constantly.
5. Profeeds has got a three-phase broiler feeding programme which starts off with Pro Broiler Starter Crumbles, followed by Pro Broiler Grower Crumbles, Pro Broiler Pellets and finishes off with Pro Broiler Finisher Pellets. All these feeds have got concentrate versions for those farmers with good quality maize.
6. Bio-security is vital in managing broilers because disease-causing organisms can easily spread within the flock.
7. It is important to understand the vaccinations required for your particular flock from your veterinarian or hatchery partner.
8. Records are important for a broiler enterprise, and these need to be compared with the breed standards for the bird you keep. This is particularly so for weights which need to be monitored and taken weekly.
9. It is important to organize a market for your broilers well before they reach harvestable weight in order to prevent losses.
10. Broiler business is all about numbers, so it is important that you understand your profit and loss account for each and every flock and make amends wherever necessary.

A close-up photograph of a woven basket filled with numerous grey eggs. The basket's rim is visible at the bottom, showing a light-colored woven pattern. An orange horizontal band is superimposed over the middle of the image, containing the text "Part Two" in white. The background is a dark, textured surface, possibly the interior of the basket or a table.

Part Two



LAYER MANAGEMENT

Layer Management

Poultry Layer production is raising chickens for the purpose of producing table eggs. Table eggs go direct to the consumer therefore it is important to ensure that the right eggs are produced by your flock. Consumers have got particular preferences for eggs in terms of primarily colour and size, therefore it is important that attention is paid to the production process.

The Primary Input: The Birds

There are many breeds of chickens bred and raised as layer birds but in Zimbabwe the main breeds are as follows:

- H & N Breed
- Hy-Line Brown
- Lohmann Brown
- Novogen Brown.

It is very important to understand these breeds and hence to make a choice of which one you want to work with. Each of these breeds has got traits that a farmer would be expected to understand in order to help them to make such a decision. However, it must be noted that all of these breeds of layer bird have been bred successfully in Zimbabwe and elsewhere. The key is for one to manage whatever breed correctly so as to get the result.

Models of Table Egg Production

There are two main models of production adopted by table egg producers.

Model 1

The farmer purchases Day Old Layer Chicks from a breeder and then raises these from Day One, through Point-Of-Lay, and through egg laying phase. This means that the farmer must properly

“Consumers have got particular preferences for eggs in terms of primarily colour and size.”

look after the young chicks from Day One to point-of-lay (about 18 weeks) when they start to lay, which they would do for about a year.

The farmer, in this case, controls all the developmental stages of the bird and has got the power to influence the quality of layer bird he ends up with.

Model 2

The Farmer purchases point-of lay birds from a breeder or another grower and they start laying a few days after landing on the farm.

In this case the farmer just gets what he gets and has less power to influence the quality of the bird he is stuck with for the laying phase. This is because most of the conditioning of the bird would have been done by the previous farmer.

Model One: Raising Layer Pullets from Day Old Chicks

Having made a decision to produce table eggs starting with the Day old chicks, one needs to prepare well for this project.

The young chicks will go through a brooding phase, just like for broilers, but in their case the brooding period is 6 weeks instead of 3 weeks. The birds then go through a growing phase, up to 18 weeks at which point they are now called Point-of-lay pullets. They can then start laying eggs.

Layer Chick Brooding

The goal of brooding layer chicks is to produce pullets which, at 18 weeks, are properly matured to start laying eggs. This maturity is defined as:

- A body weight range of 1400 – 1550 grams
- A minimum flock uniformity of at least 85%
- Healthy and disease-free and ability to fight off diseases (immunity).

Preparation for Brooding

The preparation is almost the same as for broiler chicks in terms of site selection, housing, design, equipment and so forth. You need to place your chicks order well in advance and buy the feed, stress packs and associated chemicals required in time. Thoroughly clean the house, starting off with dry cleaning, washing with water and then with detergents.

Then disinfect the house floors and walls with appropriate chemicals.

Thoroughly clean all the equipment (feeders, drinkers) in a similar way. If the house is automated, then, then empty, clean and disinfect water lines and feeder lines and feed and water tanks.

Place the appropriate bedding and level it well.

Place the equipment (feeders, drinkers, heaters, thermometers, lights, heat supply, etc) in the house and line them up properly, then rest the house for 10-12 days.

Preparation for Placing

Days before the chicks arrive, you need to check that all the equipment is in working order.

- Check the setting of the time clocks and dimmers of the lights.

- Check the feeders and drinkers to ensure they are ready for use. For automatic ones, check that they are actually discharging as per expectations, then fill them with feed and water respectively.
- The water should have stress vitamins and minerals diluted in for the first few days of the chick rearing, to calm the birds down.
- 48 hours before the chicks arrive, pre-heat the brooding house to ensure the house temperature necessary for the chicks is achieved before they are placed.
- Establish a house temperature of 33-36 degrees Celsius and 60% humidity 24 hours before placement.
- Ensure bright lights of 30-50 lux in the house for the first 7 days to help chicks quickly find feed and water and adapt to the new environment.
- Lay out cage paper and put on feed in addition to the feed trays, to encourage early feed intake.

Transportation of Chicks to the Farm

Having made you order within time, and having prepared the house, the next important thing is to plan the transport of the chicks to the farm.

If the breeder offers transport, then the vehicle is likely to be the appropriate one for the purpose.

However, if transport is not offered, the onus is on you to select the best transport vehicle. Ideally, it must be a truck designed for the transportation of the chicks from hatchery to farm.

The truck should be environmentally controlled and be able to maintain a temperature range of 30-32 degrees Celsius. The relative humidity, as measured inside each chick box, must be at 70%. Ensure there is space between stacks of chick boxes to allow for air-flow.

If you do not have the designed truck for the job, then preferably use a truck with a closed space where one would stack the chick boxes and allow for that ventilation enough to allow air flow, but preventing draught.

The back of an open truck is not ideal. Collect the chicks as early in the morning as possible and drive straight to the farm avoiding heavy traffic and congested routes.

Chick Placement

As soon as you arrive at the farm, open the boxes gently and allow the chicks to carefully move out and into the prepared, pre-heated brooding area.

During these first few days, constantly watch the young chicks as they go about their lives.

Adjust brooding temperature according to relative humidity at 33-36 degrees Celsius and 70% humidity.

After the first week, reduce the temperature weekly by 2-3 Degrees Celsius until you reach 21 Degrees Celsius by Day 42, the end of the brooding phase.

The Table below indicates the temperature and light intensity targets for the brooding phase:

Age (Days)	Air Temp	Light Intensity	Light Hours
0-3	33-36	30-50	22
4-7	30-32	30-50	22
8-14	28-30	25	19
15-21	26-28	25	17.5
22-28	23-26	25	16
29-35	21-23	10-15	14.5
36-42	21	10-15	13

Early Checks

Check that the birds are eating feed and drinking water. Do crop checks on randomly selected chicks.

- Hold a chick in your hand in-between the thumb and first finger so that the chick crop stands out.
- One that extends out onto your second finger shows it is taking in some feed or water or both.
- Carefully feel the crop with your fingers. One that feels hard means the chick is eating food and not drinking enough water. One that feels very liquid and pliable means the chick is drinking more water than it is eating feed. One that feels a mixture of both means the chick is eating feed and water in a balanced way, which is ideal.

After 6 hours of placement, 75 % of the chicks must be eating and drinking, and after 24 hours, the percentage should be 100%.

Check the behaviour of the chicks and react appropriately.

- If the chicks are listless and lie prostrate, it means the heat is too much.
- If the chicks are loud and chirping all the time, they are hungry or cold.
- If they are grouping together, then they are cold.
- If they have pasted vents, then they are in excessive heat or cold.

Water

The chicks must have access to plenty of clean fresh and cool water and intake must not be restricted in any way.

Therefore, if you are using drinking fonts, ensure there is enough of these and they are constantly replenished.

If you are using automatic watering systems, then make sure the flow is not

disturbed in any way.

If for some reason the birds are not taking in enough water, then their utilization of feed and growth will be impaired.

As a general rule, birds consume 1.5-2 times more water than feed, and this ratio increases in high temperatures.

The table below indicates the approximate daily water consumption level of various ages of 100 chicks at a normal environmental temperature of 21-27 Degrees Celsius.

Age (Weeks)	Amount of Water (Litres)
1-3	1-3
4-6	3-6
7-9	6-8
10-12	8-12
13-15	10-14
16-18	11-18
19-22	13-21
23+	15-23

Water Quality

Water is a reflection of the mineral and other constituents that are in it. Not all these minerals and other constituents are good to your chicks, so it is important to check the quality of your water at least once a year.

However, the source of your water will determine the regularity of water testing required.

As a rule, surface water requires more frequent testing since it is more affected by season and rainfall patterns.

Water from closed deep wells or aquifers will be more consistent in quality but will have generally higher dissolved minerals.

The presence of coliform bacteria indicates that the water is contaminated with

“The chicks must have access to plenty of clean, fresh and cool water.”

animal or human waste.

If the water contains high levels of dissolved minerals such as calcium, sodium, magnesium or phosphorus, their levels must be considered when formulating feed.

The pH of ideal water is 5-7 and this promotes good sanitation, increases feed consumption and gastro-intestinal health. Less than optimum water quality will affect gut health, which will result in under-utilization of feed nutrients.

Sampling Water

Let water run for 2 minutes prior to collecting a sample. Then keep the sample at under 10 degrees Celsius for not more than 24 hours before submitting for analysis.

Feed

The feed must be of high quality in order to get the chicks off to a good start. Therefore, it must be homogeneous, right size particles and formulated with quality raw materials.

The Profeeds Chick Starter Mash is made specifically with this end purpose in mind, and should be fed to the chicks from Day One to the end of the 8th week.

The expected consumption should be 1.75-2 kgs of feed per bird for the whole period. The feed must be presented in clean troughs and some laid out on cardboard paper on the bedding particu-

larly for the first few days. The feeder space must be adequate in order to give all birds equal chances of accessing feed. The amount of feed used must be measured.

Light Management and Lighting Programmes

Light is important for many reasons:

- The growing chicks need to locate feed and water.
- Light stimulates sexual development especially in later stages.

Therefore, it is important to establish an appropriate lighting programme for your layer flock from day one.

However, it is difficult to advise a universally optimum and perfect lighting programme applicable in most situations. However, it is important to note that you need to establish your own lighting programme that takes into account the following:

- Your geographical location
- The characteristics of your rearing unit (open house, light controlled, etc)
- Season of the year
- Temperatures
- Date of the hatch
- Growth of the flock
- Past records of performance obtained in this rearing unit.

Light During Brooding

In order to encourage frame development and growth, a slow step down lighting programme is advised for all types of housing. The Hy-Line breeders recommend that the chicks must have 22 hours of light and 2 hours of darkness for the first 7 days to help them find feed and

water. The light must be bright (about 30-50 lux) to enable this.

After the first week, you can then start a slow step-down of the lighting programme.

The H & N breeders recommend 24 hours of light during the first 2 days at 10 lux intensity. From Day 3 to 15, reduce the light to 16 hours per day at the same lux intensity. From 15 days to 18 weeks, they then recommend a further reduction to 10 hours at 5-7.5 lux intensity. From 18 weeks, they recommend a stepping up to 13 hours and then an increase by 0.5 hours every week until you maintain at least 16 hours during the laying period.

Intermittent Lighting Programme

This is an optional lighting programme which can be adopted for the first 7 days. This is because when the chicks arrive, they would have been intensively handled in the hatchery and then endure a long transport journey.

In practice, it is often observed that after arrival in the house, some chicks continue to sleep whilst others look for water and feed. Splitting the day into phases of resting and activity, using a specially-designed intermittent lighting programme helps the situation by synchronizing the chicks' activities and feeding.

The day is effectively split into regular 2 hour intervals of darkness followed by 4 hour intervals of light.

After a week of this programme, you can then revert to the normal regular step-down lighting programme.

This intermittent light programme establishes a more natural behaviour of rest and activity in the flock.

The antibody responses of the birds to vaccinations may be improved and the liveability to 7 days may also be improved.

Air Quality & Ventilation

Supply of sufficient volumes of fresh air into the house is necessary.

Ventilation is necessary to:

- Provide the birds with adequate supply of oxygen for the birds.
- Remove moisture from the house
- Remove carbon dioxide produced by the birds from the house
- Remove dust particles
- Dilute aerosolized pathogenic organisms

Management Events for the Growing Pullets

Once the chicks are past the first week, the day-to-day tasks become a matter of routine.

However, there are certain tasks that include the following:

Beak Trimming

This process is the process of trimming the beak of the growing chick to reduce its size and sharpness. This is important especially in open type houses. If this is not done, then the flock might experience a pecking problem which can easily become

ome cannibalism.

Feed wastage will also be a problem with un-trimmed birds.

Beak trimming must be done between 7-10 days of age. The beak trimming equipment is varied but they all work to achieve the same objective. Therefore, it is important for one to understand clearly how the particular model they use work.

Before beak trimming, the equipment must be thoroughly cleaned and disinfected.

The trimming machine must be adjusted properly and ensure they are working well.

The blades must be sharp because dull blades will crush and tear the beak rather than cutting cleanly through it.

Beak rimming in hot weather may result in excessive bleeding.

It is thus recommended that you add electrolyte and vitamins containing Vitamin K to the diet or drinking water 2 days before and for 2 days after beak trimming to help prevent excessive bleeding.

This process must be done properly to reduce stress to the birds so only properly trained personnel must do it.

If necessary, re-trim the beaks at 6 weeks or 12-14 weeks of age.

Weight Management: Birds

The target is to end up with birds of 1400g-1550g with a uniformity of at least 85% at week 18.

Therefore, it is important to monitor the weight development of the flock.

You need to be weighing the birds weekly and comparing the achieved weights with the standard weights for the breed you are raising.

Randomly select 1% or 100 birds (whichever is bigger) of the flock in the house and carefully weigh them, total then average out the weight. Basically, chick body weight must double between arrival

“Once the chicks are past the first week, the day-to-day tasks become a matter of routine.”

and 7 days of age.

Also, it is vital that you achieve target body weights for the birds at Week 6, Week 12, Week 18, Week 24 and Week 30 in order to ensure optimum development of the bird's body.

Much as the birds need not be under-weight, they must not be overweight as well.

Over-weight or fat birds will not lay well.

Flock Uniformity

At each weighing, the flock uniformity % must be calculated. Here is how:

- Calculate the average body weight
- Calculate 10% of the average weight of the sample
- Add and subtract this figure from the average weight to determine the upper and lower values of the uniformity range.
- Count the number of birds that fall within this range.
- Divide this number by the total weighed and multiply by 100, which gives you the uniformity percent.

Example of calculation:

- 95 pullets weighed a total of 86260 grams.
- $86260g \div 95 = 908$ grams per bird. And $908 \times 10\% = 91$
- $908 + 91 = 999$ (Upper value) and $908 - 91 = 817$ (Lower value)
- 81 Birds weighed within the 817-999 range.
- $81 \div 95 \times 100 = 85\%$, which is the flock uniformity value

Body Weight Gains

If your flock is not achieving minimum weight gains as indicated by your breed standard, you need to immediately understand the reasons. There are steps that you need to immediately take as follows:

- Check the basics - the feeder, drinker and floor space adequacy
- Check the temperature, lighting and ventilation in the house
- Check for any sick birds or any other abnormal behaviour
- If the problem continues, then you need to bring in your feed expert and veterinary expert to check out feed and health respectively

Weight Management: Feed

It is also important to weigh and account for the feed used at all times. This is because feed accounts for at least 60-70% of the costs of raising chickens, so it must be used efficiently.

The feed will be responsible for most of the weight gain by the birds.

Therefore, you need to check its actual performance against the expected based on information from the feed supplier.

Health Management

Just like broilers, layers health management is crucial. This is also managed through bio-security and farm sanitization, and vaccination.

Bio-security management and farm sanitization is managed in a similar way to broilers.

Layer Vaccinations

Layer birds are going to be in one house for a much longer period of time, therefore it is important that vaccination is done correctly. As mentioned, vaccination is the introduction of unique products called vaccines into the system of a live animal so that it develops the ability to fight off a particular disease when challenged in the future. Just like broilers, each breed of bird will have its own speci-

fic vaccination programme recommended by the breeder. Decisions on which diseases to vaccinate against are also made after consideration of factors such as previous exposure, geographic location, vaccination and exposure of neighbouring flocks, country regulations and endemic disease causing factors.

Mainly, the diseases that are vaccinated against include Marek's Disease, Newcastle, Infectious coryza, Infectious bursal disease, Egg Drop syndrome, Avian pneumovirus, Mycoplasma gallisepticum, infectious laryngo-tracheitis, Infectious bronchitis, Fowl pox and Avian encephalomyelitis.

You must maintain accurate records of all vaccinations and treatments done on your flock as they might be required to solve a future problem.

Vaccination Guidelines

- Vaccinate only healthy birds. Unhealthy, sick birds should not be vaccinated until they are well.
- Vaccines are specific products and should never be diluted or spread wider than is recommended.
- If your water is from a treated source, you need to add powdered skim milk to the water at the rate of 2.4kg per 1000 litres or 2.4g / 1000ml before adding the vaccine.
This is necessary to neutralise chlorine, heavy metals, acidity, alkalinity in the water which would otherwise kill the vaccine/ reduce its potency.
For treated water
- Follow the manufacturer's recommendations regarding administration of the vaccine. Some vaccines are sprayed, some are given in water, etc.
- Do not administer any medications for three days preceding and at least one week after vaccination so as not to interfere with the immune response.
- You need to deprive the birds of water

for 1-2 hours prior to water vaccination to ensure all gets exposure to the vaccine.

- Vaccinate preferably in the morning.
- Water lines should be drained prior to water vaccination to ensure uniform distribution of vaccine to all the birds. Dyes are commonly added to the vaccine solution to trace and mark birds that would have taken it.

Deworming

Because layer birds are kept in a house for a reasonably long period of time, there are chances that they get infected by worms, especially those in deep litter.

Worms get and colonize the gut, damage the linings and start interfering with feed digestion and absorption and hence utilization.

Each geographical region and season has got a unique recommended de-worming programme tailor made for each particular flock.

You need to consult your breeder for proper advice on which de-worming chemicals to use and the particular programme of deworming to adopt.

Serological Monitoring

Serological monitoring is the monitoring of a flock's health through submitting regular blood samples to a vet laboratory. Serological data obtained after the bulk of vaccinations have been done at week 17-18 is a good method of evaluating the immune status of a flock of pullets prior to production.

Such data also helps to as an immune status baseline for determining whether a field infection has occurred when production drops are observed.

It is recommended that a flock owner submits 25 good serum samples to a laboratory 1-2 weeks prior to the pullets being placed in the lay house to establish

freedom from certain diseases such as *Mycoplasma gallisepticum* and *Mycoplasma synoviae* prior to onset of production.

Transfer to Laying Houses/Cages

In some cases, rearing/growing houses are separate from laying houses, which means that at some point the birds will need to be transferred from the existing rearing house to laying houses in preparation for laying.

This is also necessary where birds are reared in deep litter houses but need to be moved to laying cages.

This is usually done at Week 15 -16.

The objective is to ensure that by the time the birds are mature, at 1400-1550grams live-weight, they are in their right laying environment.

This process needs to be well-prepared for, because birds can easily be stressed. Most important of all, ensure the body weights for that period have been achieved before moving them to laying houses / cages.

Also, check the maturity of the birds by examining their combs/wattles. These need to have developed well and now almost bright red.

Preparation for Movement to Lay

Prepare the new house and ensure it is cleaned, disinfected and all the equipment, including bedding, is fully installed and in working order.

If deep litter, ensure that adequate proper laying nests are installed as well.

Install nests such that 1 nest hole caters for 6 hens and ensure the space allows for a stocking density of roughly 6 birds per square metre. If cages, ensure each layer is allowed at least 400 square centimetres of cage space at 18 weeks of age and thr-

oughout the laying period. The feeder space in the feed trough must be at least 10 centimetres per bird.

Remove feed from the birds for a few hours but continue to provide water.

Use clean, disinfected trucks, crates.

Then move the birds as quietly but as quickly as possible.

Preferably do this very early in the morning.

The stage of transferring grower pullets into laying cages or laying house is also the same that must be followed by a farmer who adopts Model 2 of purchasing point of lay pullets from somewhere.

Check that the birds are now sexually mature by examining their combs/wattles and weight, which should be a minimum of 1400 grams.

Do not move any underweight or under-developed growers to laying houses. Separate these out until they are fully developed and ready to lay.

Transition form Grow to Peak Production

This is the period in which a layer pullet develops from a grower to starting to lay. During this transition period, the nutrient requirements increase dramatically.

This is due to the following:

- The rapidly increasing egg production
- The increasing egg size
- The increasing body weight of the birds.

It is therefore important to ensure the feed intake is optimal. Take note that feed intake might actually be compromised if the birds are underweight (less than the targeted 1.4-1.55kg). This problem will also happen if the birds' uniformity is poor, or if the environmental temperatures are too high.

Therefore, it is critical to closely monitor feed intakes during the transition phase so that adjustments can be done when

appropriate.

The Profeeds Layer feeds are designed with this in mind, to ensure that your birds nutrient requirements are met at this crucial time.

“During this transition period, the nutrient requirement increase dramatically.”

Management of Birds During Lay

Temperature Control

Temperature changes between 21 and 27 degrees Celsius have a minimal effect on egg production, egg size and shell quality. Feed conversion improves with higher house temperatures and maximum efficiency is attained in the 21-27 degrees Celsius range.

As temperature rises, feed consumption decreases and it is necessary to provide a properly formulated diet to achieve adequate daily nutrient intakes.

If feed intake decreases and the diet is not adjusted, first egg weight and body weight will decrease, thereafter the egg number.

Feed During Lay

The quality of feed during this period must be good, otherwise the birds are sensitive to any poor quality feed by dropping wither body weight, egg weight or egg number.

Feed restriction is not recommended for

whatever reason during lay, particularly if it is properly formulated and mixed.

Profeeds Layer Feeds Management

Pro Chick Starter (18.5% Protein)

This feed is to be fed to the chicks from Day Old until they reach 8 weeks of age. This feed is designed to enable the chick to develop early enough and have the anatomical and physiological make-up necessary in later life.

To enable budgeting, you plan on 1.7kg to 2kg per bird for the whole period.

For those with cost-effective good quality maize, Profeeds have a concentrate version called Chick Starter Concentrate which is mixed with maize in the ratio 2 parts concentrate to 3 parts maize.

Pro Layer Developer Mash (15.5% Protein)

This feed is to be fed to the chicks from the start of the 9th week until they reach 18 weeks of age or point of laying. This feed is designed to enable bird to mature to prepare it for a long laying life.

To enable budgeting, you plan on 4.3kg to 4.5kg per bird for the whole period.

For those with cost-effective good quality maize, Profeeds have a concentrate version called Layer Developer Concentrate which is mixed with maize in the ratio 2 parts concentrate to 3 parts maize. Remember that when changing over from Chick Starter to Layer Developer, you need to do it gradually, mixing decreasing proportions of the Starter with increasing proportions of Layer Developer for up to a week.

In all cases, you need to be watching the weight development of these birds to ensure the weights are on target.

Layer in Production Mash (16% Protein)

This is the egg production feed and is designed to support proper egg laying whilst at the same time maintaining the body of the hen in the required condition. This feed is introduced at the expected point of lay stage or as soon as the first eggs are dropped.

The feed is gradually introduced into the flock by mixing it with the Layer Developer over up to 2 weeks.

For budgeting purposes, expect a daily intake of 110-125 grams per bird per day depending on many factors like weather, stage of laying, body weight, and size.

For those with cost-effective good quality maize, there is a concentrate version of this feed called Layer in Production Concentrate which is mixed with maize in the ratio 2 parts concentrate to 3 parts maize.

Body Weight Monitoring During Lay

From 18 weeks of age to about 27 weeks of age, the body weights will not give meaningful data because of the variable degree of maturity amongst the birds. However, after 27 weeks of age, body weights must be taken every two weeks and compared to breed targets. The objective is to target a continued increase in egg weight and body weight.

If body weight does not increase slightly, production and egg weight might suffer.

After a flock reaches 36 weeks of age, the body weight average should be relatively stable with only a very gradual increase.

A slight gain in body weight indicates that sufficient nutrients are being consumed for maximum performance. If the birds are gaining excessively, it indicates that they are being over-fed on some nutrients. This then calls for an adjustment of feed nutri-

ents or intake.

Record Keeping

Good record keeping is also very important for layer production.

Again, the records are broadly in two classes: daily flock records and summary flock records.

Daily Flock Records

Daily records should be on display for each house, and some of the daily records recommended include the following:

- Mortality and culls by house
- Daily feed consumption
- Daily water consumption
- Daily egg production
- Water to feed ratio
- Water treatments
- Minimum and maximum daily temperatures
- Minimum and maximum daily humidity
- Management changes
- Type of culls

Flock Records

Flock summary records are normally a summary at the end of the flock and include the following:

- Feed deliveries (Supplier/amount/type/date of consumption)
- Feed sample from each delivery
- Egg production performance
- Egg weight
- Feed conversion ratios
- Live weight (daily/weekly/daily gain)
- Medication (type/batch/amount/date of administration/date of withdrawal)
- Vaccination (type/batch/amount/date of administration)
- Lighting program
- Litter (type/date of delivery/amount delivered/visual inspection)

- Chick delivery (number/date/time/ count in boxes/truck temperature and humidity)
- Stocking density
- Chick Source (hatchery/breed/donor breeder code/chick weight)
- Downgrades
- Cleanout (total bacterial counts/visual inspection)
- De-worming records – dates and chemicals.
- Post-mortem results
- Repairs and maintenance
- Controlling sensors and thermostats (date calibrated)
- Technical visits

bird body weight, egg production (hen day egg production), egg weight and mortality changes as the bird grows.

Annual Records

- Water (tested at source and at the drinker)

Use of Records

The records obtained from your daily recording are of no use if they are not used to better the management.

The first step to this is to compare these figures with the breed averages as advised by the breeders of the particular bird.

Each of the breeds of bird has got breed parameters which every producer must strive to match and surpass.

For example, there are recommended weights at various stages of growth of the bird, expected production levels in terms of hen day production and hen-housed performance and egg weight.

It is always better to present these results in the form of graphs for ease of study by your management team.

Please check the following graphs and tables displaying:

- The rearing graph for the average layer chick from day old up to point of lay for the breeds H & N, Hy-Line, Novogen Brown and Lohmann Brown.
- The standard performance graph for layer birds, indicating roughly how the

10 Point Summary

1. One can get into egg production either by starting off with day old layer chicks, and raising them through, or by buying-in point of lay pullets which start laying immediately after.
2. There are four main breeds of layer birds in Zimbabwe: The Hy-Line, the Novogen Brown, the Lohmann Brown and the H & N.
3. Each of these birds has been raised for egg production in Zimbabwe and they just need to be managed well.
4. Weight management is key to producing good egg-laying birds. Weight should be monitored during brooding, grow-out and laying.
5. Light management is also key in producing mature, good egg-laying birds and one must understand this management concept.
6. Profeeds has got a three-phase layer feeding programme which starts off with Pro Chick Starter Mash, Pro Layer Developer Mash and Pro Layer in Production Mash. All these feeds have got concentrate versions for those farmers with good quality maize.
7. Bio-security is vital in managing layers because they are maintained for a longer period in one place.
8. It is important to understand the vaccination required for your particular flock from your veterinarian or hatchery partner.
9. It is important to understand the standard weight pattern and the standard production graphs of layer birds because this is important as a management tool.
10. Records are important for an egg laying enterprise, and these need to be compared with the breed standards for the bird you keep.

Using this guide will you improve your poultry project. Feeds on the market are not all the same and vary in what results they give, and whether you are getting value for money is a point of conjecture.

At Profeeds we, along with our technicians and field staff are producing poultry feeds that are unsurpassed in quality and up with international trends. Working with our advisors and planning your projects, will get you the excellent returns you want from your poultry project.

Should there be further queries dont hesitate to contact and make use of our proffessional technicians.



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