
Poultry

Farm

Guide



Purpose of this document

This document is a guide book for small poultry farmers in Sierra Leone who want to increase farm productivity and profitability. The book offers detailed technical recommendations, including farm set-up, bird selection, bird rearing, feed management, and record keeping. It was developed by multiple poultry experts and reflects learning from Sierra Leone.

Acknowledgements

This document is a collaboration between Cordaid and Sierra Leone Opportunities for Business Action (SOBA). To learn more about Cordaid, visit <https://www.cordaid.org/en/publications/cordaid-sierra-leone/>. To learn more about SOBA, visit sobasl.org

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Bird Lifecycle

The following establishes a shared definition of the bird lifecycle. It reflects small farms in Sierra Leone.



- Day Old Chicks: Time 1 to 7 days**
A chick classified as a 'day-old chick' is up to 72 hours old. Chicks' body weight should double between arrival and 7 days of age. This is the time hatcheries sell chicks to farmers for raising.
- Pullet (Rearing Period): 1 week to 18 weeks**
A pullet is a young layer bird before she reaches maturity. At the age of around 16 weeks, the pullets are generally well feathered and have a greater ability to thermo-regulate, at which point they are ready for laying. During the rearing period, the body of the pullets is built for later egg production. It is extremely important to provide the best quality feed to the pullets to enable them to build the skeleton and organs to achieve the maximum performance later.
- Point of Lay (Production Period): 18 weeks to 72 weeks**
Birds reach laying period (when a bird starts to lay eggs) at about 19 weeks of age. At this point control measures should be thorough to avoid molting and poor egg production.
- Spent Birds: At about 60-70 weeks**
For spent birds, egg production will slow down and this is called 'end of lay'. The birds are referred to as 'spent' birds. At approximately 72 weeks old the birds are removed and sold for slaughter.

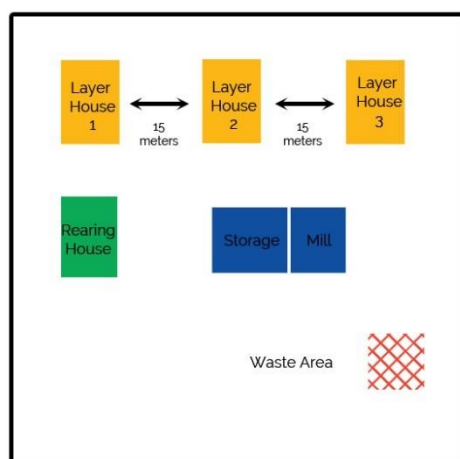
Poultry Farm & House Set-Up

Poultry Farm and House Placement

To ensure best practices in biosecurity, each layer house within the farm should be separate from each other at least 15 meters away or depending on space available. Each batch of bird brought in should be handled as a single production phase; (see illustration fig. 1.1 of farm layout and table 1 for space requirements).

- On a rearing house: one age only
- On a laying house: one age only and one source of supply. Do not mix birds from a different batch phase.
- No other poultry should be on the rearing or laying house.
- Three separate laying units ideally would be supplied by one rearing unit.
- Buildings should be at least 15 meters apart from each other or depending on space available to farmer.

Fig. 1 Local farm layout illustration



Spacing Guide

This is the most important basic principle in housing, as the space available determines the number and type of poultry that can be kept. Layer bird groups are most comfortable at a stock density of three to four birds per square meter. To allow for more economical production, stocking density up to 7 hens per square meter is acceptable. If more space is allowed, a greater variety of behavior can be expressed. Less space creates stressed social behavior, allowing disease vulnerability and cannibalism and leaving weaker birds deprived of feed or perch space. Individual birds need more room for normal behavior and adequate exercise.

Ventilation is an important factor in housing. A building with open sides is ideal, open in a direction to allow the prevailing wind to blow across the width of the building. An air mass between the side walls of a poultry house resists being moved, even across an open-sided building. The wider the building, the more difficult it is for air to move and flow throughout the house. This is not a good thing; air flow is important. Buildings over 8 m (26 ft.) wide limit air flow. It is recommended that buildings relying on natural airflow for ventilation should not exceed 8 m in width.

Table 1 - Space Requirements

Age	Floor space (m ² /bird)		Feeding space (inches)	Watering space (inches)	Height of feeders & waterers	Litter depth (inches)
	DL	CS				
0-8 weeks	0.07	0.25	2.0	0.6	1.5	2
9-16 weeks	0.12	0.55	2.5	0.8	2.5	2
17-76 weeks	0.14	0.80	3.0	1.0	5.0	2

DL = deep litter; CS = cage system

House Construction Guide

House design is very important in poultry farm set-up. Its construction should allow for easy and thorough cleaning and disinfection always.

- Take the direction of the Sun into consideration before positioning the farm house or farm layout. Construct chicken house in such a way that the end walls face East-West direction and the side walls face North-South direction, so that rain water will not enter the house.
- Allow for 4m to 6m in ceiling height for proper air circulation and a hatch in the roof for heat to escape.
- All equipment (drinkers, feeders, brooder, nest box etc.) should be removable and easy for cleaning or maintenance after each batch of birds or minimum twice every year.
- The farm layout should be fenced with cement walls, preferably wire netting should be used for window coverings or ventilation inlets. Barbwire fencing should be used to demarcate direct access to the farm houses to control unnecessary entry into bird area, rodents, control predators, wild birds and other disease vectors,
- A foldable tarpaulin or Sun/rain protection should be available around the ventilation windows to protect from sun or rain.
- The floor should be made of concrete
- A cheap locally woven Talamat can be used for indoor demarcations or as ceiling insulation against heat from direct sunlight from the roof. (See fig. 1.3.1 picture of Local Talamat as insulation). For hygienic reasons, the Talamat can only be used during one cycle as it may harbor parasites and cannot be disinfected properly.
- A space of 7 birds per M² (both in rearing and laying periods) is recommended but in warmer and humid regions like Makeni less birds per M² (down to 6) is highly recommended to avoid death from heat stress.
- Provide 3 to 4 feet overhang of the roof to avoid entry of rainwater inside the chicken house.

Fig.2 for local layer house design standard

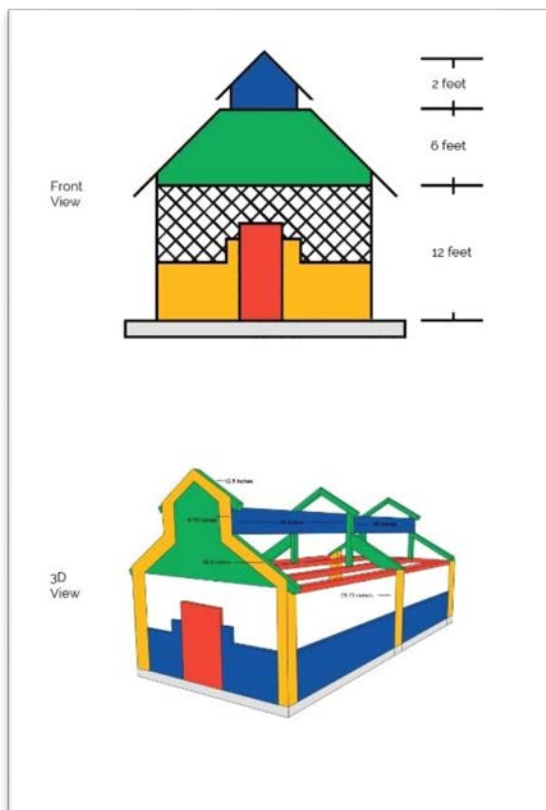


Fig. 3 picture of Local Talamat as insulation



Day Old Chick Select & Farm Preparation



Fig. 4 for identifying healthy day old chicks

Day Old Chick Selection

A list of some day old chick suppliers and distributors can be found in Annex 3.

When selecting day old chicks, look out for or observe the following during selection:

- Day old chicks should be looking healthy and not sickly when buying from hatcheries. There should be no sign of respiratory distress. *(See fig 2.1 for identifying healthy day old chicks)*
- Does the hatchery maintain a breeding flock to produce fertilized eggs for incubation or does it outsource from different farms?
- Does the hatchery have a comprehensive history of vaccination and health management programme for the breeding flock?
- Reliable hatcheries should provide performance guide on production and efficiency of their stock.
- Local poultry farmers should never compromise on quality of chicks for the sake of costs.
- Quality assessment of chicks such as clean, dry and free from dirt and contamination, should also have clear and bright eyes.
- Chicks are active and alert, can stand on their feet and capable of getting up after being placed on their backs.
- The chicks are free from any deformity such as cross beak or missing eye.
- Legs have no swelling, hock or skin lesion, should be firm and straight toes.

Identifying the Sex of Day Old Chicks

Most of the time chicks will not be grouped by sex from the hatcheries. Under normal conditions, a group of chicks generally hatch with 50-55% males and 50-45% females.

However, a farmer can tell from bird's feathers or color the sex of the bird. The feather length and color are breed specific.

Feather length:

- Wing feathers all the same length = Male
- Wing feathers two different lengths = Female

Down color:

- Males have lighter heads, sometimes with a white or yellow spot,
- Females have a darker down color often with a black or brown spot or stripes on their heads or with darker stripes on their backs.

Vent sexing

Vent sexing typically requires some expertise.

Vent sexing is another procedure for determining the sex of chicks by holding the day-old chick in one hand, spread open the vent, and viewing the copulatory organs to determine sex based on shape.

- Importantly the view reveals a shape much like a necklace with "beads" of different sizes, largest in the center "bead".
- The males have round/globe-like center "bead" while
- The females have a flat or concave center "bead"

Transportation to the Farm

The transport conditions for chicks influences the bird's health and growth rates for the rest of her life.

- Truck transporting chicks should be in conditions of 26-29°C at a suitable relative humidity.
- The dry season is most suitable for moving day old chicks in Sierra Leone
- Make sure they are spaces provided between stacks of chick boxes for air flow. (See fig.2.3 chick boxes sample image)
- Avoid transporting chicks under the rain or exposed to very cold or hot weather.



Fig.5 Sample of Chick Boxes for Transporting Chicks

Preparing Houses for Day Old Chicks

Layer production should be an “all in – all out” operation. This practice will diminish the risk of diseases and furthermore it enables the local farmer to disinfect and maintain the housing facility in hygienic condition between batches of birds.

- Chick house should be completely cleaned (manure and dust from previous flock removed completely and washed with detergent) and disinfected 3 weeks and twice before chick arrival. With chlorine, lime wash etc.
- Allow 2 weeks’ minimum of inactive period between birds transfer and start of lay. (this is the sensitive period for food and nest recognition which reduces the risk of feather pecking).
- Keep house heated at a temperature of 33-36°C (Use thermometer to measure) for 24 hours during the dry season and 48 hours during the colder months of the rainy season before putting the chicks inside.
- The present practice of heating with coal pot is not preferred. The burning of charcoal in the houses causes unhealthy fumes in the air, which may affect the chicks’ health. A system with infrared heaters either with propane gas or electricity is preferred.
- Fill feeder (local wooden feeder or imported plastic feeder) to its proper level and adjust to chick height as they can feed from. Encourage chicks to eat from day one by placing feed on a white cardboard close to the feeder.
- Provide 24 hour lighting (60 watt LED lamps) during 0-7 days, helps chicks find feed and water and also adapt to new environment.

Placement of Chicks after Arrival

- Unload boxes quickly and gently place chicks in the house prepared for them.
- A space of 25 birds per M² can be allowed in the first week; then up to 4 weeks 14 birds per M² is the recommended stocking density but in warmer and humid regions like Makeni less birds per M² (down to 10) is highly recommended to avoid death from heat stress.
- Keep layer chicks in groups separate from similar aged cockerels or broilers.
- Start chicks in a tarpaulin enclosed housing which are usually warmer and bright light should be available. Ensure the upper end is open for airflow and no shadows on drinkers.

Brooding Management

Feeding and Watering

- Adjust the feeder to touch the floor and for beak-treated chicks, feed on cardboard paper for 7 days to encourage consumption.
- Place feed on cardboard in front of permanent feeder to train chicks to move toward feeders.
- Give chicks room temperature clean water only. Automatic drinkers are highly recommended to avoid wetness and wash drinkers regularly.
- It is recommended to monitor the development of bodyweight of the pullets. The breeder manual provides tables for the ideal body weight at each age. One should both calculate the average bodyweight and the variation within the flock (uniformity).

Molting

Molting is the process of shedding and renewing feathers.

The chick goes through one complete and three partial molts during its growth to point of lay, after which the mature bird normally undergoes one complete molt once a year, usually in the rainy season (September mostly) although this depends on the time of the year at which the bird commenced laying. Generally complete molting occurs from 1-6 weeks and partial molting at 7-9 weeks, 12 -16 weeks and 20-22 weeks (it's important counting in weeks), and during this latter molt the stiff tail feathers are grown.

The laying bird natural molting usually begins sometime during March-April or at 72 weeks and should be completed by July when egg production recommences (eleven months' continuous production is expected from birds hatched in season and molt for not more than twelve weeks). The three main factors which bring about molting are:

- Physical exhaustion and fatigue
- Completion of the laying cycle. Birds only lay eggs for a certain period of time
- Reduction of day length, resulting in reduced feeding time, and consequent loss of bodyweight.

The time at which a layer ceases production and goes into her molt is a reliable guide as to whether or not she is a good egg producer.

- Poor producing layers molt early and take a long time to complete the process and resume laying i.e. she will hang in the molt and be out of production for a long period – from six to seven months. Poor producers seldom cast more than a few feathers at a time and rarely show bare patches.
- High producing layers molt late, molt for a short period (no more than 12 weeks) and come back into production very quickly. Rapid molting is not only seen in the wing feathers of good producers, but also in the loss of body feathers generally. Because of this it is common to see a late and rapid molting layer practically devoid of feathers and showing many bare patches.

All-year-round egg production can be achieved by timely batching of pullets at point-of-lay to provide sufficient eggs while the older birds are molting. When the rate of lay of the birds declines, the additional eggs from the molted birds should sustain an adequate supply.

Floor Management

- Remove cardboard at 7-14 days of age to avoid build-up of feces.
- House floor should not be wet or left bare. Floor should be covered in wood shavings, sawdust or rice husk for easy cleaning.

Vaccinations

Chicks should be given Marek vaccine at day one preferably at the hatchery to prevent against Marek diseases that is common in Sierra Leone.

- Farmers are encouraged to employ the assistance of a professional veterinary vendor to administer the vaccine from Freetown or Makeni.
- Local vaccination program for Sierra Leone should be adhered to and de-chlorinated water is what should be given to the chicks after the three days or it will ruin vaccines.
- Use vitamins and electrolytes in chicks' water (avoid sugar-based products to prevent microorganism growth). Vitamins and administering advise can be sourced from veterinary vendors in Freetown.

Beak Trimming and Treatment

Beak trimming is the removal of part of the top and bottom beak of a bird. It is also called "debeaking", poultry farmers should have their bird's beak-trimmed to blunt the beaks enough to prevent the occurrence of damaging pecking.

Hot blade beak trimming is performed by experienced private vendors, individual farmers and some hatcheries. The majority of birds are trimmed by individuals in Sierra Leone. Birds must be beak-trimmed by an experienced beak-trimmer to ensure that the welfare of the birds is not compromised and when birds are not beak trimmed, increased incidences of mortality and morbidity will occur due to cannibalism. Welfare problems associated with cannibalism can be devastating. When performed correctly, beak trimming has advantages.

These include reduced:

- Feather pecking
- Mortality
- Vent pecking and prolapse
- Bullying
- Stress on the bird

When beak trimming is not done correctly, birds can suffer from:

- Reduced ability to eat and drink
- Short and long term stress
- Reduced social status

There are production techniques, which may reduce the need for beak trimming, although none of these can guarantee against an outbreak of damaging pecking and cannibalism.

These techniques include:

- Anti-pick compounds such as paw paw leaves, potato leaves or scratch grains etc.
- Nutritional amendments

Before trimming:

- Do not beak trim when the birds are not healthy or when reacting to vaccinations.
- Add vitamin K to the drinking water to prevent hemorrhages.
- Check the equipment i.e. temperature of the trimming blade: 600-650 OC -
- Do not trim with dull blade

Beak trimming is carried out at various ages depending on the preference of the poultry farmer. The most common ages for birds to be beak-trimmed are:

Young age (most common)

- 6 day - 10 days' old
- Cut the beak at least 2mm from the nostrils
 - Hold the chick in one hand, with the thumb behind the head with head firmly in position resting on the thumb.
 - Tilt the chick's beak upwards through 15° and cauterize the reinforced side edges of the beak, to avoid unequal re-growth of the 2 mandibles.
- 8–12 weeks
- Insert a finger between the two mandibles
 - Cut the beak perpendicular at a right angle to its long axis, so that after cauterization about half the length of a beak between the tip and nostrils is left.
 - Cauterize each mandible with care, particularly at the sides of the beak, so as to round off the sides of the beak and avoid lateral re-growth.
- At transfer, if necessary, re-trim the beaks of any birds which require it. This should however be avoided as beak trimming at this age causes a delay for the start of laying eggs.
 - Increase the water level in the drinkers
 - Make sure that the depth of feed is adequate (do not empty the feeders for a week)

Climate Control

To maximise productivity, it is important to monitor and adjust the climatic conditions in which the birds are living. Make sure the temperature, humidity and ventilation rate in the chick house is balanced by using a simple thermometer installed in the chick house and by physical behavior of birds.

- Continuously check and monitor room temperature especially when using coal pot for heating. For the first week, keep house at a temperature of 33-36°C after the first week, reduce temperature 2-3°C weekly until reaching 21°C.
- Monitor chicks to lookout for even distribution, active and sounding content shows they are comfortable, chicks gather into groups sounding distressed when they are cold or chicks congregating in one part of the house, avoiding drafts, noise or uneven light distribution which indicates uneven ventilation. (See fig. 3.4 for illustration of physical behavior)
- Poor (low) humidity in the house (minimal 55%) reduces bird comfort, increases dehydration, result in pasty vents in chicks, increase agitation and possibility of pecking, affects fowl feather and increases dust. While excessive humidity (later in the rearing period) increases ammonia and causes poor air quality, it can be prevented by using automatic drinkers to avoid wetness on the floor or feces, proper ventilation and proper cleaning procedures.
- Chicks should be checked regularly for pasty butt/pasty vent or vent gleet, which is droppings blocking their vent and can be fatal to the chicks or cause death.

Climatic Conditions Within Sierra Leone

This seasonal changes and drop in relative humidity has an adverse effect on the poultry sector and should be considered when venturing into the business – from building design to vaccinations program and heating etc.

- On average, sunshine hours in Sierra Leone range from 2 hours 17 minutes each day in August to 8 hours 11 minutes per day in March.
- The longest day of the year is 12 hours 30 minutes long and the shortest day is 11 hours 29 minutes long.
- It is sunny 50% of daylight hours. The remaining 50% of daylight hours are likely cloudy or with shade, haze or low sun intensity.
- Most times the relative humidity in Sierra Leone is excessive above the comfortable 25-60% up to 90% during the raining season, which can increase ammonia and poor air quality if farm is not properly managed.
- The following local relative humidity conditions are required for better output such as; Hatching 80%, Transportation to farm 70%, Raising period (0-7 days) 60%, Growing 40% and Laying 40%.
- Temperatures during raising chicks that are too low or too high will decrease the percentage of chicks eating, their feeding at 24 hours after chick placement should be at 100%.

Lighting

Adhering to a good lighting program will help enhance the quality of layers by the amount of time the light is on each day to color of the light. Lighting plays a very important role in enhancing and maintaining the level of egg production in layers and must be given serious consideration if willing to improve egg production yield.

Lighting Intervals and Timing

In poultry farming, lighting is a tool when applied properly can greatly enhance performance and profitability. A local lighting system in a chick house has three characteristics:

- Color of the light (wavelength)
- Intensity of the light
- Amount of time the lights are on each day (daily photoperiod)

Traditionally, we have limited our lighting in chick houses to incandescent bulbs and fluorescent lamps, which have fixed color and intensity, and only the length of the daily light exposure is controlled. Which leaves our production and welfare of the birds the same or in some cases causes issues from cannibalism to high feed conversion etc.

Recommendation:

New improved local lighting system can keep chickens laying as daylight hours fall and egg production is linked to changing patterns of daylight. Light stimulates the pituitary gland, which produces a hormone that is carried via their bloodstream to the ovary which sets egg production in motion.

- Extra few hours of light should be added to the morning before the break of daylight.
- Once the chickens are laying, their daylight hours should not be decreased.
- We should add extra artificial 4 hours of light to our 12 hours of natural light in the morning to keep their daylight (16 hours) hours constant.
- These will help prevent your layers from going into molt.
- The minimum light intensity (brightness) provided should be enough to clearly see the chicks feed when standing over the feeder.
- Light intensity can be measured with a light meter app that can be downloaded free of charge on smartphones. The minimum light intensity should be 40 lux at any time.
- Do not use it on spent birds they will be on their natural laying cycle and will need rest.

The combination of LED red, white and blue light will help improve poultry performance such as:

- Growth improvement
- Accelerates sexual development
- Increases egg production (eggs/chicken/week)
- Reduces aggression
- Decreases cannibalism
- Decreases nervousness
- Increases egg size
- Reduces activity

The economic value translates to birds gaining more weight but eating less feed, which is a difference of 0.003 in feed conversion largely based on the multiplier effect of the number of birds in a single poultry farm. (*see citations below*)

Alternative Light Sources

In Sierra Leone power from the National grid EDSA (Electricity Distribution and Supply Authority) is barely consistent in Freetown but more stable in Makeni. Some rural provinces do not have a National grid connection. The most cost effective means of reducing overhead cost on power depending on your scale of production is explained as follows below:

For small scale confined poultry farms not connected to EDSA (Electricity Distribution and Supply Authority) the only means of reducing overhead cost on energy is by using the following:

- Locally constructed coal pot for heating (see Appendix A for sample image)
- Solar powered rechargeable standalone LED lamps which can provide lighting for more than 8 hours or a system of solar panels, batteries for electricity storage and LED lamps in the poultry houses.
- An effective local lighting program should be adhered to (as in section 3.8.1)
- Runs a self-generator powered feed mill grinder and mixer or buys complete feed mix from other farms

For small scale confined poultry farms connected to EDSA (Electricity Distribution and Supply Authority) the only means of reducing overhead cost on energy in the following locations are:

In Freetown (power supply fairly stable mostly during the dry season):

- Locally constructed coal pots to substitute for heating during power outage
- Rechargeable LED lamps can be used to substitute during power outage
- Energy saving LED bulbs should be used to reduce consumption per wattage
- An effective local lighting program should be adhered to (as in section 3.8.1)
- A generator set or mini-solar (long term cost reduction benefits) has to be installed if running a hatchery
- A feed mill can run perfectly well

In Makeni (power supply is mostly stable):

- An effective local lighting program should be adhered to (as in section 3.8.1)
- A feed mill can run perfectly well
- Energy saving LED bulbs should be used to reduce consumption per wattage
- A hatchery can run well with a backup generator just in case of an hour of outage during hatching process
- Rechargeable LED bulbs can be used to substitute a few hours of power outage

Bird Water Management for Sierra Leone

Reliable Water Supply and Treatment

In Sierra Leone, water supply is mainly gotten from two sources across the country which are;

- Urban pipe borne water (referred to as GUMA) which is not reliable in Freetown and more frequent in Makeni
- Borehole is the most common source of reliable clean water across the entire provinces

Every poultry farms must have easy access to a reliable and clean water source for it to run efficiently and to be bio-secured. A borehole is a recommended choice when setting-up a poultry farm in Sierra Leone. The quality of the water from the borehole (or well) must be tested regularly to find out if the water is suitable as drinking water for chickens. This can be done by a local laboratory. There is a standard for the water quality both for chemical and bacterial analysis. The most important chemical parameters are pH, nitrate, nitrite, calcium, iron. Bacteria like Salmonella and E. coli can cause intestinal disorders and therefore should be absent.

Treatment

Water used in the poultry farm must be treated to prevent disease outbreak or prevent getting the birds sick. It is very important to treat the water being given to layers to maintain their health and weight for maximum production.

Chlorine and lime, which are commonly found can be used to treat water for use in the poultry farm for drinking, washing and other uses of water in the poultry farm.

Mixture

Chlorine - 4 milligrams per liter (mg/L)

Lime – 10 milligrams per liter (mg/L)

Proper Use and Types of Drinkers

Chickens drink a surprising amount of water and this is because they are almost always active through the daylight hours. Therefore, it is vitally important that chickens are given access to a drinking source whenever they need. If a chicken does not have access to water (for whatever reason) they can quickly become dehydrated making them go “off the lay” or even die. This can happen quickly in hot weather.

If the right type of container/drinker is not chosen it can turn into a real unnecessary liability for local poultry farmers to constantly be cleaning and refilling the drinker. A chicken waterer can be easily emptied by accident if not correctly positioned or have dirt and debris raked in it making it impossible for the chickens to get a drink. Drinkers can fail, become clogged, leak, and/or be contaminated.

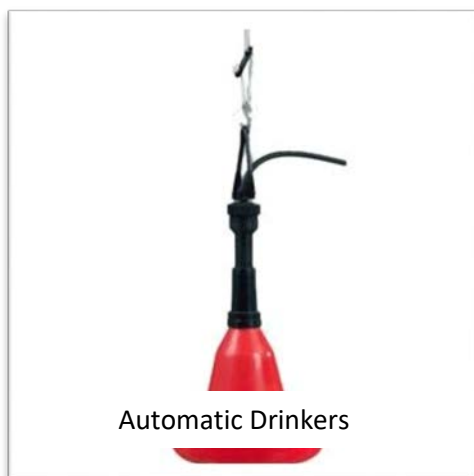
Follow these simple rules for proper use of drinkers:

- Ensure the drinker is positioned so it cannot be tipped over or dirtied by feces or scratched dirt. This can easily be done by either hanging the container at about the height of the back of a chicken or use an automatic drinker system.
- Try to keep 1 liter of water minimum per bird per day.
- Have more than one container kept in different places just in case there is a problem with the other one.
- Keep the containers in a cool shady place as this not only makes the water cool to drink but it also helps prevent the formation of algae and moss in or on the container. If the container is in a position where it does get some sunlight, then covering the top (if possible) is a good idea or use a dark container (not see through).
- If using a gravity-fed drinker (like cups or nipples) don't make the water container too large or hook up to mains otherwise leaks will occur. A good sized container for gravity fed drinkers is under 30 liters (8 gal) and if using mains then ensure a good pressure reducer is installed.

Types of Drinkers

There are many different types of chicken drinkers available, however, the three most common ones are:

- **Bucket, container, or trough:** Open containers are fine to use for chickens and they will drink out of them easy enough. Nevertheless, these types of drinkers can have a tendency to be difficult to maintain and keep clean. Causes a lot of issues from wet floor to ammonia smell – which will be dangerous to the bird's health.
- **Self-contained water dispensers (standard):** Basically, these drinkers tend to be the most common type used by local poultry farmers. They are: manually filled; hold anything from 500 ml to 10 liters (sometimes more); and gravity fed. Be aware plastic drinkers will become brittle and have a short life if exposed to regular sunlight.
- **Automatic waterers/drinkers:** There are several different types of auto-drinkers but really only two categories – those with a self-contained water source (like a drum) or those that are fed by a main water source (like a hose from a mains) – help prevent splashing of water by birds and reduces smell of ammonia in the poultry farm.



Bird Feed Management for Sierra Leone

Starter, Grower and Layer Rations

It is very important to use high quality balanced feed corresponding with the age of the birds:

- Starter feed (up to 8 weeks of age)
- Grower feed (9 to 16 weeks of age)
- Layer feed (17 to 72 weeks of age)

Feed either needs to be manufactured by reputed institutions or companies or the feed can be prepared on the farm.

If poultry feed is poorly managed it could lead to reduction in productivity or death due to infection. Therefore, store the feed in a clean, dry, well-ventilated environment – wet feed may bring fungus infection (*see section 5.3 on feed storage for more information*).

The weight of bird feeds varies at different stages. Use properly designed feeders and control the rats to avoid feed wastage and also provide adequate feeding space per bird. More space is required as the bird grows in age. An egg-laying hen requires 130-140g of feed per day (Layers), growers require a maximum of 90g per day and a chick requires a minimum 60g per day (Starter).

Local feed mixtures at the different stages are comprised of the following:

For Starters: 1 to 8 weeks of age		For the first weeks instead of layer concentrate, broiler concentrate can be used. This contains anti coccidiosis medicine and helps the birds to control the coccidiosis. When switching to layer concentrate, the manure of the chicks should be monitored and if suspicion of coccidiosis occurs, a treatment should be given.
Maize (Western Yellow)	750kg	
Layer concentrate	250kg	
Total	1,000kg (1-ton mixture) of 20 bags of 50kg each	

Local Substitute: (Starters)		This option should be followed only if there is no concentrate available. At least a vitamin/mineral premix should be added to the mixture or if possibly a vitamin/mineral/amino acid premix. As mentioned earlier: in the rearing period the chicks/pullets are building their body to prepare it for high egg production. All the nutrients needed for that are in the concentrates so do not compromise on it.
Maize	750kg	
Fish Meal	250kg	
Total	1,000kg (1-ton mixture) of 20 bags of 50kg each	

For Growers: 9 to 16 weeks of age	
Maize (Western Yellow)	600kg
Layer concentrate	200kg
Loose feed	200kg
Total	= 1,000kg (1-ton mixture) of 20 bags of 50kg each

Local Substitute: (Growers)		This option should be followed only if there is no concentrate available. At least a vitamin/mineral premix should be added to the mixture or if possibly a vitamin/mineral/amino acid premix. As mentioned earlier: in the rearing period the chicks/pullets are building their body to prepare it for high egg production. All the nutrients needed for that are in the concentrates so do not compromise on it.
Maize	600kg	
Fish Meal	200kg	
Rice Bran	200kg	
Total	1,000kg (1-ton mixture) of 20 bags of 50kg each	

For layers: 17 to 72 weeks of age	
Maize (Western Yellow)	500kg
Layer concentrate	200kg
Loose feed	200kg
Limestone	100kg
Total	1,000kg (1 ton mixture) of 20 bags of 50kg each

Local Substitute: (Layers)		This option should be followed only if there is no concentrate available. At least a vitamin/mineral premix should be added to the mixture or if possibly a vitamin/mineral/amino acid premix. As mentioned earlier: in the rearing period the chicks/pullets are building their body to prepare it for high egg production. All the nutrients needed for that are in the concentrates so do not compromise on it.
Maize	500kg	
Fish Meal	200kg	
Rice Brown	200kg	
Oyster Shell	100kg	
Total	1,000kg (1 ton mixture) of 20 bags of 50kg each	

Local Supplements

Local feed supplements are necessary in Sierra Leone because of issues such as shortages in maize during the planting season due to lack of storage facilities to enable the birds feed and maintain its body weight and nutrients. Below are some supplements that can be used to supplement other major ingredients in feed mixture as listed below:

Table 2: Local Substitutes

Local Substitute	Major Ingredient
Oyster Shell	Limestone
Fish meal (only for protein)	Concentrate
Beniseed (a %)	Maize
Sorghum (a %)	Maize
Moringa (a %)	Concentrate
Soya Meal	Fish Meal

Important notice: Only a percentage (%) of maize should be supplemented. The substitution of concentrate is permissible only in minor quantities.

Processing and Feed Storage

Local feed processing and the associated quality control procedure are keys to successful layer production. Unless the poultry farmer understands and specifies the activities of the feed mill and its sources, profitable poultry layer farming will be a matter of chance.

Local poultry farmers could use the Pearson Square method. In this method, the digestible crude protein (DCP) is the basic nutritional requirement for any feed preparation for all animals and birds. Grinding or particle-size reduction is a major function of local feed processing. Many feed mills pass all incoming ingredients through a grinder for several reasons:

- Clumps and large fragments are reduced in size
- Some moisture is removed due to aeration, and
- Additives such as antioxidants may be blended

All of these improve the ease of handling ingredients and their storability and to make feed for layers, the feed should have at least 18% crude protein. Chickens are very sensitive to aflatoxins – never use rotten maize (maozo) while making feeds.

The objective of feed mixing is to start with a certain assortment of ingredients called a "formula", totaling some definite weight. This is processed so that each small unit of the whole, either a mouthful or a day's feeding, is the same proportion as the original formula. Mixing is recognised as an empirical unit operation. For mixing, local farmers are advised to use a drum mixer, never to use a shovel to mix feed because the ingredients will be unevenly distributed.

Important: To improve on the feed quality, local farmers making their own feeds should always have it tested to ensure the feed is well balanced with a few birds before giving to the entire flock.

Oyster Shell

Oyster shell is readily available in Sierra Leone and handpicked from the side of the sea and ocean. It is a good source of calcium and can be used in place of limestone when not available.

Before using it one should follow these steps:

- Emptied and washed properly at the point of collection
- Should be dried in the sun for a period of time
- Should be rinsed again in water and dried for the second time
- Parboil the oyster shell for 4 to 5 hours to kill microbes or bacteria inside the shell
- Remove from fire and put in the Sun again to dry
- After drying, it should be placed on fire again before allowing to cool
- The shell should be grinded to powder and its ready for use
- Failure to follow these processes can cause paralysis in birds



Fig.6 image of Oyster Shell pile

Feed Storage

Store the feed in clean, dry, well-ventilated storage area – wet feed may bring fungus infection.

Due to the issue of shortages of maize in Sierra Leone, here are recommended ways to store maize for a longer period so local poultry farmers can feed their birds to full production:

- The maize needs to be dried to moisture level of 13.5 per cent or below before bagging – which is 72 hours of sunlight drying.
- The AgroZ (not currently available in Sierra Leone but is readily available within Africa) bag has several layers in addition to the outer woven bag, which helps the inner layer cut off oxygen into the bag hence the pests and insects inside the harvested crops will die without destroying the maize.
- Bags of maize should be placed on a wooden pallet in a well-ventilated room without allowing it touch the walls or damp.
- A “grab” test can be utilized to test maize moisture locally. Squeeze the chopped forage into a ball and hold it for 20 to 30 seconds. The ball will hold its shape if moisture content is over 75%. If the ball falls apart with no juice, the moisture content should be around 60 to 70% (a more accurate way to measure moisture content is through the use of a microwave oven, drying oven, or a commercial forage moisture tester).

Scratch Grain

Chickens use their toes to mix up litter or scrape the ground in search of various seeds, greens, grit, or insects to eat. Spreading scratch grains (cracked, rolled, or whole grains such as corn or wheat) encourages this behavior. Scratch grains are relatively low in protein and high in energy or fiber, depending on which grain is used. When scratch grains are fed with complete feeds, they dilute the nutrition levels in the carefully formulated diets. Scratch grains are like French fries—chickens that eat too many scratch grains have less of an appetite for more nutritious feed. If you use scratch grains, feed them to chickens in the afternoon after birds have eaten complete feed, and then provide only as much scratch grains as chickens can finish in 15 to 20 minutes.



Biosecurity & Vaccinations

Preventive Measures to Reduce Risk of Transmission of Infectious Diseases

Biosecurity and farm hygiene are aimed at the prevention of diseases in the farm. Not every day there is a major threat of diseases but as one can never predict the occurrence of infections, one must follow every day the rules for hygiene and biosecurity. As a key biosecurity component, entry into the farm and chicken houses should be limited and controlled. Entry into the houses should follow strict guidelines:

- Clean hands with soap
- Wear protective clothing within the farm area
- Provide specific protective clothing for veterinarians and consultants who need to enter the chicken houses
- Disinfect boots before entry
- Do not allow personnel to enter the houses that are not needed including truck drivers or non-farm personnel.

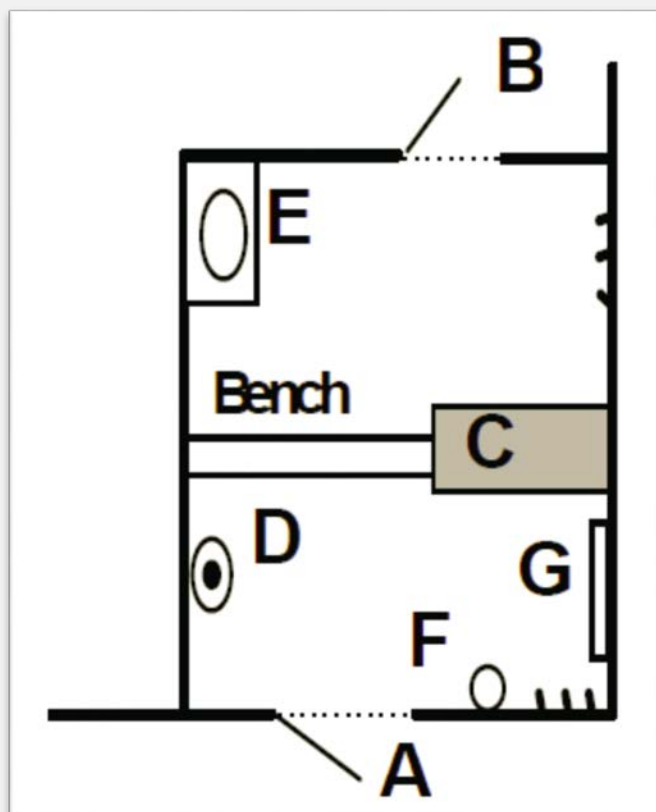


Fig. 7 Hygiene lock sketch at the entrance of a poultry house.

- A Entrance / exit
- B Exit to clean area
- C Storage cupboard
- D Hand basin
- E Boot rinse
- F Laundry basket

Routine Procedures of Biosecurity in Sierra Leone

Clean up & disinfection

- Floor material choice for easy clean up and disinfection
- Use an insecticide and lime wash just after the birds have been removed
- Foot baths should be always filled with disinfectant and clean; dirt reduces the disinfecting power of the chemical used.
- Remove all the non-stationary equipment and residual feed from troughs, conveyors and bins
- Exterminate all rodents and wild birds
- Remove all the manure, litter, feathers, dust, and any other organic materials every three months or when there is increased smell of ammonia in the farm.
- Wash equipment, fans, ducts, water tanks, feed bins, walls and floor twice a year or when bringing in new flocks.
- Disinfection is efficient only after cleaning thoroughly
- Disinfect the interior of the building on surfaces and all equipment before bringing in new flocks.
- Disposal of dead birds in hygienic manner either by using incinerator or by pit method is essential

Table 3: Local Vaccination Programme

Birds	AGE (DAY OLD -16 WEEKS)	PRACTICES INVOLVED	VACCINE ADMINISTERED	TYPE OF FEED GIVEN
Layers	Day old	Brooding	Marek (first vaccine against Marek disease)	Starter
	Week 1	Brooding	HB1 – vaccine against Newcastle disease. Administered for 2hrs in the morning after which you administer vitamin for 3 days and continue with de-chlorinated water after the 3 days.	Starter
	Week 2	Brooding	Gumboro vaccine for bacterial infection. Administer same as above.	Starter
	Week 3	Brooding	Lasota vaccine for prevention of Newcastle Disease. Administer the same as above.	Starter
	Week 4	Brooding	Repeat Gumboro Vaccine and administer the same as above.	Starter
	Week 5	Brooding	Repeat Lasota and Administer as above.	Starter

	Week 6	Brooding	Antico x (antibiotic). Used against coccidiosis for 3 days again and continue with de-chlorinated water after 3 days.	Starter
	Week 7	Brooding	De-wormer – used against worms. Administer for 24hrs after which vitamins is given for 3 days.	Starter
	Week 8	Brooding	Pox vaccine used against fowl pox diseases. Inject through the wings and give vitamin for 3 days.	Starter
	Week 9	Debeaking	Administer Anti-stress after debeaking for 3 days.	Grower

**this local vaccination program is subject to change anytime due to outbreaks or new disease peculiar to Sierra Leone*

Local poultry farms vaccinations are administered to birds by injection, water intake, eye drops and spraying.

Important Notice:

- Lasota should be administered to birds after every 3 months till the end of their production period. Followed by vitamins for 3 days afterwards.
- The application of a inactivated oil adjuvated vaccine against Newcastle Disease is recommended at 16 – 17 weeks of age. This vaccination will protect the hens against the disease almost throughout the rest of the productive life.
- De-wormer should be given after every 40 days followed with vitamins for 3 days.
- Regular routine-like administering of antibiotics and other vaccines should be given against the signs and symptoms shown by the birds with approval of a trained veterinary professional.
- Administer different forms of vitamins for the boosting of egg production and egg size e.g. egg formula, premix, vitaflash etc.

At present the vaccination and medication schedules used are mainly based on experience and trial and error practices. It is recommended to introduce blood and other types of laboratory testing to establish the need and right age for vaccinations and medications. This could be cost saving and will be beneficial to the quality of the eggs.

Waste Disposal and Management

Proper Waste Disposal Procedures

The method of disposal of poultry wastes plays major role in controlling and eradication of diseases. Improper approach and carelessness of this important aspect of production process in poultry, can lead to constant emergence of disease ailments on poultry farms. This results in heavy losses in the forms of mortality and reduced productive performance. Therefore, timely disposal of wastes with efficient method is an important poultry waste management tool for raising healthy and profitable poultry.

The various poultry waste produced in production process of poultry are the following:

- Dead birds
- Droppings or manure
- Dressing waste

The following are the procedures for waste disposal from local poultry farms in Sierra Leone:

1. Disposal of dead birds is often neglected for want of time, fuel and labor in poultry farms. It is observed that in many instances, dead birds are just thrown away in open outside the farm on fallow land or at the corner of premises. This practice is increased during critical periods of outbreaks, due to more number of dead bird posing difficulties for systematic disposal. It is necessary to take extra care for systematic disposal of dead birds to control outbreak by checking spread of infection. They should be deeply buried in the soil or dumped into deep manure or carcass pit where their carrion is auto-digested by hot fermentation or fully burnt to form ash, which is also an effective disposal means.
2. The site of manure pit should be at corner of premises, preferably on downwind flow side to avoid recontamination of birds.
3. Other wet non-edible organs should be dumped into deep manure pit to fulfill compost manure through hot fermentation. The manure pit must be properly covered to avoid spread of infection by aerosol route and dogs should be prevented to root out manure for offal consumption.

Uses of Waste from Poultry Farms

Poultry manure is very useful as an organic fertilizer, as animal and fish feed and as a raw material for methane gas generation in biogas plants for cooking fuel. Adult birds produce approximately 30 kilogram of fresh manure (70 percent moisture content) per year per kg of body weight.

To preserve its fertilizer value, manure will be dried to about 30-40 percent moisture content on the floor of the poultry house before storage. This will retain the maximum nitrogen content for fertilizer value. If the moisture content is too high, then the stored manure releases ammonia, carbon dioxide, hydrogen sulphide and methane, which can have serious physiological effects on humans.

Whatever the type of confinement, proper attention must be paid to manure management. There are many different waste management options for litter including:

- Land application of litter as an organic fertilizer for local maize production.
- Local poultry farmers can rely on land application of litter as a sustainable disposal method
- Composting litter before applying to land can enhance both plant growth and soil structure and its ability to reduce litter volume, dispose of carcasses, stabilize nutrients and trace elements and reduce pathogens.

Egg Harvesting and Packaging

Layer House Management

Effective and efficient layer house management techniques are necessary to increase the productivity of the birds and consequently increase income. This entails not only proper housing and feeding, but also careful rearing and good treatment of the birds.

Table 4: Temperature and its effects on egg production

Temperature (°C)	Effects
11 – 26	Good production. Below 20°C, increased feed intake.
26 – 28	Some reduction in feed intake
28 – 32	Feed consumption reduced and water intake increased; eggs of reduced size and thin shell.
32 – 35	Slight panting.
25 – 40	Heat prostration sets in – measures to cool the house must be taken.
40 and above	Mortality due to heat stress.

When the temperature rises above 28° C the production and quality of eggs decrease. Seasonal temperature increase can reduce egg production by about 10 percent and clean and, hygienic living quarters and surroundings may eliminate up to 90 percent of all disease occurrences.

In periods of higher day temperatures it is beneficial to provide feeding opportunities to the birds in the night as the temperature is lower then. This means that the light can be turned on for 1- 1.5 hours in the night so the hens can feed. As the digestion of feed causes the production of body heat, this heat will not be a burden for the birds in the night. The negative effect of high temperatures on the egg shell quality will be limited in this way.

If production is to be kept constant, a simple chart as shown in Table 2, for example, will be needed to plan when new chicks must be brought-in so that they can be introduced to laying in time to pick up on diminishing egg production.

Table 5: Production Planning for Local Poultry SMEs

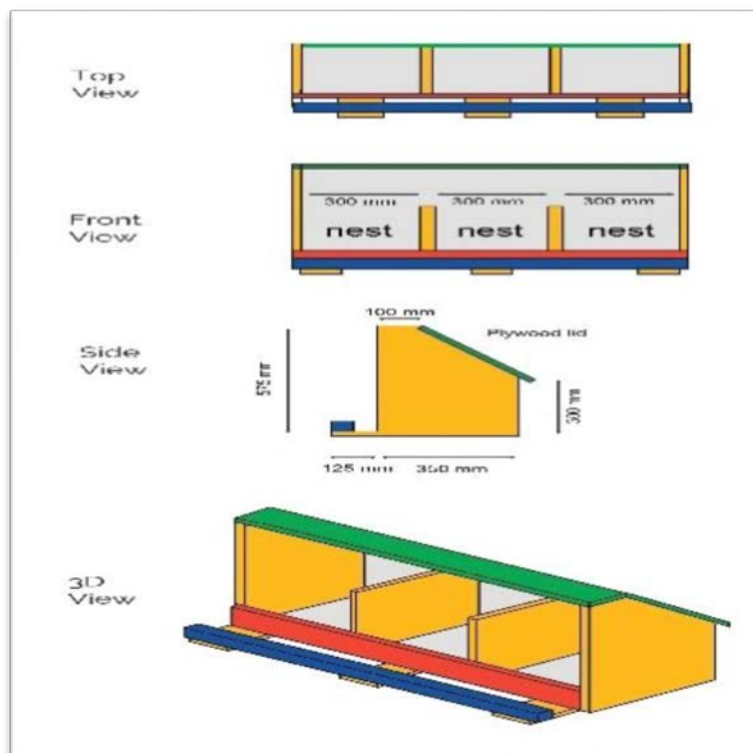
Layer Flocks	0	11	21	31	41	51	61	71	81
	Time in weeks								
1 st layers	Chicks		Lay						
2 nd layers			Chicks		Lay				
3 rd layers				Chicks		Lay			

Note: As indicated on the chart, the first layer flock chick arrived at 0 weeks to become productive after 21 weeks. The second flock of layers' chick arrived at the 21st week to be ready to lay after the 41st week, as the first layer flock starts to diminish production. This type of production entails having flocks of birds of different age groups. This sort of planning will help boost the steady egg supply of local poultry farmers in Sierra Leone earning them profits.

Proper Egg Cleaning and Handling

- Frequent egg collection will prevent layers from brooding eggs or trying to eat them and will also prevent the eggs from becoming damaged or dirty.
- Providing nest boxes one for every 3-5 birds will help keep eggs clean and also avoid excessive competition and minimize eggs laid on the floor. One individual nest box per 7 hens is recommended. Wide nest can accommodate 2 hens at the same time.
- Nesting box bedding should be changed often so it is always clean and eggs should be collected as often as possible. Rice hulls may be the best bedding available. That way the eggs should be clean and not caked with mud or chicken feces. (See fig. 8.2 local nest box design standard)
- If the eggs are soiled and can be washed, use warm water and try to use them immediately or at least refrigerate them right away. It is however better to clean the eggs with a steel wool sponge.

See fig. 8 local nest box design standard



Sorting, Grading and Storage

Grades are assigned to eggs based on the interior quality of the egg, and the appearance and overall condition of the eggshell. Egg size has no relationship to egg grade. (note: paying attention to grading of eggs will help local farmers sell and produce quality eggs, compete favorably for local market share etc.)

Top Grade Egg – eggs have whites that are thick and firm; yolks that are high, round, and practically free from defects (including blood spots, and meat spots); and clean, unbroken shells. Air cell depth may not exceed 3.2mm.

Lesser Grade Egg - eggs have characteristics of Top Grade eggs except the whites are “reasonably” firm. This is the quality most often sold in stores.

Grading Eggs

Exterior Grading:

Begin the egg grading process by checking the quality of the shell. The ideal eggshell is clean, smooth and oval in shape with one end slightly bigger than the other. Eggs with cracked or broken shells should be discarded. If you are selling the eggs, remove any with unusual shapes, textures or thin spots on the shell. While they are edible, they break easily and will be unacceptable because of their appearance.

Interior Grading:

Grading the interior of the egg is performed by a method called candling. Using an egg Candler (which is holding a candle behind an egg in a dark room) will allow you to examine the air cell, the egg white (called albumen) and the yolk. Candling also lets you check for spots and cracks.

Listed below are the different components to observe when candling an egg:

Air Cell Depth: The air cell is the empty space between the shell and the white usually found at the bigger end of the egg. As the egg ages, the air cell depth grows and the quality of the egg diminishes.

Egg White or Albumen: The white of the egg is called the albumen. The quality is based on its clarity and thickness. Look for a clear color without discolorations or floating foreign matter. Thick albumen allows limited movement of the yolk and indicates a higher quality egg.

Yolk: The quality of the yolk is determined by the distinctness of its outline and other features like size, shape and absence of any blemishes or blood spots. It should be surrounded by a dense layer of albumen.

Spots: Candling can help reveal foreign matter like blood spots or meat spots. Eggs with interior spots should not be sold.

Sizing Eggs:

If you plan on selling your eggs, you need to sort and size them. Large and extra-large eggs are the best sellers. Eggs are not sized individually, but rather sized by the combined weight of a crate (30 eggs) of eggs. Sizing of eggs will help local farmers sell eggs faster and increase customer base.

A size breakdown by weight (European standard) can be found in the chart below:

Size Category	Minimum Weight
Small	less than 53 grams
Medium	53-63 grams
Large	63-73 grams
X-Large	over 73 grams

Egg Storage

Eggs are not packaged by individual egg weight. Eggs packaged in containers marked “Medium”, “Large”, “Extra-Large” or “Jumbo” – packaged by total carton weight, per one crate of eggs.

Most consumers do not think about egg sizing. But if been provided with the option consumers will go for the much sizable eggs. Eggs should always be stored with the pointy end down and the blunt end up. The air sac in the blunt end helps keep additional moisture from being lost. Since eggshells are porous and will absorb odors, they should be stored in a carton or covered container away from other food with sharp odors. A bowl with plastic wrap over the top works fine.

As a general rule, eggs should not be washed immediately after collecting them. There is a natural bloom on the surface of the shell that keeps out air and bacteria. It’s important to leave the bloom intact in order to keep your eggs fresh. Provided the total carton weight is approximately 24 ounces, all eggs in that carton are, based on an average, “Large” for the purpose of sale. This means a large egg should weigh, on average, 2 ounces.

Marketing

In Sierra Leone marketing of eggs is non-competitive because prices are the same in all market categories, which does not give consumers much choices. Both imported and locally produced eggs are priced the same meaning people do not know the difference or have a second thought about the eggs they consume. Most local poultry farmers in the country ignore sales aspects of the business when it comes to marketing of their eggs or spent birds, leaving a huge gap in the role local poultry farmers play in dispensing their products faster so they can have a more profitable turnover.

Locally produced eggs provide more value over imported eggs such as:

- Readily available fresh
- It is healthier to consume
- Less likely to have rotten eggs within a batch
- Can be stored longer as it was produced sooner

Here are the basic marketing channels for every local poultry farmer in Sierra Leone to explore based on their location. The greater the distance between the local poultry producer and consumer, the more complex the marketing organization required to ensure that eggs reach consumers in the form, place and time desired. Local poultry farmers may decide to market their produce directly to consumers (direct marketing) or may choose from a variety of marketing strategy that make up a marketing channel.

Direct marketing includes the following methods of selling:

- Sales from the farm (farm gate);
- Door-to-door sales;
- Sales to local market sellers; and
- Sales to local retail shops (supermarkets).

A typical marketing channel is made up of:

- Collectors (middlemen);
- Wholesalers;
- Retailers.
-

Local poultry farmers in Sierra Leone need to take the following steps to improve the marketing of their products:

- They have to introduce a pricing regime that puts their egg prices lower in the market to consumers than the imported eggs.
- Their eggs should be graded and packaged properly to appeal to all market segments
- Sales outlets can be introduced by some distant farms as a cooperative or individually
- Identify possible wholesale markets or potential wholesalers
- Encourage more people in the provinces to eat egg through discounts or promo
- Process their own spent birds especially those in Makeni due to stable power supply
- Try out home delivery services of fresh farm eggs and processed or live birds
- Feed birds properly and keep them looking healthy

Note: the current egg market in Sierra Leone is not determined by what consumers are willing to pay for because they are no competitive pricing nor options and this manual is suggesting local farmers introduce competitive pricing model and also produce quality eggs.

Record Management

A daily record of feed consumption, egg production, mortality, egg sales, and expenditures is essential to help improve farming efficiency and pinpoint troubles and their solutions. Records are the only way to determine whether a poultry business is making profits or not.

Financial Records and Templates

The following are free record keeping templates for poultry farmers in Sierra Leone. They can be models for farm records.

Costs. When calculating costs for the laying cycle, the main expenditures to consider are:

- **Rearing** - rearing brooders until they become layers;
- **Housing** - building or maintaining laying house and brooder house;
- **Equipment** - the cost of miscellaneous items such as feeders, buckets, etc.;
- **Feed** - total feed used during the year;
- **Labour** - labour costs incurred to manage birds;
- **Vaccinations** - medicines and veterinary visits;
- **Mortality** - loss of laying birds due to disease, etc.; and
- **Various expenses** - lighting, water, etc.

Income. When calculating income for the laying cycle, the earnings to consider derive from:

- The sale of eggs;
- The sale of spent birds after the first cycle of production; and
- Where applicable, manure sold as fertilizer

Initial investment capital is required to start a local poultry enterprise; proceeds from the sales of eggs should, however, provide funds to continue with the business before the end of the first laying cycle. Indeed, three months after point of lay (30 -31 weeks of age), when the birds should normally have reached peak production, the proceeds from the sale of eggs should be sufficient to operate the business on a revolving fund basis. The three-month period is long enough, even for the low producing birds or those that peak late.

Template: Expenses for rearing Layers

Cost	SL-Leones
Chicks (total no. of chicks x price per chick)	
Feed (total kg of feed x price per kg)	
Housing	
Equipment	
Labour	
Vaccinations	

Template: Weekly Costs and Sales

	SL-Le
a) Eggs sold	
b) Feed used	
c) Rearing costs	
A - B - C =	

Mortality	
Loan	
Others	
Total Costs	

Production & Productivity Templates

Monitor Feed Consumption

It is essential for local poultry farmers to keep proper records on feed consumption per bird for each batch.

- About 7 kg (7,000g) feed should be consumed per bird up to 20 weeks of age
- About 38 kg (38,000g) feed should be consumed per bird from 21 to 72 weeks of age

Excess consumption may be due to feed wastage, rats, low temperature of shed or poor feed quality (low energy feed). Feed consumption that is too low may be due to disease, low quality/unpalatability of feed, high temperature in poultry shed.

Monitor Bird Rearing and Outcomes

Template: Production

Batch: _____ No: _____
 Day old: _____ Date: _____
 No. at beginning of _____ Age at beginning of period: _____ period: _____

Feed given (bags kg)								
Day	1	2	3	4	5	6	7	Total
Week 1								
Week 2								
Week 3								
Week 4								
Total								

Death and culls								
Day	1	2	3	4	5	6	7	Total
Week 1								
Week 2								
Week 3								
Week 4								
Total								

Eggs laid (Saleable = G and Non Saleable = B)															
Day	1		2		3		4		5		6		7		Total
	G	B	G	B	G	B	G	B	G	B	G	B	G	B	
Week 1															
Week 2															
Week 3															
Week 4															
Total															

Mortality % _____ Feed intake _____ g/Bird/day Rate of lay _____ %
 Remarks _____

Note:

Mortality rate will range between 5% to 10% under good management procedure and a good laying rate of 28 crates (840 eggs) approx. of egg per day for 1000 birds.

Annex 1: Additional Recommendations for Improved Productivity

Feed and Housing

Locally constructed wooden feed trough



Bagging of feed mixture



Local usage of automatic drinkers and local wooden feeders



Locally constructed coal pot from empty gas cylinder for proper heating



Day Old Chicks

One day old chicks just arriving from hatcheries



Health and Hygiene

A dead layer bird infected by paralysis disease



Effect of pecking due to cannibalism



How to keep our local poultry farm surrounding clean



Sample of disinfectant tray in front of entrance



Annex 2: Diagnostic Guide

Checklist poultry farming (egg production) Sierra Leone

Farm:

Date of interview:

E-mail and or tel.no:.....

	Value	Standard	Remarks
Preparation with soap			
How are the empty houses cleaned between flocks		Dry till all manure is out, the water	
How are they disinfected		Effective disinfectant	
Floor (concrete/ soil)		Concrete	
Rearing period			
Origin day old chick, breed and price			
Heating equipment		1x 1450 kcal/500 chicks	Costs fuel?
Other brooding equipment			
Litter		Woodshavings	Costs?
Temperature at arrival chickens		28 °C floor	
Temperature monitoring		0-3 days 35°C 4-7 34 8-14 32 15-21 29	If not monitored: how you evaluate comfort of chicks?

Chick feeders		1 per 50 birds	
Chick drinkers		1 per 100 birds	
Feeders		5 cm/pullet	
Drinkers		1 per 75 birds	
Floor space		10/m ² or 1,07 sq ft	
Coccidiostat in starter feed		Yes	
Hygiene policies and structures			
Vaccination:			Costs?
Gumboro /IBD			
IB			
NCD			
Pox			
AE			
Medications			
Debeaking what age			
Feeding: grams of starter feed		850 grams	

Composition of starter feed			Costs?
Grams of grower feed		5 kilo (-16 weeks)	Costs?
Composition of grower feed			
(Grams of pullet feed)			
(Composition of pullet feed)			
Pre lay feed? From what age?			
Illumination schedule		30-40 lux first days 40 lux in lay 22 Hours first day 0,5 W/ m ²	Costs?
Light increase at onset of lay		5% 14 h 35 % 15 h 60 % 16 h	
Water quality (smell, clarity, sediment, colour)		Chlorine treatment (how) Analysed?	
Body weight monitoring		Week 5 390gr Week 10 845 gr Week 15 1280 gr Week 18 1550 gr	
Uniformity monitoring		Yes	
What was the mortality till 18 weeks?		Maximum 3 %	
What period of mortality? What type of mortality?			

Daily routine for checking the birds?		<ul style="list-style-type: none"> -Observing general appearance -Observing behaviour (scratching, dustbath) -Observing bird that are out of average -Functioning of equipment -Observing other aspects like sound of the hens - manure 	
Production period			
Stocking density		6 birds/ m2 1,8 sq ft/ bird	
Feeding at the onset of lay	18 weeks 20 weeks 26 weeks	100 grams/bird/day 115 " " " 125 " " "	
Composition of different feeds		At least 2 types of layer feed	Costs?
How formula decided			
When change of composition			

Program of feed quantity		125 grams a day; decreasing after ... days/ % lay	
Feeders empty at end of day?		Yes	
Feed on the floor? Spillage		No	
Feeding equipment		7,5 cms per bird 3 pans/ 100 birds	
Feeding times per day		At least 2	
Drinking equipment		1 per 25 birds or 5 cms/bird (troughs)	
Cleaning of drinking equipment		Every 2 days	
Medications			
Light program		Yes, after 16 weeks step up program from just daylight; max. 6 hours extra.	
Light intensity		40 lux	
Nests		7-8 birds per nest	Costs?
Nest material		Dry and loose	Costs?
Placement of nests		Easy to reach	
Start of lay		Age 5% (ultimately 140 days)	

		Age 50 % (ultimately 147 days)	
Time of egg collection (hours after light starts)		At least 2 times; first within	
Peak production (figure and age)		At least 85% at 175 days	
Decline in production		10% in 30 weeks after peak	
Mortality % Reasons and age extra mortality		0,6 % per 5 weeks	
Egg weight monitoring?		Yes; result:...	
Egg shell quality at peak production? After 1 year Periods of lower shell quality?			
Egg selling prices?			
Revenue manure			
Particulars of feather coverage		Peak prod.: excellent 1 year of age: good End of lay: reasonable	
Parasites (red mite, worms)		Not present	

Annex 3: Sierra Leone Poultry Business Directory: August 2017

Maize – Sourcing, Service Provision				
	List	Description	Phone Number	Address
1	Ahmed Alaska Bangura	Maize: Trade, Shelling Services Provider, Weighing Scales, Hybrid Seed	076741192; 077552424	Mile 91, Kholifa Mabang Chiefdom
2	P4F	Maize: Farm, Trade, Shelling Services Provider, Weighing Scales, Hybrid Seed	099968879	Mile 91
3	Haja Sundu Marah	Maize: Trade, Shelling Services Provider, Weighing Scales, Hybrid Seed	078908610	Kabala
4	Woria Kabbah	Maize: Shelling Services Provider, Weighing Scales	07696050	Kabala
5	Hajaratu Mahoi	Maize: Weighing Scales	076898379	Moyamba
6	Mammy Yeabu Koroma	Maize: Weighing Scales	076655257	Mile 91
7	Neneh Jabbie	Maize: Weighing Scales	076994693	Kabala
8	Sahid Abdul Kargbo	Maize: Hybrid Seed, Weighing Scales	076607984	Mile 91
	Weighing Scales Suppliers	Description	Phone Number	Address
9	Concord Store	Reseller – Scales	088354177	5 Siaka Stevens Street, Freetown
10	Hema Trading & Construction	Reseller – Scales	077630260	7 Ecowas Street
Poultry Services Providers				
	List	Description	Phone Number	Address
1	Big Things (vet services, DOC)	Veterinary Drugs & Services Day-Old-Chick Supplier	078882777	Makeni
2	Lanark (feed, DOC)	Feed Concentrate Supplier Day-Old-Chick Supplier	078553062	Bah Drive, 4 Mile
3	VetMan (vet services)	Veterinary Drugs & Services	078421172	Ross Road, Freetown

4	Leecon (feed, DOC)	Feed Concentrate Supplier Day-Old-Chick Supplier	076/30 686526	Sokoma Town, Waterloo
5	BBOXX (energy)	Solar Lighting – Poultry Energy Needs	079093662	Wellington Street, Freetown

Poultry Farms

	List	Description	Phone Number	Location
1	Big Things Poultry	Poultry Company	078882777	Makeni
2	Leecon Poultry Enterprises	Poultry Company	076686526	Kamara Lane Benguema Road/Macdonald, Sierra Leone
3	Ya Marie Agro Enterprise	Poultry Company	077613401	Old Rail Way Line, Rokel, Sierra Leone
4	Affia Poultry	Poultry Company	076671207	Kabal
5	Glorious Poultry	Poultry Company	077826210	Mile 91
6	Jan & Sank	Poultry Company	078404822	Mile 91
7	Memsors Pride	Poultry Company	088858808	Mile 91
8	Maji's Poultry	Poultry Company	076163790	Bo
9	Breat Construction Company	Poultry Company	079544565	Ogoo Farm
10	Macho Poultry	Poultry Company	076673800	Sumbuya
11	Dr Jalloh	Poultry Company	076601845	Off Lumpa Road, Waterloo
12	Francis Poultry	Poultry Company	076268259	Makeni
13	Pa Wurie	Poultry Company	076610131	Masantigie
14	Anita Samson	Poultry Company	077797217	Hastings
15	Janga Enterprises	Poultry Company	076330610	Off Newton
16	Mr. Sesay	Poultry Company	076542200	Waterloo
17	Mustapha PMB	Poultry Company	076675111	Devil Hole
18	Johnie Elber	Poultry Company	088354658	Newton Four Mile
19	Family Poultry	Poultry Company		Bo
20	Wanword Enterprise	Poultry Company	076601244	Babardorie Lumley, Sierra Leone
21	Q and A Poultry	Poultry Company	076603275	Regent Road Lumley, Sierra Leone
22	Rogers Right Poultry	Poultry Company	030657796	Godrich, Sierra Leone

23	Noldred Enterprise	Poultry Company	078230130	Godrich, Sierra Leone
24	Green Field	Poultry Company	076602001	Adonkia, Sierra Leone
25	Sheku Enterprise	Poultry Company	099992656	Hamilton, Sierra Leone
26	Glenis Enterprise	Poultry Company	076512122	Hamilton, Sierra Leone
27	Lamrana Poultry	Poultry Company	076149686	Hamilton, Sierra Leone
28	Momoh Enterprise	Poultry Company	030160914	Hamilton, Sierra Leone
29	Eat Small Small Poultry Farm	Poultry Company	078344304	Mambo, Sierra Leone
30	Dorays Poultry	Poultry Company	076622545	Colegiate School Road, Sierra Leone
31	Suzlald Enterprise	Poultry Company	076774171	Majay Town, Sierra Leone
32	Ayoub Enterprise	Poultry Company	076661273	Murray Town, Sierra Leone
33	Wilmacs Poultry Farm	Poultry Company	076627027	New England Ville, Sierra Leone
34	Shawee Enterprise	Poultry Company	077394555	Kissy, Sierra Leone
35	Rely Force Enterprise	Poultry Company	076200576	Wellington Old Road, Sierra Leone
36	Yele Poultry Farm	Poultry Company	078287545	Allen Town, Sierra Leone
37	MDS Ascendant Farms	Poultry Company	076923650/ 076300299	Rokel, Sierra Leone
38	Malcolm Enterprise	Poultry Company	077337786	Pentagon Off Old Rd Rokel, Sierra Leone
39	Bokum Poultry Enterprise	Poultry Company	030579681	Old Rail Way Line, Rokel, Sierra Leone
40	Sierra Leone Poultry	Poultry Company	078180170	Yams Farm Wharf, Sierra Leone
41	Jamka Poultry Enterprise	Poultry Company	077679703	Hastings Maston Street, Sierra Leone
42	Ace Home Farm	Poultry Company	077797217	Upper Hastings, Sierra Leone
43	Thomas Poultry Farm	Poultry Company	079134877	Maroon Town Hastings Quarry, Sierra Leone
44	Jojo Poultry Farm	Poultry Company	076619115	Kosso Town, Sierra Leone
45	Salmaranth Poultry	Poultry Company	077648388	Upper Kosso Town, Sierra Leone
46	Technical Poultry Enterprise	Poultry Company	076768156	Mongegba Grafton, Sierra Leone
47	Sallie Business Enterprise	Poultry Company	079751197	Regent Road, Sierra Leone
48	Sylrose Enterprise	Poultry Company	076576113	Regent, Sierra Leone

49	Sugar Loaf Enterprise	Poultry Company	076623304	Regent, Sierra Leone
50	Florict Agricultural and General Enterprise	Poultry Company	076672673	Gloucester, Sierra Leone
51	Freddy Right Enterprise	Poultry Company	078833995	Gloucester, Sierra Leone
52	Ledema Fofanah Enterprise	Poultry Company	076391425	Gloucester, Sierra Leone
53	Dolish Poultry Farm	Poultry Company	088610859	Gloucester, Sierra Leone
54	Sierra Akker	Poultry Company	076759882	Sumbuya F/T Highway, Sierra Leone
55	Djanta poultry Enterprise	Poultry Company	088202598	Sumbuya F/T Highway, Sierra Leone
56	Borah Poultry	Poultry Company	076673800	Konta Line Makoloh, Sierra Leone
57	Brizza Poultry	Poultry Company	078921422	Six Mile, Waterloo-Masiaka Hwy, Sierra Leone
58	Alrassin Poultry	Poultry Company	076792350	Newton, Old Road, Sierra Leone
59	African Pride Poultry Farm	Poultry Company	076330610	Kpoubu, Newton, Sierra Leone
60	United Poultry Farm	Poultry Company	088354658	Newton, Sierra Leone
61	SABI	Poultry Company	076931610	Newton, Kattu Town, Sierra Leone
62	Lemon Poultry Ent	Poultry Company	077731629	Newton, Sierra Leone
63	Rogberay Farmers Development	Poultry Company	077943736	Rogberay, Off Newton, Sierra Leone
64	Roseleneh Business Enterprise	Poultry Company	078178644	Rogberay, Off Newton, Sierra Leone
65	Degania Poultry Farm	Poultry Company	088586689	Modonkeh Rd, Coker Town, Off NewtonRogberay, Off Newton, Sierra Leone
66	Munu Poultry Enterprise	Poultry Company		Modonkeh Rd, Coker Town, Off NewtonRogberay, Off Newton, Sierra Leone
67	Farm for Business Ent	Poultry Company	076706795	Mondonkeh, Sierra Leone
68	Bakmon Poultry Ent	Poultry Company	077897511	Mabrun off Newton, Sierra Leone
69	Lanark Trading Company	Poultry Company	076535338	Bah Drive, 4 Mile Newton Area, Waterloo
70	Abdul Kamara Ent	Poultry Company	030327822	Three mile bah drive, Waterloo-Masiaka Highway, Sierra Leone
71	Nyandehun Poultry	Poultry Company	088945191	Nyandehun Fofu, Sierra Leone

72	Saidu Poultry Ent	Poultry Company	077724694	Masorie, Off Camp junction, Sierra Leone
73	A C Wurie Poultry Ent	Poultry Company	076610131	Masantigie, Off Paloko, Sierra Leone
74	Mac's Poultry Farm	Poultry Company	088622308	Joe town off Camp Junction, Sierra Leone
75	Pajah and I J SL Limited	Poultry Company	076585874	Lumley/Joe Town Off Camp Junction
76	Salay Burn Ent.	Poultry Company	077591272	Joe town off Camp Junction, Sierra Leone
77	Jabex Ent	Poultry Company	076603973	Campbell Town, Sierra Leone
78	Free Town Store Ent	Poultry Company	077328355	Cole town, Sierra Leone
79	We Yone Poultry	Poultry Company	077257459	Off Samuel town, Benguema Rd, Sierra Leone
80	Kerry Town Poultry	Poultry Company	076360604	Kerry Town, Sierra Leone
81	Dimol Poultry Farm	Poultry Company	076727738	Kerry Town, Sierra Leone
82	Ayo Carney Poultry Farm	Poultry Company	079466427	During Town, Sierra Leone
83	Aminata Poultry Ent	Poultry Company		Fire Mambo, Old York Road, Waterloo, Sierra Leone
84	Augusta Tucker Ent	Poultry Company	077639587	36 Hartshorn Street, Waterloo, Sierra Leone
85	Yayah Jabbie Ent	Poultry Company	076542200	24 Pike Street, Ibo Town, Waterloo, Sierra Leone
86	Abdul Kargbo poultry	Poultry Company	077248426	White Stone, Waterloo Highway, Sierra Leone
87	Bayo Poultry Ent	Poultry Company	077456887	Upper Deep Eye Water off Quarry, Sierra Leone
88	A and A Poultry	Poultry Company	076675111	Lower Deep eye Water, Sierra Leone

Annex 4: SOBA Poultry Partners

SOBA: POULTRY PARTNERS

BIG THINGS: Big Things Poultry launched a veterinary services business in 2017, now staffed with a vet technician that offers guidance and medicines to poultry farms in the Makeni area.

LANARK: Lanark is the main distributor for Koudijs concentrate, imported from the Netherlands, with plans to develop complete and near-to-complete feed for resale in 2017. They operate out of two outlets in Freetown and Makeni.

LEECON: Leecon Poultry is one of the largest poultry farms in Sierra Leone with 27,000 layers. Leecon and SOBA set-up model layer houses, established new farm controls, and launched scales and buyer workshops. Leecon is based in Waterloo.

AHMED ALASKA: Ahmed Alaska is a maize aggregator based in Mile 91 that also offers shelling services for maize farmers. In 2017, Alaska trialled hybrid maize seeds and weight-based maize trade. They work with over 1,500 maize farmers.

Production Capacity (Layer Hens)



Maize Growing Region

- Veterinary Services Providers
- Local Feed Distributor
- Poultry Farmers
- Maize Sheller
- Maize Aggregators
- Demo Plots
- Maize Aggregators other
- Poultry Farmers other



Annex 5: Additional Resources

Poultry Farmers Baseline Study:

<http://sobasl.org/poultry-farmers-baseline-study/>

Business Opportunity: Veterinary Services:

<http://sobasl.org/poultry-business-opportunity-vet-services/>

Business Opportunity: Day Old Chicks:

<http://sobasl.org/poultry-business-opportunity-day-old-chicks/>

Business Opportunity: Feed and Concentrate:

<http://sobasl.org/poultry-business-opportunity-concentrate/>

Poultry Farm Recordkeeping Guide & Workbook:

<http://sobasl.org/poultry-farm-record-keeping-workbook/>

SOBA Poultry Rearing Presentation:

<http://sobasl.org/poultry-soba-rearing-presentation-2/>

SOBA Poultry Laying Presentation:

<http://sobasl.org/poultry-soba-laying-presentation-2/>

Business Basics Guide:

<http://sobasl.org/basic-business-series-compilation/>