

# World Poultry Foundation



## POULTRY MULTIPLICATION INITIATIVE

Brooder Unit Manual

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*A Guide For Farmers*

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## ACRONYMS

APMI:	African Poultry Multiplication Initiative
BU:	Brooder Unit (also known as a Mother Unit)
DOC:	Day-old chick
FLAWS:	Food, Lighting, Air, Water, Sanitation, Security and Stocking Density
MU:	Mother Unit (also known as a Brooder Unit)
ND:	Newcastle Disease
P&L:	Profit and Loss Statement
PMI:	Poultry Multiplication Initiative
SSP:	Small-scale producer (10–500 birds)
WPF:	World Poultry Foundation

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# The World Poultry Foundation

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## INTRODUCTION TO THE WORLD POULTRY FOUNDATION (WPF)

The World Poultry Foundation is a U.S. based non-profit organization that specializes in development and implementation of programs that support the poultry value chain. The WPF works to promote economic development in emerging markets outside of the U.S. by helping to establish the production, availability, and ultimately consumption of a low cost, highly efficient and nutritious protein that poultry and eggs provide. This is accomplished by providing technical, educational, and other assistance needed to foster the development of the local poultry and egg industries in rural areas.

The World Poultry Foundation's mission is to be a self-sustaining instrument for improving lives globally through production and consumption of poultry, while empowering farmers in developing regions.

The World Poultry Foundation is governed by a Board of Directors with extensive experience across a broad spectrum of disciplines. The Board oversees the vision and mission of the organization in identifying and funding projects that advances its philanthropic purposes.

Through the experience of the WPF management team and Board, as well as access to poultry consultants and specialists, the World Poultry Foundation has the capabili-

ties to positively impact poultry enterprises across the globe.

While public perception of poultry operations lies predominately on the production and processing operations, the WPF can provide access to experts with knowledge in governmental affairs, academia, manufacturing, pharmaceuticals, equipment, management, nutrition, veterinary services, and poultry breeding practices.

Learn more about the WPF programs at [www.worldpoultryfoundation.org](http://www.worldpoultryfoundation.org).



## THIS BROODER UNIT MANUAL

The World Poultry Foundation has developed this Brooding Manual to assist in the proper care and production of healthy dual-purpose chicks.

The first 10 days of a chick's life are the most important as to organ development and in building a robust immune system. Newly hatched chicks are unable to regulate their body temperature for the first 3 days and must rely on a supplemental heating source to prevent chilling. Chilling of young birds can negatively affect gut development and also result in respiratory problems that can lead to stunting or even death. As the caretaker of the flock, you are assuming the role of the mother hen and the chicks will depend on your care to properly grow into healthy adults.

A brooder unit enterprise is not a hobby and requires a commitment to manage the birds correctly, and to establish and grow a network of small-scale producers to purchase

your stock. Data from thousands of farmers has shown that the brooder unit operators who run the enterprise as a business, and are committed to its success, have the highest financial returns.

The objective of this manual is to assist you in providing an environment where the chicks are maintained in a zone of comfort and given the attention needed to grow into a healthy and productive bird.

This training manual has been developed to guide and assist in the proper management and care for flock of day-old chicks. It has been formatted in Chapter form to make navigation of the manual user friendly. Each chapter is designated for a specific management category, although there will be some overlap among the chapters.

# 2

## The Poultry Multiplication Initiative

### INTRODUCTION

Since 2016, the World Poultry Foundation has been involved in the development and implementation of a unique program referred to as the Poultry Multiplication Initiative (PMI).

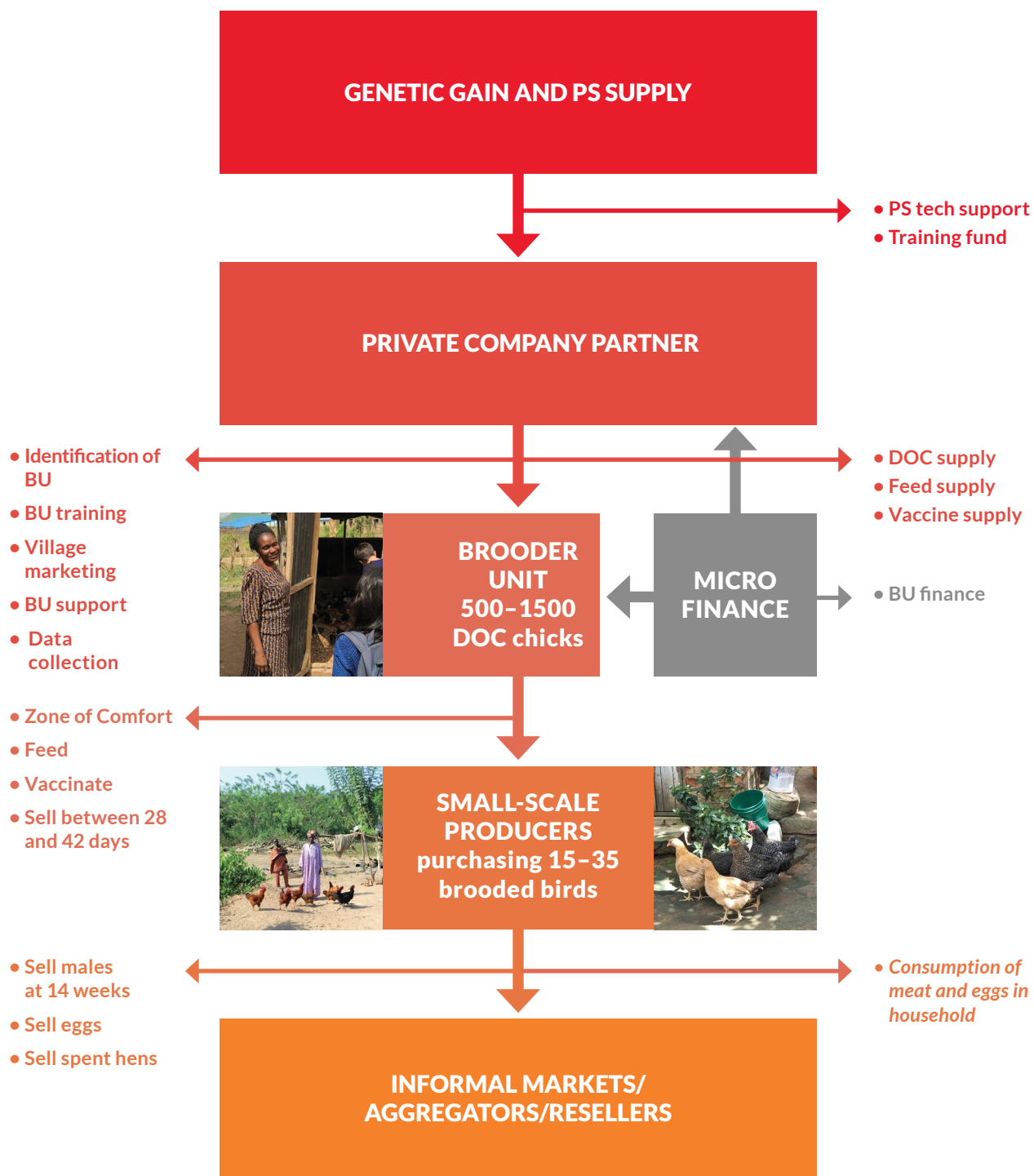
The PMI objectives are to increase farmer income, empower women and youth, improve family nutrition, and create job opportunities through the multiplication and supply of dual-purpose breeds. The PMI catalyzes a transformation of rural poultry production by helping to scale up private sector efforts on chicken production with a special focus on productivity and income growth for farmers. The WPF believes the PMI model empowers small-scale producers (SSPs), and especially rural women, to improve the health, nutrition, and the overall livelihood of their households.

The PMI model identifies capable private sector partners to scale the production and delivery of inputs and support services to small-scale producers. The WPF seeks partners that have an established business model that focuses on the delivery of inputs and services to rural households, and are willing to invest time and resources into the rural poultry sector. The partners must have the capabilities to scale to the targets needed for the PMI to become sustainable, and to provide input supplies and support to farmers through extension and technical support in remote rural areas.

WPF works with private companies and their partners to: (a) establish a supply of improved genetics of low-input, dual-purpose chicken breeds; (b) scale day-old chick production systems to service rural communities; (c) establish brooding units (BUs) to properly rear, feed and vaccinate day-old chicks; (d) assist the companies in the recruitment and training of technical specialists to support the BUs; and, (e) enable women small-scale producers who purchase chicks from the BUs to raise them for meat and eggs for household consumption and sale.



## APMI SUPPLY CHAIN MODEL



It is important to note that the PMI is a business model, and no chickens or inputs are given away or subsidized. The Brooder Unit (BU) operator purchases chicks, feed, and vaccines from the private company partners, who in turn sell birds to the small-scale producers. The farmers increase their income by producing a faster growing male while the hens produce more eggs, both of which may be sold or consumed in the household.

The PMI has 5 basic goals:

- 1) **Increase poultry production and productivity:** By having access to improved low-input dual-purpose breeds that have been properly brooded, fed, and vaccinated; the PMI seeks to achieve an increase in productivity of at least 200% when compared to the local indigenous breeds. The dual-purpose birds supplement the local breeds to increase the flock size of birds raised by rural households. Data from the field indicates a dual-purpose bird can lay between 130 to 175 eggs annually (under scavenging conditions) compared to approximately 50 eggs annually for the local breeds. The males can reach market weights of 1.8 kg to 2.2 kg in 13 weeks compared to 32 to 36 weeks for the local breeds.
- 2) **Increase rural household income:** Potential income values are variable based on location and circumstances, but the PMI will provide a net benefit from egg production and sales, as well as from the sale of males for meat.

- 3) **Improve household nutrition:** By increasing productivity and producing more meat and eggs, it is assumed that a portion of the output would be consumed by the families, particularly the children. What is not consumed would be sold directly by the farmers or to market aggregators for income. Additional income generation may also be used for a more diverse diet for the household.

- 4) **Empowerment of women:** The goal of the PMI is to establish poultry enterprises primarily owned and operated by women. The gender theory of change is that by enabling women's collective action in poultry development and providing access to quality poultry inputs, the PMI will lead to increased women's control over poultry assets. This will in turn enhance the status of women at the household and community level, as well as to increase women's decision making around poultry systems.

- 5) **Rigorously track and measure impact:** Any PMI program should contain a work program to gather and analyze comprehensive data as part of a monitoring and evaluation system. Data collection should be robust and, at a minimum, provide real-time feedback to ensure that the PMI is advancing each of the above 4 goals.

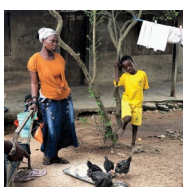
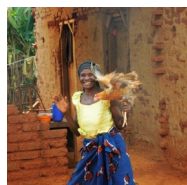
This initiative was first implemented in Ethiopia, Nigeria, and Tanzania and is now expanding into other regions across Africa.

## PMI OBJECTIVES

### TEAMS OF EXTENSION SUPPORT AND MARKET DEVELOPMENT/ DATA COLLECTION



### ENABLE SSP AND WOMEN'S GROUPS TO ACCESS DPP



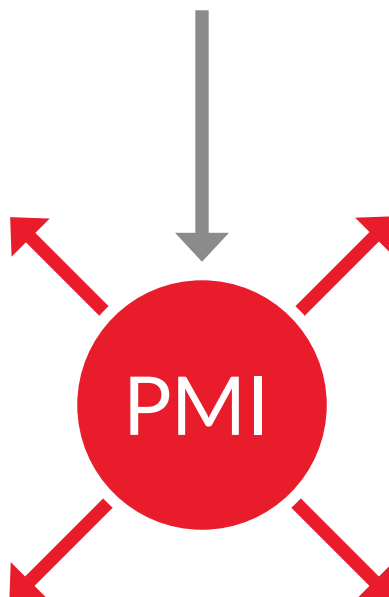
### SUPPLY OF IMPROVED DPP GENETICS



### SCALE DAY-OLD CHICK PRODUCTION SYSTEMS



### ESTABLISH NETWORK OF BROODER UNITS





## WHAT IS DUAL-PURPOSE POULTRY?

There are many breeds of domesticated commercial chickens and each breed has been developed for a particular purpose: fast-growing broilers for meat, and highly efficient laying hens for egg production. Dual-purpose breeds are developed to sit between these highly efficient strains and the local village breeds (which are poor performers in both weight gain and egg production).

Dual-purpose chickens are extremely robust and perform exceptionally well in the harsh conditions seen in rural areas. The females produce more eggs, and the males grow much faster than the local breeds. Dual-purpose birds are foragers and scavengers so they can survive well with limited commercial blended

feed. The dual-purpose breeds are extremely resilient and highly productive compared to local indigenous breeds and can meet the needs of the rural farmers in the small to medium enterprises. In addition, the plumage of the birds closely aligns with local breeds, making them more acceptable to farmers and consumers alike. Through the PMI model, farmers can access dual-purpose breeds which provide a pathway to improved genetics and quality inputs.

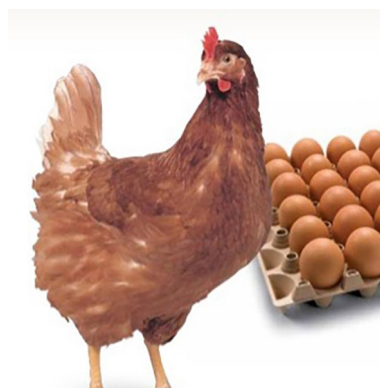
**Commercial broiler**



**Dual-purpose bird**



**Commercial layer**



Dual-purpose birds are bred to produce more eggs and gain weight faster as compared to local breeds. Dual-purpose chickens provide small-scale producers with more eggs and higher weight birds in a shorter period of time. These attributes result in a larger availability of eggs and meat for home consumption and increased income through sales.



**Local village chicken**

Eggs per year: 30–60 (laid in clutches)

Weight gain (males). Days to 2kg: 255

Mortality > 40%



**Dual-purpose chicken**

Eggs per year: 130–175

Weight gain (males). Days to 2kg: 84–91

Mortality < 15%



*WPF Photo: Dual-purpose birds out scavenging*

# 3

## Housing

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### INTRODUCTION

A properly equipped and maintained poultry house is key in keeping birds safe and healthy. From our experience, a quality poultry house does not require a high-tech, expensive facility. There are thousands of older facilities that perform well as brooder units, and many will only require minimal upgrades to be acceptable. The primary criteria for a well-maintained brooding facility is the ability to keep rain and water out (well drained), be bird proof and rodent proof (no holes in sidewalls or mesh wiring), has the ability to clean and disinfect, and can be locked and secured.

In commercial poultry production, there are 2 basic styles of poultry housing – open houses and enclosed houses. Open houses have walls at each end, but the sides are open and covered in wire mesh to prevent wild birds and other animals from entering the house. An enclosed house is one which

has walls on all 4 sides with only air inlets for ventilation. This type of house must be mechanically ventilated by fans to provide fresh air and cooling for the chickens and artificial light must be provided.

For the sake of this manual, we will only be referencing the basic open house design. Open houses have the advantage that they are cheaper to construct and do not require mechanical ventilation.

An open house is the most common type of house used by small and mid-size producers, and serves the purpose well, although it requires more attention to air flows and ventilation and must be managed properly.

The most important thing is that the house must protect the chickens from unfavorable weather conditions, predators, water leaks, theft, wild birds, rodents and must be bio secure.



## HOUSE CONSTRUCTION AND ORIENTATION

When constructing or modifying an existing building, many factors have to be considered beyond just the size of the house and the building materials. Plan ahead and not only think about potential flock size now, but how it could be expanded in the future for higher capacities.

If building a new house, it ideally should be built on an east-west axis to minimize heating from the sun or extend the roof to prevent sun from entering the house. It is best that any new house be at least 20 to 25 meters from current poultry houses to reduce disease transmission and on elevated ground to assure water drainage and better ventilation.

If modifying an existing structure, try to adhere as closely as possible to the following structural requirements to provide a good home for the chicks.



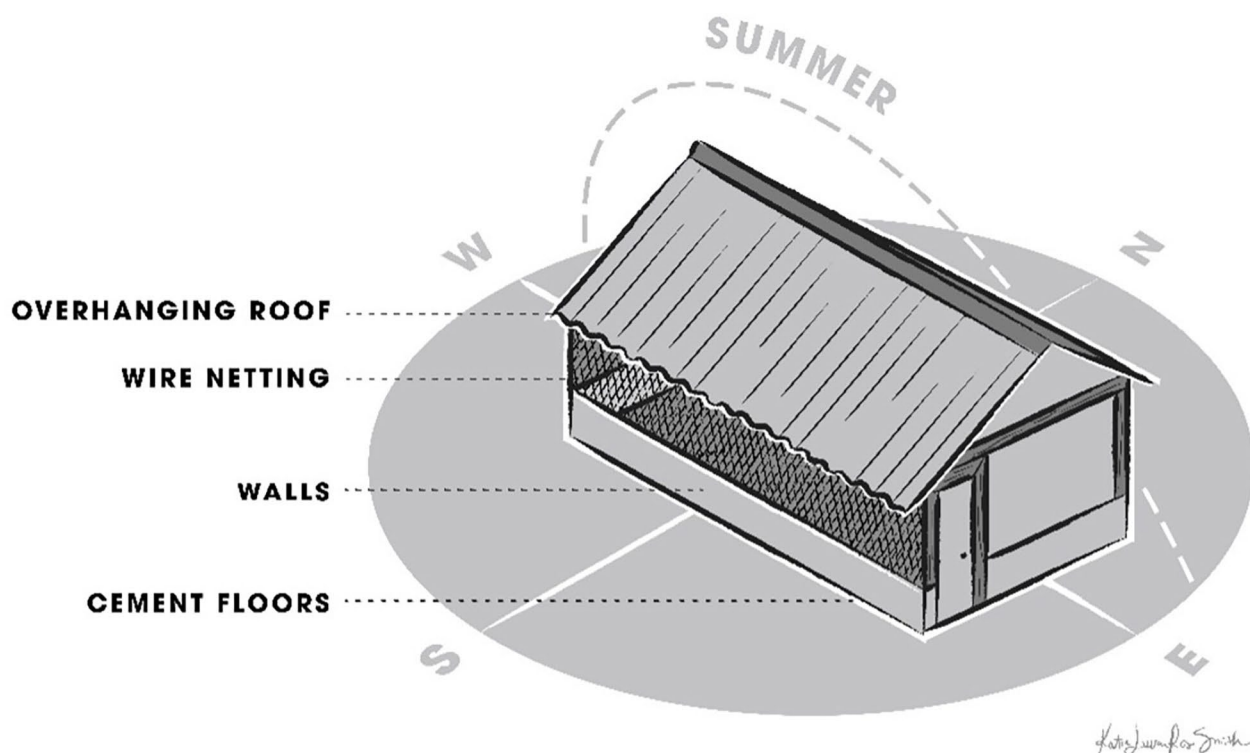
*WPF Photo: Typical open sided brooder unit house*

## FLOOR

The floor must be able to be thoroughly cleaned and disinfected. Preferably the floor would be made of concrete, but a solid hard packed dirt floor is acceptable. The key requirement is that no cracks or holes are present so that it can be easily cleaned and disinfected. Any cracks and holes may allow disease-causing organisms to flourish and potentially affect the flock. Floors should also extend above ground level for drainage and to help prevent flooding.

The area of usable floor space dictates how many chicks your facility will house. A common mistake is to place too many birds in a house, which creates crowding and adverse

litter conditions. Crowding can lead to mortality from heat stress and stunting due to inadequate feeder and waterer space. It is important to accurately calculate the length and width of the inside walls of the structure to determine the correct square footage to know how many fully brooded birds can be properly housed. Consider only space the birds will have available to them. For example, subtract charcoal heater space, storage, or posts from the overall floor space of the brooding chamber. As a rule, the capacity of a poultry house should be 15 birds per square meter of usable space. To calculate *usable* floor space, see [Appendix B \(a\)](#).



WPF Drawing: Proper poultry house orientation



## SIDE WALLS, WIRE MESH AND CURTAINS

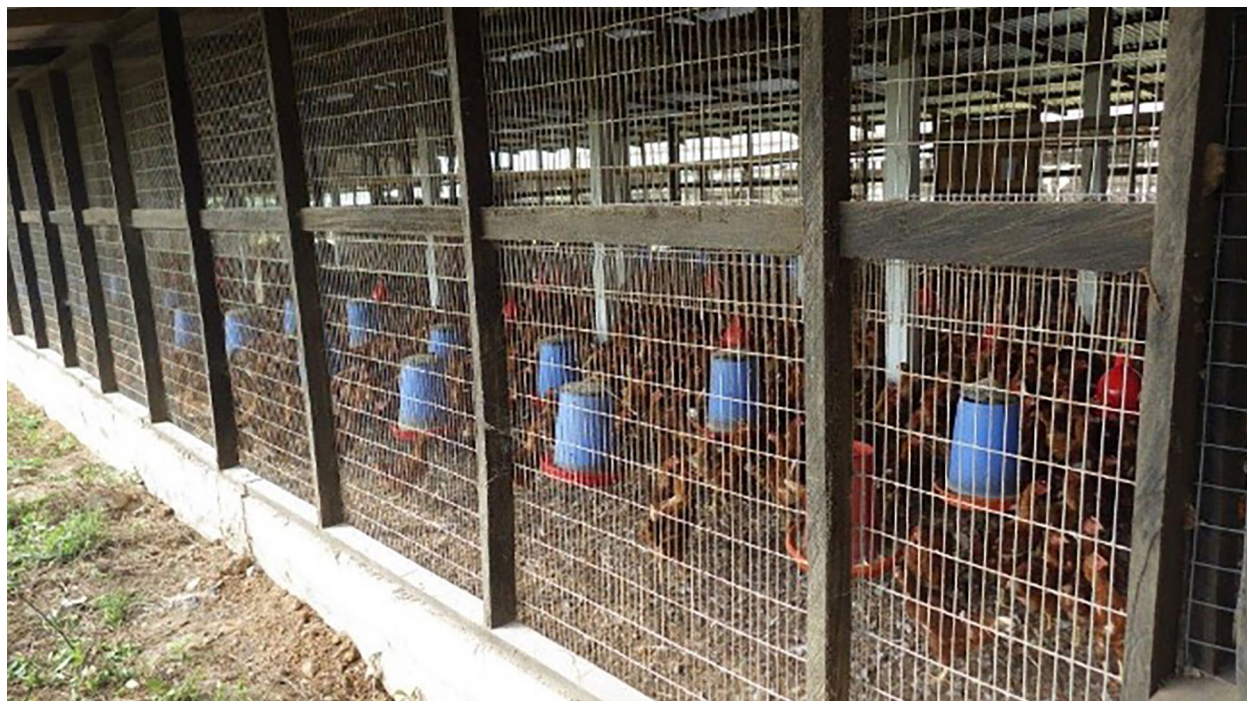
Side wall height on open houses must be high enough to prevent animals and predators from entering the house, but should not be over 0.6 meters (2ft) to allow for good ventilation. Side walls that can be easily cleaned and disinfected will help minimize bacteria, viruses and other disease-causing organisms.

Bird proof wire mesh needs to be in place and maintained from side wall to ceiling. Mesh needs to be small enough to exclude wild birds but not so small as to inhibit air flow.

An open house must have plastic side curtains to close during cooler temperatures and open during hot days. Baby chicks cannot regulate their body temperature until around 5–7 days of age and require a Zone of Comfort for proper growth and survival. If nighttime tempera-

tures fall below 25°C (77°F), then curtains are required to hold heat inside the house. Side curtains may also be used to shade the birds from direct sunlight.

It is preferable to have curtains on a winch system or chains so that curtains can easily be adjusted during the day or night and in inclement weather. When the birds are younger, it is important to prevent direct wind flow across the chicks to prevent chilling. If there is a strong wind, raise the curtains on the windward side and lower on the side opposite the wind. This will block the wind but allow proper fresh air availability for the birds. Always keep an eye on the birds and if they are panting or have their wings drooped down, they are too hot and need the curtains to be lowered to increase air flow.



*Picture: Side wall and wire mesh*

## ROOF

The roof should be at least 2.5 to 3 meters from floor (8 to 9.8 feet) level to facilitate good air movement. If possible, an overhang of 1 meter (3.3 feet) from the side walls will help prevent rain from entering the house and give shade to the birds. In addition, adequate storm water run-off (gutters) is recommended to prevent rain and moisture from getting into the poultry house and affecting the comfort of the birds.

If insulation is available, it is recommended the roof be insulated to reduce heat radiating from the roof into the house during the heat of the day. If insulation is not available, the higher the roof the better.

## SECURITY

Be certain that the door to the poultry house can be locked to prevent unwanted visitors and theft. Many diseases that affect chickens can be carried and transmitted by human traffic. Limit visitors to the poultry house, particularly if they own and work with other livestock. A good rule is to not allow anyone in the poultry house unless they have either been away from other chickens for 24 hours or at the least have changed clothing and footwear.



*Pictures: Showing overhangs for water runoff and providing shade  
Courtesy of Hendrix Genetics*

# 4

## Basic requirements for a Brooding Unit

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### INTRODUCTION

The Brooder Unit is the foundation of the Poultry Multiplication Initiative. The brooder unit operator in essence acts as the surrogate mother for the baby chicks protecting them from predators and providing warmth and care.

Day 1 to day 10 is the most critical period of a bird's life as to the development of organs and the immune system. Baby chicks cannot regulate their body heat and therefore require supplemental heat and proper care to survive. When a baby chick arrives on the farm, the heart and lungs are functioning, but the digestive tract is dormant and does not start up

until the chick has ingested feed and water. To assure that the chick gets the proper nutrition and environment (i.e., dry, warm), the brooder unit is an essential part of the chain to nurture the chicks until they are ready to be released into the harsh free-range conditions seen in the rural villages.

To qualify to become a Brooding Unit enterprise, there are minimum requirements that must be met. The following categories will provide guidance on what characteristics and infrastructure a successful brooder unit operator must provide.



## MANDATORY REQUIREMENTS

### HOUSING/STRUCTURE

The facility used for brooding (referred to as the “Brooding Chamber”) has many of the same requirements as a large commercial chicken operation:

- i. The roof of the structure must be intact and have no holes or gaps that would allow rain to leak into the house. The ability to keep the house dry is essential.
- ii. Side walls must be intact with no holes or gaps that would allow easy access of rodents or predators.
- iii. The house must have adequate side wall openings for proper ventilation (ability to keep air fresh and without direct drafts that could chill the birds).
- iv. Bird and rodent proof — The side openings should be completely covered in bird wire with no holes or gaps.
- v. The floor must be solid and with no holes or gaps. A brooder unit structure with a concrete floor is a plus as a concrete floor enhances the cleanout and disinfection process. However, regardless of the floor type (concrete or dirt), the requirement is that the floor must be in good shape. Good shape is defined as no cracks, relatively level, and has the capability to be cleaned and disinfected.
- vi. If nighttime temperatures fall below 25°C, then side curtains or plastic is required to hold heat inside the house (a



WPF Photo: Place mesh over all openings

minimum of 25°C during the first 7 days). Remember, baby chicks cannot regulate their body temperature until around 5 to 7 days and require a “Zone of Comfort” for proper growth and survival.

- vii. Dry/Waterproof feed storage area — This area does not necessarily need to be a separate building (although a plus if available) and can be inside the brooder unit. However, this area must be secure to prevent birds from accessing any space inside the house used for feed storage and must be accounted for when calculating the capacity of useable floor space.
- viii. Fresh water source availability. If under 1000 birds, the source of the water (well/borehole) should be no further than 50 meters from the house. If over 1000 birds, then running water to the facility would be required.
- ix. The house should not be in a low-lying area that is vulnerable to flooding during the rainy season.
- x. Any vegetation nearby the poultry house should be cut, and the area clean — no trash or discarded or stored items should be around the facility.

### EQUIPMENT

As with the structure, there are minimum requirements for equipment that are mandatory. Maintenance of the needed inventory of functioning feeding and watering equipment is essential.

- i. Supplemental feeding trays — These are the trays used for the first 7 to 10 days in brooding to help the chicks find the first feed and then to start the transition to the hanging feeders. At a minimum, 1 supplemental feeder tray for every 50 chicks is needed (for every 500 chicks, 10 feeder trays would be required).



Hanging tube feeders — These are feeders for the juvenile birds after 10 days of age. At a minimum, there should be 1 feeder for every 70 birds (for every 500 birds, 7 tube feeders would be required).



- ii. Chick Fonts/Waterers — Chick fonts are used for providing water to the baby chicks and typically are used for the first 2 weeks. For every 50 birds, a water font is required (for every 500 birds, 10 water fonts are needed).

If bell waterers are available, then the fonts can be removed after 10 days. **If the capacity is more than 1000 birds, some type of automated waterer system (bell drinkers) is required.** Just remember that 4- to 5-week-old birds consume large amounts of water, particularly in hot and humid environments.



- iii. Bell Waterers/Water Fonts — After 7 days, if continuing to water by hand, the minimum number of fonts would be 3 per 100 birds (15 drinkers for 500). If using bell drinkers, 1 drinker for every 100 birds (5 bell waterers for 500 birds).



- iv. Heaters — The source of heat can be charcoal pots, gas brooders, wood stoves, or any other form of clean heat. The objective is to have as many heat sources as required to create a “Zone of Comfort” for the chicks. A good rule of thumb is 1 heat source for every 100 chicks (5 charcoal pots for 500 birds).
- v. Locks need to be on the doors of the brooder unit to prevent theft and unauthorized entry.

## WATER

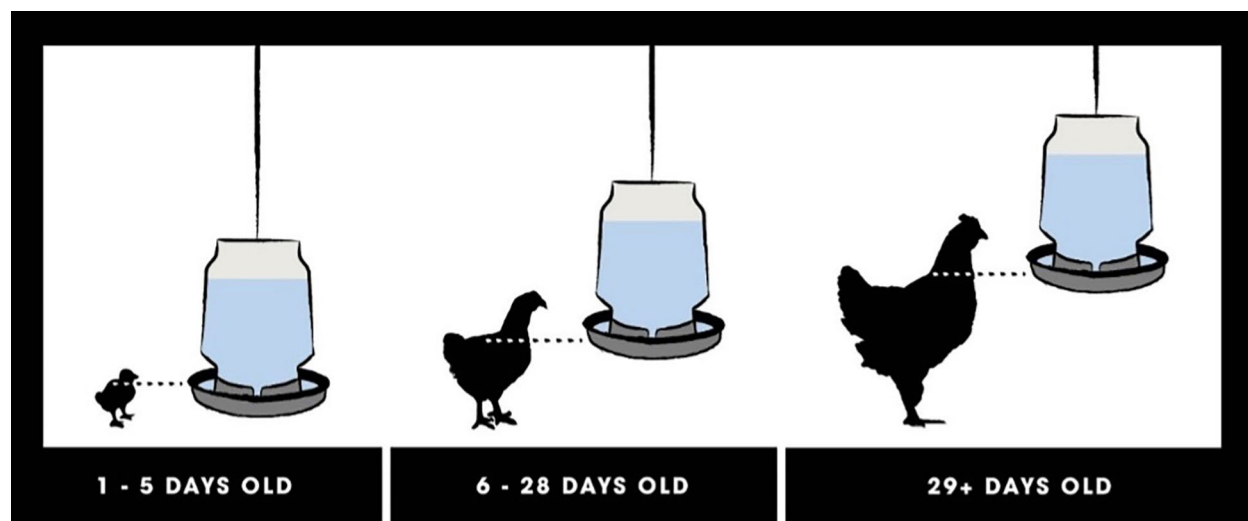
A 5-week-old bird will consume water at approximately 2.5 times the amount of feed consumed. At 5 weeks of age, the typical dual-purpose bird will consume 65 grams of feed a day so water intake would be around 162 grams. This equates to 0.16 liters of water per day per bird, and as temperatures exceed 30° Celsius, this can increase to 0.19 liters per day. **IT IS CRITICAL THAT THE BIRDS HAVE ACCESS TO CLEAN WATER AT ALL TIMES.**

If under 1000 birds, the source of the water (well/borehole) should be no further than 50 meters from the house. If over 1000 birds, then running water to the facility would be required.

Chicks are natural scratchers and love to play around in the bedding. This usually indicates that the chicks are happy and in a Zone of Comfort, but this creates problems. Drinkers get filled with debris and this not only takes away the access of water for the chick, but is a sanitation issue. Walk through the house and empty any drinkers that have shavings into a bucket. **DO NOT** just throw onto the litter as this can create even bigger problems.



**HINT:** The waterers need to be raised as the birds grow. The lip of the waterers (and feeders) should be at the height of the bird's back.



*Kathy Jumper Smith*

### LIGHTING

Chickens have varying eating behaviors, but most are program eaters which means they eat many meals during the day. If the birds are in darkness for extended periods of time, they will be off feed too long and become hungry. It is best to limit the hours of darkness so that chicks have the ability to eat and drink at will. If no electric lights are available, then solar lamps must be used throughout the house. The goal is to have no more than 4 hours darkness per day.

### BIOSECURITY

All aspects of biosecurity including the quality of the structure, proximity to other commercial poultry, entry/access control, and restriction of visitors need to be examined and assurances made that the proper controls are in place. Many poultry diseases and pathogens

can be transmitted by human or animal traffic, so it is important to have controls and barriers in place. See [Chapter 8](#) of this manual for more on biosecurity.

### SCALE

Brooders Units must have a scale for weighing birds. Taking and recording regular weights is an important part of assuring chick health and proper management. See [Appendix C \(b\)](#) of this manual for weighing procedures.

### THERMOMETERS

The WPF recommends placing a thermometer in the house at chick level which allows the brooder to determine if the temperature is within the range comfortable to chicks. Temperature of the litter and floor is more important than air temperature. Be sure to preheat the brooding areas at least 24 hours before

chick arrival to be certain the floor is warm when the chicks are placed. See [Appendix B \(d\)](#) for more information on thermometer placement in the house.

### BENEFICIAL ATTRIBUTES

The following are not mandatory requirements but are beneficial to the proper management of a BU.

#### FOOT BATHS

Foot baths are a good addition to biosecurity, but they must be maintained. Should the

foot bath become dry, or if it is not routinely cleaned and the disinfectant changed, it can be worse than no foot bath at all. Dirty standing water can become a source of pathogens that can be tracked into the house each time someone steps in it. Having a poorly managed footbath will be more harmful than helpful. Therefore, if a foot bath is utilized, it must be properly maintained.

#### CONCRETE FLOOR

Although not a requirement, a brooder unit structure with a concrete floor is an advantage as concrete makes the cleanout and disinfection process easier.



*Photo: Chicks with clean litter exploring their new house  
Courtesy of Dr. Scott Gillingham; iChicken*

# 5

## Cleaning and Disinfecting the Poultry House

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### INTRODUCTION

Cleaning and disinfecting a poultry house thoroughly between flocks is essential. It is extremely important to thoroughly clean and disinfect a poultry house between flocks. Cleaning the house reduces the number of pathogens, including bacteria and viruses, which can carry over to the next flock of chicks and jeopardize their health and performance. This is also the time to make any necessary repairs to the house itself.

Cleaning, disinfecting and the necessary rest period between flocks is an important step in the production cycle.

### CLEAN OUT

The first step in cleaning the house is to remove all litter and all moveable equipment. All feeders, waterers, heaters and other materials should be removed from the house and cleaned. Any remaining stored feed and other materials within the house should be removed as well.

All organic material must be removed from the floor, side walls and other areas of the house. Organic materials include litter, feathers, manure, old feed and dust. Should organic material remain, disinfectants will not work as effectively to destroy pathogens (which may affect the health of the next flock).

The complete and proper removal and disposal of litter is a critical step. Start from the back of the house and work toward the door. All litter should be placed in bags within the poultry house to prevent spills and wind from carrying contaminants back into the house. Litter can be valuable as a fertilizer for crops, but any used litter must be disposed of far away from the house to prevent any contamination.

### HOUSE REPAIRS

Once all equipment has been removed and all organic material has been cleaned from the house, look for any repairs which need to be made before the final disinfection process. Inspect the floor, side walls, wire screening, curtains and roof for leaks or damage and make the necessary repairs. Once the inspection is completed and all necessary repairs made, wash or spray the interior of the house with water to remove any remaining dirt, dust and organic matter.

## DISINFECTING THE EQUIPMENT

Wash the equipment (feeder trays and waterers) with a brush and soap to remove all dirt and caked feed prior to application of the disinfectant.

Once the cleaning and repairs has been completed, apply a disinfectant to the house. These can be found at a local agro-dealer or distributor. A disinfectant is a chemical compound that destroys microorganisms that might carry disease. It is extremely important to follow the label directions when preparing disinfectants. The chemicals utilized will not work properly if not mixed to the manufacturers recommended concentrations. As an example, a disinfectant that recommends a

dilution rate of 1:100 means 1 liter of disinfectant to 100 liters of water.

Using the disinfectant, spray or wipe down the floor, sidewalls and clean the curtains. Try to reach as much of the house as possible, including roof supports. Be certain to disinfect the entire house, including storage areas.

When working with disinfectants, take precaution to protect yourself and your family. Wear gloves, boots, and clothing to protect the skin when applying the disinfectant. Do not allow others to enter the poultry house while disinfecting and allow to dry before reentering the facility.



WPF Photo: A house being prepared for DOC delivery

### REST PERIOD

After having thoroughly disinfected the house, raise the curtains, close, lock and leave empty for 14 days. Raise the side curtains to increase the heat in the house. Viruses cannot live for very long without a host (chickens, manure, organic matter).

### SUMMARY

A proper cleaning of a poultry house between flocks is critical. A proper cleaning, disinfecting, and rest period reduces pathogens in the poultry house and reduces the stresses on the next flock of chicks.



# 6

## Brooding – Zone of Comfort

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### INTRODUCTION

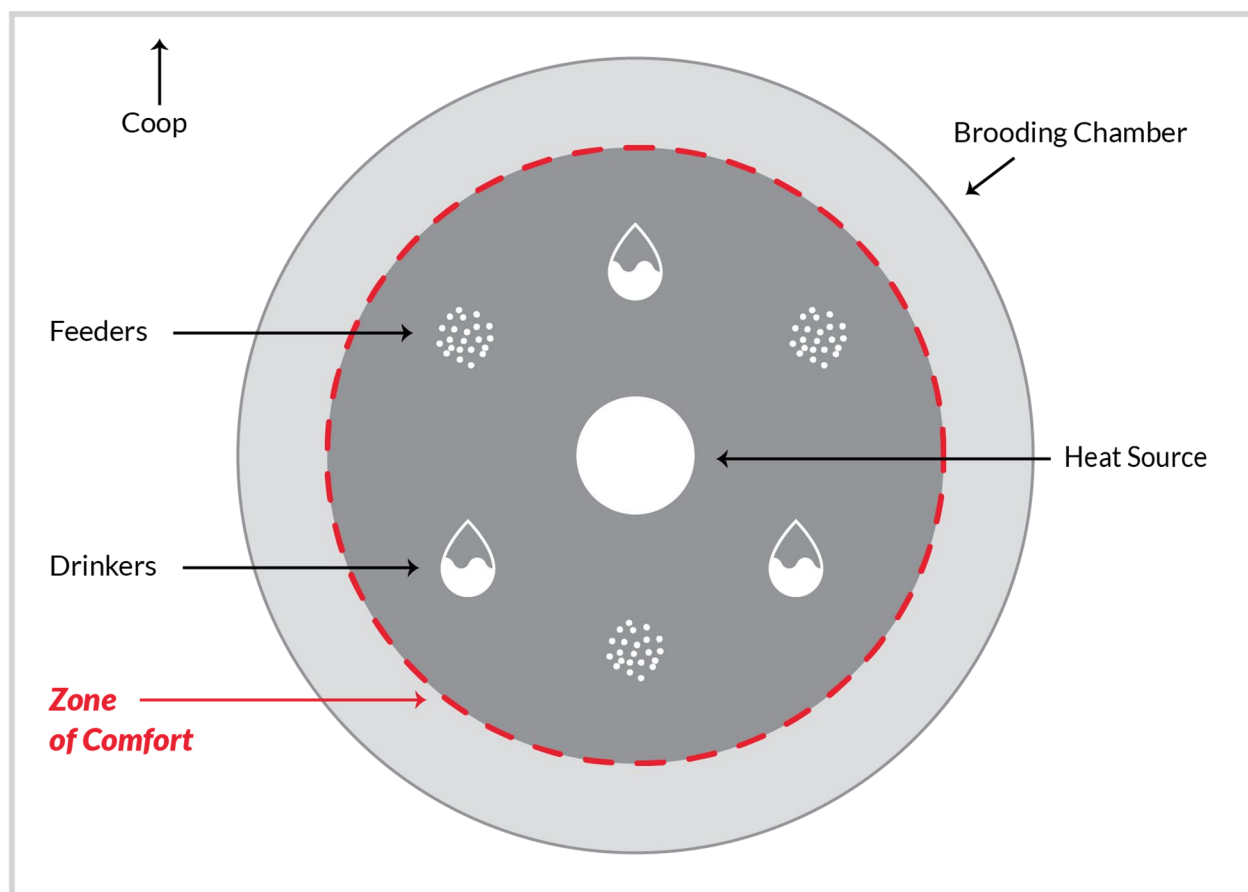
It is importance to create a “Zone of Comfort” for the chicks during the brooding period. The chicks could have endured a long trip from the hatchery and may be stressed when they arrive. Having the ideal environment for them when they arrive will help reduce this stress and get them off to a good start.

Day 1 to day 10 is the most critical period of a bird’s life as to the development of organs and the immune system. Baby chicks cannot regulate their body heat and therefore require supplemental heat and proper care to survive. When the chicks arrive on the farm, the heart and lungs are functioning, but the digestive tract is dormant and does not start up until the chick has ingested feed and water. To assure that the chicks get the proper nutrition and environment (i.e., dry, warm), the brooder unit is an essential part of the chain to nurture the chicks.

For the next 35 days, the brooder unit is where the chicks will spend their time and the objective is to provide an environment where they feel warm, safe, and secure. As the caretaker, you are assuming the role of the mother hen and the baby chicks will depend on your care to properly grow into adult healthy birds.

After the house has been cleaned, washed, and disinfected as outlined in the prior chapter, proper heating, brooding chamber set-up, and feed and water distribution must be ready upon arrival.

The objective is to create a Zone of Comfort, which is an imaginary circular line around the heat source where chicks have access to feed and water and don’t have to go far. If a chick remains outside the Zone of Comfort for a period of time, it will become chilled and will not find the feed and water and will fall behind in development.



WPF Drawing: The dotted line illustrates the desired **Zone of Comfort** within your brooding chamber

Providing this Zone of Comfort is critical for the chick's health and for profitability.

**HINT:** Should your brooding chamber be placed in a corner, be sure to place cardboard or other materials to round-out the corner so chicks do not pile up and get injured or suffocated.

## WATER

If water is plumbed directly to the house, let the water run for a time to clear the lines of any impurities. Prior to arrival, assure all waterers are filled and at **room temperature**. Remember, water not only provides hydration for the birds but is involved in regulating body temperature, digesting food, and eliminating waste. Chicks must have access to water immediately after delivery from the hatchery.

At normal temperatures, chickens typically consume twice as much water as feed and

during periods of high temperature water consumption can double or triple. Water on the farm must be clean and safe to drink. If you would not drink the water or give it to your children, then it should not be provided to the birds.

## FEED

Before the chicks arrive, it is essential to prepare the feed trays. Paper should be placed under each feed tray to prevent any spillage from being wasted in the litter. Feeder trays should be filled to capacity allowing a small amount to spill over onto the paper for the first feeding (only do this the first time). Spread the lids evenly across the room around the water founts near the heat source. If the chicks are in their Zone of Comfort, they will become curious and start finding the main feeders and water.

**HINT:** Noise made by tapping or scratching on trays and waterers in the first few hours will stimulate the chicks by “calling” them to the feed and water. Repeat as often as needed.

Remember, the supplemental feeder lids and chick fonts are the main source of feed and water for the first 7 days, but we want to assist the chick’s transition to the larger feeders.

The key to early feed management is to provide support to help the chicks find their first feed and creating a zone of comfort is a key.

**HINT:** A GOOD GUIDE IS 40–50 GRAMS OF FEED PER CHICK FOR FIRST FEEDING.

The particle size of feed must be appropriate to the age of the chick. Large particle sizes will limit the chick’s intake and create stunting or starve outs. A mash feed or fine crumble is recommended for the first week. If receiving blended feed from the chick supplier, consult with them if the particle size is too large.

### Feed particle size:

CHICK AGE	FORM	PARTICLE SIZE
1–18 days	Starter feed (mash or crumble)	1.5 to 3.0 mm
11–18 days	Mini-pellets	1.6 to 2.4 mm
19 days till sale	Pellets	3.0 to 4.0 mm



Feed is 60% to 70% of the cost of producing a chicken so it is important to provide the chicks with good quality of feed while taking all the measures to avoid wastage. Never limit feeding just to save feed, as the result will be worse than some wasted feed! It is recommended that beginning on day 14 feeder trays should be removed if there are hanging feeders available. If the trays are the only source of feeding, allow the trays to com-

pletely empty in the evening before adding the last feed of the night.

This allows the chicks to clean up any feed that has been spilled outside of feeders and reduces feed waste. Feed left in the bedding may become moldy and in humid conditions could increase the chance of mycotoxin growth which can be harmful for chicks.



*Photo: Example of feed wastage*

## BEDDING

Place new bedding to a depth of 5 to 10 centimeters (2 to 4 inches). The litter or bedding acts as a cushion or barrier from the floor and absorbs moisture. If there is inadequate bedding in the house, it will not absorb and release moisture properly and will become wet and slick. Not only does this create an uncomfortable environment for the birds to walk and sleep on, it also increases the chances of pathogens and parasites that can affect the birds' health.



*Photo: Chicks exploring their new home  
Courtesy of Dr. Scott Gillingham; iChicken*

## TEMPERATURE

As previously mentioned, chicks cannot regulate their body temperature for the first 5–7 days so supplemental heat is required for them to stay comfortable and to avoid chilling. Even if it is 28° Celsius outside, the chicks must be able to get warmth on their backs.

There are many options on the source of heat. Charcoal pots, gas brooders, or heat lamps are all acceptable.

It is important that if wood or charcoal is used, it is lit outside of the house and only placed in the house when the coals are glowing and not putting off excessive smoke. If lighting the coals or wood inside of the house, it can give off toxic fumes or heavy smoke that can cause problems to the respiratory tract for both you and the birds.

The objective is to create a Zone of Comfort which is an imaginary circular line around the heat source where chicks have access to feed and water. If a chick remains outside the Zone of Comfort for a period of time, it will become chilled and will not find the feed and water and will fall behind in development. Also, make sure that there are no unwanted air drafts that could create cool spots in the house.

When the chicks arrive, the target is to have the house temperature at 25° Celsius (77°F) and then maintain a temperature of 29° Celsius (84°F) for the first week. Take extra precautions so that the temperature does not fall below this at night, as keeping the chicks from getting chilled is very important for good healthy birds.

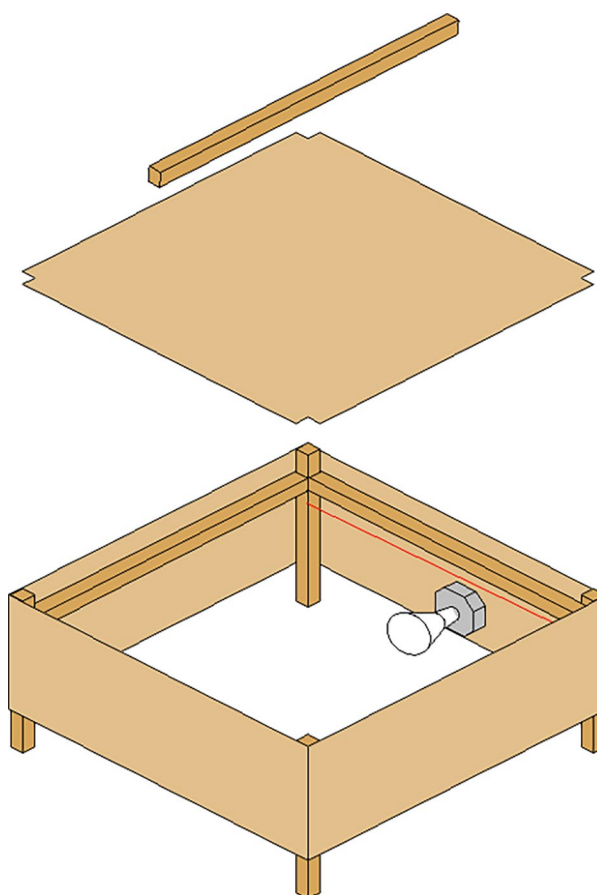
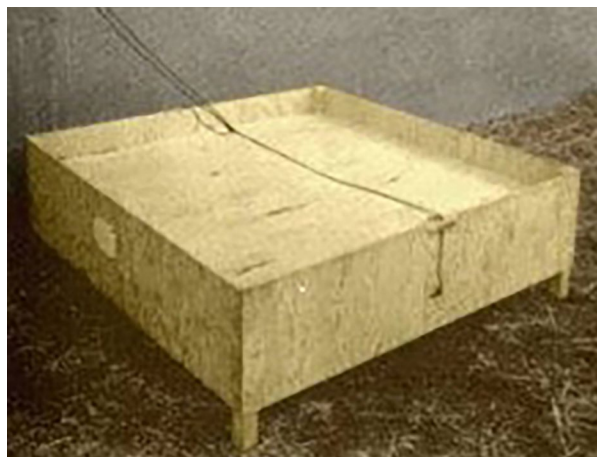
**HINT:** The WPF suggests building a temporary barrier around the heat source for the

first 5 days to keep chicks confined in the Zone of Comfort. Be certain that the chicks have sufficient space to move away from the heat source if they are too hot, and check frequently for chicks that may have gotten outside of the barrier. Keep litter clean and remove the barrier after 5 days.

If the chicks are huddled up and not active, make sure that the area is properly warmed and there are enough heat sources for all chicks to gather around. The general rule is to have 1 heat source for every 100 chicks. If you observe that chicks are surrounding the heat source, but there are chicks still outside of the zone of comfort that appear to be huddling for warmth, add additional heaters. As the birds get past 14 days, the attention switches to keeping the birds cooler. Open window openings to provide as much fresh air as possible and avoid overcrowding.

We recommend having a simple minimum/maximum thermometer and recording the high and low temperatures each day. Adjustments should be made if it is getting too hot or too cold.

**HINT:** In high ceiling houses, the heat from the brooding heaters rises and may not radiate outward as far as needed. This is especially true for cooler climates or cold nights. One way to create a larger Zone of Comfort is to construct some type of structure that can capture the heat and radiate it back to the ground. Some examples of this would be roofing tin or 55-gallon drums that are cut in half and put on legs. These can be placed over the heat source to create an “umbrella effect”. By doing this, the costs of brooding may be reduced by focusing heat on chicks within the brooding chamber rather than heating the entire poultry house.





However, if any type of metal material is used, take precautions to prevent accidental burns as the metal can become very hot. Also, when evaluating any type of artificial barriers, make sure it does not create any fire hazard potential.

A brooding chamber heat barrier can be made of wood or other appropriate available materials and uses heat lamps as the source of heat. As an example, a brooder may be a simple 5-sided wooden box on legs.

Construction of a brooder is simple. The height gap between the side walls and the floor for day old chicks should be between 10 to 13cm (4 to 5 inches). **The brooder level must be raised as the chicks grow older.** This can be done by placing blocks or bricks under each leg, assuring that the brooder is stable.

Inside the box are 2 to 4 outlets for light bulbs, depending on how much heat that needs to be generated.

The brooder helps in conserving heat by trapping the warm air under the box top. That is, the top of the brooder acts as an umbrella and keeps the heat closer to floor level. If the chicks feel cold, they come under the brooder, and if they are warm, they will move to other parts of the brooding chamber.

A 1.2 by 1.2 meter (4-foot by 4-foot) brooder is sufficient for 250 chicks.

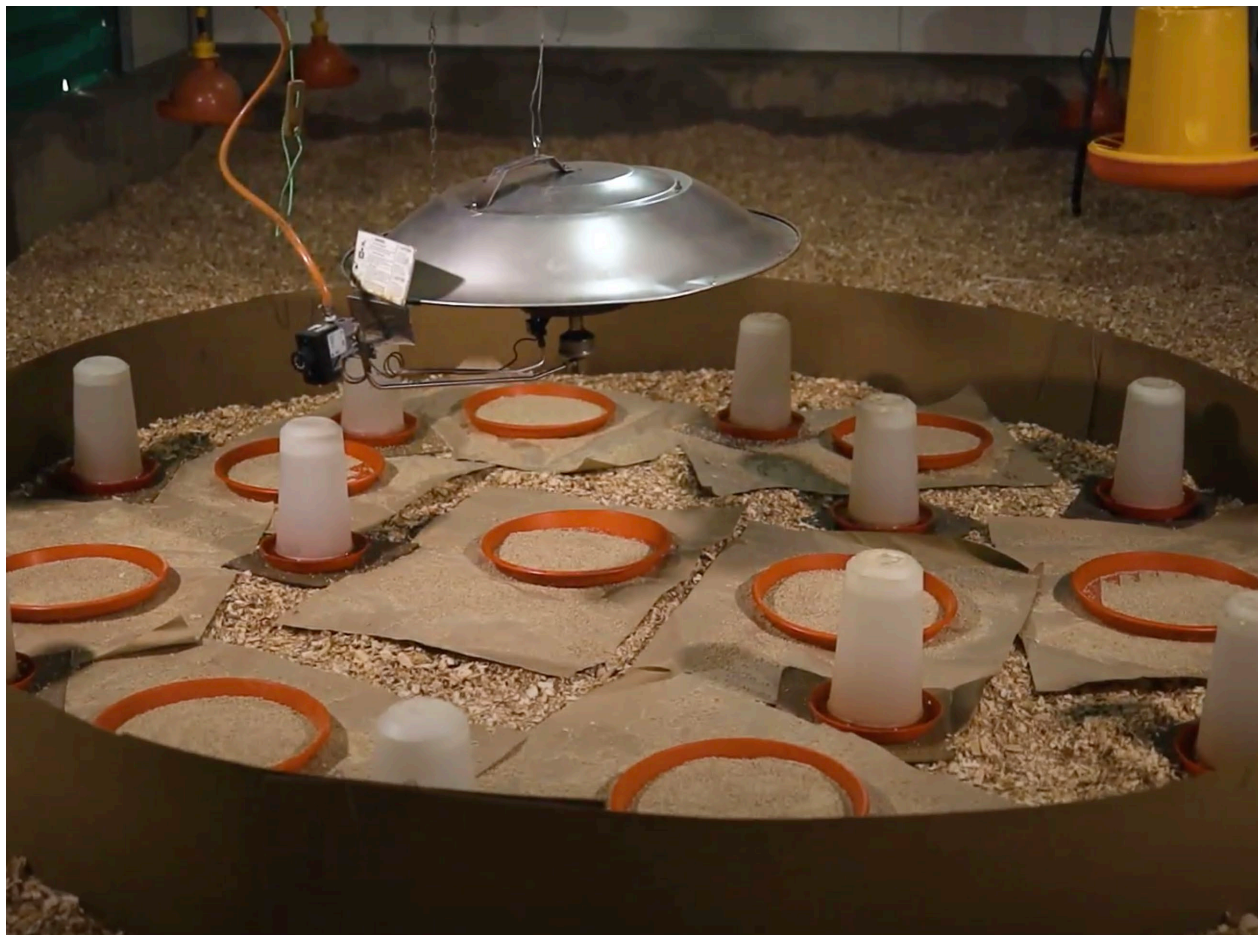
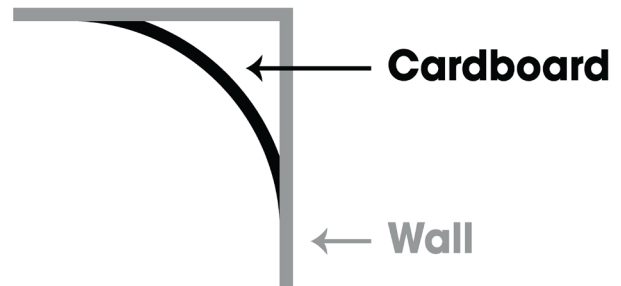
Other options include factory made metal brooders like that shown below.

If using a heat barrier, make sure it is the correct height for the chicks. The chicks need to be able to enter and exit freely and that it is not too low to the ground creating hot spots underneath. If no chicks are under it and are all huddled around, then it may be too low. In this picture below, the cover is too low. Notice that the chicks are huddling around the side of the brooding chamber and not under it.



## ROUNDING OUT THE CORNERS

Make sure all corners of the brooding chamber are rounded off with metal or cardboard. Be certain to minimize any areas in the house where chicks could pile up on each other which can cause injury or mortality.



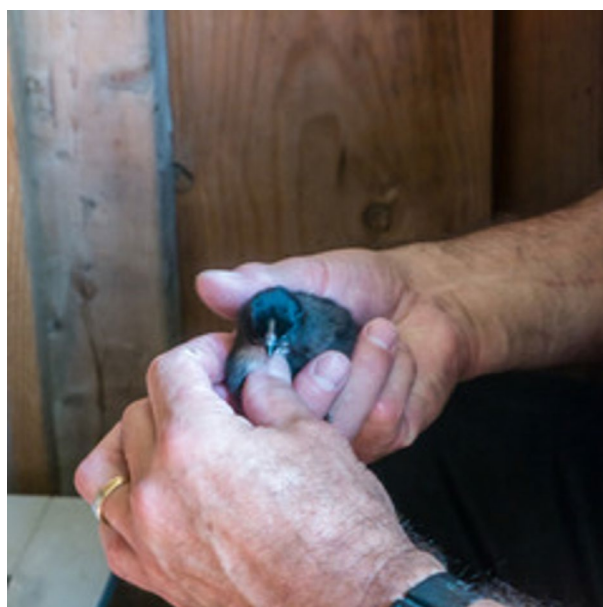
*WPF Photo: rounding out any corners in the brooding unit*

## CROP FILL

A good practice is to check the crop fill of the chicks no longer than 12 hours after delivery. The crop is a little pouch at the bottom of the neck just before the breastbone.

After 12 hours, the crop should be full and soft. If it is empty the chick is not eating. If it is hard, the chick is eating but may not have enough water to push feed through its digestive system. A good rule is that for every 1 gram of feed a chick eats, it will need approximately 2.5 grams of water. After 12 hours of delivery, randomly pick up 10 chicks and feel the crop. At least 8 out of the 10 should have feed in the crops and after 48 hours, all chicks should have feed in the crop. The photo below shows a veterinarian checking for crop fill.

Should chicks not be having their crops full, that could mean they do not have enough



*Photo: Checking for crop fill  
Courtesy of Dr. Scott Gillingham; iChicken*

water, the feed size is too large, or the chicks are too hot or too cold and not eating. If there is a problem, continue to check every 4 hours to see if there is improvement.

### Crop Fill Goals:

TIME AFTER DELIVERY	TARGET PERCENTAGE OF FLOCK WITH FULL CROP
2 hours	75%
8 hours	80%
12 hours	85%
24 hours	95%
48 hours	100%

See [Appendix B](#) on how to check for Crop Fill

## VENTILATION

Ventilation is the amount of air moving through the poultry house. Proper and adequate ventilation is essential as it supplies fresh air to the birds and removes dust, carbon dioxide, ammonia gas and moisture from the bedding (ammonia comes from the uric acid in poultry manure and is made worse by wet floor conditions). High ammonia and dust levels can damage the trachea, eyes and lungs of chickens and make them more susceptible to respiratory diseases. If the ammonia is stinging your eyes, be assured that it is affecting the chicks as they are closer to the source.

On a windless day, the house may rapidly increase in temperature and can stress birds. Chickens do not have sweat glands and use

their respiratory system to regulate body temperature during hot weather (chickens pant to remove body heat). Routinely adjust the side curtains to make sure the air is fresh but without allowing the brooding chamber to cool down. However, we had rather see the house *slightly* cooler versus being warmer with high ammonia.

If the BU was converted from an existing non-poultry structure to house the birds, it is very important to assure the proper ventilation for the chicks.

## LIGHTING

Unlike commercial broilers, the dual-purpose breeds do not require 23 hours of light. However, a brooder must limit the hours of darkness so that the birds can eat and drink at will. Chickens have varying eating behaviors, but most are program eaters which means they eat many meals during the day. If they are in darkness for

extended periods of time, they will be off feed too long and will become hungry. Therefore, when feeding for the first time in the morning, they may pile on top of each other in the feeders resulting in mortality. If the feeder space is limited, it can also create a situation whereby the smaller birds may not get the opportunity to satisfy their needs creating uneven birds. Having the proper number of supplemental feeders and waterers is essential so that all chicks have access to feed and water.

WPF recommends having solar lamps throughout the house if electricity is not available. *The goal is to have no more than 4 hours darkness.* At night, the brightness of the bulbs should be so that one can visibly see all of the chicks throughout the brooding chamber. The chart below is the ideal lighting program for a flock so try to stay as close to it as possible. If utilizing solar energy, make sure that the chicks do not sit in long periods of darkness.

AGE	DURATION OF LIGHT	DURATION OF NIGHT	LIGHT OFF	LIGHT ON
Day 1	23h	1h	Midnight	1:00 AM
Day 2	22h	2h	Midnight	2:00 AM
Day 3	21h	3h	Midnight	3:00 AM
Day 4	20h	4h	Midnight	4:00 AM
Day 5	19h	5h	11:00 PM	4:00 AM
Day 6	18h	6h	10:00 PM	4:00 AM
Day 7	17h	7h	9:00 PM	4:00 AM
Day 8	16h	8h	8:00 PM	4:00 AM
From Day 9	Natural light + 2 hours extra light (23:00 PM–1:00 AM)			



## STOCKING DENSITY

A common mistake for brooder units is to place too many birds in the house. This creates crowding issues which can lead to losses from heat stress, stunting due to inadequate feeder and waterer space, and severe litter conditions which can increase incidence of parasite infections and bacterial challenges.

It is important to accurately measure the inside walls of the structure to determine the correct square footage to determine how many birds can be properly housed. Consider any penned areas or posts that subtract from the overall floor space in the calculation of the size of the brooding chamber.

To calculate the floor space, multiply the length of the inside wall by the width of the inside wall. For example, if the inside wall is 7 meters and the width of the house is 5 meters, then the total floor space is 35 square meters.

At most, the capacity should be 15 brooded birds/square meter so in this example the capacity of the house would be 525 birds (35 square meters x 15 birds = 525).

Measure and determine the **USABLE** floor space and multiply by 15 birds as the maximum capacity of the structure.



*WPF Photo: Too high of a stocking density with limited feed and water*



## SUMMARY

Although chickens don't speak our language, they do have the ability to communicate with us. Learn to observe your birds and closely watch their behavior. If they are spread out with wings drooped and panting, they are telling you that they are hot. If they are huddled together and not moving around, they may be telling you that they are cold. If you walk up to your house and hear them chirping loudly, they are telling you that they may be hungry or thirsty or under some other type of distress. Take time to just sit and observe the birds.

The first 7 days of a chick's life are the most important for the health and productivity of the bird's life and it is essential that we provide an environment that reduces stress and gives them a Zone of Comfort to realize their maximum potential.

**HINT:** The younger the chicks, the more often they need to be looked after — at least 4 times per day for new chicks.

The acronym **FLAWS** helps one remember what needs to be checked on a regular basis.

**FLAWS** stands for: **F**ood, **L**ighting, **A**ir (temperature and odors), **W**ater and **S**anitation, **S**ecurity and **S**tocking density.

**Food:** Do the birds have enough feed? Are the feeders clean and at the correct height?

**Lighting:** A well-lit brooding chamber helps the birds find feed and water. Avoid flickering lights and promptly change any burned-out bulbs. Lighting at night also provides safety for any care takers.

**Air:** Is the air fresh? Is the poultry house too hot or too cold? Is there a strong odor of ammonia, mold or wet litter? Avoid direct air drafts across the chicks for the first 7 days.

**Water and Sanitation:** Do the birds have enough water? Are the waterers clean and at the correct height? Are any leaking or turned over? Correct any deficiencies.

**Security and Stocking density:** Have any unwanted birds or rodents gotten into the house? Is the house secure from visitors? Do the chicks have enough space to have access to feed and water without overcrowding?

Go to the WPF website at [www.worldpoultryfoundation.org](http://www.worldpoultryfoundation.org) to find instructional videos on all of the FLAWS. FLAWS checklists can be found in the [Appendix C \(c\)](#) and [\(d\)](#) and on the WPF web page.

# 7

## Vaccination

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### INTRODUCTION

When receiving day old chicks from the hatchery, they will have been vaccinated for the major diseases such as Newcastle and bronchitis. This vaccine will provide the chicks with protection, but in most cases will require a “booster” vaccination which will be performed in the brooder unit. The purpose of the “boost” vaccine is to assure long-term immunity for the chicks and protect them from disease. Whether you are keeping the birds to grow out for eggs and meat or selling to customers, vaccination is a key step to keep chickens healthy so they can stand the harsh conditions seen in the rural areas.

The vaccination process is not complicated if you will follow the guidelines and steps outlined below. This chapter is to be used as a guideline, and if you have never water vaccinated a flock before, the WPF highly recommends that you seek advice from a qualified veterinarian or from the supplier of your chicks.

### HANDLING

The first step in the process is the handling of the vaccine. The vials of vaccine contain live viruses that can be destroyed if not properly handled. If the virus is destroyed, you will basically be vaccinating with water and will not immunize the chicks.

- 1) The vaccine bottles (vials) must be kept in a cool place (preferably a refrigerator or an icebox with ice) and not allowed to get warm. Do not let the vaccine get above 7° Celsius while in storage.
- 2) Make certain the vaccines have not expired. The date should be printed on the bottle.
- 3) Do not expose the vaccine to direct sunlight until you are ready to mix in the water.
- 4) Do not open the bottles until you are ready to mix in the diluent, chlorine-free or water.

### TIMING OF THE VACCINATION

The chicks arrive at your farm with antibodies from the mother hen as well as the vaccine given at the hatchery. The timing of the vaccination is dependent on the chick’s antibody levels and when they are ready for the booster vaccination. It is important that you vaccinate the chicks on the day that the supplier of the chicks recommends. If you vaccinate too early, the vaccine will not be effective and if you vaccinate too late, it can cause severe reactions that can affect the health of the birds. Typically, the first vaccine is given around 10–14 days after placement, but follow the advice of your DOC supplier as to the vaccination schedule.

## WATER RESTRICTION

When it is time to vaccinate the birds, it is important that they are slightly thirsty so that the chances of all chicks taking a drink is high. As a rule, remove all of the chick waters or raise the bell waters up an hour before you plan on vaccinating. By the time you prepare, mix the vaccine, and fill waterers, the birds should be ready. It is important that **ALL** the chicks receive a drink of the vaccine, but don't restrict water too long as that the birds will become severely thirsty, which could result in the bulk of the water being consumed too fast and smaller chicks not getting a drink.

**HINT:** Fill all of the waterers before you start putting them back in the house so that they can all be placed quickly. It is recommended to vaccinate the birds first thing in the morning and not in the heat of the day.

## MIXING

When it is time to mix the vaccine, get all of the buckets and water ready so that the vaccine can be mixed quickly. Typically, once the dried vaccine is dehydrated, it will be viable for about 2 hours (if not in direct sunlight).

### Steps for mixing:

- 1) Have enough water in a bucket (or 2) that can fill all of the waterers to  $\frac{1}{2}$  full. **Do not use chlorinated water to mix the vaccine as chlorine will destroy the virus.** If your water supply has chlorine in it, draw the water the night before you are to vaccinate and let it sit without a lid overnight. This way, any residual chlorine will be evaporated. If the water supply has high levels of chlorine, it is recommended to use a vaccine

stabilizer to add to the water. These can be purchased from your local vet or agro-dealer. If no vaccine stabilizers are available, powdered milk mixed in the water is an acceptable alternative.

- 2) Open all of the bottles (vials) of vaccine.
- 3) Take the vaccine vials and immerse them in the water to rehydrate the virus. Make sure that all of the vaccine is out of the bottle and in the water. Use a clean stick to gently stir the vaccine to make sure it is properly mixed.
- 4) Avoid using your hand or arm to mix the vaccine in the water. After mixing, avoid touching your eyes and face until washing your hands with soap and water.
- 5) Fill all of the waterers to  $\frac{1}{2}$  full with the mixed solution.
- 6) **Quickly** place the waterers throughout the house to make sure all chicks have access. You want to make sure you have enough waterers that all chicks drink within an hour.

Some vaccines have dyes in them and will turn the water into a light blue solution to indicate that the vaccine is present. If not, you can add a drop of food coloring if you have it available.

## DISTRIBUTION

You want to make sure that all chicks have the opportunity to take a drink of the vaccine, so spread the waterers evenly across the house. Once the waterers are placed, gently walk through the house to stir up the birds to encourage them to take a drink.

## FINAL STEPS

Once all the vaccine water has been consumed, remove the waterers and rinse them thoroughly with fresh water. If there is water left in the waterers after 2 hours, go ahead and remove from the house and discard it in a bucket (as all of the birds should have had a drink by then). Do not pour the unused portion of the water anywhere near the house and anywhere that children or other animals have access.

When cleaning the waterers, you can use a mild soap to clean them, but make sure that they are rinsed well before placing back in the house.

## DISPOSAL

Take the empty vials and place them in a bag and properly dispose of them by taking them away from the house and bury them in a pit. Vaccine vials are typically made from glass and you do not want to leave them lying around to have the risk of breaking and someone stepping on them.

## OBSERVE

2 to 3 days after the vaccination, you will want to hear a uniform sneeze in your flock that indicates a successful vaccination. The sneeze will sound like a low clicking noise and is normal. If the reaction is severe (very loud sneezing or a loud rasping noise) and if you start to see a rise in mortality, contact a professional veterinarian or your field agent for support.

It is important that you keep the birds warm and the air clear during this vaccine reaction to prevent it from becoming too harsh. As the

bird is building immunity from the vaccine, it puts stress on the immune system, and you want to keep the birds comfortable to minimize any additional stresses.

## RECORDS

It is important to keep good records in the event there is a problem, and these records can help you and other professionals troubleshoot the causes.

- 1) Type of vaccine (Newcastle, Bronchitis, Infectious Bursal Disease, Fowl Pox)
- 2) Date of vaccination
- 3) Number of vials used, and vial batch number
- 4) Source of vaccine (local agro-dealer, from the chick supplier/hatchery, etc.)
- 5) How long did it take for the vaccine to be consumed (1 hour, 2 hours, longer than 2 hours)?
- 6) Record daily mortality to see if there is an increase after the vaccinations.



# 8

## Biosecurity

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### INTRODUCTION

Biosecurity on the farm is important for your family's health as well as the health of the chickens. Biosecurity is a set of preventive measures designed to reduce the risk of transmission of infectious diseases in livestock. Simple tasks can reduce the risk of disease being brought into your flock, and can protect you and your family as well. Biosecurity is an important part in protecting your financial investment in the birds. (Dead birds don't produce eggs).

### BIOSECURITY RULES

Preventive measures need to be taken to ensure that any introduction of pathogens is minimized through strict biosecurity protocols. All aspects of biosecurity including the quality of the structure, proximity to commercial poultry, entry/access control, and restriction of visitors need to have controls in place to protect your flock. Always remember that people are a primary source of transporting diseases into a flock.

- i. Housing — Wild birds and rodents can carry diseases such as Avian Influenza, mycoplasma, and strains of *salmonella*, just to name a few. It is important that all side openings are covered with chicken mesh and that all holes and gaps in the walls, and roof have been repaired to prevent access of pests.
- ii. Hand Washing — Before entering the poultry house be certain that everyone has washed their hands with soap. This simple activity can result in large benefits to bird health. And all individuals who have been in contact with the birds should wash their hands immediately after leaving the house.
- iii. Footwear — It is important to have a separate set of footwear used when entering the brooder unit to avoid tracking in pathogens from everyday footwear. These boots, which should be cleaned daily, help assure that diseases are not transmitted from other parts of your farm to the birds.
- iv. Surrounding area — Keeping the grass around the poultry house short and free of rubbish helps prevent the transition of disease carried by rodents and flies. Remove any tree branches close to the sidewalls or roof which animals may use for access to the house.
- v. Proximity to commercial poultry — Any type of poultry that is raised intensively requires vaccination and the type of vaccinations can vary between species. As most vaccinations are live viruses, it is very important to minimize any cross-contamination by limiting dust particles and feathers which can be a vehicle for viruses that can be wind borne and infect another flock. The recommendation is to have at least 100

meters distance between the brooder unit and any commercial poultry. It is recommended that the brooder unit limit exposure to any poultry (chickens, ducks, guinea fowl) around the brooder unit facility.

vi. Visitors — Limit any entry into the flock from persons who have been around commercial poultry. Keep in mind that viruses can last on clothing for several hours and one wants to avoid any cross-contamination. All visitors should wash their hands before and after visiting the poultry house.

vii. Feed — Feed can be a source of disease if not stored properly. Feed should be kept in a dry rodent proof location separate from the poultry house. Be sure feed bags are out of the sun and off the floor to prevent moisture buildup, which causes mold growth.

viii. Dead birds — Dead chicks should be removed from the house as quickly as possible. Take any mortality away from the house and dispose of properly (burying, burning). Do not allow dead carcasses to be consumed by humans or pets as they can carry deadly pathogens.



WPF Photo: A clean and well-maintained chicken house with good biosecurity



ix. Foot Baths — Foot baths are a good addition to biosecurity, but they must be maintained. Should the foot bath become dry, or not routinely cleaned and the disinfectant changed, it can be worse than no foot bath at all. Dirty standing water can become a source of pathogens that can be tracked into your house each time someone steps in it. Having a poorly managed footbath will be more harmful than helpful. Therefore, if a foot bath is utilized, it must be properly maintained.

Undertaking a few tasks to reduce the possibility of disease entering your poultry house will result in healthier birds and protects your investment. Also, healthy birds perform better and result in more income for your business enterprise.



*WPF Photo: Poor sanitation increases the risk of rodents and diseases entering the poultry house*

# 9

## Record Keeping MANAGING FOR SUCCESS

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### INTRODUCTION

There is an old saying that goes, “you cannot manage what you do not measure”.

Keeping records only takes a few minutes each day but will assist you in becoming a better and more profitable manager. This task is an important and essential part of the brooding enterprise and should not be overlooked. Record management is not just keeping numbers on issues like mortality and sale prices, but on your observations of chick behavior as well.

Keeping record sheets is simple and should be maintained within the brooding house so they are easily available to enter daily records and notations. Do not rely on memory to record information at a later time.

There are many data points that should be considered for record keeping. Some are done daily, such as mortality and feed, while others are done weekly (weighing) or only once when the flock sells (customer names and contacts, sales prices). You must determine the information needed to record to run a healthy business and to monitor flock performance.

### ORDER AND DELIVERY RECORDS

Prior to arrival keep a record of:

- ✓ Date DOCs were ordered
- ✓ From what hatchery
- ✓ Price for the chicks and feed
- ✓ How many chicks and how much feed was ordered
- ✓ The primary contact and phone number of the hatchery representative should you have questions or concerns.

This information should be compared to what is received on the date of delivery.

### DELIVERY

Upon delivery check and record the number of chicks delivered against the number ordered, determine the mortality count (dead on arrival) and record. Also record how many, if any, had physical defects (twisted legs, cross beaks). This provides an accurate account of birds placed and allows you to determine if the proper number of chicks received matches the number ordered.



## PRODUCTION RECORDS

Once the chicks have been placed in the brooding chamber begin keeping production records on mortality, reason for mortality (if known), house temperature, any vaccinations provided, vaccination costs and average bird weight.

On day of delivery a sampling of chicks should be weighed. This provides a baseline for growth. To take the initial weighing sample, take a plastic bucket with litter in the bottom and determine the weight of the bucket and litter. Add 10 chicks to the bucket, and weigh. The difference between the total weight less the weight of the empty bucket, divided by the number of chicks, will result in the average chick weight. To get an accurate weight, do this several times from different parts of the brooding chamber. See [Appendix B \(b\)](#).

Once the baseline information has been recorded, keep daily records until the flock is sold.

**Daily** records should be kept on the following.

- The number of chicks which died each day
- The reason for mortality, if known
- Temperatures within the poultry house at floor level

The reason for recording this data on a daily basis is to assist in managing the flock and indicate if there are possible health problems starting within the flock. A spike in mortality (or if it is higher than the last flock's records for the same age) will alert you to a disease or management problem. High mortality shortly after delivery may be a sign of stress during delivery, poor vaccination or chick quality. Mortality after 3 days might indicate that the chicks are not being properly warmed, fed

or watered. Remember, the first 14 days of a chick's life is when the bird is most vulnerable.

In addition to daily records, **weekly** records on the average weight gain of the chickens should be maintained. The process is the same as above, in selecting birds from different parts of the house, weighing the birds, subtracting the weight of the bucket, and dividing by the number of birds. Pick a set day each week to weigh the chickens and record the average weight.

The reason to keep the above record on a weekly basis is to track the weight gain of the chicks. Any significant differences from prior flocks, or discovery of chicks which are stunted, are indications of a feed or disease problem. Also, knowing the weight and age of the birds on the date of sale is important.

Also, keep records when the following occurs:

- Vaccination date
- For which disease vaccinated (Newcastle, IBD, Bronchitis, Fowl pox, etc.)
- Cost of vaccine. (The cost of any vaccine will factor into the profit or loss of the flock).

Recording the actual date of any vaccinations allows you to determine if a reaction to a vaccine has resulted in higher mortality, and if the vaccine was given at the appropriate age.

## OBSERVATIONS

One aspect of recordkeeping does not include numbers. It is important that every day you observe how the birds are behaving and take note of any concerns.

Chicks should be engaged in one of the following activities: drinking, eating, sleeping, scratching or playing. First listen, are the chicks chirping happily or are they loud alarming chirps that indicate stress? If stressed, determine why, correct the problem, and make a note in the records to try and prevent the problem from happening again.

## ARE YOU MAKING MONEY BEING A BROODER?

To determine if the brooder unit enterprise is profitable, you must record the information for all sales and expenses. Even if you decide to gift some birds to a neighbor, or to consume some, it must be recorded so that you can account for all of the birds placed on your farm. When the birds are sold, it is important to record each sale.

- The date sold
- The age of the birds when sold (days of age)
- The number sold
- The price of chicks sold
- Individual and contact information for the person who purchased the birds (Maintain the contact information of the buyer for marketing and sale of future flocks).

As a business owner and operator, the only way to tell if the business is profitable is by keeping an account of production expenses, DOC purchase price, vaccination costs, litter, fuel, labor, and interest on loans compared to the sale prices of the brooded chicks. Adding all costs and comparing that number to the total sales income, will provide a profit or loss statement for each flock.

## SAMPLE PROFIT AND LOSS STATEMENT

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

Example 1 Assumptions:

- A flock of 500 birds per cycle (3,000 birds per year)
- A 30- to 35-day cycle from receipt of the DOCs to sale of all brooded chicks
- That you will need to borrow 75% of the funds to purchase each flock and feed
- That the interest rate on the borrowed funds is 2.2% per month
- That the mortality rate of the chicks will be 5% (per flock)
- That you will need to vaccinate for Newcastle Disease and Fowl Pox
- That you will produce 6 flocks per year
- Amounts are shown in US dollars (all prices are estimated)

At 500 birds per flock, this example would generate estimated net earnings (profit) of \$128.50 US per flock, or \$771 per year. If the flock is not profitable, evaluate the records for the cause. For example, was the mortality high? Was the sales price too low? Did you have to purchase additional inputs such as supplemental feed? Utilize this information to assist in improving the next flock.

The most important assumption in this example is that you can sell all of the birds within 35 days.

*The longer the chicks are held past 35 days the greater the feed costs you will have, and the lower the income received.*

It is best to market and obtain commitments to purchase chicks from small-scale producers before the chicks are fully brooded. Keep in mind that if the average flock size sold is 15 chickens, then you will need to secure 32 farmers to sell to.

### **BROODER UNIT INCOME AND EXPENSES** *(based on WPF analysis of 1,079 historical records of Brooder Units).*

*The following table is an illustration only and the WPF cannot predict and does not guarantee that these results will be obtained. Each Brooder Unit's results depend on country specific input costs as well as market prices at the time the birds are sold. Success of the Brooder Unit also depends on each brooder units unique background, dedication, management, desire, motivation, flock size and numerous other factors.*

EXPENSE	QUANTITY	PRICE/BIRD (\$USD)	TOTAL (\$USD)
Cost of day-old chick	500	.62	310.00
Cost of feed	1.2kg/bird	.045/kg	249.00
Cost of vaccine	500 doses	.045	22.50
Charcoal (or other heat source) and transport			11.25
Wood shavings and transport (litter)			7.50
Cost of mortality (5%)		.07	35.00
<b>Total expense</b>			<b>635.25</b>
Finance cost (2.2%/month)		.04	20.00
<b>Total cost</b>			<b>655.25</b>
<b>Income</b>	475	1.65	<b>783.75</b>
<b>Net profit per batch</b>			<b>128.50</b>
Annual profit (6 cycles)			771.00
<b>Operating margin</b>			<b>18.3%</b>

# 10

## Marketing

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### INTRODUCTION

Managing the key aspects of flock production is the key to producing a healthy brooded chick. However, none of this is of value to you if you cannot effectively sell all of the birds to small-scale producers in your area.

This chapter is to provide guidelines on messaging and marketing to surrounding communities.

The 4 main messages of the advantages of the dual-purpose breeds are 1) increases in productivity compared to the local breeds, 2) opportunities for improved family nutrition from eating a portion of the output, 3) increases in income from selling the meat and eggs, and; 4) the low-input scavenging breeds require minimal supplemental feed or medicines to grow and produce eggs.

The above are the key points that need to be presented to the small-scale producers so that they understand why they are paying a higher price for a brooded bird. The farmer receives a more productive, heartier, and income generating scavenging bird, which more than compensates for the higher price paid to you as a brooder.

### WHY IS MARKETING IMPORTANT

In the APMI model, the supplier of the day-old chicks will provide you with enough feed to last until market age of the chicks – around 35 days. This is usually 1.2 to 1.5kg of feed per bird (depending on the breed and the market age), and is sufficient to provide the proper nutrition for the birds to grow. However, if you don't sell all of the birds at market age and have to hold them in the house longer, you will be required to purchase additional feed, which will have a large negative impact on your profit. **The number one priority is to have all the birds sold before the marketable age of 35 days.**

Selling all the fully brooded chicks by 35 days of age provides the opportunity to grow more flocks per year, which increases your annual revenues.

How to market your flock is a decision for you to make, but you cannot wait until the birds are close to market age before you start advertising the advantages of dual-purpose birds. Successful brooder unit operators develop a network of potential buyers prior to the 35-day selling target and many already have sold the birds even before they were placed as DOCs.



## MARKETING AND DUAL-PURPOSE BIRD PRODUCTIVITY

A key advantage to the dual-purpose breeds is that they are bred to perform well under harsh scavenging conditions. The dual-purpose birds look and behave like the local breeds but are

more robust. Because the birds have been properly vaccinated, there is significantly lower mortality within the flock from diseases. Also, with a healthy immune system, the birds can handle the normal stresses experienced under local conditions.



*WPF Photo: Staff talking to village poultry producers about marketing*



*WPF Photo: Staff meeting with farmers and talking about the advantages of dual-purpose birds*

## EGG AND MEAT PRODUCTION

On average, the local breeds will lay between 30 and 60 eggs per year (in clutches of 6 to 8 eggs; 5 to 6 times a year). Once they lay the eggs, they will go “broody”, which means they go out of egg production to sit on the eggs to hatch chicks. The advantage of the dual-purpose breeds is that they are bred not to go broody and will not sit on the eggs. Also, since the dual-purpose breeds do not lay in clutches and lay eggs continuously under normal scavenging conditions, they will lay between 130–175 eggs per year. If the farmer decides to supply supplemental feed, the birds will respond and lay more eggs, but they must consider the economics of doing so as blended

feed can be expensive and increase the cost of the eggs produced (see below under low-input feeding).

Growth rate for the males is another advantage to the small-scale producer in that the males grow extremely fast under normal scavenging conditions. For a dual-purpose male, WPF would expect them to reach weights of between 1.9 to 2.2 kg at around 84 to 91 days whereby the males of local breeds can take as much as 225 days to get to the same weight. The key advantage is that the small-scale producer can sell the males in a short period of time and use the money to purchase more chicks from your brooder unit.



	INDIGENOUS CHICKENS	DPP CHICKENS
Mortality	> 40%	< 15%
Eggs (at 80 weeks of age)	47 eggs	130–175 eggs
Days to 2 kg	225 days	84–91 days

This increase in productivity is a key message for the small-scale producers that will purchase the birds from your brooder unit.

## IMPROVEMENTS IN HOUSEHOLD NUTRITION

Due to increases in productivity from dual-purpose birds, the small-scale producers will be producing more eggs and meat. Research has shown that egg consumption by young children contributes to brain development, strengthening of bones and teeth, reduced stunting and promotes overall child physical and mental development. Eggs also support the health of new and expecting mothers. Eating an egg a day will help children and women to meet the nutritional requirements for growth and fetal development. Like eggs, poultry meat also provides vitamins, minerals and protein to a diet.

## DIETARY DIVERSITY

Using some of the money from the sale of eggs and birds is important for the purchase of other foods which add diversity to the family diet. Different foods and food groups are good sources for various nutrients, so a diverse diet ensures nutrient balance for growth and development. Health experts advise a diet containing fruits, vegetables, legumes, nuts and whole

grains, as well as the proteins and vitamins that eggs and poultry meat can provide.

**HINT:** We recommend that the households not consume any of the females, but utilize them as a source of eggs. Once a female is gone, they cannot produce any more eggs!! Once the hen stops producing eggs, they can be profitable to sell for meat or to consume within the household.

## INCREASES IN INCOME

Due to the increase in productivity, the small-scale producers will have more eggs and meat to sell. It is reasonable to expect the small-scale producer to obtain 2 to 4 times the income from selling the output of their dual-purpose flock versus the output from the local breeds. Based on the example below from 2550 actual records, the small-scale producer can realize a profit of \$217.24 from purchasing 20 birds from the brooder unit at USD \$1.95 each. This would compare to an approximate net profit of \$88 for 20 local birds (based on desk research).

*The following table is an illustration only and the WPF cannot predict and does not guarantee that these results will be obtained. Results for each small-scale producer depend on country specific input costs as well as market prices at the time the birds and eggs are sold. Success of farmer also depends on marketing skills, motivation, flock size and numerous other factors.*

*Assumptions: (Based on 2550 actual small-scale producer records).*

- a) Purchase of 20 chickens from brooder unit at USD \$1.95 each*
- b) 2 males eaten*
- c) Loss of 1 male for mortality*
- d) 1 female eaten and no additional mortality*
- e) 13.5 % of eggs collected eaten in household*
- f) Price of males sold – USD \$7.12*
- g) Price of eggs – 15.6 cents/egg*
- h) Price of spent hen – USD \$8.65*
- i) Egg production of 144.6 eggs at 75 weeks of age*

Revenue/eggs	\$156.10	
Revenue meat	\$48.06	
Revenue spent hens	\$69.17	
Total revenue		\$273.33
Cost of brooded birds	\$39.13	
Other costs (supplemental feed, medicines)	\$16.96	
Total cost		\$56.09
Net profit		\$217.24
Net margin %		79%
Net profit per bird purchased		\$10.86



## LOW-INPUT

One of the marketing messages to the small-scale producer is that if they purchase birds from you, it does not require a lot of money to raise them. Farmers may simply feed dual-purpose breeds with table scraps or cracked maize and they will find the other nutrients from insects and vegetation through scavenging. These are scavenging breeds and can survive and grow with minimal supplemental feed. Many farmers will decide to purchase blended feed for their flocks, but with the dual-purpose breeds this is not necessary and will only take away from any profits from selling the meat and eggs.

The only inputs that the farmer must provide the chickens is a source of clean water and a shelter to bring them into for protection from bad weather, predators, and theft.

**HINT:** Use a small amount of feed to call the birds back to the shelter in the evening.

As these birds have been properly brooded and vaccinated in your brooder unit, they require almost no antibiotics, vitamins, or other supplements. However, please inform the farmer that if their birds look sick or are not acting right, please consult with a local veterinarian or agro-dealer for diagnosis.

Some farmers use their own houses as shelter for their birds. The WPF discourages this practice as it can create hygiene problems, particularly with children if they are exposed to droppings. If it is a practice to keep the chickens in the house, inform them that they need to keep them in a separate area and wash hands frequently after handling the birds. Clean and disinfect the area of that they stay in frequently to minimize any potential pathogens.

## MARKET CREATION AND PROMOTION

There are many ways to create the market and deliver the messaging.

- 1) Use your network of friends and family to let people in the area know you have birds for sale. Create a one sheet information leaflet on the advantages to the farmer... more money, good nutrition, low input, and higher productivity.
- 2) If you can identify a small group in your area to purchase some of the birds, the others will see firsthand how fast they grow and how healthy they look. This will encourage others to buy from you.
- 3) Organize small groups of women to discuss the advantages of dual-purpose birds. Your supplier of day-old chicks and feed may support you in this effort.
- 4) Find groups of youth and train them to purchase birds and transport them on motorcycles or bicycles to surrounding villages for resell. The “hawkers” or “machinga’s” can expand the area that you sell into.
- 5) Be certain to keep a list of your customers (name, contact information, number of birds purchased) so you can follow-up and sell them more chicks.

Support – Lastly, use your training and experience as a brooder unit operator to support your customers. Assist them by answering questions and follow up with them to make sure they are pleased with their birds. As a brooder unit operator, you can become a valuable resource for them.

Keep good records of the contact information for everyone who purchases birds from you. Use this contact list to follow up for future sales and encourage them to tell others about the successes they experience. Word of mouth is the greatest marketing tool for you.



*Picture: Farmers attending a village meeting to discuss dual-purpose poultry production*



## THE BROODING MANUAL

The World Poultry Foundation (WPF) thanks you for reviewing this Brooder Manual and for your interest in poultry production. It is our hope that this manual provided an understanding of the brooding process and the net returns that may be realized.

It is important the small-scale producer understand that having access to improved genetics and well brooded birds, they receive birds which will grow faster, produce more eggs, and have a lower mortality rate than the local chickens.



*WPF Photo: Another happy customer*

# A

## APPENDIX A GLOSSARY

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### POULTRY GLOSSARY

**Avian Influenza (AI):** Avian influenza is categorized as mild or highly pathogenic. The mild form produces listlessness, loss of appetite, respiratory distress, diarrhea, transient drops in egg production, and low mortality. The highly pathogenic form produces facial swelling, blue comb and wattles, and dehydration with respiratory distress. Dark red/white spots develop in the legs and combs of chickens. There can be blood-tinged discharge from the nostrils. Mortality can range from low to near 100 percent.

**Bedding:** material scattered on the floor of a poultry house to absorb moisture and manure (also called litter).

**Biosecurity:** disease prevention programs.

**Broiler:** a chicken raised for meat.

**Crop:** enlarged part of the digestive tract of birds that serves as a temporary storage space of food.

**Cull:** to remove a bird from the flock because of productivity, age, health, etc.

**Cycle (brooders):** a cycle is the time between brooded flocks. Time from when DOCs arrive, to brooding finish and house preparation for the next flock.

**Disinfect:** to kill bacteria through chemical means.

**Feed Conversion Ratio (FCR):** calculating FCR is as simple as taking the total amount of feed consumed by the flock and dividing it by the amount of weight gained or the number of eggs produced. In other words, FCR equals input divided by output. For example, an FCR of 1.6 means that chickens have gain 1 kilogram of weight for every 1.6 kilograms of feed consumed. The lower the FCR, the more efficient animals are at converting feed into food.

**Feeding trays:** trays used for the first 7-10 days in brooding to help the chicks find the first feed prior to the transition to the hanging feeders. At a minimum, 1 supplemental feeder tray for every 50 chicks is required.

**Fowl Pox:** a contagious viral infection that cause painful sores on a chicken's skin. The wet form affects the mouth and upper respiratory tract; the dry form creates skin lesions. Fowl pox can cause poor growth and egg production.

**Gumboro (Infectious Bursal Disease):** a highly infectious disease that affects young chickens. The disease is caused by the infectious bursal disease virus (IBDV). The virus destroys the lymph cells within the tonsils and spleen.



**Infectious bronchitis:** a highly contagious respiratory infection disease in chickens. Morbidity for flocks affected is usually 100%. Affected chickens will be chirping, with a watery discharge from the eyes and nostrils, and labored breathing with some gasping in young chickens. Feed and water consumption declines.

**Infectious Bursal Disease (Gumboro):** a highly infectious disease that affects young chickens. The disease is caused by the infectious bursal disease virus (IBDV). The virus destroys the lymph cells within the tonsils and spleen.

**Litter:** material scattered on the floor of a poultry house to absorb moisture and manure (also called bedding).

**Marek's disease:** a viral disease common in chickens. Commonly prevented by a vaccination administered immediately after chick's hatch. Chickens between 12 to 25 weeks of age are most commonly clinically affected.

**Newcastle disease:** a viral respiratory disease common in chickens. Newcastle disease can spread very quickly within a flock. Commonly prevented with a series of vaccinations.

**Mortality:** death due to disease or accident.

**Pathogen:** a disease-producing organism.

**Splayed legs (spraddle, splay leg):** the chick's legs are positioned such that the bird is unable to stand up. In chicks this is a condition that occurs in newly hatched chicks. It is caused by a weakness or injury in the tendons of the feet and legs. When evident at hatch, causes may be due to a poor chick position inside the egg or improper incubator temperature.

**Vaccine:** a product that stimulates the im-

mune system to produce immunity to a specific disease, protecting the animal from that disease. Vaccines are usually administered through needle injections but can also be administered by mouth or sprayed into the nose.

**Vent:** the outside opening of birds through which the digestive, excretory and reproductive tracts empty. Also called the cloaca.

**Zone of Comfort:** area in the brooding chamber where the chick is most comfortable and able to easily access feed and water.

**Zoonosis:** a disease transmissible from an animal to a human.



## APPENDIX B

### WORK SHEETS

#### a) WORK SHEET – POULTRY HOUSE CAPACITY

A common mistake for brooder units is to place too many birds in the house. This creates crowding issues which can lead to losses from heat stress, stunting due to inadequate feeder and waterer space, and severe litter conditions which can increase incidence of parasite infections and bacterial challenges.

It is important to accurately measure the *inside* walls of the structure to determine the correct square footage to know how many birds can be properly housed. Consider any penned areas or posts that subtract from the overall floor space in the calculation of the size of the brooding chamber.

To calculate the floor space, multiply the length

of the inside wall by the width of the house.

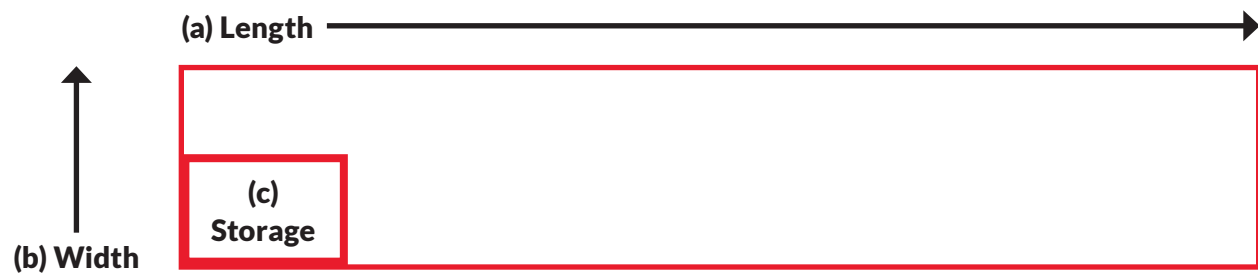
If the inside wall is 10 meters and the width of the house is 5 meters, then the total floor space is 50 square meters. Subtract any storage areas from the total. If there is a 2m x 4m storage (8 square meters), then the total usable space would be 42 meters (50m less the 8 meters for storage).

At most, the capacity should be 15 birds/ square meter so in this instance the capacity of the house would be 630 birds (42 square meters x 15 birds = 630).

Measure and determine the **USABLE** floor space and multiply by 15 birds as the maximum capacity of the structure.

#### EXAMPLE

(a)	(b)	(c)	(d)	(e)	(f)	
Length (m) of sidewall	Width (m) of sidewall	House size (square m) (a) x (b)	Less storage area	Total useable floor space (c) - (d)	Birds per square meter	Capacity (e) x (f)
10m	5m	50m	8m	42m	15	630



**For calculating capacity, fill in your numbers below and follow instructions.**

(a)	(b)	(c)	(d)	(e)	(f)	
Length (m) of sidewall	Width (m) of sidewall	House size (square m) (a) x (b)	Less storage area	Total useable floor space (c) - (d)	Birds/sq. meter	Capacity (e) x (f)
					15	

## b) WORK SHEET – WEIGHING CHICKS

### EXAMPLE

**Example:** A total of 30 chicks at 14 days of age are weighed in a bucket (10 chicks at a time). The 3 separate sample weights were:

First weighing is 3306g

Second weighing is 3318g

Third weighing is 3345g

Total weight is 9969g

(3306+3318+3345 = 9969)

We need to subtract the weight of the empty bucket which was 454g

$453\text{g} \times 3 \text{ weighing's} = 1359\text{g}$

$9,969 - 1,359 = 8610\text{g}$  which is the weight for all 30 birds

$8610\text{g}$  divided by 30 = 287g per bird

The average weight for each bird in the flock is 287g

### EXAMPLE

	(a)	(b)	(c)	(d)	(e)
	Weight (g) of empty bucket	Weight (g) of bucket with birds	Weight of birds only (b) - (a)	Number of birds in bucket	Average weight per bird (c) / (e)
Weighing 1 (f)	454 g	3306 g	2852 g	10	285.2 g
Weighing 2 (g)	454 g	3318 g	2864 g	10	286.4 g
Weighing 3 (h)	454 g	3345 g	2891 g	10	289.1 g
Average weight (f + g + h) / total number of birds			8607 g	30	286.9 g



**Fill in your numbers and calculate average weight**

	(a)	(b)	(c)	(d)	(e)
	Weight (g) of empty bucket	Weight (g) of bucket with birds	Weight of birds only (b) - (a)	Number of birds in bucket	Average weight per bird (c) / (e)
Weighing 1 (f)					
Weighing 2 (g)					
Weighing 3 (h)					
Average weight (f + g + h) / total number of birds					

### c) WORK SHEET – CROP FILL

A good practice is to check the crop fill of the chicks no longer than 12 hours after delivery. The crop is a little pouch at the bottom of the neck just before the breastbone. The crop should be full and soft. If it is empty the chick is not eating. If it is hard, the chick is eating but may not have enough water to push feed through its digestive system. A good rule is that for every 1 gram of feed a chick eats, it will need approximately 2.5 grams of water. After 12 hours since delivery, randomly pick up 10 chicks and feel the crop. At least 8 out of the 10 should have feed in the crops and after 48 hours, all chicks should have feed in the crop.

- Should chicks not be having their crops full, that could mean any of the following:
- Chicks do not have enough water or the water quality is poor
- The feed size is too large
- Food and water are poorly distributed, unsuitable or not accessible
- The chicks are too hot or too cold and not eating
- Stocking density is too high
- Sick or distressed chicks

Should a problem occur, work to correct it and continue to check every 4 hours to see if there is improvement.

#### Crop Fill Goals:

TIME AFTER DELIVERY	TARGET PERCENTAGE OF FLOCK WITH FULL CROP
2 hours	75%
8 hours	80%
12 hours	85%
24 hours	95%
48 hours	100%

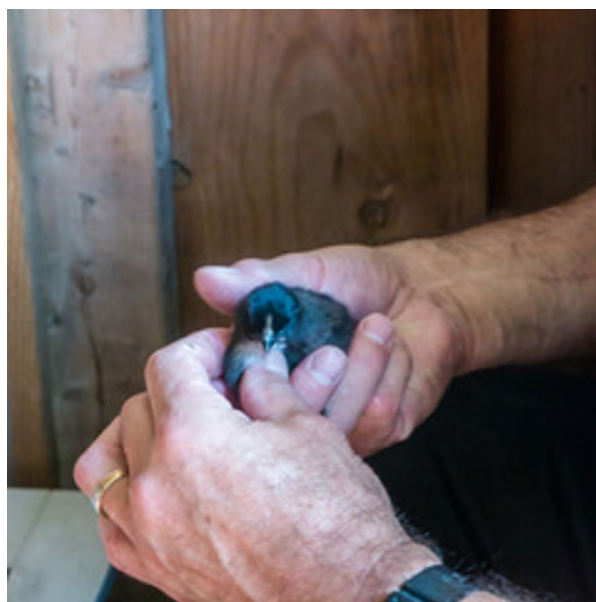


Photo: Checking for crop fill  
Courtesy of Dr, Scott Gillingham; iChicken

## d) WORK SHEET – PROPERLY LOCATING THERMOMETERS IN POULTRY HOUSES

Thermometers are critically important tools for promoting poultry performance. Locating the thermometers in the right place in the poultry house so that poultry house temperature can be monitored and adjusted appropriately is key to bird comfort.

Thermometers should be located so they measure the temperature the birds are experiencing. This means thermometers must be located where birds are congregating. Generally, the best location for a thermometer is close to feeders and waterers. The thermometer should be hung on an adjustable cord or chain just high enough over the heads of the birds that the birds cannot reach them. It will likely be necessary to raise the height of the thermometer as the birds grow.

The thermometers must be located far enough from the heat source to be certain the thermometer is measuring the temperature of the poultry house and not affected by any source of heat, such as a wood or coal burning pot or electrical heat lamp. The thermometer should be located approximately 30 cm (1 foot) from the edge of a heat source.

- Do NOT place thermometers in corners, behind equipment or in areas not representative of the true temperature the birds are experiencing.
- Do NOT place thermometers too high. Having the thermometer at eye level may be convenient, but the temperature at human eye level does not accurately measure the temperature the birds are experiencing.
- Do NOT place thermometers too low. Birds are curious and will peck at and play with anything hanging too close over their heads.
- Do NOT place thermometers on the wall of the poultry house.
- Do NOT place thermometers near door, curtain or window openings in the poultry house.
- Do NOT place thermometers in drafty areas.
- Do NOT place thermometers in direct sunlight.



# APPENDIX C

## CHECK LISTS

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### a) CHECK LIST – BROODING, CHICK ARRIVAL

#### HOUSE PREPARATION

- ☐ The house has been cleaned and disinfected
- ☐ All necessary repairs have been made to the house
- ☐ Feeders have been cleaned and disinfected
- ☐ Waterers have been cleaned and disinfected
- ☐ Fresh bedding has been placed on the floor
- ☐ Lights are working
- ☐ Heating source is in place (if needed)

#### BROODING CHAMBER

- ☐ The chamber is large enough to accommodate the number of DOCs ordered
- ☐ Rounded corners have been installed (to keep chicks out of corners and smothering each other)
- ☐ My brooding chamber is at the correct temperature (25°C / 77°F)

#### FEED

- ☐ Is feed scattered on paper on the floor
- ☐ Feed is located in the Zone of Comfort

#### WATER

- ☐ Waterers have been filled and water is at room temperature

#### BIOSECURITY

- ☐ Have washed hands before handling chicks
- ☐ Have washed hands after handling chicks
- ☐ Locked the poultry house

#### NOTES



**b) CHECK LIST – WEIGHING CHICKS**

- ☐ Washed hands before handling chicks
- ☐ Assure the bucket clean and has bedding in the bottom
- ☐ Write down the weight of the bucket, including the bedding
- ☐ Washed hands after handling chicks

**WEEK 1 – DAY OF DELIVERY**

- ☐ Weigh 10 chicks and record average weight of each chick (see example below)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Record the average weight

**WEEK 2 (DAY 7)**

- ☐ Weigh 10 chicks and record average weight of each chick (see example below)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Record the average weight

**WEEK 3 (DAY 14)**

- ☐ Weigh 10 chicks and record average weight of each chick (see example below)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Record the average weight

**WEEK 4 (DAY 21)**

- ☐ Weigh 10 chicks and record average weight of each chick (see example below)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Record the average weight

**WEEK 5 (DAY 28)**

- ☐ Weigh 10 chicks and record average weight of each chick (see example below)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Weigh additional 10 chicks (from different sectors of the brooding chamber)
- ☐ Record the average weight

**NOTES**

## c) FLAWS – MORNING CHECK LIST

### FOOD

- ☐ Check to assure food is in the Zone of Comfort
- ☐ Clean feeders (remove any feathers, waste, other materials)
- ☐ Top-off feed

### LIGHTING

- ☐ Replace any broken lights
- ☐ Turn off any lights from last evening

### AIR

- ☐ Check and record temperature inside the house (at chick level)
- ☐ Is there a strong odor of ammonia, mold or wet litter?
- ☐ Are the chicks behaving properly in the Zone of Comfort (not huddled under or away from the heat source)
- ☐ Adjust temperature if necessary
- ☐ Adjust curtain height if necessary

### WATER

- ☐ Check to assure water is in the Zone of Comfort
- ☐ Clean waterers / water fonts
- ☐ Add clean, room temperature water

### SANITATION AND SECURITY

- ☐ Boots have been cleaned before entering house
- ☐ Washed hands before handling chicks
- ☐ Removed any chicks which have died
- ☐ Record number of dead chicks
- ☐ Removed any caked litter and replaced with dry bedding
- ☐ Washed hands after handling chicks
- ☐ Locked house when done

### NOTES

## d) FLAWS – EVENING CHECK LIST

### FOOD

- ☐ Check to assure food is in the Zone of Comfort
- ☐ Clean feeders (remove any feathers, waste, other materials)
- ☐ Top-off feed

### LIGHTING

- ☐ Replace any broken lights
- ☐ Turn on any lights (if necessary)

### AIR

- ☐ Check and record temperature inside the house (at chick level)
- ☐ Is there a strong odor of ammonia, mold or wet litter?
- ☐ Are the chicks behaving properly in the Zone of Comfort (not huddled under or away from the heat source)
- ☐ Adjust temperature if necessary
- ☐ Adjust curtain height if necessary

### WATER

- ☐ Check to assure water is in the Zone of Comfort
- ☐ Clean waterers / water fonts
- ☐ Add clean, room temperature water

### SANITATION AND SECURITY

- ☐ Boots have been cleaned before entering house
- ☐ Washed hands before handling chicks
- ☐ Removed any chicks which have died
- ☐ Record number of dead chicks
- ☐ Removed any caked litter and replaced with dry bedding
- ☐ Washed hands after handling chicks
- ☐ Locked house when done

### NOTES

## e) CHECK LIST – FEED

### PRIOR TO AND DAY OF DOC DELIVERY

- ☐ The feed for the DOCs 2mm–3 mm in particle size
- ☐ Placement of feeder trays and paper
- ☐ Number of feeder trays is sufficient for number of chicks (1 feeder tray for every 50 chicks)
- ☐ Feeder trays are full and some feed on paper
- ☐ Volume of feed is sufficient (approximately 40–50 grams of feed per chick for first feeding)

### AFTER FIRST FEEDING

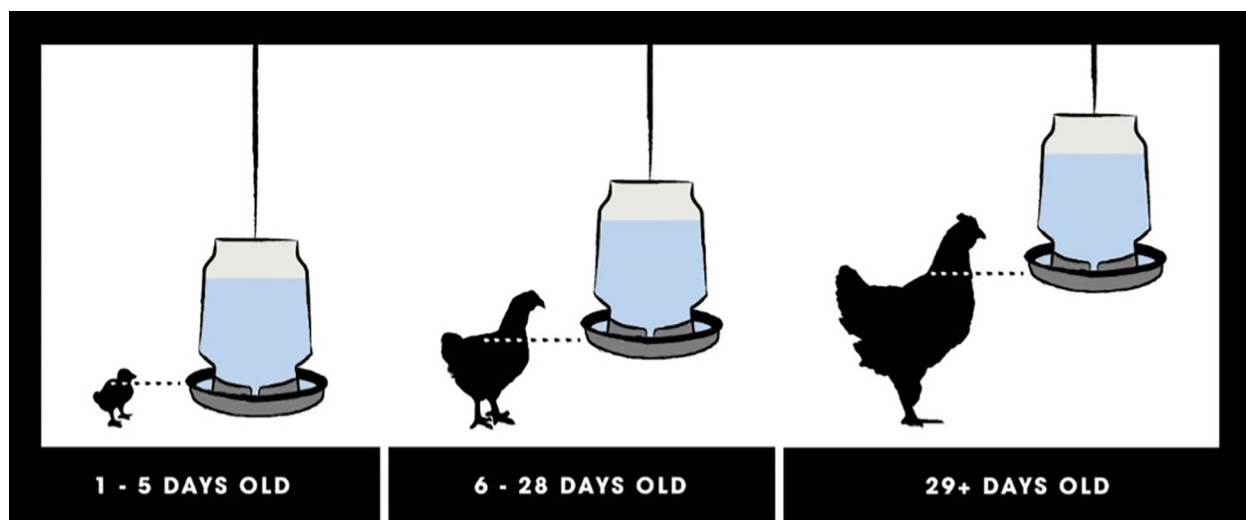
- ☐ Paper removed and only feeder trays utilized
- ☐ Supplemental feeder trays in place (for the first 7 days)
- ☐ Minimum of 1 feeder tray for every 50 chicks
- ☐ Trays not overfilled with feed (chicks will play in the feed)
- ☐ Checked the crop fill of chicks after 12 hours (see work sheet [Appendix B \(c\)](#))
- ☐ Removed all caked litter and any moldy feed
- ☐ Feed is stored properly

### AFTER FIRST 7 DAYS

- ☐ Transitioned to the larger feeders
- ☐ Have 1 hanging tube feeder for every 70 chicks
- ☐ The top of the feeder lip is  $\frac{1}{2}$  way up the wing of the smallest birds
- ☐ Assure height of feeders (and waterers) is appropriate (see illustration below)
- ☐ Removed all caked litter and any moldy feed
- ☐ Clean and disinfect trays every 3 days
- ☐ Feed is stored properly

### NOTES





*Proper height of feed and water as birds grow*

*Kelly Jumper Smith*

## f) CHECK LIST – VACCINATION

### PURCHASING AND PREPARING TO VACCINATE

- ☐ Chicks are healthy (to assure vaccine can be utilized)
- ☐ Vaccine was purchased from a reputable dealer
- ☐ Was vaccine held at the correct temperature of between 2° and 8° Celsius (35°–45°F)
- ☐ Read the label on the vaccine to assure it is the correct vaccine
- ☐ Check expiration date
- ☐ Assured water is clean and **without chlorine**
- ☐ Cleaned hands, **without soap**, prior to administering vaccine

### ADMINISTERING THE VACCINE

- ☐ Chicks have been denied water for 1 to 2 hours
- ☐ Water and vaccine mixed according to label instructions, assure proper dosage
- ☐ Fill the drinkers with the vaccine-water mixture (drinkers should be about half full of daily water intake)
- ☐ Wash hands after administering the vaccine
- ☐ Assure **ALL** chicks receive a drink of the vaccine
- ☐ Remove any remaining water within 2 hours and dispose of properly

### IMMEDIATELY AFTER VACCINATION

- ☐ Proper disposal of any remaining water used for the vaccine
- ☐ Proper disposal of vaccine vial
- ☐ Washed hands thoroughly

### FINAL STEPS

- ☐ Clean waterers after vaccine disposal
- ☐ Keep a record of date, disease vaccinated for, cost of vaccine, doses administered
- ☐ 2 to 3 days after the vaccination check to make certain there was no negative reaction to the vaccine. (You want to hear a uniform “sneeze” in the flock that indicates a successful vaccination).

### NOTES

## g) CHECK LIST – BIOSECURITY

### POULTRY HOUSE

- ☐ The area around the poultry house has grass cut short and overhanging tree branches removed
- ☐ The area around the poultry house is free of trash
- ☐ During cleanout, the floor was inspected, and all necessary repairs were made
- ☐ The roof of the house is looked at daily and all needed repairs have been made
- ☐ The side walls and wire mesh of the house are looked at daily and all needed repairs have been made
- ☐ The side curtains of the house are looked at daily and all needed repairs have been made
- ☐ Lights are working
- ☐ Poultry house locked at night

### EQUIPMENT AND FEED

- ☐ Clean set of plastic boots outside the poultry house door to wear when entering the house
- ☐ Plastic boots cleaned daily
- ☐ Feed bags are kept off the floor to prevent rodents

### PEOPLE AND PETS

- ☐ Limit all visitors to the farm
- ☐ Do not allow young children to handle or hug the chicks
- ☐ Everyone has washed hands before handling chickens
- ☐ Everyone has washed hands after handling chickens
- ☐ No dogs or other pets allowed into the poultry house

### NOTES

## MORE INFORMATION

For further information visit the World Poultry Foundation website and see videos on the Zone of Comfort, feed, water, housing, biosecurity, preparing the house and other topics. The website also contains other resources on recordkeeping, check lists and other documents to assist in producing and raising chickens.

Visit [www.worldpoultryfoundation.org](http://www.worldpoultryfoundation.org).

