Basic Management of Poultry in Developing Communities

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Modern Poultry

There is an estimated rolling stock of 19 billion chickens in the world (not sure if this includes village chickens)

There are an estimated 4.93 billion egg-laying hens in the world

Global average consumption of eggs is around 8.9kg per person/year

Today's laying hens are capable of producing over 300 eggs per hen per year
  - The color of the egg shell does not affect the egg quality
  - Eggs shells can be many colors including: white, brown, blue, green and olive
Common Types of Production in Developing Areas

Scavenging
Birds are left to fend for themselves
Local breeds work best

Semi-intensive
Some control over housing and feed
Local, modern breeds or a mixture of the two work best

Small/medium scale intensive
Birds are confined
Feed is controlled
Modern or improved breeds work best
Types of Breeds

Production can also be classified by the type of product produced:

**Meat**
Great at producing meat but not efficient at egg production

**Eggs**
Good egg production but poor meat production
Do not need males to lay eggs

**Dual**
Produces both meat and eggs but at lower production rates
Basic External Anatomy

- Nostril
- Comb
- Eye
- Ear
- Tail
- Neck
- Back
- Vent
- Wing
- Beak
- Wattles
- Breast
- Hock
- Shank
- Toe
Basic Internal Anatomy

http://www.poultryhub.org/physiology/body-systems/digestive-system/
Getting Started
The First Steps

**Treat your birds like a business**

Have a plan
- Why are you increasing production?
- Do you have a market?

Keep records
- This will allow you to see if you make money
- Helps identify the best birds so they can be used as breeders
  - Only keep productive birds

Know the source of the birds
- Buy from a good farmer that takes good care of their birds
- Are birds vaccinated?
- Avoid buying birds at the market
  - They can bring a lot of disease to your farm

Isolate any new birds for 2-3 weeks from the rest of your flock to make sure that they are healthy

If you get young birds, keep them separate from the older birds
  - Older birds can spread disease to young birds
The First Steps

Get the best genetics possible
Try different breeds to determine which works best for your area
Try different hatcheries/farmers if the one you are using is not providing quality chicks find a new one

Quality chicks should be:
- Dry with long fluffed down
- Eyes should be bright and active
- Lively and alert
- Navels should be completely healed
- Legs should be bright and waxy to the touch
- Free of deformities
Good Quality Chick
Getting Started

Chicks require three things to thrive

Protection (housing)
  From the environment
  From predators

Feed

Water

Chicks need more protection from the environment than adult birds
The Chicken House

Clean the house and equipment before your chicks arrive
   Scrape and wash the house thoroughly using a good disinfectant, if available
   Old litter can be sold for fertilizer or composted and then used for fertilizer

There are several types of chicken houses
   There is no “perfect” chicken house
   As long as the birds needs are being met then almost anything will do

Houses should be constructed to meet the needs of the birds, allow the caretaker to provide for the birds, and match the environment in which they are in
Housing

In warm areas naturally ventilated houses need to be situated to take advantage of the prevailing winds.

Houses should run east-west to prevent direct sunshine on birds.
   Tall trees that can shade the house but not block the prevailing winds can help reduce heat stress.

Houses need to be far enough apart so that they do not block the wind.

Houses used to rear chicks need to be able to block the wind when they are young and then open up for older birds (use adjustable curtains).

Houses need to have a high ceiling.
   Houses with low ceilings are hard to work in.
   High ceilings also help keep birds cool by allowing hot air to rise.

Openings should allow for as much air as possible to enter the house.
Housing

Extend the roof out from the house so that rain does not enter during storms
Make sure ceiling is high enough that you can work easily in the house
Make sure that water drains rapidly away from the house
Two main types of housing
  1. Confinement
  2. Free Range
Confined Housing

Place a fence around your chicken house to keep village chickens away from your birds

Birds are maintained indoors all the time
Free Range Housing

Free range housing allows birds to have access to the outdoors (birds should be over 4 weeks old or be with their mother)

Disease concerns increase when birds have access to the outdoors

Encounter chickens and other species of poultry

They can interact with wild birds

Birds can encounter more predators (including theft by neighbors)
The Chicken House – Bedding

Bedding absorbs moisture, provides insulation, acts as a cushion for the birds, and dilutes feces and minimizes bird/manure contact

Criteria:
- Must be absorbent
- Lightweight
- Inexpensive
- Non-toxic (free of mold)
- Should lend to post production applications: compost, fertilizer, fuel

Materials such as sawdust, wood shavings, straw, rice hulls and peanut hulls make good litter

Cover the floor with litter 7.5-15cm deep (3 to 6 inches)

Use the best bedding for brooding (young birds)

Use clean bedding in nests and move the old bedding to the floor

Try to keep the litter dry
- If an area gets wet, replace the wet litter with dry litter
- Stir the litter around waterers if it gets wet to help dry the litter

It will not be necessary to clean out and replace the litter until you are ready to start another flock of chicks, even if you start with laying-type chicks and keep the pullets until they are 18 months old or older

Maintain at least 7.5 cm (3 inches) of bedding in the house
Chick Transport

Make sure that chicks are transported properly
They should have plenty of fresh air
Not too hot or too cold
22 – 28 °C (70 – 82°F)
Don’t let them sit in direct sunlight

Make sure that there is room for air to move between the stacks of boxes
Chick Transport

Chick behavior is the best indicator of conditions during transport:

Under ideal conditions, day old chicks breathe quietly through their nostrils, losing only a little water

They spread evenly in the boxes, make little noise and are relatively inactive

When hot, chicks open their beaks and pant, which evaporates water from their lungs and air sacs to help cool them down

   Leads to dehydrated chicks
   Chicks will become noisy

Unload the chicks immediately on arrival at the farm
Get them in the house and out of the boxes
Don’t leave old chick boxes laying around the farm
The Chicken House

Before the chicks arrive, make sure everything is prepared

- Litter should be warm and dry (~33°C)
- Water should be in the house and at a level chicks can find it quickly (as low as possible), use only fresh clean water
- Feed should be easy for the chicks to find and eat
  - Use extra feeders for the first few days

Stocking densities
(For birds raised indoors, same for the first 3 weeks)

<table>
<thead>
<tr>
<th>Age (Weeks)</th>
<th>0 – 2 Weeks</th>
<th>2 – 5 Weeks</th>
<th>6 Weeks-Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds / m²</td>
<td>30</td>
<td>20</td>
<td>5*</td>
</tr>
<tr>
<td>Birds / f²</td>
<td>4</td>
<td>1-2</td>
<td>1/2</td>
</tr>
</tbody>
</table>

*Larger birds will need more space than smaller ones*
Phases of Growth

Brooding
Growing
Laying
What is Brooding

The time from placement until 14 days of age
Chick survival is dependent on how quickly they adjust to the farm
Most important time for the flock, growers need to spend more time with their birds
Mistakes made during brooding may be irreversible and negatively impact performance for the life of the flock
Similar for all types of birds and types of production layers, breeders, and broilers
6 Basics of Brooding

1. Pre-Placement
2. Temperature Management (Heat)
3. Feed Management
4. Water Management
5. Light Management
6. Air Quality/Ventilation

Pre-Placement means having everything ready for the birds when they arrive

- House is clean and warm
- Heaters are running
- Feed and water are already and placed in the house for the birds
Example of how to place feed and water (the important part is to have lots of feed and water)

While birds are often brooded in “brooder rings” it is not necessary to use perfect circles. Chickens can be brooder in almost any room (or shape) as long as they are protected from the environment.
Heat

A quality heat source is necessary in order to keep the chicks warm

Under a canopy or hover - keeps the heat down close to the chicks

Electric, oil, and gas brooders are the most common types

Radiation from an infrared lamp warms only the objects to which it is directed; it does not warm the air

Be careful not to let the litter/bedding under the heat source get too hot as it can result in a fire
There are many ways to heat chicks, use what is available
Heat

Temperature at the chick level needs to be around 34°C (94°F) near the heat source and cooler 1 meter away

Prior to chick arrival – be sure that the heat source is working properly

Are they too hot or too cold?
   Visually check often and check the temperature with a thermometer once in a while
   Check it more frequently in extremely hot or cold weather

When placing the chicks – have the floor-level temperature at 33-34°C (90-92°F) for the first couple of days then slowly decrease the temp by around 2.5°C (5°F) per week

Once the chicks begin to feather out well, the temperature may be dropped rapidly, saving energy

Good ventilation is important while maintaining the proper temperature
   The area should be light and airy, without drafts
   Free of strong smells of ammonia
   Air should not be too moist
   Air high in moisture can make the inside of the house wet and lead to poor bird health
Reference for Brooder Heat

Good

Cold

Hot

Draft/Breeze
Feed and Water

Feed and water need to be readily available when chicks are placed.

If available start the chicks on a “chick starter” mash or crumbles.

Place your feed pans slightly under the heat source.

Make sure there are plenty of feeders and waterers so that chicks find them quickly and that there is space for all of them to eat.

Use extra feeders for the first couple of days to help chicks get off to a good start.
Feed and Water

When placing chicks in the house put them on the feed

For the first week, fill the feeders full

Second week $\frac{3}{4}$ full and no more than half full thereafter

Keeps birds from wasting feed

Ideally, multiple feeders in each pen is best

You don’t want them to have to look for feed

Watch birds eat and make sure all of them have access to feed

When chicks are placed, the feeder needs to be low enough so the chicks can walk in it

As they grow, raise the feeder so that the chicks can eat while standing (mid chest height)

Look at the smaller birds when adjusting the feeder height
Quick Reference Feeder Height

For First week

While Growing

Adult
Feed and Water

Never let chicks run out of water!!!
Waterers need to be cleaned daily
It can be helpful to dip some of the chick’s beaks in the water so they know where it is, especially after a hard trip
   If chicks spend more than a day traveling to the farm, provide water for a couple of hours prior to introducing feed
      This allows the chicks to rehydrate

Waterer Height

For babies as low as you can until they learn to find and drink
Raise the waterers as soon as all birds are drinking
Adjust height based on the smaller birds
The higher the waterers are, the less litter the birds will get in the water
Quick Reference Water Height

For First week

While Growing

Adult
Waterer Height

For growing birds the waterer should be at the same height as the chest of the birds

For adults the waterer should be at the same height as the back of the hens
Good Examples of Feed and Water Placement
Feed

For the first few weeks, chicks need a good quality starter feed with 18-22% protein (can be fed for the duration of the grow-out)

After that they can be fed a grower ration with ~18% protein until birds are grown

For layers a 16% protein diet should be sufficient

Don’t let birds run out of feed!
   - Slows growth
   - Need more feed to grow (costs more)
Growing

Growing covers the time from the end of brooding until birds are harvested or are sexually mature.
Growing

Management is not as intensive

Birds can manage their body temperature
Still need some supplemental heat until they are fully feathered
Once grown they can handle cold weather without problems if they can stay dry and out of the wind
It is best to keep them confined indoors until they are 4 weeks old
Mortality is lower as the chicks know how to find food and water

For rapid growth, birds should not be allowed to run out of feed
Feeder height needs to be adjusted periodically as the birds grow
If the feeder is too low they will waste feed

Make sure that there is sufficient feeder space for all the birds to eat at the same time
Growing

It is important that water be provided at all times. On hot days, lack of water can quickly lead to death. Water needs to be clean and fresh. Birds consume about twice as much water as they do feed.

This waterer is too low for adult birds, but good for young ones. If you have both large and small birds together set feed an water at the correct height for the smallest birds.
Prevent Feed Wastage

When starting chicks, have feeders as low as possible. Then slowly raise them as they grow to help prevent debris from getting in feed. The level of feed in the feeder should be high when young and then low when old to prevent feed wastage.
Perches

Help to keep birds from sitting on feeders and waterers

Helps keep poop out of the feed and water

Can help to improve bone strength

Perches can be made with locally available materials. If using branches, remove bark as it provides a place for parasites to hide.
No Perches

The lack of perches results in birds roosting on feeders and waterers and contaminating them with feces.
Predators

Little chicks are very vulnerable to predators
The list of predators is long but some to consider include
  Cats and dogs, they may be pets but they can see chicks as food if not properly supervised
  Rats
  Owls and raptors
  Wild animals
    Weasels, mink, skunks, opossums, bobcats, foxes, coyotes, and even bears will kill and eat chickens

Most predation occurs at night so make sure your chicks are in their house and that it is shut tight to keep them safe

Cover chicks in boxes or feed tanks with poultry wire to protect them
Common Behavior Issues

Sometimes birds behave in abnormal ways

Egg eating
   Once learned it can be hard to stop

Cannibalism
   Can be a sign that something is wrong
      Nutrition imbalance
      Bored
      Injured birds
   Beak trimming can be done to help prevent and reduce the problem

Feather picking
   Same as cannibalism

Some feather loss is the result of mating, (note feather loss on back as well as the back of the head at the base of the comb)
May need to remove males at times to allow hens to recover, be sure to allow males access to females a couple of times a week to maintain fertility
Reducing the number of males can also help lessen the damage to hens, again make sure there are sufficient males to maintain fertility if eggs are to be hatched
Layers and Breeders
Egg Production/Breeding

The amount of time it takes for chickens to sexually mature varies by the breed

- Usually start laying between 18 and 22 weeks of age
  - Some breeds may start laying as early as 16 weeks
- Lighter breeds usually mature faster than heavier breeds

Feed and water need to be provided at all times

Water is particularly important as it is a major component of the egg

If water is restricted or unavailable for long times during the day, egg production will drop

Housing is the same as growing with the exception of nest boxes

- Need one nest box for every 4-6 hens
  - 12x12x12 is a good size for average size hens
  - Make them a little bigger for large size breeds
- Place in a shaded area to encourage the hens to lay eggs in them
Egg Production

Males are not necessary for hens to lay eggs
Males are needed for fertile eggs to produce chicks
Takes about 24-27 hours for a hen to form and lay an egg
Hens use calcium from their bones to form the egg shell, this calcium must be replaced by calcium in the diet
Diets low in calcium reduce egg production and can lead to weak bones in hens
Calcium can also be supplied by allowing the hens to access oyster shell free choice
Can be used instead of grit in layers
Extended periods of hot weather can also cause bone problems in high producing layers
Lighting Program

24 hours of light is recommended for the first 4 days
20 hours of light for days 4-7
For the second week 16 hours of light
After the second week natural light should be sufficient

<table>
<thead>
<tr>
<th>Age (Days)</th>
<th>1-4 Days</th>
<th>4-7 Days</th>
<th>8-14 Days</th>
<th>15+ Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of Light</td>
<td>24 hours</td>
<td>20 hours</td>
<td>16 hours</td>
<td>Natural light</td>
</tr>
</tbody>
</table>

If possible increase day length by 1 hour when birds reach their 18-week body weight target
Housing Layers in Cages

Housing layers in cages allows for:
- More birds to be kept in a small area
- Less exposure to internal parasites
- Less egg loss due to dirty eggs or breakage
- Lower mortality of birds

Bird welfare may be a concern, especially if birds are crowded
Housing Layers in Cages

A bi-level house made of wood and poultry net (wire) and covered with a tarp. Floors are cleaned and the litter is used to grow crops.

Use what you have/can afford

These pens are large and allow the birds more freedom to move and has perches for the birds.
Hatching Eggs
Hatching Eggs

It takes 21 days for eggs to hatch, hens that set on eggs and care for young do not lay eggs during that time

Incubating eggs in an incubator allows hens to continue to lay eggs

Requirements for incubation (embryo growth) are

Correct temperature ~ (99.5, 98– 100° F)
  - Do not place incubators in direct sunlight as it can cause them to overheat during the day
  - Make sure the incubator is located in a well ventilated room that is protected from the environment

Correct humidity ~ 55%, or 28.5°C (83°F) wet bulb
  - Make sure water reservoirs are maintained at the appropriate level, in order to maintain the proper level of humidity

Regular turning of eggs ~ 4-8 x per day
  - After 18 days of incubation the eggs do not need to be turned anymore
Hatching Eggs

While most incubators operate using electricity, there are some that run on paraffin lamps. When using this type of incubator it is important to ventilate the exhaust gasses out of the building. If not properly ventilated, the gasses can build up and kill the developing embryos and lower the number of chicks hatched. It can also cause health problems for the people living and working there.

Example of a paraffin heated incubators
Using Hens to Hatch Eggs
Using Hens to Hatch Eggs

Identify which hens will set on eggs
  Always on the nest
  Fluff up and peck at you when you try and get eggs
  Have a bald patch on their chest
Using Hens to Hatch Eggs

Provide a safe place for them that prevents predators from eating them
Keep food and water close by
Provide adequate ventilation

When chicks are small provide a safe place for them
Keep a fence around the area to keep them safe during the day from predators
At night, lock them in a safe house with their mothers to keep protect them

Make sure food and water are accessible to the chicks when they hatch
Storing Hatching Eggs

Collect eggs 2-3 times a day
Store them with the big end up
Store eggs for hatching in a cool part of the house
  Not too dry or too wet
  19-21°C is best temperature
    Avoid temperature fluctuations, keep constant temp
  Do not place in direct sunlight

Only store eggs for 7 days or less before placing them under a hen

Eggs from multiple hens can be placed under the same hen
  This allows you to place eggs that were layed at the same time
Why Some Eggs Don’t Hatch

They were not fertile
They were stored too long or improperly
They were dirty, if an egg breaks and covers the other eggs it can prevent the egg from breathing
They get broken

Eggs were stored in direct sunlight
If eggs don’t hatch wait a couple of days and see if they are fertile
To see if they are fertile carefully open one end of the egg and look for an embryo
Selecting Breeders
Genetics

Body size and rate of production are inherited traits
For layers – the smaller the hen the more efficient her production – less feed to produce eggs
For layers – Leghorn type hens and sex-link hens are best for producing lots of eggs using little feed
Modern meat birds are fast growing and very efficient

Egg laying breed, notice they don’t have much muscle

Mixture of modern and local breeds, Birds are the same age and fed the same food, but modern birds are much larger
Poultry Production

Birds are usually selected for either growth (meat) or for eggs.

This is because selection for growth results in a reduction in egg numbers and in efficiency of lay. Also, if selected for efficient egg production, body size and muscle decrease.

Comparison of a modern meat breed to an egg laying breed at three weeks of age, they are fed the same diet and reared in the same facility.
Basics

Establish long term goals
Make deliberate mating's that lead to your goal
Keep good records
  Keep track of birds
  Keep the best and remove the rest
Select only healthy birds
  Don’t select birds with physical abnormalities
You will only need a few males compared to females
  1 male for every 10 females
Basics

Always evaluate birds at the same age
Don’t compare older birds to younger ones
Age at selection depends on the breed and production trait you are selecting for

For example, you may want to select meat birds at 12 weeks of age but for egg layers you may want to wait until the start laying eggs

Don’t compare birds of different breeds
Meat breeds vs egg breeds
Selecting for Meat
Criteria to Measure

Growth rate – weight
Feed conversion
Conformation
Health
Adult size
Growth Rate – Weight

Weight is easy to measure and not subjective
Faster growing birds tend to be more efficient
  Check fleshing to make sure growth contains muscle
Always measure at the same age
  Example – 14 and 35 days of age
Appetite affects growth rate
  Birds that eat more will grow faster than birds that eat less
  Select birds that show big appetites
Feed Conversion

This is a measure of how much feed they eat compared to how much weight they gain.

3kg of feed to get a 1kg bird = 3 to 1 feed conversion

Can be done on individuals (very labor consuming) or on groups of birds (usually chicks are grouped by who their parents are, and how old they are)

Conformation

Meat birds need to have a strong frame and large capacity.

Look for birds which have
- Long backs
- Deep through the chest
- Thick body
- Look for large feet and thick shanks
Health

Select only birds that are in good health
   Cull (remove) birds that get sick
   Cull birds that are not physically sound
Select birds that have bright red combs without dark tips
   Dark tips can be an indicator of heart trouble
Make sure that they have bright clean eyes
Selecting Layers
Criteria to Measure

Egg production
Conformation
Health
Adult size
Egg Production

Use your best layers for breeders

Measure egg production

Number of eggs laid – use trap nests to monitor each hen's production

Select hens that start producing early
Select hens that have long laying cycles, that is, lay eggs many days before they skip a day

Cull hens that molt early

Molt – when hens stop laying and lose their feathers

Select hens that that lay good sized eggs
Cull hens that lay misshapen eggs
Egg Production

Select hens that don’t go broody
Hens don’t lay eggs when broody
Do this only if you have an incubator to incubate eggs, or will be using other hens to hatch the eggs for you

Conformation

Layers need sufficient capacity to maintain high egg production
Look for birds which are
  Long
  Deep
  Thick
  Good abdominal capacity
    Measure between the keel and pubic bones

Health

Select only birds that are in good health
Cull birds that get sick
Make sure they have bright clean eyes
Identifying Good Laying Hens
What to Look For in a Good Laying Hen
What to Look For in a Good Laying Hen

Good Layer

Poor Layer
What to Look For in a Good Laying Hen

Good Layer

Note: this only works for birds with yellow legs

Poor Layer
What to Look For in a Good Laying Hen

Good Layer

Poor Layer

Note: this only works for birds with yellow legs.
What to Look For in a Good Laying Hen

**Good Layer**

Measure how many fingers fit between the pubic bones

More is better

If you can't fit 3 or more then she is not laying

Measure how many fingers fit between the pubic bones

**Poor Layer**
Measure how many fingers fit between the keel and the pubic bones
If you can't fit 3 or more then she is not laying
More is better, should also be soft not firm
Feeding Poultry
Water

Water is the most important part of poultry nutrition.

Birds need a constant supply of fresh clean water.

Birds cannot lay eggs if they lack water.

Use water that you would drink.

Dirty water can make birds sick.

Clean waterers regularly.

**Good**

Birds can access water but not make it dirty.

**Bad**

Water is contaminated with feces and litter, waterer is too low and the birds can roost on top of waterer. Ok if chicks are present (clean often).
Why Good Quality Feed?

Better health
More eggs
Birds grow faster
Good Quality Feed

Good quality feed has five nutrients
   1. Protein
   2. Carbohydrates Energy
   3. Fats
   4. Minerals
   5. Vitamins

Protein

Protein is one of the most important parts of poultry feed

Protein can be found in
   Beans – Soy beans, cow-peas, mung beans
   Fish meal
   Oil seed cakes – sesame cake, soya cake, cottonseed cake
   Insects
   Leaves of legumes – Leucaena, Cassava, Beans
Energy

Chickens need energy to live, grow and lay eggs
Energy helps birds stay active
Energy comes from two sources
  Carbohydrates (starch)
  Fats & oils

Carbohydrates (starches)

Carbohydrates (starches) are the largest source of energy for chickens
  Maize
  Millet
  Sorghum
  Rice
  Root crops and starchy fruits
  Seeds
Fats and Oils

Most grains have some fats and oils in them
Other sources include oil seed meals

Minerals

Minerals are important for proper bone growth and egg production
Sources of minerals include
  Shells – eggshells, oyster shells, snail shells
  Bone meal – made by heating bones then crushing them up
  Limestone products – lime is a good source of calcium

Vitamins

They are important for body functions
Are found in fresh plant leaves, seeds, and fruits
Protein and Energy Requirement for Layers

<table>
<thead>
<tr>
<th>Age (weeks)</th>
<th>0-6</th>
<th>6-12</th>
<th>12-18</th>
<th>18 to First Egg</th>
<th>In Egg Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein %*</td>
<td>18-20</td>
<td>16-18</td>
<td>15-17</td>
<td>17-18</td>
<td>16-18</td>
</tr>
<tr>
<td>Energy kcal/kg</td>
<td>2,850</td>
<td>2,850</td>
<td>2,900</td>
<td>2,900</td>
<td>2,900</td>
</tr>
</tbody>
</table>

*Depends on the quality of the protein

For Layers

3% to 4% Calcium
0.5% Phosphorus
Remember that feed intake decreases as temperatures rise above 32ºC (90ºF)
May have to increase CP% if outside temps stay above 37ºC (98ºF)
# Protein and Energy Requirement for Meat Birds

<table>
<thead>
<tr>
<th>Age (weeks)</th>
<th>0-3</th>
<th>3-6</th>
<th>6-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein %*</td>
<td>22-23</td>
<td>20-21</td>
<td>18-20</td>
</tr>
<tr>
<td>Energy kcal/kg</td>
<td>3,200</td>
<td>3,200</td>
<td>3,200</td>
</tr>
</tbody>
</table>

*Depends on the quality of the protein
Approximate daily feed consumption (grams) per bird

<table>
<thead>
<tr>
<th>Age (week)</th>
<th>Layer</th>
<th>Broiler</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>21</td>
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<tr>
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## Approximate daily water consumption (ml) per bird

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Mixing Feeds

Make your own feed
   The most difficult
Buy feed from supplier
   The easiest way but not always the cheapest
Mix homemade feed with purchased feed
   Buy a concentrate and then add your own grains or other energy feedstocks
   Buy feed and make a similar type feed and blend them together to make sure birds are getting all the nutrients that they need

Need to know what you have available and what nutrients they have

Ingredients will need to be processed properly for use
   Remove anti-nutritional properties

Grind/crush large grains and other large feedstocks so that young birds can easily eat them
Mixing Feeds

All of the different nutrients need to be included in the diet or birds will not perform.

By using more than one source for each nutrient you get a better feed.

- Helps to make sure all nutrients are available in an adequate amount.

Use simple containers to measure and mix feeds.

Feed is only as good as its least supplied nutrient.

A very basic feed can be made using 1/3 proteins and 2/3 grains.

Use multiple sources of each to get a more balanced diet.
Cafeteria Feeding

This type of feeding allows the birds to select what they need.
Proteins and grains are fed separately and birds eat what they need.

Store Feed Properly

Keep it dry
Keep rodents out
Elevate it off the floor
Use What You Have

Corn and millet are the best grains to use
Wheat bran has about 17% protein
  Can make up 1/3 of the ration
  High in fiber, which may help with cannibalism
Rice and rice bran can also be used
  Lower in protein
  Polished rice has less vitamins
Bananas can be used but need to be ripe and they are low in protein limit to 10% of diet
Sweet potatoes can replace up to 50% of grains in a diet
Cassava
  Needs to be dried first
  Both leaves (up to 5%) and root (up to 40%) can be used
  Not much protein but provides energy
Proteins

Legumes (beans)
  Must be treated first (heat, sprout)
  Ground nut cake is a good protein but make sure it is free of mold
  Field peas and some green grams (mung beans), can be used without having to treat them first (up to 1/3 of diet)

Fish Meal
  Feed a maximum of 10%
  High levels make eggs taste “fishy”

Meat and bone meal

Insects

Palm kernel meal
  Can be used as a protein source
  Can be fed up to 25% or ration
  Mix with other source of protein
How to Mix Feeds

Use the Pearson's Square to determine how much of each feed to combine when blending commercial feed with homemade feed.
Poultry Diseases

With assistance from
Dr. Nathaniel Tablante, Professor and Extension Poultry Veterinarian, University of Maryland
and
Dr. Daniel Bautista, University of Delaware, Lasher Lab
What is *Disease*?

Any condition that results in deviation from normal function.
How do Diseases Occur?

Diseases occur due to the interaction between 3 main factors:

- **Agent**
- **Host**
- **Environment**

Not all poultry health and production problems are caused by infectious agents.
Many problems can be traced to management factors.
Infectious Agents

Bacterial

Bacteria cause many diseases, but can usually be treated with antibiotics

Viruses

Viruses cause diseases that can not be treated, therefore, prevention is the only way of protecting your birds
Vaccines are available to help protect your flock

Parasites

Most parasites can be treated with conventional medicine (anthelmintics) as well as traditional remedies

Fungus

No good way to treat fungal infections
Antibiotics may help

http://health.utah.gov
Non-infectious Agents

Chemical

Birds can come in contact with poisons when farms are not kept clean
  – Poisons used to kill rodents
  – Do not use the chicken house to store farm chemicals

Physical

Injury to the bird

Dietary deficiency

  Improper feed formulation or mixing

Toxins

  – Molds create toxins that the birds can consume in the feed

\textbf{Do Not} feed moldy feed to your birds!!

\textbf{Antibiotics only work against bacteria!}
What Factors Affect The Host

Breed
Age
Sex
Immune status
Management and Environmental Factors

Weather
  Temperature
  Humidity
  Wind

Season

Geographic location

Housing

  All birds need protected from;
  - Wind
  - Rain
  - Direct sunshine (in hot weather)
Management and Environmental Factors

For best management check for FLAW
Feed quality
Lighting program
Air quality and ventilation
Water quality
Space requirements
Sanitation
Vaccination and medication
Management and Environmental Factors

Biosecurity = Any and all procedures used to help protect humans or animals against disease or other harmful biological agents

There are three parts to biosecurity:

- Isolation
- Traffic control
- Sanitation
What To Look For

Some symptoms of disease are:

- Weakness, muscular tremors, drooping wings, twisting of the head and neck, or complete paralysis
- Lameness and tumors
- Swelling around the eyes and in the neck
- Bluish comb and wattles
- Sudden death or an unusual number of birds dying in a flock

Other Symptoms Include

- Loss of production
- Poor appetite
- Huddling
- Depression
- Runting/stunting; poor uniformity
- Ruffled feathers
- Coughing, sneezing, eye-nose discharge, difficulty breathing
- Bloody or wet litter
- Increased mortality
What To Look For

Know what a normal bird looks like

How can you tell if your bird is sick?

Sick birds are inactive, dull and tend to isolate themselves from other healthy birds in the flock

What To Look For
What To Look For
What To Look For

Normal
What To Look For

Something is wrong
Some Common Poultry Diseases

With assistance from
Dr. Nathaniel Tablante, Professor and Extension Poultry Veterinarian, University of Maryland
and
Dr. Daniel Bautista, University of Delaware, Lasher Lab
Newcastle Disease (Ranikhet)

Caused by – Paramyxoviridae virus (RNA virus)

Signs can be identical to AI
  Facial swellings
  Red Shanks
  Respiratory Signs
  Nasal/Mouth Discharges
  Eye/Nasal Discharge
  Swollen crusty eyes
  Coughing/gaping, gasping
  Tracheitis
  Can be zoonotic to humans
    Can cause conjunctivitis
Prevention and Control

Biosecurity
Vaccination
Quarantine of infected premises/areas
Destruction of infected birds/flocks
Proper disposal of infected carcasses
  - Composting
  - Burial
  - Incineration
Cleaning and disinfection

Misshapen and abnormal eggs can be a sign of Newcastle disease
Avian Influenza

Caused by Orthomyxovirus
Type A Avian Influenza virus
Various serotypes (H5 and H7 strains are the most common in poultry)
Infects most birds
Can be zoonotic to humans

Note: wild waterfowl (ducks and geese) are natural reservoirs of AI virus
Signs and Lesions

Highly Pathogenic AI
Severe clinical signs
High mortality

Low Pathogenic AI
Mild respiratory signs
Minimal mortality

What to look for

Some symptoms of disease are:
- Sneezing, coughing, gasping for air
- Greenish watery diarrhea
- Depression, weakness, and lack of appetite
- Any unusual decrease in egg laying, or abnormal eggs
- Weight loss
Prevention and Control

Biosecurity
Quarantine of infected premises/areas
Destruction of infected birds/flocks
Proper disposal of infected carcasses

Composting
Burial Incineration
Rendering
Landfill

Cleaning and disinfection

If you bury dead birds make sure that they do not contaminate ground water
Also make sure to bury them deep enough to prevent scavengers from digging them up
Marek’s Disease

Cause, Signs and Lesions

Caused by a herpes virus called *Alphaherpesvirinae*

Seen only in birds older than 16 weeks of age

Initially the birds may show paralysis of one or both wings or the paralysis may be in the legs

Less common forms of the disease include

- Enlarged feather follicles that redden and can sometimes lead to brown crusty scabs
- Lymphoid tumors in various organs
- The ocular form causes a graying of the eye and or a change in the shape of the iris and can result in blindness
Prevention and Control

Biosecurity
Vaccination
Quarantine of infected premises/areas
Destruction of infected birds/flocks
Proper disposal of infected carcasses
  Composting
  Burial
  Incineration
Cleaning and disinfection
Mycoplasmosis
(Chronic Respiratory Disease)

Caused by *Mycoplasma gallisepticum*

Secondary *E. coli* infection is common

Transmitted through the egg, airborne droplets, or from bird to bird
Mycoplasmosis (Chronic Respiratory Disease)

Signs

- Coughing, sneezing, facial swelling, nasal discharge, cloudy air sacs
- Deformed eggs, drop in egg production
- Pericarditis and perihepatitis (with secondary *E. coli* infection)

Prevention and Control

- Purchase chicks only from MG-negative sources
- Provide medicated feed (containing Tylan® or Gallimycin®)
  - Can reduce clinical symptoms but will not completely eliminate MG
  - Be careful some antibiotics cannot be used for birds raised for meat and eggs
- Even if birds have been treated with antibiotics, they can still spread MG to other birds
- Harvesting (or culling??) meat birds may be better than treating them because treatment can be expensive
- Don’t mix birds of different species and age
Infectious Bursal Disease (Gumboro)

Caused by *Birnavirus*

- Affects young birds, not older ones
- Adults are immune compromised
- Virus is very resistant, persisting for months in houses
- Insects can harbor the virus for up to 2 months

Signs and Lesions

- Depression
- Diarrhea
- Vent picking
- Unsteady gait
- Swollen bursa
- Necrotic bursa
- Bursal atrophy
Prevention and Control

There is no treatment

Vaccination programs are used to prevent
  Needs to be for the strain you have

Need good biosecurity
Fowl Pox

Caused by *Avipox* virus

There are two forms

**Dry pox**
- Cutaneous lesions on the feather-less skin
- Some are ulcerated

**Wet pox**
- Skin lesions and/or plaques in mouth, pharynx, larynx, and sometimes the trachea
Prevention and Control

There is no treatment
Vaccination programs are used to prevent
Wing web
Controlling mosquitos
Need good biosecurity – Sanitation

Wet form of Fowl Pox, often results in higher mortality
Internal Parasites

Roundworms (Ascarids)
Hairworms (Capillaria)
Cecal worms (Heterakis)
Tapeworms (Cestodes)

Hairworms
Signs and Lesions

Unthriftiness, stunted growth, emaciation, enteritis, anemia and decreased egg production

Prevention and Control

Rotate birds in yards or pens

Deworm flocks regularly, particularly those raised on the ground or in floor pens

Provide medicated feed (containing broad-spectrum dewormer)

Treat infected birds with the proper dewormer

- *Piperazine* is effective only against roundworms and cecal worms
- *Fenbendazole* is effective against roundworms, cecal worms, and hairworms
Coccidiosis

Caused by *Eimeria sp.*

9 species in chickens

The main problem in broilers are caused by:

- acervulina
- maxima
- tenella

7 species in turkeys

Transmitted through infected droppings (containing oocysts)
Coccidiosis

Intestinal coccidiosis (caused by *E. acervulina, brunetti, maxima, and necatrix*)

- Loss of weight
- Shriveled combs
- Drop in egg prod.
- Pale shanks
Clinical Signs and Lesions

Cecal coccidiosis (caused mainly by *E. tenella* in chickens)

- High mortality
- Bloody feces
- Pale combs
- Ruffled feathers
- Lack of appetite
- Coagulated blood in ceca
Prevention and Control

Good management

Provide medicated feed (with coccidiostats)

Treat infected flocks promptly

There are two types of medications used, coccidiostatic and coccidiocidal

Coccidiostatic medications stop the development of coccidia in the middle of the lifecycle

Coccidiocidal medications kill the coccidian

These medications are usually used in the feed.

A coccidia vaccine is available commercially in some parts of the world and can be given to chicks at one day of age
Other Diseases

Fowl cholera (pasteurellosis)
Can affect birds of all ages
Symptoms are similar to AI:
   Diarrhea, respiratory symptoms, loss of appetite, blue combs and wattles
No treatment
Vaccine is usually available

Infectious coryza
Seen in all ages of birds
Symptoms:
   Runny nose, swellings under the eyes, closed eyes, drop in egg production
Treatment with antibiotics
Prevent by biosecurity

Pullorum disease (Bacillary white diarrhea)
Most commonly seen in young birds
Symptoms:
   Difficulty walking, big bellies, wing dragging and white runny feces
No treatment
Prevent by biosecurity
External Parasites
Mites

Scaly leg mite (*Knemidocoptes mutans*)
Chicken mite (*Dermanyssus gallinae*)
Northern fowl mite (*Ornithonyssus sylviarum*)
Signs and Lesions

Scaly leg mite:
  scales and crusts in legs, combs, and wattles

Northern fowl mite:
  blackened feathers, scabby skin around vent
Signs and Lesions

Stay-Fast Fleas

Poultry ticks, when present can found hiding in debris or cracks in the chicken house
Prevention and Control

Scaly leg mite

Cull or isolate affected birds
Dip legs in warm acaricidal solution (consult veterinarian)
Can coat legs in oil to smother the mites

Mites, Ticks and Fleas

Monitor all birds and facilities for infestation; check egg flats and cases for mites
Treat birds with approved insecticide (e.g. permethrin)

Sulfur powder and wood ashes can also be used
Fill any cracks or crevices in the chicken house to eliminate hiding places for parasites
Vaccines
Vaccines

Vaccines are used to protect birds from diseases, usually viral diseases
Vaccines are used to prevent:
  - Newcastle disease
  - Marek’s
  - Gumboro (Ranikhet)
  - Fowl Pox
  - Fowl cholera
Methods of Vaccinations

1. Eye drops
2. Injections – under the skin (subcutaneous) and in the muscle
3. Skin piercing
4. Orally (in feed or water)
Vaccine Basics

1. All vaccines should be stored in a refrigerator before use
2. Some vaccines are so-called heat stable, which means that the vaccine can tolerate high temperatures (However, heat stable vaccines should also be stored in a cold place to keep them viable)
3. Always keep vaccines out of direct sunlight.
4. When using vaccines in the field, you should transport them in a cool box with ice
5. Do not use any chemical disinfectants to clean syringes, needles or other equipment used for vaccination, as these may destroy the vaccine (instead use boiling water and let cool before using)
6. The vaccines must be mixed or diluted in cold distilled water
7. Make sure any water used for vaccination is free of chlorine
8. It is best to vaccinate birds during the cool hours of the day, either in the morning or evening
9. Some mixed vaccines should be used within a short time frame, otherwise they will be useless and should be thrown away (check instructions for how long vaccine is viable after mixing)
10. Always read and follow the manufactures instructions
11. Don’t vaccinate sick birds, wait until they are healthy
Examples of Vaccine Schedules

These are only examples of programs and not suggestions

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<th>Disease</th>
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**INDIGENOUS CHICKEN VACCINATION PROGRAM**

- **DAY 1 (Done By Hatchery)**
  - MAREKS
  - IB + NCD
  - INTRA MUSCULAR SPRAY

- **DAY 10-14**
  - GUMBORO
  - DRINKING WATER

- **DAY 14-18**
  - IB + NCD
  - EYE DROP

- **DAY 24-28**
  - GUMBORO
  - DRINKING WATER

- **DAY 28-32**
  - IB + NCD
  - EYE DROP

- **WEEK 6-8**
  - NCD Killed/IB + NCD-Live
  - FOWL TYPHOID
  - IM / SPRAY
  - INTRA MUSCULAR

- **WEEK 8-10**
  - FOWL POX
  - WING STAB
  - SUB CUTANEOUS

- **WEEK 12-14**
  - FOWL TYPHOID
  - INTRA MUSCULAR

- **WEEK 16-18**
  - NCD + IB + IBD (K) / IB + NCD (L)
  - IM / SPRAY
  - SUB CUTANEOUS

**Notes:**
- NEVER vaccinate sick chicken
- Consult your veterinary/livestock staff for detailed vaccination programs in your area.

Date of Hatching: ____________
FINAL THOUGHTS

Work with local animal health officials to design a vaccine program for your birds

Make changes with help from animal health officials whenever disease challenges change

Be vigilant – continuous flock health monitoring is a MUST

Use all available senses (sight, touch, smell, hearing) as well as COMMON SENSE

Look for all possible causes and/or predisposing factors, i.e. do not “leave any stone unturned”

Initiate corrective or preventive measures promptly

When in doubt, seek expert advice

Practicing strict biosecurity, and provide adequate high quality feed, water, ventilation, heat, etc. (a.k.a. bird comfort or TLC) will help prevent disease
What is Biosecurity

“Bio” means life and “security” means protection

“Life protection”

Any and all practices and protocols used for the prevention of disease

Why is it important?
  To prevent the spread of disease
  Maintain healthy flocks
  Profitability

Effects of Disease

Decreased reproduction
Decreased productivity
Increased mortality
Decreased cash-flow
Quarantines
Market loss
Flock loss
So what can we do?

Keep people out
Keep birds out
Keep animals out
Remove dead and sick birds quickly
Know what sick birds look like
Elements of Biosecurity

Isolation

Confine your birds within a controlled environment
   Keeping other birds out
   Locking doors to prevent others entering

Separating birds by age

Traffic Control

Control traffic on and around your farm

Sanitation

Disinfect material, equipment, and people that work or enter the farm
Isolation—Keep people out!

If people need to come on the farm make sure that they have not been around any other birds!

Have a fence around your farm
   Keeps people and animals out
   Put up signs

Keep a record of who enters the farm, why they are entering and where they are coming from

Have visitors wash their shoes

Better yet, have them wear plastic covers over their shoes after washing them

Particularly those that own poultry

Post signs to keep people out. Make sure that there is a place to wash hands on entering the farm.
Why Clean Shoes?

People spread disease
Footwear goes with you – everywhere!
You can not see germs on shoes
Easier than you think!
Clean Shoes

Foot baths need to be cleaned often
If they have dirt in them they are not effective
Use something that is easy to clean
Make sure permanent foot baths can be drained and cleaned
Use disinfectants
Use signs

![Foot wash sign]

PLEASE STEP INTO FOOT BATH BEFORE PROCEEDING
Maintain Footbaths Properly
Clean Shoes

Everyone needs to use footbaths!

This means owners and those in charge

Use the footbath when you enter the chicken house
and then again when you leave it

If you can, have a pair of shoes for each house and
only use them there

Use Shoe Covers
Wash Hands

Simple washing your hands often will help stop the spread of disease

Make sure to wash when you return to the farm from a trip to town or a visit to a neighbor

Use signs
Wash Clothes

Clean clothes helps stop the spread of disease
If you can, have a set of clothes to wear only in the chicken house
Drying clothes in the sun can help disinfectant clothing
Prevent wild birds from entering houses

Use wire or other materials to fill holes in housing to prevent birds from entering. Put feed and water inside so it is hard for wild birds to get it.

Examples of bad designs
Don’t mix different species of birds and keep “wild” chickens away from your birds.
Once a bird leaves the farm **DO NOT** let it come back on the farm.
Do not bring birds onto the farm unless you quarantine them first.
Biosecurity

If you must buy birds know the source
   Buy them from a local farmer who has good stock
Make sure that they are healthy
   Go and look at the birds,
   If possible, go and look at birds they have sold to other farmers (practice biosecurity)
Separate new birds for at least 3 weeks to make sure that they are free of disease
Move Sick Birds Away From Healthy Birds

Keep them isolated until they are healthy again
Locate the sick pen as far from other birds as possible
Visit them last and wash your shoes and hands after taking care of them
If possible, have a veterinarian or other trained specialist look at them
Disinfect the pen after sick birds are removed
All in All Out

Have only one age of birds on the farm
  Sell all birds
  Clean and Disinfect the buildings
  Leave farm empty for a week or two
    Longer times between flocks reduces disease
  Place next flock

If You Have Birds of Multiple Ages

Maintain them in separate areas away from each other to help prevent the spread of disease

Take care of the younger birds before visiting the older birds

Always clean shoes and hands before checking each flock of birds and between flocks
  Better yet have different shoes that you wear only to check that flock
Store feed properly

Store feed off the ground. If feed is set on the ground, moisture can enter the feed and make it mold. Store feed so rodents cannot access it. Placing feed in barrels can help.

Storing feed properly can reduce rodent problems
Control Rodents and Insects

Rodents can cause damage to buildings and equipment as well as spread disease.
Insects can also damage buildings, eat insulation and spread diseases.

[Diagram showing a PVC pipe tee with annotations for a rodent control solution.]

Pipe cap

Stiff wire rod (inside)

Bait blocks or pouches (on rod)

PVC pipe
2 inch — mice
4 inch — rats

Pipe “tee”
Cleaning and Disinfection

Simple physical removal of contaminated material reduces the pathogens
Surfaces need to be cleaned before disinfectants are used
Disinfectants do not work if there are large amounts of organic material (manure, dirt, litter) present
Application of an appropriate disinfectant can further reduce the risk of pathogens in a clean environment

Follow the directions for the product you are using
Cleaning and Disinfection

One of the best things we can do to reduce disease is let the chicken houses sit empty.

Most agents that cause disease need a place to live so if the house is empty their numbers will go down over time.

The longer the time between flocks of birds the lower the chance of disease remaining from the previous flock.

Types of disinfectants

**Natural**
- Sunlight (UV)
- Heat
- Cold
- Desiccation
- pH
- Antibiosis
- Organic Acids

**Chemical**
- Oxidizing agents
- Alcohols
- Halogens
- Coal Tar Products
- Phenolics
- Quats
- Aldehydes
- Ammonia
Types of disinfectants
Clean Your Farm

Remove garbage and debris
Cut the grass and weeds
Don’t leave dead birds laying around
Clean up feed spills
When Disease Strikes

Call your veterinarian
Get a diagnosis of the disease and then try and determine how it happened
Work with the Animal Extension group
Don’t visit other farms
Get the sick and dying birds away from the healthy birds
   Move them as far away as possible
Euthanize the birds humanely
Dispose of dead quickly to prevent further diseases
Remember Diseases are Spread by

Wild birds
Other poultry (chickens, ducks etc.)
Humans
Cats
Pigeons
Rodents
Insects

In order to protect your chickens you must limit contact with all of these things
Record Keeping
Record Keeping

Records are needed in order to evaluate production methods

You can’t correct problems if you don’t know what you are doing and what you have done in the past

Need to keep records
  Financial Records
  Production Records

Financial Records

Important in order to know if you are making money
Helps to determine what production methods work

<table>
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<th>Description</th>
<th>How Many</th>
<th>Total Cost</th>
<th>Income</th>
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<td>$200</td>
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<td><strong>Total</strong></td>
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<td></td>
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Production Records (meat birds)

Number of birds
  Source of the birds
  Start of grow-out
  Mortality
    Why did they die

Weight of birds
  Weekly
  Final

Keep field records with the birds
  Amount of feed used
  Total
    Weekly

Disease
  Type
  Number affected (age of birds)

Anything else that happens different
  Weather
  Feed change
  Mechanical problems
Production Records (layers)

Source of hens
  Type
Number of eggs
  Daily (compare weekly)
  Age of hens is also important
    Age affects production rate
Egg size
Mortality
Feed consumption

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<td>June 7</td>
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Records of Flock Health

Acceptable parameters
Measurable data
Past History
Current Information
  What are the birds doing?
  How long?
  How many affected?
  When did it first happen?
  Has it happened before?
  What has been done? (Changes)

Tests
Treatments
Records

It is important to keep accurate records
Don’t make the system so hard it does not get done properly
The more data you collect the more you can learn about the business
Keeping records allows for a way to compare
  Flocks
  Farms
  Breeds of birds
  Suppliers
In poultry flocks where records are not kept, fewer diseases or problems are noticed and therefore, they can’t be prevented or fixed
The sooner you start treating a problem the better,
  Less loss of production
  Less chance of it spreading

Keep the records for several years
Maintain an organized system
That way you can find them
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