Chicken 101
- Basic Management of Poultry in Developing Communities

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Modern Poultry

Chickens can be found throughout the world, and are efficient at converting feed stocks into high quality protein. High quality protein is important for normal development in children. Developing poultry production not only increases food security and nutrition but also improves financial stability.

Because of its low cost to start and operate, along with its potential to improve lives, poultry production is one of the most common beginning farm ventures in the world. Modern genetics can improve local poultry production. Modern breeds can reach market weight in less than 3 months. Today's laying hens are capable of producing over 300 eggs per hen per year. Eggs shells can be many colors including: white, brown, blue, green and olive. The color of the egg shell does not affect the egg quality.

Bird well-being (welfare) should always be considered when starting poultry project. Consider the Five Freedoms before you start:
- Freedom from Hunger and Thirst
- Freedom from Discomfort
- Freedom from Pain, Injury or Disease
- Freedom to Express Normal Behavior
- Freedom from Fear and Distress
Common Types of Production and Breed Types 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

Meat Breeds
Great at producing meat but not good for egg production

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

Dual / Local Breeds
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
Getting Started
The First Steps

**Treat your birds like a business**

Have a plan
- Why are you increasing production?
- Do you have a market?
- Where is your market?
- What do your customers want?

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

Have everything ready before you buy your birds
Getting Started

Chickens 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 Barn

There is no one “perfect” chicken barn

As long as the birds needs are being met, then almost any kind of structure will work

Barns should be constructed to:

- Meet the needs of the birds
- Protect them from the environment and predators
- Allow the caretaker to provide for the birds
- Drain well and don’t flood
- Allows air to flow though the building
- Under tall trees that can provide shade in hot areas

Even free-range/scavaging chickens can benefit from housing, as the birds will be able to get out of bad weather and find safety from predators, particularly at night when most predation occurs
Housing

In warm areas:

- Naturally ventilated barns need to be situated to take advantage of the prevailing winds.
- Try and run barns east-west to prevent direct sunshine on birds.
- Openings should allow for as much air as possible to enter the barn.
- Tall trees that can shade the barn but not block the prevailing winds can help reduce heat stress.
- Barns need to be far enough apart so that one barn does not block the wind from another.
- Barns need to have a high ceiling.
  - Low ceilings are hard to work in.
  - High ceilings also help keep birds cool by allowing hot air to rise.

Use locally available materials, and keep surfaces as smooth as possible to make cleaning easier.

For cooler weather, adjustable curtains on windows and air inlets will allow the barn to be closed when weather is bad, or too cool for the birds.

Barns 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).
Housing

Extend the roof out from the barn so that rain does not enter during storms
Make sure that water drains rapidly away from the barn
Make sure barns are constructed so predators cannot get to the birds

There are two main types of housing

1. Confinement – birds are keep in a barn at all times
2. Free Range – birds are allowed to roam outside part of the time

Disease concerns increase when birds have access to the outdoors
Encounter chickens and other species of poultry
They can interact with wild birds creating a disease risk
Birds can encounter more predators (including theft by neighbors) when they are outside
Birds can supplement part of their diet by scavenging for seeds and bugs

Stocking densities (maximum)
(For birds raised with outdoor access, it is the 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 that smaller ones
Confined Housing

Placing a fence around your farm to keep village chickens far away from your birds, helps to prevents disease

Birds are maintained indoors all the time
Confined Housing

Hope in the Harvest
Free Range Housing

Free range birds will need shade to protect them from the sun and to make them feel safe.

These structures lacks window to allow for ventilation
Poor design
The Chicken Barn – Bedding

Bedding is helpful when birds are raised in a confined area, it absorbs moisture, acts as a cushion for the birds, and dilutes feces

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

Use the best bedding for brooding (young birds)

Use clean bedding in nests and then as it get dirty, move it 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 barn

Old litter can be sold for fertilizer or composted and then used for fertilizer

Rice Hulls

Pine Shavings

Chopped Grass
Fundamentals of Poultry Production
Quality Chicks

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
Poor Quality Chicks
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 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 barn and out of the boxes
Don’t leave old chick boxes laying around the farm
Phases of Growth

Brooding

Growing

Laying

2 Weeks

~16 weeks
Brooding

The first two weeks of life

Chick survival is dependent on how quickly they adjust to the farm and this is the 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.
- Barn is clean and warm
- Heaters are running
- Feed and water are ready and placed in the barn 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 and have access to heat, food and water. Brooder rings are not necessary, whole rooms/barns can be used to brood as long as temperature is maintained and food and water are available.
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.
Use what you have available.

Electric, oil, carbon, 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.

Before the chicks arrive, make sure everything is prepared.
Litter should be warm and dry (~33°C, 92°F).

Be careful not to let the litter/bedding under the heat source get too hot as it can result in a fire.
Heat

Temperature at the chick level needs to be around 34°C (94°F) near the heat source and cooler 1 meter (3 feet) 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 barn 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

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

Place some of your feed near the heat source

Use what is available, don’t spend money on expensive equipment if you are poor

Bamboo can be used to make feeders and waterers
Cooking oil jugs can be cut and used as well

Use extra feeders for the first couple of days or place feed on paper spread on the floor to help chicks find feed quickly and get off to a good start
Feed and Water

When placing chicks in the barn put them on the feed (making it easy for them to find it)

   Place paper on the floor, cover with feed, then place birds on that
   Remove paper after a couple of days

For the first week, fill the feeders full
Second week ¾ 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

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)

Never let chicks run out of water!!!

Use only clean water that you would drink

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 baby chicks, place the waterer as low as you can until they learn to find and drink

Raise the waterers as soon as all birds have learned to drink and they are large enough to reach the water

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
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
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
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

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, civets, bobcats, foxes, coyotes, snakes and even bears will kill and eat chickens

Most predation occurs at night so make sure your chicks are in their barn 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

http://www.poultryhub.org/health/health-management/beak-trimming/

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

This hen needs her beak trimmed to allow her to eat properly
It can be done with a pair of nail clippers
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 (1 male to 10-12 females)

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

Ideally, if light can be controlled birds would be grown on eight hours of light after the third week until they are 18 weeks old and at the proper weight

Lighting Program (Where There is No Light Control)

<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 at least one hour when birds reach their 18-week body weight target
Use artificial light to create a constant day length of 14-16 hours to encourage hens to lay the most eggs
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
- Improved biosecurity

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
Incubating 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 ~ 37.5°C (99.5°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 16 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

<table>
<thead>
<tr>
<th>Incubation Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Chickens</td>
</tr>
<tr>
<td>Ducks</td>
</tr>
<tr>
<td>Quail</td>
</tr>
<tr>
<td>Geese</td>
</tr>
<tr>
<td>Turkey</td>
</tr>
</tbody>
</table>
Using Hens to Hatch Eggs
Using Hens to Hatch Eggs

To identify which hens will set on eggs, look for hens that;
Are always on the nest, refuse to get off eggs
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 place with their mothers to 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 farm
   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, eggs that are covered in feces are less likely to hatch
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
CHICK EMBRYO DEVELOPMENT

INFERTILE
- No development.

DAY 1
- Appearance of tissue development.

DAY 2
- Tissue development very visible.
- Appearance of blood vessels.

DAY 3
- Heart beats.
- Blood vessels very visible.

DAY 4
- Eye pigmented.

DAY 5
- Appearance of elbows and knees.
- Voluntary movements begin.

DAY 6
- Appearance of beak.

DAY 7
- Comb growth begins.
- Egg tooth begins to appear.

DAY 8
- Feather tracts seen.
- Upper and lower beak equal in length.

DAY 9
- Embryo starts to look bird-like.
- Mouth opening appears.

DAY 10
- Egg tooth prominent.
- Toe nails.

DAY 11
- Comb serrated.
- Tail feathers apparent.

DAY 12
- Toes fully formed.
- First few visible feathers.

DAY 13
- Appearance of scales.
- Body covered lightly with feathers.

DAY 14
- Embryo turns head towards large end of egg.

DAY 15
- Gut is drawn into abdominal cavity.

DAY 16
- Feathers cover complete body.
- Albumen nearly gone.

DAY 17
- Amniotic fluid decreases.
- Head is between legs.
- Yolk sac is still on outside of embryo.
- Head is under the right wing.

DAY 18
- Growth of embryo nearly complete.
- Yolk sac is drawn into body cavity.
- Amniotic fluid gone.
- Embryo occupies most of space within egg (not in the air cell).

DAY 19
- Yolk sac drawn completely into body.
- Embryo becomes a chick (breathing in air cell).
- Internal and external pip.
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 feed, 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 about three weeks of age, they are fed the same diet and reared in the same facility.
Basics

Establish long term goals
Make deliberate matings 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

Don’t compare birds of different breeds
   Meat breeds vs egg breeds

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

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 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

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
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 hens 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 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

Good Layer

Poor Layer
What to Look For in a Good Laying Hen

Good Laying Hen

Poor Layer
What to Look For in a Good Laying Hen

Note: this only works for older birds with yellow legs

Good Layer

Poor Layer
What to Look For in a Good Laying Hen

Good Layer

Note: this only works for older birds with yellow legs

Poor Layer
Measure how many fingers fit between the pubic bones
If you can't fit 3 or more then she is not laying
More is better
What to Look For in a Good Laying Hen

Measure how many fingers fit between the keel and the pubic bones.

More is better, should also be soft not firm.

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

Poor Layer

Good Layer
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 has five nutrients

1. Protein
2. Carbohydrates
3. Fats
4. Minerals
5. Vitamins

Energy
Protein

Protein is one of the most important parts of poultry feed. It is important for muscle and feather development. Protein can be found in:
- Beans – Soy beans, cow-peas, mung beans
- Ground nut
- Fish meal
- Meat and bone meal
- Oil seed cakes – sesame cake, soya cake, cottonseed cake
- Insects
- Moringa leaf
- Leaves of legumes – Leucaena, Cassava (up to 5%), Beans

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
Protein levels need to be higher when using low quality protein.
### 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 32°C (90°F)
May have to increase CP% if outside temps stay above 37°C (98°F)

### Vitamins and Minerals

Vitamins and minerals are important for proper bone growth and egg production

Sources of vitamins include
- Fresh plant leaves, seeds, and fruits

Sources of minerals include
- Shells – eggshells, oyster shells, snail shells (heat treat and crush before using)
- Bone meal – made by heating bones then crushing them
- Limestone products – limestone is a good source of calcium
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
  Sweet potatoes
  Root crops and starchy fruits
  Seeds

Fats and Oils

Oils are important source of energy and essential fatty acids
They also improve feed taste and function as a carrier for fat soluble vitamins
Most grains have some fats and oils in them
Other sources include oil seed meals such as
  Soybean meal
  Palm kernel meal
  Groundnut meal
## Approximate daily water consumption (ml) per bird

<table>
<thead>
<tr>
<th>Age (week)</th>
<th>Layer</th>
<th>Modern Broiler</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>65</td>
</tr>
<tr>
<td>2</td>
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<td>120</td>
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<tr>
<td>3</td>
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<td>4</td>
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<td>20</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>21 and up</td>
<td></td>
<td>270</td>
</tr>
</tbody>
</table>

*Hot weather will increase water consumption

## Approximate daily feed consumption (grams) per bird

<table>
<thead>
<tr>
<th>Age (week)</th>
<th>Layer</th>
<th>Modern Broiler</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>95</td>
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<td>4</td>
<td>25</td>
<td>135</td>
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<td>5</td>
<td>30</td>
<td>170</td>
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<tr>
<td>6</td>
<td>40</td>
<td>190</td>
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<tr>
<td>7</td>
<td>45</td>
<td>200</td>
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<td>8</td>
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<td>50</td>
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<td>9</td>
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<td>17</td>
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<td>18</td>
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<td>110</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>21 and up</td>
<td></td>
<td>130</td>
</tr>
</tbody>
</table>
Store Feed Properly

Keep it dry
Keep rodents out
Elevate it off the floor

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 (cooked, dried, cleaned)

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.

A very basic feed can be made using 40% proteins and 60% grains.

Use multiple sources of each to get a more balanced diet and then add some fresh greens such as kale and a source of minerals like bone meal.

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.

Bone meal can be made at home by baking/roasting bones (any animal bones) until they are easy to crush and then crushing them into a powder/small pieces (bones can be cooked over a fire, on a grill or in an oven).
Use What You Have

Energy

Corn, sorghum 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

Moringa leaf (up to 5%)

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
Use What You Have

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 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.

---

**Basic Layer Diet (1 kilo)**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>&lt;8 weeks</th>
<th>8-17 weeks</th>
<th>18+ weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground corn</td>
<td>500 g</td>
<td>575 g</td>
<td>600 g</td>
</tr>
<tr>
<td>Toasted ground soy</td>
<td>440 g</td>
<td>360 g</td>
<td>325 g</td>
</tr>
<tr>
<td>Bone meal</td>
<td>55 g</td>
<td>60 g</td>
<td>70 g</td>
</tr>
<tr>
<td>Salt</td>
<td>5 g</td>
<td>5 g</td>
<td>5 g</td>
</tr>
</tbody>
</table>

**Basic Meat Bird Diet (1 kilo)**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>&lt;4 weeks</th>
<th>&gt;4 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Corn</td>
<td>485 g</td>
<td>565 g</td>
</tr>
<tr>
<td>Toasted ground soy</td>
<td>480 g</td>
<td>400 g</td>
</tr>
<tr>
<td>Bone meal</td>
<td>30 g</td>
<td>30 g</td>
</tr>
<tr>
<td>Salt</td>
<td>5 g</td>
<td>5 g</td>
</tr>
</tbody>
</table>

---

*Hope in the Harvest Mission International in Liberia uses the following ration to feed their chickens:*

- 50%-Corn
- 10%-Peanut
- 6%-fish meal
- 15%-Wheat Bran
- 19%-Palm Kernel Cake

*this is their base feed and they add the following supplements:*
- eggshells/snail shells
- moringa/sweet potato greens
- salt
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
Diseases

Disease is any condition that results in deviation from normal function.

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

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 barn 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

Antibiotics only work against bacteria!
Management and Environmental Factors

Weather
- Temperature
- Humidity
- Wind

Season

Geographic location

Housing
- All birds (and feed) need protected from;
  - Wind
  - Rain
  - Direct sunshine (in hot weather)

Do Not feed moldy feed to your birds!!
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

Use good biosecurity to keep birds healthy

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

---

**Biosecurity Area**

No Admittance Without Owner Permission

Telephone:
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
What To Look For

Normal

Something is wrong
Biosecurity
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

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
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
Clean Shoes

Why Clean Shoes?

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

Used foot baths to clean and disinfect 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

Everyone needs to use footbaths!

This means owners and those in charge

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

If you can, have a pair of shoes for each barn and only use them in that barn

PLEASE STEP INTO FOOT BATH BEFORE PROCEEDING
Use Shoe Covers

Get shoe covers on hand to provide to visitors to the farm

- Shoe covers can be purchased from many different companies
- If shoe covers are not available then you can use plastic bags to cover their shoes
  - Use bags that have thick plastic to prevent them from ripping
  - Can also use two or more bags so that if one rips the other still protects the shoe from contact with the ground
Wash Hands and Clothes

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

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

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

Don’t mix different species of birds and keep “wild” chickens away from your birds.
Biosecurity

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
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

One of the best ways to get birds disease free is to only have birds of the same age on the farm

Separating production to multiple location allows production to continue even in the event that birds at one location are lost due to disease or natural disaster

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.

If you are using poisons to control rodents, make sure that they are protected so that the birds (or children) cannot eat them.

Rotate poisons so that the rodents do not become resistant.

Follow all safety warnings for the control method you are using.

Insects can also damage buildings, eat insulation and spread diseases.

Use cation if you use insecticide to control insects.

Follow all safety rules.

Store in a location away from birds and people, and keep locked so that children cannot access them.
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

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

Most agents that cause disease need a place to live so if the barn 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
Phenolocis
Quats
Aldehydes
Ammonia
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
- Keep people away from your farm
- Don’t visit neighboring farms

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
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

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

Note: wild waterfowl (ducks and geese) are natural reservoirs of AI virus
Marek’s Disease (Range Paralysis)

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 barns
- 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
Internal Parasites

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

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)

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

- Loss of weight
- Shriveled combs
- Drop in egg prod.
- Pale shanks
Coccidiosis

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 coccidians

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

http://www.impextraco.com/xtra-performance%C2%AE-anticoccidials
Other Diseases

Fowl cholera (pasteurellosis)
Caused by the bacterium *Pasteurella multocida*
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
Caused by the bacterium *Haemophilus paragallinarum*
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)
Caused by the bacterium *Salmonella Gallinarum* and *Salmonella pullorum*
Most commonly seen in young birds
Symptoms:
- Difficulty walking, big bellies, wing dragging, anorexia, weakness, and white runny feces,
High Mortality
Can be passed from the hen to the chick thought the egg
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

Stay-Fast Fleas, fleas attach around the eyes and on the comb and wattles

Poultry ticks, when present, can be found hiding in debris or cracks in the chicken barn
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 barn to eliminate hiding places for parasites

FINAL THOUGHTS on Disease

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, Don’t put off repairs!
When in doubt, seek expert advice
Practicing strict biosecurity, and provide adequate high quality feed, water, ventilation, heat, etc. (keeping birds comfortable and happy) will help prevent disease
Keep your farm clean!
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

### COMMERCIAL LAYERS

<table>
<thead>
<tr>
<th>AGE</th>
<th>DISEASE</th>
<th>VACCINE</th>
<th>METHOD</th>
<th>DOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 days</td>
<td>IB + ND</td>
<td>HVT 200/1</td>
<td>INTRAMUSCULAR</td>
<td></td>
</tr>
<tr>
<td>1 week</td>
<td>IB + ND</td>
<td>HVT 200/1</td>
<td>INTRAMUSCULAR</td>
<td></td>
</tr>
<tr>
<td>3 weeks</td>
<td>IB + ND</td>
<td>HVT 200/1</td>
<td>INTRAMUSCULAR</td>
<td></td>
</tr>
<tr>
<td>8 weeks</td>
<td>IB + ND</td>
<td>HVT 200/1</td>
<td>INTRAMUSCULAR</td>
<td></td>
</tr>
</tbody>
</table>

### INDIGENOUS CHICKEN VACCINATION PROGRAM

<table>
<thead>
<tr>
<th>AGE</th>
<th>VACCINE</th>
<th>MODE OF ADMINISTRATION</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day old</td>
<td>Mareks</td>
<td>Subcutaneous</td>
<td>Mainly for commercial hatcheries</td>
</tr>
<tr>
<td>Day 10</td>
<td>Gumboro (1st dose)</td>
<td>Drinking water</td>
<td></td>
</tr>
<tr>
<td>Day 18</td>
<td>Gumboro (2nd dose)</td>
<td>Drinking water</td>
<td></td>
</tr>
<tr>
<td>3 Weeks</td>
<td>Newcastle disease (1st dose)</td>
<td>Eye drop or Drinking water</td>
<td></td>
</tr>
<tr>
<td>3 Weeks (In hot spot areas)</td>
<td>Fowl pox</td>
<td>Wing web stab</td>
<td></td>
</tr>
<tr>
<td>6 Weeks (Other areas)</td>
<td>Newcastle disease (2nd dose)</td>
<td>Eye drop or Drinking water</td>
<td>Repeat every 3 months</td>
</tr>
<tr>
<td>8 Weeks</td>
<td>Newcastle disease (3rd dose at point of lay)</td>
<td>Eye drop or Drinking water</td>
<td>Repeat every 3 months</td>
</tr>
<tr>
<td>19 Weeks</td>
<td>De-worming</td>
<td>Drinking water</td>
<td>Repeat every 3 months</td>
</tr>
</tbody>
</table>

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

Date of Hatching:

![Date of Hatching Image]

KARI
Record Keeping
(Basic Business)
Basic Business

Every farm needs a business plan - a written document

Describes what you are going to produce
    Eggs
    Meat
    Feathers

How you are going to produce it
    Confined housing
    Free range
    Where will you get your birds

States your marketing strategies
    Where will you sell your product?
    How will it be different from other products?

Start small and only purchase what you need
    Make your own waterers and feeders to save money
    Use what you have
    Expand when you can afford to

Sets a budget for production and marketing activities
Record Keeping

Records are needed in order to evaluate business methods

Need to keep
  Financial records
  Production records
  Bird health records

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

Financial Records

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>How Many</th>
<th>Total Cost</th>
<th>Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/Jan/2013</td>
<td>feed</td>
<td>400kg</td>
<td>$200</td>
<td></td>
</tr>
<tr>
<td>10/Jan/2013</td>
<td>fuel</td>
<td>20 liters</td>
<td>$20</td>
<td></td>
</tr>
<tr>
<td>12/Jan/2013</td>
<td>chicks</td>
<td>100</td>
<td>$100</td>
<td></td>
</tr>
<tr>
<td>01/Feb/2013</td>
<td>labor</td>
<td></td>
<td>$30</td>
<td></td>
</tr>
<tr>
<td>01/Mar/2013</td>
<td>labor</td>
<td></td>
<td>$30</td>
<td></td>
</tr>
<tr>
<td>09/Mar/2013</td>
<td>birds</td>
<td>90</td>
<td></td>
<td>$450</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$380</td>
<td>$450</td>
</tr>
<tr>
<td>Net Income</td>
<td></td>
<td></td>
<td></td>
<td>$70</td>
</tr>
</tbody>
</table>
Production Records (Meat Birds)

Number of birds
   Source of the birds, number of birds
   Start of grow-out, end 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 (symptoms)
   Number affected (age of birds)

Anything else that happens different
   Weather
   Feed change
   Mechanical problems

<table>
<thead>
<tr>
<th>Date</th>
<th>Feed Added</th>
<th># Dead</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Production Records (layers)

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

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 and use them

Look at your records when you have a problem to see if it is something new or a repeat problem that you need to address differently

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 kept, diseases and problems are noticed and therefore, they can be fixed quickly preventing losses and increasing profits

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
The latest version of this book can be found at:

https://extension.umd.edu/poultry/publications/international