Livestock

1. Apiculture
2. Broiler
3. Egg Production
4. Rabbit Production
5. Small Ruminant Production
6. Swine Production

TECHNOLOGY PACKS

EGG PRODUCTION

November 2015
Background

Production decisions concerning how much effort and resources to invest and which farming practices to follow, have consequences and create opportunities for the farm affecting production levels, input costs, time constraints, and the potentially size of the operation. They also may have implications for resource use and environmental quality.

Numerous information exist on the various aspects of production and handling/marketing of crops and livestock, the majority of which are outdated, not easily understood and lacking the where with all for addressing present day challenges such as good agricultural practices (GAPs) and food safety and climate change that impact on the environment and rural livelihoods. These issues are also closely related to the importance of the role of primary producers in increasing the earnings of all actors along the value chain in supporting the development of a commercially viable and sustainable agricultural industry.

The production of high quality and easily understood information packages is critical as this forms a basis for farmers to obtain financing from lending institutions and to efficiently increase their production through the availability of modern technology. This will also result in a reduction of rural unemployment and will greatly help in alleviating poverty and other associated social ills.
CARDI
P.O. Bag 212, Frederick Hardy Building
University of the West Indies
St Augustine Campus,
St. Augustine Trinidad and Tobago, W.I.

© The Ministry of Agriculture, St Lucia 2015
# Table of Contents

- Introduction 4
- Breeds 5
- Production Practices 5
  - Site Selection 5
  - Housing and Equipment 6
  - Preparation for the Arrival of Day Old Chicks 11
- Brooding 14
- Rearing Pullets 15
- Water 17
- Lighting 17
- Flock Uniformity 18
- Debeaking 19
- Egg Production 19
- Egg Handling 20
- Health Management 21
- Cannibalism 27
- Biosecurity 27
- Record Keeping 29
- Appendices: Example of Layer record Cards 31
Introduction

This Technological Package (Tech Pack) deals with the production and marketing of layer chickens. Also included as an Appendix are examples of Layer Record Cards.

The mention of any commercial products in the Tech Pack is for the purpose of citing examples and is not meant to either endorse or discredit any particular product. Use of chemical products should strictly comply with local regulations and all instructions provided by the manufacturer.

The scientific name of the chicken is *Gallus gallus domesticus*. 
BREEDS

Most laying breeds used today are based on the White Leghorn and Rhode Island Red breeds. However, in St Lucia, the Novogen is used as these are generally considered more tolerant to high temperatures.

Production Practices

SITE SELECTION

A good poultry house protects the birds from the elements, predators, injury and theft. Poultry require a draft free house that should be built on high ground not prone to flooding and with proper drainage. The
pen should be accessible from a good road network for the ease of transportation of feed, litter and most importantly birds at the time of arrival and collection of eggs.

Preferably the house should be within sight of the owner or watchman to guard against predators and praedial larceny. The site should not be close to other poultry houses to reduce the spread of diseases.

Some trees could be planted to cast a shade on the roof to reduce temperatures within the house without restricting air flow.

**HOUSING AND EQUIPMENT**

The following are the requirements for housing and equipment:

- Each bird needs a floor space of around 2 - 3 square feet (0.2 – 0.3 m²). The width of the pens should not be more than 30 feet (9 m). The length will depend on the number of birds housed and the availability of land. The height should not be less than 7 feet (2.1 m) anywhere in the pen.
- Build pens so that the long walls have an east to west orientation, which allows for proper ventilation and avoid exposure to direct sunlight, thereby allowing the birds to be cool during the hottest time of the day. In cases where more than one pen is present the minimum distance between pens should be 25 feet (7.5 m).
- Sides of houses are usually open using wire mesh to allow proper air circulation and removal of excessive humidity, heat and harmful gases. This wire mesh should stand on the top of at least one row of blocks to inhibit the unwanted entrance of rodents.
- Gable roofs with ridge openings are recommended. The roof should also extend for about 1½ - 2 feet (0.5 – 0.6 m) beyond the wall.
- Floors should be of concrete or rammed earth; the former being
the type most highly recommended for it facilitates the proper cleaning and disinfecting of the pen between batches. However, it comes with a higher investment cost.

- If dirt or sand floors are preferred, wire netting should be placed between floor and litter, to keep rats out of the pen. Between batches a few inches (5 – 10 cm) of soil should be removed and fresh soil used to replace it, before the wire netting and litter is laid down. Dirt and sand floors do not lend themselves to proper disinfection.

- Brooder houses ideally should be completely separated from the other buildings and a storeroom should be centrally located among the pens.

- Planting of lawns and other vegetation around the house will absorb the excessive radiation of the sun’s rays, thereby reducing heat within the pen.

- Keep water tanks shaded from direct sunlight.

- Most farmers operate an all-in/all-out system, whereby all birds of the same age are reared in the same pen. A 3 week period is recommended in between batches to facilitate cleaning, disinfecting and resting of the pen.

Layers are reared under either a deep litter system or in a battery cage system. In St Lucia, the Ministry of Agriculture recommends the deep litter system.

**Deep litter system**

In this system birds are totally confined to their house and the farmer provides and maintains the best environmental conditions for production. Different types of litter may be used with the type chosen depending on availability and cost. Good litter must be dust free and not too fine. Some examples are:
Untreated wood shavings. Wood shavings that are treated should not be used.

Chopped grass/straw: the grass must be dried completely before being used as a litter; if this is not done, there is the possibility that fungal growth may occur which will compromise the health of the birds.

Shredded paper or dice beds.

Pumice sand.

River sand.

Litter quality and management is important to the well-being of flocks. It must be stressed that the function of the litter is to provide insulation from the floor as well as absorbing moisture from the droppings.

Litter should be placed on the floor in a layer 3 – 4 inches (7 – 10 cm) thick. In hot weather, litter can be reduced to 2 inches (5 cm) thick. This will reduce heat caused by fermentation in the litter.

The litter must be turned twice a week to improve aeration and to ensure dryness. In some cases, layers tend to scratch the litter making it possible to turn litter once per week. Litter should be kept in a good, crumbly condition. Wet spots must be removed and fresh litter used to replace these damp spots. Some farmers top dress the litter as it becomes moist.

Litter can be reused several times as long as there is a high degree of management. One of the main problems which may arise with reused litter, beside dustiness, is high ammonia concentrations. The experienced/progressive farmer will deal with this problem more readily than a new, inexperienced farmer. Besides improving ventilation in the pen, there are additives which can be applied to the litter to reduce the ammonia concentration. Heaping or piling litter between batches for 9 - 10 days
TECHNOLOGICAL PACKAGE

will reduce the carryover of some viruses between batches. Recycling of litter is not recommended for use by the inexperienced farmer and in cases where the last batch suffered an infectious disease outbreak. This can facilitate the transmission of disease from flock to flock.

Proper ventilation is important as poor ventilation can lead to increased heat and reduction of feed intake and weight gain. In cases where ventilation is poor it is recommended that fans be installed to assist in the circulation of air.

Provide adequate space for birds to exercise, and an area to nest. Nest boxes must be provided before the first eggs are laid to minimize broken or dirty eggs. Nest boxes should be 14 inches wide x 12 inches high x 11 inches deep (35 x 30 x 28 cm). At the entrance to the box, there should be a 4 inch (10cm) lip (from base to top of lip). Usually, one nest box is sufficient for five hens. The nest boxes are placed in the coolest and darkest areas of the house and raised about 2 feet (60 cm) from the floor. The top of the box should be constructed with a sharp slope to prevent birds from perching. The nest box must be protected from draughts but be well ventilated. The lighting in the house should be placed in such a way so as to minimize shaded areas under nest boxes.

The inside of the nest box should be lined with nesting material, 6 inches (15 cm) deep, which should be replaced regularly to ensure good sanitation. Nesting materials commonly used are wood shavings or rice hulls.

A perch may be constructed just on the outside of the entrance of the nest box; each bird should have 6 – 10 inches (15 – 25 cm) of perch
space. This prevents birds from entering the nest boxes when not laying and reduces the possibilities of contamination and breakages of eggs. Double tiered nest boxes may be used; the upper and lower level perches must be far enough apart to allow hens to jump from one level to the other.

Under most systems, layer chicks are reared in the very house in which they will be laying when they reach adulthood. Some systems utilize two houses in which pullets (young hens) are transferred to the laying house at 17 weeks of age. When this is done, both houses should be very similar in design and layout.

**Battery cage system**

In this system, two to three hens are placed in cages with feed and water being provided. Cages measure 12 x 16 x 18 inches (30 x 40 x 45 cm) and are placed 2 - 3 feet (60 – 90 cm) above ground. Cage floors are
graded gently to facilitate eggs rolling to the back of the cage where they are collected.
At the entrance of any house a well-activated footbath should be placed. Some pens have “change rooms” which serve personnel needing to change clothing and washing hands before going to the birds.

**Feeding and watering equipment**
It is a priority to keep feed wastage at a minimum. Feeding equipment must be durable. The feed level and height of feeder must be adjustable and cleaning should be easy. There are two main types of feeders available; hanging feeder and trough. Both should have a rim and a lip to the top to prevent wastage of feed. On some modern farms, it is also possible to install a chain feeding system, which channels feed directly from the storage bins throughout the house.

There are also different types of watering equipment available, some commercial and others which can be built. These include troughs with float valves to regulate flow, hanging waterers and nipple waterers. The type chosen will depend on the size of farm, availability of skilled labour to operate them and their cost. It must be noted that equipment must be checked daily. The height of the waterer should be level to the height of the birds backs. To prevent spillage the level of the water must not be too high. Waterers must also be cleaned. Clean, fresh water must always be available to the birds.

**PREPARATION FOR THE ARRIVAL OF DAY OLD CHICKS**
Before birds arrive on the farm the following practices have to be carried out:
- Clean and disinfect the building and all equipment at least 2 weeks before the arrival of the day old chicks.
• Screen off the brooding area to cut down on draft. Cardboard may be used to confine chicks close to feed, water and warmth. The screen should be at least 12 inches (30 cm) in height and can be removed after 1 - 2 weeks.

• Most farmers brood their chicks on the floor. When this is done, absorbent, non-slippery bedding material is required. A slippery floor will cause dislocation of hip bones in day old chicks. Sawdust or wood shavings could be used.

• Spread litter at least 4 - 6 inches (10 – 15 cm) thick in the brooding area. Do not allow litter to become wet, it must be changed as required or top dressed with dry material. Any foreign objects, which can cause injury to the birds, should be removed from litter. River sand, pumice sand, dice bed, saw dust and wood shavings are the most commonly used materials used for litter. Do not use treated timber shavings.

• Feeders and waterers should be alternated around the brooder lamp. Fill feeders and waterers a few hours before the arrival of birds.

• Suspend heaters (heat lamps or bulbs) from the roof between 18 – 21 inches (45 – 55 cm) above the chicks using wire or chain, and turn them on at least 24 hours before the arrival of the chicks. Thermometers should be hung close to the heat source at chick height to monitor temperature.

• Ensure that the pen is bird (wild) and rodent proof.

• Prepare record sheets to collect information on numbers that arrive, treatment, mortality, feed intake, house temperatures and other relevant data.

• Wind and rain barriers should be available on stand-by.
Transportation of day old chicks
Day old chicks should be ordered from a hatchery with an excellent reputation for size, uniformity, cleanliness and alertness of day old-chicks. Chicks are transported in specially made boxes that protect them from jolts, overcrowding and suffocation. Transport chicks during the coolest hours of the day; either early morning or in the evening to avoid problems related to heat stress.

Arrival of day old chicks on farm
When the birds arrive on-farm:
- Carefully remove the chicks from the delivery truck. Ensure strict sanitation during unloading.
- Open boxes and check for symptoms such as coughing, sneezing, watery eyes, diarrhea and any abnormalities.
- Reject all birds with abnormalities and signs of weakness and inform the hatchery.
- Dip the birds’ beaks in water. This serves to teach birds how to drink. Ensure waterers are filled. On the first day, a 5% sugar solution may be made available to chicks.
- Ensure that the heat source is functional and the area is rodent proof.
- Ensure that the temperature of the brooder is between 90 - 100°F (32 - 37°C).
- Institute proper bio-security measures including foot dips, clean shoes and boots, limit visitors.
- Frequent visits by the farmer to the brooder are important at least for the first 10 days to ensure that chicks are comfortable. Look for chicks which may fall into cavities in the floor or become stuck under waterers or feeders.
BROODING
The initial temperature in the brooder should lie between 90 - 100°F (32 - 37°C). to supply enough heat to maintain the right body temperature of chicks. Reduce this by 3 - 5°F (2 - 3°C) per week until the temperature reaches ambient levels. The temperature can be adjusted by raising or lowering the heater. The importance of maintaining the required temperature is unquestionable, as stress and high mortality due to asphyxia (suffocation), and poor feed intake are associated with exposure to temperatures outside of the chicks’ comfort zone.

Chick behaviour provides a clear indication of their comfort. If they form clusters under the heater, this indicates insufficient heat; clusters may also be formed on one side of the brooding area when a draft is present. However, if excess heat is generated, they would tend to be as far away from the source as possible.

A prompt solution to any problem is necessary:
I. If clusters are being formed under heaters, increase the temperature by regulating heaters, increasing the wattage of bulbs or reducing the height of the heater.
II. The opposite of the above is done if chicks remain as far as possible from the source of heat.
III. When draft occurs, identify the source of entry of cool air, and construct appropriate barriers. Some farmers use simple materials such as cardboard or used feedbags which have been washed and air-dried.

Ensure that the brooder also has sufficient light. If the light is too bright, chicks may begin feather picking. An easy rule to follow is that if you can read a newspaper, there is enough light.
REARING PULLETS

Feeding
Birds should weigh between 2.8 - 3.4 lbs (1.3 – 1.6 kg) at 18 weeks old. Underweight birds produce small eggs and are predisposed to prolapse. Overweight birds will produce large eggs but will consume much more feed thus increasing the cost of production.

For layers, feed mills produce three types of feed:
- Starter (20% Crude protein): for birds up to 9 weeks old.
- Grower (18% Crude protein): 9 - 18 weeks old.
- Layer: 18 - 72 weeks old.

Place flat feeding plates on the floor to ensure that birds find the feed during the first few days of brooding after which feed can then be offered in automatic feeders.
Use one feeder for every 50 birds. The top lip of the feeder should be at the same level as the birds’ back to prevent wastage. This is adjusted as the birds grow.

Feed has a short shelf life. Ensure that feed being purchased is fresh and stored in a cool dry place separated from the floor and walls to prevent the growth of micro-organisms and to eliminate the possibility of rodent infestation. Do not store feed for more than 3 weeks.

Ensure that feed intake records are up to date and reviewed regularly. Any abnormal increase or decrease in intake could point to health or production problems.

Egg production should start when the birds are 18 - 20 weeks old. At 120 days after the first egg is laid, birds should be fed ad lib. Ensure that calcium and phosphorus are present in the ration. If necessary, additional calcium should be administered. Calcium is required in the diet of laying hens to reduce the possibility of shell-less eggs, soft shell eggs or broken eggs. Calcium can be obtained by crushing seashells.

To encourage feed consumption, feed during the cooler periods of the day. A common strategy is to feed 50% of the requirement in the morning and 50% in the evening. At 1, 9, and 17 weeks old, you can expect a hen to consume, on a daily basis, ½, 1¼ and 2¾ ounces (15, 50 and 80 grams) of feed respectively.

Feed intake should peak to about 3½ ounces (100 grams) per day when the hen achieves mature body weight.
WATER
Water should be of good quality and readily available. One waterer should be used per 100 birds. Provision should be made for adequate storage of water in the event of a water shortage. To store sufficient drinking water for 1000 birds (5 week old) for 2 weeks requires 1,050 gallons (4,500 L) of water. Lack of water can seriously retard growth. Water deprivation can lead to death within a short period. Tanks should be stored in a shaded area to prevent exposure to direct sunlight and painted white to keep its contents cool. Warm or hot water will result in lower intake of water and subsequently lower feed consumption. Each pen should have a small tank of a capacity of approximately 50 gallons (200 L) for administration of medications.
Use one waterer for every 60 birds.

LIGHTING
Lighting is used to simulate longer days. Proper light management is important when raising pullets in order to obtain maximum egg production. Sexual maturity is stimulated by increasing the length of the day. Lighting will also stimulate egg production and help to synchronize the pullets so that all birds start to lay at approximately the same time.
There are two fundamental principles that should be followed when using the lighting system. These are:

- Never increase the length of day during the growing period (1 day to 18 weeks old). If this is done, birds enter sexual maturity too early and the proper body weight is not reached. This can cause an increase in the chances of prolapse, which commonly leads to cannibalism and later death.
- Never reduce the length of day when birds are in production. This could result in a reduction in egg production.

In the first week of the life of birds allow 23 hours of light. This will
encourage birds to feed during the cool hours of the day. Between the second and 18th week, submit birds to a light regime of 14 hours light (natural and artificial) daily. After 18 weeks, increase the duration of light by half an hour every 2 weeks until 16 hours of light a day is reached. This number of hours is maintained until the end of the birds’ productive life.

**FLOCK UNIFORMITY**
The uniformity target to achieve is 80% of the flock to weigh within 10% of the flock’s average body weight.

The critical times to ensure flock uniformity are at 4 - 6 weeks, at sexual maturity and at the start of laying. To be able to achieve this, birds must be weighed weekly up to 26 weeks old. During the first 4 weeks, collective weights of five to ten birds can be taken using a bucket. After this time, birds will need to be weighed individually.

Between 26 - 32 weeks, weigh birds every 2 weeks and from 32 weeks onwards, weigh birds on a monthly basis. A 5% sample of birds should be weighed individually using a scale with increments no more than 1 ounce (20 g). Sample birds from different parts of the house and weigh before feeding.

It is also important to weigh birds before scheduled feed changes as the results will guide the decision on whether or not to proceed as planned.

There are several advantages to rearing a uniform flock: The flock produces more efficiently and the peak of production is higher. This is because a uniformed flock enters sexual maturity at the same age and begins producing at the same time with all arriving at the peak of production at approximately the same age hence yielding a higher peak of production. Also the birds are at a weight which is within 10% of the average flock's weight. This reduces the possibility of competition for feed and water space.
allowing all birds to consume at the same rate.
The following factors influence uniformity of a flock:
- Access to feed and water. Good nutrition in terms of quality and quantity.
- Management.
- Sanitary conditions.
- Lighting system.
- Disease and parasitism-health status of flock.
- Quality of beak trimming.

DEBEAKING
Debeaking is the blunting of the lower beak and removal of one-third of the upper beak. It helps prevent cannibalism, feather pecking and wastage of feed. Debeaking must be carried out carefully, preferably when chicks are no more than a few days old. At this age, beaks are soft and chicks are easy to catch and handle, thereby minimizing stress. This procedure can also be done at the hatchery. If the farmer is not well skilled, debeaking can be done up to 10 days old to avoid damaging beaks. It may be necessary to debeak some birds again just before the start of laying.

Debeaking instruments are commercially available. Avoid clipping areas rich in blood supply. After debeaking add some vitamins (A, B complex, D3 and K) and antibiotics to the feed for 1 week. Newly debeaked birds should have access to plenty of clean, cool water. Add water soluble vitamins and electrolytes to the drinking water to reduce stress on the birds.

EGG PRODUCTION
The age of the birds is a determinant in the quantity of eggs produced. Commercial pullets begin laying eggs about 18 - 20 weeks of age at which time production is at 5% (hens/day laying). Egg size is usually small at the start of laying, but will gradually increase as birds reach peak production.
which occurs when birds are 27 - 29 weeks. At peak production in a good flock will be 90% or higher. Production begins to drop slowly after the peak and by 72 weeks is down to 70% of hens laying in a given day. Shell strength will tend to deteriorate as the rate of egg production declines and during this time diets should be rich in calcium.

The hens will eventually cease to produce and go into moulting (regression of reproductive function). Moulting is the natural process of shedding old feathers and the growth of new feathers. Moulting initiates a new egg-laying cycle. The natural moulting process takes about 4 months to complete. However, on some farms, poultry producers induce starvation to control egg production in laying hens. This “forced moulting” is extremely stressful to hens. Forced moulting methods include food and water deprivation, medications, and simulated light and dark cycles. Following molting hens can lay for at least the second year but production will be 10 - 15 % lower than the first year.

**EGG HANDLING**

Collect eggs regularly and keep nesting material clean. Possible times during the day are at 8 a.m., 11 a.m. and 2 p.m. Use trays when collecting eggs. Do not use baskets or buckets as this will increase the chances of breakage. After being laid, eggs should be allowed to cool gradually prior to refrigeration to avoid sweating. Store at a temperature of 50 – 55°F (10 - 13°C) before marketing.

Avoid washing eggs as this would favor the entrance of bacteria through the shell. Adequate conditions must be put in place to prevent eggs from getting dirty.

If eggs require cleaning dirt can be brushed off. This reduces the possibilities of contamination. If a wash cloth is used, it must be cleaned and disinfected
as regularly as possible.

If the rate of laying is too low, check feeding levels, feed quality, the number of hens and look for health issues which may affect production. These are explained below:

- Poor quality or quantity of feed with nutrient deficiencies and imbalances, can lead to reduce egg production (protein, energy, water and calcium are the most common culprits).
- Lighting programmes, which are not appropriate, may cause problems. If the pullets were reared with day lengths that are too long there will be an early entrance into sexual maturity giving low quality and quantity of eggs. Hens may stop laying if the day length is decreased at any time during the production period.
- Sudden changes in temperature can affect egg production due to stress. High temperatures may cause a reduction in feed consumption, leaving the hen with insufficient nutrient intake to produce eggs.
- Poor ventilation can cause a build-up of gases such as carbon dioxide and ammonia. This will contribute to health problems (respiratory tract diseases) which in turn decreases the number of eggs produced.
- Various diseases can also play a part in reducing egg production. These include parasitic infections such as coccidiosis, intestinal worms, mites and infectious diseases. See the Section below.

HEALTH MANAGEMENT

Early disease identification, diagnosis and control are extremely important in any livestock enterprise, particularly poultry, due to the high stocking densities which cause diseases to spread a lot quicker. Sick birds have lower production levels. Prevention is always better than cure. Proper housing, adequate nutrition with clean water and good management including bio-security will ensure incidences of diseases on your farm are minimal. A good farmer will walk through his flock on a daily basis to look for signs of diseases or abnormalities.
General symptoms of disease
- Lack of appetite.
- Ruffles feathers and birds together in search of warmth.
- Birds are weak and dull with their combs usually pale.
- Birds lose condition and weight.
- Swollen eyes.
- Difficulty in breathing, with sneezing, coughing and rattling signal respiratory problems.
- Digestive problems may appear as a change in consistency and colour of the faeces, diarrhea.

Always isolate sick birds from the rest of the flock. Store dead birds in a freezer for post mortem examinations. Notify the veterinary authorities as soon as possible for proper diagnosis and treatment.

Do not administer drugs unless prescribed by a veterinarian or an Animal Health Assistant. In the case where drugs are recommended for treatment, always follow the directions and comply with the withdrawal period. Medication should be mixed fresh when administered to birds.

The most frequent causes of mortality in layers are listed in Table 1.

Other common causes of high mortality are asphyxiation (suffocation) associated with draft, fright and subnormal brooding temperature; aggression by rodents.

Vitamins and minerals are required to maintain health and maximize production. Under the intensive system, poultry depend on the feed to provide most vitamins.

It is also advised that birds be given a booster from 1 - 5 days old to help strengthen them against disease.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Symptoms</th>
<th>Control/Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate 5 Visceral Gout. Source: <a href="http://www.thepoultrysite.com/publications/6/diseases-of-poultry/232/gout/">http://www.thepoultrysite.com/publications/6/diseases-of-poultry/232/gout/</a></td>
<td>Low feed intake, depression and growth. Mortality. Post mortem will show white urate deposition on internal organs.</td>
<td>Treatment involves measures to encourage water consumption. Avoid feeding excessive protein. Preventative measure could be initiated at the hatchery level. At the farm level, ensure water is available when chicks arrive.</td>
</tr>
<tr>
<td>Condition</td>
<td>Symptoms</td>
<td>Control/Management</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>E Coli septicemia of respiratory origin</td>
<td>Coughing and post mortem will show lesions in the respiratory tract.</td>
<td>Frequent and close observation along with effective management will help to significantly reduce the incidence of this disease.</td>
</tr>
</tbody>
</table>

Plate 6 Marek's Disease (fowl paralysis). Source: http://www.poultryhub.org/health/disease/types-of-disease/mareks-disease-virus-or-mdv/

|                                                                 | Leg paralysis which could lead to mortality, paralysis of wings and neck, weight loss and vision impairment. | There is no treatment for Marek's Disease. Chicks are usually vaccinated against this disease at the hatchery. Ensure calcium levels in diet are adequate. |


<p>|                                                                 | Vary from no sign to sudden death.                                                                               | There is no treatment for this disease. Vaccinate birds to reduce occurrence. Enforce stringent biosecurity measures. Report cases of suspected Newcastle Disease to the Veterinary Division of the Ministry of Agriculture. |
|                                                                 | Coughing, sneezing, nasal discharge, depression, and diarrhea are sometimes seen. Low production or production of thin-shelled eggs. |                                                                                          |
|                                                                 | May also see swelling of the tissues of the head, muscle tremors, drooping wings, twisted head, circling, paralysis or sudden death. |                                                                                          |</p>
<table>
<thead>
<tr>
<th>Condition</th>
<th>Symptoms</th>
<th>Control/Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate 8 Infectious Bursal Dis-</td>
<td>Lameness, severe morbidity and mortality. There may also be a rapid</td>
<td>There is no treatment. Cull any suspected birds. Good biosecurity and vaccination</td>
</tr>
<tr>
<td>ease (IBD) or Gumboro. Source:</td>
<td>drop in feed and water consumption, diarrhea, unsteady gait and birds</td>
<td>will ensure prevention. Vaccination against IBD should be done at 14 - 21 days old</td>
</tr>
<tr>
<td><a href="http://agritech.tnau.ac.in/">http://agritech.tnau.ac.in/</a></td>
<td>sleeping with beaks touching the floor.</td>
<td>to minimize incidence. The vaccine type will depend on the type of viruses present</td>
</tr>
<tr>
<td>expert_system/poultry/Dis-</td>
<td></td>
<td>in the area.</td>
</tr>
<tr>
<td>ease%20Control%20And%20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management.html</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plate 9 Coccidiosis (Protozoan).</td>
<td>The droppings are watery with spots of blood. The birds droop; there is a</td>
<td>Good hygiene such as cleaning boots between sheds, rodent control, drip free water</td>
</tr>
<tr>
<td>Source: <a href="http://www.chickenvet">http://www.chickenvet</a>.</td>
<td>reduction in feed intake and egg production.</td>
<td>lines will help in prevention and control. Anticoccidial drugs are available to</td>
</tr>
<tr>
<td>cool.co.uk/health-and-common-</td>
<td></td>
<td>assist with prevention. Vaccinations are also available. The Veterinary Authority</td>
</tr>
<tr>
<td>diseases/coccidiosis/index.aspx</td>
<td></td>
<td>should be contacted immediately if there are signs of this disease on your farm.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Symptoms</td>
<td>Control/Management</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Plate 10 Cage Layer Fatigue</td>
<td>Deformed birds and fractures which may lead to mortality.</td>
<td>As a prevention, good nutrition during rearing and pre-lay periods is essential for good skeleton development. Proper levels of calcium, phosphorus and vitamin D3 are important during the laying period. Mortality can be reduced by adding 1 teaspoon (5 g) of oyster shell per hen for 3 consecutive days, and vitamin D3 to the drinking water. The treatment is suspended for 3 days and then repeated. In severe cases, this treatment may be required to be done over a 2 - 3 week period.</td>
</tr>
<tr>
<td>(Osteoporosis, Hypocalcemia)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photo source: <a href="http://en.engormix.com/MA-poultry-industry/health/diseases/osteoporosis-cage-fatigue-t1223/165-p0.htm">http://en.engormix.com/MA-poultry-industry/health/diseases/osteoporosis-cage-fatigue-t1223/165-p0.htm</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plate 11 External parasites</td>
<td>Restlessness, scratching, anemia, feather loss, unthriftiness and a drop in body weight and production levels.</td>
<td>Chemical pesticides are available as powders or sprays for control of lice and mites. It is more important to apply the insecticides directly to the bird's body rather than the premises. Keep wild birds away from flocks and ensure proper cleaning of pens between batches of birds.</td>
</tr>
<tr>
<td>(lice and mites). Photo source: <a href="http://www.ashtreevets.com/information/pet-chicken-health">http://www.ashtreevets.com/information/pet-chicken-health</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CANNIBALISM
This occurs more often in egg-type than in meat-type chickens. It may be caused by dietary insufficiencies, stress such as feed deprivation, overcrowding, bright lights, high environmental temperature, inadequate ventilation, insufficient feeders and waterers or nesting spaces, prolapse and flock nervousness and over excitement. Treatment is to eliminate all factors that contribute to stress. Beak trimming helps to minimize the consequences of this behaviour.

BIOSECURITY
Instituting good bio-security measures will ensure a healthy flock with reduced mortality. Some measures are outlined below:

- Clean pens between each batch or when there is a disease outbreak. All surfaces should be washed and rinsed before disinfecting. This will involve immediate disposal of manure at least 1 mile (1.6 km) downwind of the pens. Remove any unwanted materials.
- Scrape floors and wash curtains. White lime could be used to treat side walls and posts up to a height of 3 feet (1 m). Several disinfectants are available locally.
• Footbaths, placed at the entrance of each pen, should be activated with disinfectants on a daily basis or with greater frequency if required. This is to allow for disinfecting boots when entering and leaving the pen. Shoes should be scrubbed with a brush to remove droppings, mud or any other contaminant. Farmers most commonly use an extra pair of shoes to enter the pen. These shoes are solely used for pen activities and are stored in the pen.
• Wheel baths activated with disinfectant will disinfect the tyres of farm and delivery vehicles when entering and exiting the premises.
• Clean and disinfect all equipment which comes in contact with birds or their droppings. This will include shovels, rakes and brooms.
• Don’t rear other livestock species with commercial flocks.
• Allow only essential personnel on farm, particularly in the pens. In cases where a farm has multiple pens with birds of different ages, personnel should conduct their tasks in younger flocks first before proceeding to older flocks.
• Ensure pens are rodent proof. Rat bait should be placed around the pen and changed at intervals of 3 months.
• Remove and dispose of any dead birds daily so as to reduce the spread of diseases.
• Dead birds should be completely burnt to eliminate the possible transmission of diseases from its remains.
• Dead birds should be buried at least 6 feet (2 m) deep and covered with soil.

Dead birds which are collected for post mortem examination by the Veterinary Officials should be stored in a freezer until the post mortem is carried out. They should never be placed in the sun or under high temperatures as this will facilitate decomposition and the cause of death will be difficult to determine.

Unless there is a disease outbreak or some other disaster, most mortality occurs during the first week of life. Excessive mortality may be caused by mismanagement at the hatchery, stress during transportation to the pullet farm or improper brooding. It is estimated that mortality on a commercial layer farm is about 7 %.
Record Keeping

Record keeping ensures early awareness of any problems (such as mortality) in the poultry house. It also allows comparison of feeding regime, mortality and weight gain between batches. Records of the past are extremely helpful in planning future operations. It will immediately indicate whether management systems and practices need improving.

Keep records of disinfectants, antibiotics, medication, feed additives, the amount of feed used for the day, daily egg production and number of dead birds.
APPENDICES
APPENDIX: EXAMPLES OF LAYER RECORD CARDS

Egg production

Pen number: ___________ Date of arrival (chicks): ________ No. chicks: ________
Breed or cross: ________

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of eggs collected</th>
<th>Notes (indicate any mortality)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan</td>
<td>Feb</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Vaccine and drug use**

Pen number: ______________ Date of arrival (chicks): ________ No. chicks: ________

Breed or cross: __________

<table>
<thead>
<tr>
<th>Date</th>
<th>Name of vaccine/drug</th>
<th>Serial number</th>
<th>Expiry date</th>
<th>Method of administration and dosage</th>
<th>Withdrawal period (days)</th>
<th>Comments</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Feed record

Pen number: __________ Date of arrival (chicks): ______ No. chicks: ______

Breed or cross: ______

Feed type: 

<table>
<thead>
<tr>
<th>Date</th>
<th>Quantity of feed offered (kg)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>