Livestock

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TECHNOLOGY PACKS

BROILER 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exist on the various aspects of production and handling/ marketing of crops and livestock, the majority of which are outdated, not easily understood and lacking the where with all for addressing present day challenges such as good agricultural practices (GAPs) and food safety and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.

TECHNOLOGY PACKS

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November 2015

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Introduction

This Technological Package (Tech Pack) deals with the production and marketing of broiler chickens. Also included as an Appendix are examples of Broiler 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

The term “broiler” normally refers to chickens bred for rapid growth. Several strains exist in the Caribbean with the most common being hybrid crosses between Cornish White, White Plymouth Rock and New Hampshire (Plate 1).



Plate 1 Cornish White, White Plymouth rock and New Hampshire
Sources: www.backyardchicken.com; www.cacklehatchery.com; www.meyerhatchery.com

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 width of the pens should not be more than 30 feet (9 m). The length will depend on the number of birds housed and availability of land. Each bird requires a floor space of 1 square foot (0.1 m2). Stocking rates higher than this cause poor flock uniformity, cannibalism and diseases.

- The height should not be less than 7 feet (2.1 m) anywhere in the pen.
- The pen should be built so that its long walls have an east to west orientation, which allows proper ventilation and avoids 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 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 as it facilitates 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.
- At the entrance of any house a well-activated footbath should be placed. Some pens have change rooms for personnel needing to change clothing and wash hands before going to the birds.
- 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 absorbs the excessive radiation of the sun's rays thereby reducing heat within the pen.
- Water tanks should be kept shaded from direct sunlight.

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.

Plate 2 Broiler chicks in brooding area
Source: http://www.ternakpertama.com/2014/12/tips-irit-bahan-bakar-tanpa-mengurangi_24.html

BROILER REARING

Most farmers operate an all-in/all-out system whereby all birds of the same age are reared in the same pen and marketed at the same time. Birds can be slaughtered at the age of 6 weeks. A 2 week period is recommended in between batches to facilitate cleaning, disinfecting and resting of the pen, thus 6.5 batches can be reared in a pen per year.

Broilers are marketable at an average weight of 4.5 lb (2 kg).

Litter management

The deep litter system is an intensive system most commonly used in St. Lucia. In this system birds are totally confined to their house and the farmer provides and maintains the best environmental conditions for production.

Plate 3 Broiler production under a deep litter system
Source: http://farmingbizsetup.com/index.php?topic=12724.0

Different types of litter may be used. The type of litter depends on its availability and cost. Good litter must be dust free and not too fine. Some examples are:

- 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.
- Wood shavings—treated wood shavings should not be used.

It must be stressed that the function of the litter is to provide insulation from the floor as well as to absorb the moisture from the droppings.

Litter should be placed on the floor in a layer 3 – 4 inches (8 – 10 cm) thick. In hot weather, litter can be reduced to 2 inches (5 cm) thick to ensure birds are comfortable by reducing the heat caused by fermentation in the litter.

The litter must be turned at least twice a week to improve aeration and to ensure dryness. 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 will reduce the carryover of some viruses between batches.

Recycling of litter is not recommended for the inexperienced farmer and in cases where the last batch suffered an infectious disease outbreak. Proper ventilation is important. Poor ventilation can lead to increased heat, hence the 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.

FEEDING BROILERS

- In St. Lucia, broilers are most commonly fed with two rations; the broiler starter and broiler finisher.Broiler starter is normally fed from day 1 - 4 weeks of age and broiler finisher which is usually higher in energy but lower in crude protein than the starter, from 5 weeks to market at 8 weeks. The starter also contains a coccidiostat which serves to prevent coccidiosis (an intestinal parasitic disease). No coccidiostat should be in feed being offered to broilers up to a few days before slaughtering, to ensure that the broiler meat is free from residues.
- Flat feeding plates should be placed 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. Finisher ration should be fed in pellet form for most efficient utilization.
- Use one feeder for 50 birds. The top lip of the feeder should be at the same level as the birds' backs to prevent wastage and adjusted as the birds grow.
- Feed has a short shelf life. Over time, its quality particularly, the vitamin content, will decrease. 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.

- Broiler birds should be given a regime of 23 hours light to encourage birds to consume feed during the coolest hours of the day. A total period of 24 hours is not recommended because in the event of a power outage the flock tends to panic.

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.

Table 1 presents a guide on feed and water requirements of birds.

Table 1 Feed and water consumption per day for 1000 birds

Age (weeks)	Feed consumption-1000 birds lb (kg)/day	Water consumption for 1000 birds gal (L)/ day
1	44 (20)	17 (77)
2	93 (42)	35 (159)
3	148 (67)	50 (227)
4	216 (98)	60 (273)
5	282 (128)	75 (341)
6	348 (158)	85 (386)

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 must be done before the chicks are 10 days old to avoid damaging beaks.

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.

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. If this is not done, drug residues may still be present in the animal at slaughter and when its products are ingested, consumers can experience allergic reactions. Medication should be mixed fresh when administered to birds.

The most frequent causes of mortality in broiler chickens are shown in Table 2.

Table 2 Symptoms and treatment of pests and diseases of broiler chickens

Condition	Symptoms	Control/Management
 Plate 4 Omphalitis. Source:http://www.backyardchickens.com/a/mushy-chick-disease-yolk-sack-infection-omphalitis 	Inflamed navel, depression, droopiness, unabsorbed yolk sac and peritonitis.	No treatment. The disease is prevented by control of temperature, humidity and sanitation in the incubator.
 Plate 5 Visceral Gout. http://www.thepoultrysite.com/publications/6/diseases-of-poultry/232/gout/	Low feed intake, depression and growth. Mortality. Post mortem will show white urate deposition on internal organs.	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.
E Coli septicemia of respiratory origin	Coughing and post mortem will show lesions in the respiratory tract.	Frequent and close observation along with effective management will help to significantly reduce the incidence of this disease.

Condition	Symptoms	Control/Management
 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.
 Plate 7 Newcastle Disease. Source: http://www.thepoultrysite.com/publications/6/diseases-of-poultry/199/newcastle-disease/	Vary from no sign to sudden death. 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.	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.
 Plate 8 Infectious Bursal Disease (IBD) or Gumboro. Source: http://agritech.tnau.ac.in/expert_system/poultry/Disease%20Control%20And%20Management.html	Lameness, severe morbidity and mortality. There may also be a rapid drop in feed and water consumption, diarrhea, unsteady gait and birds sleeping with beaks touching the floor.	There is no treatment. Cull any suspected birds. Good biosecurity and vaccination will ensure prevention. Vaccination against IBD should be done at 14 - 21 days old to minimize incidence. The vaccine type will depend on the type of viruses present in the area.

Condition	Symptoms	Control/Management
 Plate 9 Coccidiosis (Protozoan). Source: http://www.chickenvet.co.uk/health-and-common-diseases/coccidiosis/index.aspx	The droppings are watery with spots of blood. The birds droop; there is a reduction in feed intake.	Good hygiene such as cleaning boots between sheds, rodent control, drip free water lines will help in prevention and control. Anticoccidial drugs are available to assist with prevention. Vaccinations are also available. The Veterinary Authority should be contacted immediately if there are signs of this disease on your farm.
 Plate 10 External parasites (lice and mites). Photo source: http://www.ashtreevets.com/information/pet-chicken-health	Restlessness, scratching, anemia, feather loss, unthriftiness and a drop in body weight and production levels.	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.
 Plate 11 Internal parasites: Helminthiasis-Parasitic worms (helminths). Photo source:http://www.bhwt.org.uk/information/internal-parasites-in-chickens/	Infected birds may lose condition, show droopiness, emaciation and diarrhea. Worms may also be seen in the faeces. The primary damage is reduced efficiency of feed utili¬zation.	These are commonly treated by the use of dewormers such as Piperazine and Fenbendazole. Good biosecurity measures will aid in prevention.

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.

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.

MARKETING

Broilers are marketed at the age of 6 weeks. Feed is usually withdrawn from birds 10 hours prior to slaughter; water should be available as long as practical.

Remove or elevate feeders and waterers in the pen before catching birds to make the process easier. Birds should be captured in the evening or early morning, under blue lights or dim lights as this will limit the birds' visibility. They should be cornered to limit their movements. Care should be taken when capturing birds to minimize bruising. Do not try to catch more than one bird at a time. If not done properly, catching can cause undue stress on the birds.

Ten birds at 6 weeks of age should be placed in a crate and these crates should be handled gently and transported to the processing plant during the coolest hours of the day to avoid mortality due to heat stress.

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 and the amount of feed used for the day and the number of dead birds found.

APPENDICES

APPENDIX: EXAMPLES OF BROILER RECORD CARDS

Feed Record

Pen number: _____Date of arrival (chicks): _____ No. chicks: _____

Breed or cross: _____

		Amount Fed (kg)								
Week	Feed type	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total	Comments
1st										
2nd										
3rd										
4th										
5th										
6th										
Total										

Vaccine and drug use

Pen number: _____Date of arrival (chicks): _____ No. chicks: _____

Breed or cross: _____

Date	Name of vaccine/drug	Serial number	Expiry date	Method of administration and dosage	Withdrawal period (days)	Comments	Signature

Weight record

Pen number: _____Date of arrival (chicks): _____ No. chicks: _____

Breed or cross: _____

Week	Number of birds weighed	Total live weight	Average live weight
1st			
2nd			
3rd			
4th			
5th			
6th			
Total			