Hi-Pro
FEEDS

Layer

Management & Feeding Guide

FEEDING PROGRAM PER 100 BIRDS PER DAY

	Age (Weeks)	Lbs. of Feed
Pullet Starter	1	3
	2	4
	3	6
	4	7
	5	8 1/2
	6	9 1/2
	7	10
	8	11
Pullet Grower	9	12
	10	12
	11	14
	12	15
Pullet Developer	13	16
	14	16
	15	17
	16	17
	17	18
	18	18

FEEDING PROGRAMME AFTER 18 WEEKS

Production Phase	Hi-Pro Feed Type	Feeding Recommendations
19-44 weeks (Peak)	18% CP Layer Mash/ Crumble	115 Grams/day
44-58 weeks	17% CP Layer Mash	115 grams/day
> 58 weeks	16% CP Layer Mash	120 grams/day

*CP – Crude Protein

Hi-Pro FEEDS

Layer

Management & Feeding Guide

LAYER MANAGEMENT & FEEDING GUIDE

For information contact:
Hi-Pro Feeds
White Marl, St. Catherine
Tel: (876) 984-7919-20
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Contents

Introduction

There has been a renewed interest by many persons to produce table eggs as a business or hobby.

The Hi-Pro Layer management guide presents information that encourages good agricultural practices essential for the profitable production of table eggs. You can choose to purchase day-old layer chicks and rear them for 18 weeks when they will begin to lay, or you can buy Jamaica Egg Services (JES) replacement pullets. Backyard farmers can cut their costs significantly by purchasing and rearing day-old chicks instead of 18-week old ready-to-lay pullets. Hi-Pro Layer feed is customized to satisfy the maintenance and production requirements of our Novogen strain pullets over the 14 months of table egg production.

ABOUT YOUR HI-PRO NOVOGEN PULLET

The Novogen strain is ideally suited for our tropical climate. They were hatched in the modern Best Dressed Chicken hatchery after twenty-one days and immediately vaccinated against 3 strains of Marek's Disease. This vaccination programme designed by Hi-Pro Veterinarians is implemented on our specially selected grow-out farms and guarantees the production of healthy, properly immunized 18 week old pullets that are ready to lay. Additionally these pullets were reared in similar albeit bigger houses to that of our customers and are acclimatized to produce under normal tropical temperatures. The manual will provide practical solutions to counteract the negative effect of abnormally high temperatures on feed consumption and egg production.

TRANSITION PERIOD

Before the pullets arrive ensure you have prepared the following:

a. **Clean** and dry chicken house
b. **Clean**, fresh litter
c. **Clean** Water pans filled with fresh clean water
d. **Clean** feeder pans ready for Hi-Pro Layer Mash with Celmanax
e. **Clean** nest boxes with fresh wood shavings
f. Eliminate rats with Storm™ rodenticide and repair or replace mesh to keep out wild birds
g. Build and/or open drains to allow for channelling of storm water away from coop
h. If land is flat raise floor base at least 12-18 inches with marl to prevent flooding

The period between pullet arrival and 50% of the flock producing eggs is called the transition period. For you to reduce the stress of this phase and maximize the potential of your recently arrived pullet you must do the following:

a. If you transport your pullets ensure that the container is properly ventilated and **proceed directly to your farm**
b. Handle your pullets gently when off-loading them into the coop
c. Provide water with HiProVit "Stress-Paks" (for 3 to 5 days).
d. Allow access to feed 3 to 4 hours after pullets arrive at the coop.
e. Ensure that all bulbs are in working condition and at dusk turn on lights to ensure a maximum of 16 hours of light e.g. if dawn to dusk is 12 hours provide an additional 4 hours of artificial light
f. Collect floor eggs quickly to discourage the hens from laying on the litter. Placing bags with sand or fresh litter in the corner of the houses or other dark areas may be necessary to discourage this habit.
g. Hens must be encouraged to consume feed. Walking through the coop and shaking the feed pans encourages consumption. This is important because the hens need to gain 300 grams in body weight during the transition period if they are going to achieve and maintain their peak production.

Your successful table egg business starts with the purchase of ***Hi-Pro replacement pullets*** *from* ***Jamaica Egg Services (JES)*** *and specially formulated* ***Hi-Pro Layer feed.***

Building Your Layer Coop

The ideal Layer Coop should allow for proper ventilation, spacing, and be situated away from bushes in an area free of rats and wild birds; in addition, the house should be rat and bird proof. As 1.5 square feet of space is required per bird, the dimensions of the house need to be built in accordance with how many birds you intend to grow.

Example:
To accommodate **100 hens** the house needs to be **10' wide x15' long.**
To accommodate **500 hens,** the house should be **15'x50'** or **25'x30'.**

The Layer Coop should be oriented East to West meaning that the narrow section should face East and the Wider Section should face North to South to reduce direct sunlight into the house.

The floor should be concreted, with the posts at least 7-8 feet in height to allow for proper ventilation. The wall should be one block height from the ground with a ½"-1.5" mesh enclosing the coop.

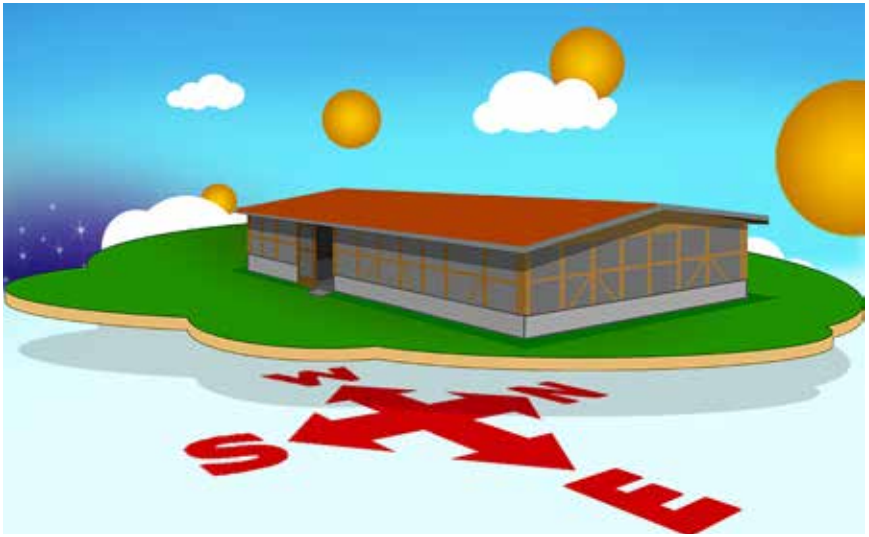
The roofing should be peaked, and is usually constructed with zinc sheets.

If dwelling house is on the property build layer house downwind of dwelling house.

If two houses are being built they should be at least 35 feet apart.

Coops should not be more than 35 feet wide to ensure natural ventilation.

Building roof should angle between 35 and 40 degrees with a 5 feet overhang.



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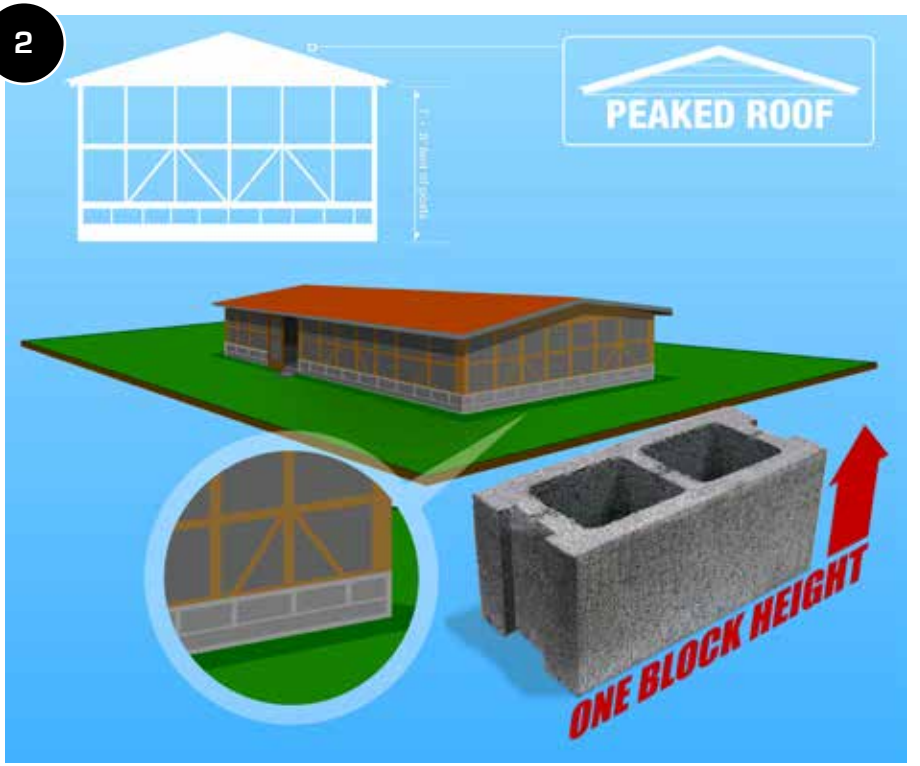
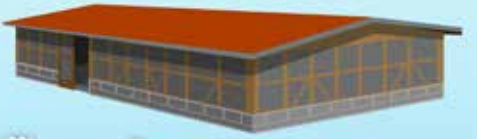
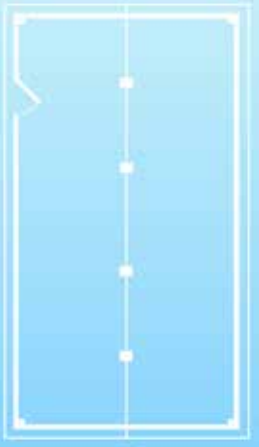


COOP CONSTRUCTION

STOCKING DENSITY





*Hens per sq. ft.

100 HENS = 10’x15’

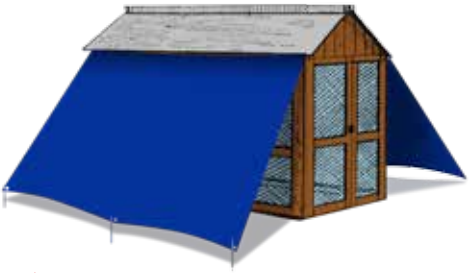
500 HENS = 15’x50’ or 25’x30’

Feeds • Chicks • Farm Supplies • Technical Support

White Marl (off Mandela Highway), St. Catherine
Tel: 984-7918 / 619-1302 • Fax 984-5914
Store Hours: Monday - Friday 8:30am - 5:00pm
Saturday 9:00 - 6:00pm / Closed on Sundays

Layer House Equipment

PURPOSE OF CURTAINING



House with curtains diagonally pegged to prevent rain and direct sunlight from entering the house, while allowing for ventilation

The purpose of curtaining or screening the chicken house is to prevent rain blowing into house and wetting litter, wet litter is a significant cause of coccidiosis outbreaks.

The surface area of the curtain should be free of holes and must be held down tightly. While layer chicks are brooding, curtains should be rolled down and pegged from Day 1-10. After brooding, curtains should be pegged at a 45 degree angle to the coop to keep out direct sunlight and rain while ensuring the birds receive sufficient ventilation.

LIGHTING

Lighting programs are heavily relied upon in commercial operations to maintain optimal productivity. To ensure your birds receive the ideal amount of light, purchase a programmable light switch that can turn the light on and off at prescribed times each day.

This will allow for the correct light exposure even when you are not present. A single clean 60 watt incandescent bulb or the equivalent in LED or fluorescent bulbs (please see Table 1) will provide enough light for 100 (150 Square feet) hens.
A good rule of thumb is that you should be able to comfortably read a newspaper while crouching at bird level in the coop.

Do NOT give birds more than 16 hours of light per day. It is stressful for the birds and expensive for you and should therefore be avoided. Recent advances in fluorescent and LED Bulbs will reduce electricity cost while having no negative effect on egg production.

TABLE 1:
LIGHTING TYPES

Light Source	Watts/Hr	Cost/KWH (Based on a 20¢ US/KWH)
Incandescent	60 Watts/ 150 Sq. Ft.	JA$154
Fluorescent	15 Watts/ 150 Sq. ft.	JA$39
LED	9 Watts/150 Sq. Ft.	JA$23

WATERING EQUIPMENT

Plassons

The plasson is used throughout the egg production cycle. Also referred to as an automatic waterer, it supplies water continuously to the birds. Plassons should be washed daily with bleach and soap. Widely used on large farms, a single plasson can supply water to 75 hens.

FEEDING EQUIPMENT

Galvanized Iron Hanging Feeder

Hanging feeders are manufactured from high quality galvanized sheeting with rolled edges for safety. They are available in 13.5 and 18.0 kg (30 & 40 lbs) capacity with either a 35 cm (14") or 43 cm (17") pan diameter. As an accessory, there is an additional Feeder Cover that can prevent roosting and protect feed.

Layer House Equipment continued

Plastic Feeder

Fabricated from rugged plastic, this feeder will not corrode. It is widely recognized as the more popular feeder, and is adjustable to prevent feed wastage. If you overfill this feeder, it can damage the handle so do not pour out more than a day's worth of feed for the birds.

Nest Boxes

Nest boxes are essential to prevent floor eggs. Properly maintained eggs collected from the nest box are usually clean and crack free. In order to achieve this a ratio of 5 hens per nest is recommended.

TABLE 2:
EQUIPMENT TO BIRD RATIO

Equipment	Ratio
Plastic or Galvanized Feeders	1:25 hens (ie. 1 Feeder required for every 25 hens)
Plassons	1:75 hens
Nest boxes	1:5 hens
Light Bulbs (60 watt or Equivalent)	1:100 hens

Hi-Pro

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JAMAICA BROILERS GROUP OF COMPANIES

Preparation of House

It is important to prepare the coop with an emphasis on hygiene. A low bacteria or viral load will not challenge the pullet's weakened immune system at the most stressful time of her life, allowing for a successful transition period. The following preparations are recommended:

1. Remove ALL remaining hens; dead or alive and search for and remove ALL litter.
2. Follow litter treatment recommendations on page 9-10
3. Thoroughly sweep floor and mesh; also, be sure to sweep the roof for dust, feathers, and cobwebs.
4. Disinfect entire house with approved insecticide/viricide making sure to follow label instructions.
5. Remove all plassons and feed pans from the house. Then thoroughly clean the plassons, and feed pans, in addition to flushing the water lines. Be sure to soak the plasson hose in an approved chemical as well.
    a. Chlorine bleach (5%) 350 ml in 484 litre (128 Gal.)
6. Repair or replace defective feed pans, light fixtures and nest boxes. Also repair or replace damaged mesh wire.
7. Clean nest boxes, removing old litter and replace with adequate fresh bedding.
8. Check light timer switch to ensure it is working correctly.
9. Remove remaining feathers using rake or blow torch.
10. Spread fresh, clean litter 3-4 inches deep.
11. Close house to all human traffic unless properly attired.

MANAGEMENT OF LAYER HOUSE LITTER

Using good quality material as litter is as important as the handling or management of the litter. How it is treated during the laying period of the flock will determine the extent of its use. Litter should be:

a. **3" (8cm) thick but no more than 5" (13cm) thick**
b. **Remove damp litter and rake the remaining litter to perfect compaction**

When old litter is removed, it should be disposed of at a location far from the layer house.

When necessary, remove any accumulated faeces from the chicken house, as decomposition produces heat. Removal also keeps pests to a minimum.

TYPE AND QUALITY OF LITTER

The type of litter used depends on suitability, availability and cost to the farmer. Sawdust, wood shavings, and rice hulls are the most common choices.

Sawdust

Sawdust are the wood fragments that result from the process of saw milling. It provides a soft cushion for the birds; however it is limited in its capacity to absorb moisture and at times become dusty.

Preparation of House continued

Wood Shaving

Wood shaving is highly regarded in layer operations for its cushioning and high absorbency. Litter from wood shaving should be sprayed with a suitable antifungal like Mertect™ at least 5-7 days before pullets are placed in the coop.

Rice Hull

Rice hull, like bagasse, is used mostly in areas where it is easily available. It produces a soft underfoot but possesses little absorbency.

QUALITY LITTER

Good quality litter is:

- **Highly absorbent and at the same time maintains a consistent moisture level.**
- **Not dusty, musty or moldy, and provides a sufficient cushion for the feet of the birds.**
- **Clings together very slightly when squeezed tightly together and breaks apart when dropped from the hand.**

WARNING: Bitterwood and Hardwood must be avoided for their high tannin content and the ease with which they splinter. These are fatal to the birds. Avoid using sand and soil instead of litter; sand and soil are not as absorbent as litter so you risk your birds contracting an infection. Sand can affect gut health by causing a blockage.

Pullet Care from Day One

While many commercial egg farmers prefer to purchase pullets when they are ready to lay at 18 weeks, people raising the birds for domestic use may choose to acquire day-old birds. Day-old birds require as much care and attention as broiler chicks from the standpoint of brooding, nourishment and exposure to light.

Brooding Pullet chicks (Day 1-10)

Place chicks in a clean, warm area (0.25 sq. ft./bird) with 2 inches of wood shavings. Cover wood shavings with paper for the first five days. This will prevent birds from eating litter.

The brooding area should be well curtained to keep out draft. Temperature within the brooding ring should be 90° Fahrenheit. Reduce by 1° every 2 days. Any wet litter should be removed from the house immediately.

Upon placing layer chicks in the coop, give the birds water with glucose. Issue feed 2-3 hours after. Also provide the birds with an antibiotic upon arrival to ensure they get a clean, healthy start.

Suggested application: Menorox powder for 5 days – 2tsp to 1 gallon water.

Give birds access to the entire house at 3 weeks.

Feeding Program

• Starter Feed (1- 8 weeks)

Scatter a small amount of pullet starter feed on paper day one only when chickens arrive.

Use feeder trays for first seven days. Afterwards use feed pans.

Pullet Care from Day One continued

• Grower Feed (9-12 Weeks)

Feed birds Hi Pro pullet grower ration during this stage. Adjust feed pan height as birds grow.

• Developer Feed (13-18 weeks)

Feed Developer ration until birds start laying. Change feed to Hi Pro 18% layer crumble at 19 weeks.

Lighting Program

Give layer birds 21 hours of total light for the first week.

LIGHTING PROGRAM (NUMBER OF HOURS LIGHT PER DAY)			
Age (wks)	**Duration hrs**	**Age (wks)**	**Duration hrs**
1	21:00	10	15:00
2	20:00	11	14:30
3	19:00	12	14:00
4	18:00	13	14:00
5	17:30	14	14:00
6	17:00	15	14:00
7	16:30	16	14:00
8	16:00	17	14:00
9	15:30	18	15:00

Vaccination

Give birds fowl pox vaccine at 8 days.

Deworm birds at age 7, 10, and 17 weeks. Get advice about dewormers like Benvet, Polywormerzine, Safersan and Ivomec from the Pharmacist at Hi-Pro Supercenter. Do not use the same wormer all the time as the worms will develop an immunity.

See schedule at right for vaccination and other activities.

Fowl Pox / Debeaking	8 days	In wing web. To be performed by trained persons
NDV/IBV/IBD	Week 2	Applied in water by coarse spray
Mertect (Optional)	Week 3	180 ml to 1 gal water applied by coarse spray
IBD vaccine	Week 4	Applied in water by coarse spray
Benvet – 10% dewormer	Week 7	4ml to 1 gal. water for one day
NDV vaccine	Week 8	Applied in water by coarse spray
Polywormerzine dewormer	Week10	Half tsp to 1 gal water for one day.
Fowl Pox vaccine	Week12	In wing web. To be performed by trained persons
Mertect (optional)	Week14	180 ml to 1 gal water applied by coarse spray
NDV vaccine	Week16	Applied in water by coarse spray
Benvet / Ivomec Dewormer	Week17	4ml to 1gal. drinking water. Ivomec 2 ml to 1 gal water

Beak Trimming

Debeak birds at 8 days old, using trained operators with correct machines. For small producers and backyard farmers, beak trimming may not be required if adequate space is provided in the coop (ie. At least 2- 2 1/2 square feed per bird). The extra space will prevent competition and pecking. Farmers can also:

a) Put perches in the house. Birds can take refuge on these if they feel threatened by bigger birds.

b) Hang green leafy vegetables, such as water grass in the house. Birds will pick these instead of pecking each other. Remove unconsumed portions.

c) Use low light intensity. Extremely bright lights or excessively long periods of light can make birds hostile towards each other.

d) Promptly remove birds that have obvious signs of uterine prolapse or “blow-out”. Also remove dead or injured birds quickly. Chickens are attracted to blood and pecking on a carcass can initiate cannibalism.

e) Provide adequate ventilation. High temperatures will make birds uncomfortable.

f) Ensure birds have dry litter of sufficient depth (3” - 4”) to have a dust bath. A dust bath is comforting for them.

g) Provide appropriate nesting boxes. An exposed cloaca (bottom) during laying is highly attractive for pecking. A dark nest is best.

h) Use the Hi-Pro feeding program every step of the way. This program provides your birds with a well-balanced diet.

i) Feed mash instead of crumble. Mash feed keeps birds eating longer to get the same meal, with less time left to peck other birds.

Water Intake & Feeding of Layers

WATER INTAKE

Hens must have access to a consistent supply of good quality water. The term "good quality" means potable water i.e. fit for human consumption. If water quality is unknown, add 1 teaspoon of bleach to 10 gallons of water. Any deviation from that standard affects bird health negatively and by extension, flock egg production. Poor water quality also affects the quality of the egg shell and may cause staining of the shell surface.

Water is also very important in maintaining a stable body temperature. Water temperature and ease of access to water sources become even more important on very hot days.

Hens will consume 115 grams of feed per day, and up to 375ml of water on a hot day. By extension, 100 birds will drink 10 gallons of water per day. Be very aware of the amount of water the birds will require based on atmospheric temperature.

TABLE 3:
TEMPERATURE EFFECTS ON WATER CONSUMPTION PER 100 HENS AT 42 DAYS

Temperature	Litres Per Day	ml/Bird/Day
22ºC	21	210
35ºC	35	350

Adjust plasson 14"-16" above litter level to reduce contamination of the water with litter; also, to prevent wet spots due to birds bouncing the plasson. Fix all leaks promptly to prevent wet litter.

FEED & NUTRITION

Egg size is greatly affected by the intake of specific nutrients including crude protein, amino acids such as methionine and cysteine, energy, total fat, and the essential fatty acids in vegetable oil. Levels of these nutrients must be adjusted to improve early egg size and control late egg size.

In order to achieve this the Hi-Pro nutritionist uses very sophisticated computer software to ensure you get a feed that satisfies all nutrient requirements at the least possible cost to you.

This feed can take the form of crumble or the very popular 18% protein mash.

The primary objective when feeding layers is to maintain consistent feed intake and egg production that closely match or exceed the standard for the strain. The Hi-Pro feed programme for layers provides the nutrients to support the production of 280 to 300 eggs per hen per year with a feed conversion of 2.15 to 2.2 Kg. feed per dozen eggs.

It is always better to feed hens Hi-Pro Layer Mash or Crumble, commercially produced feeds that are manufactured under strict quality control guidelines. Maximum profits are achieved when hens are fed the full range of Hi-Pro Layer feeds compared to homemade recipes.

For profitable egg production follow the Hi-Pro Layer program (See Table 4) as recommended.

Common mistakes made while rearing healthy hens are as follows:

- **Giving vitamins and electrolyte supplements for more than 10 consecutive days. Birds will put on too much weight which might affect productivity. Five days is sufficient.**
- **Supplementing Hi-Pro feeds with corn and wheat middlings. Mixing reduces the nutritional value of the feed.**
- **Administering medication not recommended by your vet. Purchasing and applying unnecessary medication can only waste your money, and could potentially affect the birds' productivity.**

Feed accounts for 50-60% of the cost of producing a dozen eggs. It is therefore essential that you follow the feeding guidelines (see page 16) in order to maximize your profits.

Water Intake & Feeding of Layers continued

TABLE 4: FEED GUIDELINES (Crude Protein – CP)

Hi-Pro Feed Type	Feeding Recommendations	Production Phase
18% CP Layer Mash	115 Grams/day	19-44 weeks (Peak)
17% CP Layer Mash	115 grams/day	44-58 weeks
16% CP Layer Mash	120 grams/day	> 58 weeks

By gradually changing the feed to correspond with the three production phases you will save on your feed dollar as the feed price per Kg. falls as the protein level is reduced.

One of the most fundamental problems in layer operations is egg-shell quality. Despite extensive research, inferior shell quality remains one of the major causes of economic loss to egg producers.

TIP: Feed 55-60% of daily feed in the evening to improve shell quality.

Feeding Management

Feeding Management plays a critical role in determining shell quality. Issuing the daily feed ration in the late evening ensures that calcium in the feed is available to the birds at the period when they need it the most.

a) Do not add fresh feed to feed already in the feeders.

b) Allow feeders to be completely empty for approximately 2 hours each day preferably during the hottest time of the day.

c) During cold spells expect an increase in consumption. It may be necessary to increase feed to prevent a reduction in production. This occurs because more feed energy is used to keep the hen warm.

d) During hot spells expect a decrease in consumption. It may be necessary to follow procedures for reducing heat load in the hen house.

e) Feed Hens twice per day; apportion the feed to supply 60% in the late evening (ideally 1 hour before lights out) and 40% in the morning.

f) During the summer it is recommended that you set your timer to turn lights on an hour before dawn to encourage hens to consume feed during the coolest time of the day.

g) Make sure that the number of feeders and plassons are adequate for the number of hens in the house (See Page 6 for Bird to Equipment Ratios).

Hi-Pro

Slight Toxicity

Detia®
Diatomaceous Algae

100% Organic!

CROP & LIVESTOCK INSECTICIDE

Always exercise caution and wear proper safety gear when handling, preparing and using insecticides; keep out of reach of children. Refer to Product Instructions for correct usage.

Wettable Powder Insecticide; novel mode of action that clings to waxy exoskeleton of insects, dehydrating them.

Active Ingredient: Silicon Dioxide

Controls insects including DARKLING BEETLES, White flies, Aphids, Thrips, Caterpillars, Mites and Ants in crops such as Leaf Vegetables, Cabbage, Cauliflower, Tomatoes, Peppers, Onions, Eggplants, Carrots, Potatoes, Melon, Cucumber, Ornamentals, Banana, Plantain, Sugar Cane, Pasture, Mangoes, Fruit Trees, Papaya, Pineapple, Citrus, Coffee and Cocoa. Controls insects such as Weevils, and Grain Moth in stored grains. Also controls Red Poultry Mite, Darkling Beetles, Ants, Spiders, Scorpions, Centipedes, Cockroaches, Beetles, Weevils and other crawling insects in animal husbandry.

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Lighting and Temperature Management

LIGHT MANAGEMENT

The provision of 16 hours of light for hens is important for the following reasons:

1) **Light stimulates and maintains egg production**

2) **Light increases feed consumption especially if provided before dawn or before lights out at night when the house temperature is low**

The cardinal rules for light management are:

Never reduce the light offered to layers during their egg producing cycle; even a slight reduction in light exposure will be perceived by the hen and egg production will be reduced. JES provides you with a light schedule that can be used to set your on and off times. (See Lighting Program on Page 12 or Novogen Lighting Program in Appendix).

Turn on the light at Sunset to correspond with the onset of dusk. This is particularly important as the days shorten starting in October each year.

MANAGING HEAT STRESS

Hens have a sophisticated mechanism to maintain body temperature between 40-41°C in an environment that may be too hot or cold. In our situation we are more concerned about the effect of high temperatures (> 32°C) on egg production and quality. Hens will change their behaviour to make use of the three main methods of combatting heat stress.:

1. **Hens will drop their wings and move wings away from the body to allow for heat loss due to convection**
2. **Hens will seek out areas cooler than their bodies and make physical contact with those areas to allow for heat loss due to conduction**
3. **Hens will move from sunlit areas of a coop to the shaded area to allow for heat loss due to radiation**

HENS SHOWING SIGNS OF HEAT STRESS

When these changes in behaviour do not alleviate the heat stress, hens will use the last physiological defence mechanism at their disposal, they will begin to pant. As water evaporates from their mouths it takes away body heat and cools the bird but it does so at a significant cost to the hen:

a) The act of panting itself generates heat.

b) It lowers her blood levels of bicarbonate which is essential for egg shell formation.

c) It reduces egg shell integrity leading to thinner shells and more cracked eggs.

d) It increases the possibility of the hen dying.

Farmers have a role to play to assist the hens during periods of high outside temperatures:

1. **Feed according to guidelines outlined in this manual.**
2. **Install a thermometer 1 foot from the litter surface in the hen house and monitor to trigger intervention.**
3. **Flush water lines during the hottest time of the morning and afternoon.**
4. **Do not run main water line on the floor under the litter.**
5. **Cover the water storage container to protect it from the direct rays of the sun. Keep the tank in the coolest possible area to minimize exposure to heat and sunlight.**
6. **Do not allow hens to run out of water.**
7. **Have the correct number of plassons for the number of hens in the coop.**
8. **Do not schedule any flock activity where birds will be disturbed during the hottest time of day.**
9. **Make sure that the coop is properly ventilated i.e. raising side curtains, mesh free from cobwebs and dust.**
10. **Design coops with insulation on the underside of the roof, very effective in lowering house temperatures by as much as 9°C.**
11. **Paint the outside of the roof white to reduce radiated heat**
12. **Sprinkle the roof with water only if you have properly constructed drains to quickly move water away from the house**
13. **Fans will move air and assist hens to loose heat by convection**
14. **Remove wet spots in the litter promptly**

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HIPROVIT

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CELMANAX™

Water Soluble Vitamins & Electrolytes

For Broilers, Breeders, Layers, Pullets and Turkeys

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Hi-Pro FARM SUPPLIES

JAMAICA BROILERS GROUP OF COMPANIES

Flock Health Management

COMMON DISEASES/ILLNESS IN LAYERS

NOTE: Consult with a veterinarian on treatment of the various illnesses and disease.

ASPERGILLOSIS

A fungal infectious disease, caused by ***Aspergillus fumigatus,*** in which the typical sign is gasping for breath, especially in young chicks. Sometimes the same organism causes eye lesions or chronic lesions in older birds. The fungus can infect plant material and many species of animals including birds and man. Occasionally similar lesions are produced by other species of Aspergillus or even other fungi such as Penicillium, Absidia etc.

SIGNS

Acute form:

- Lack of Appetite
- Weakness
- Silent gasping
- Rapid breathing
- Thirst
- Drowsiness
- Nervous signs (rare)

Chronic Form:

- Ocular discharge (ocular form only).
- Weight loss (Wasting).

TREATMENT

Usually none. Environmental spraying with effective antifungal antiseptic may help reduce challenge. Copper Sulphate can be given in drinking water, however the efficacy is low.

PREVENTION

- Store feed in a dry place to avoid growth of mould
- Dry, good quality litter and proper sanitation

Flock Health Management continued

DARKLING BEETLE INFESTATION

A condition in poultry caused by infestation of the external parasite *Cimex lectularius*. The parasites are up to 5 mm long and feed at night. It occurs mainly in subtropical and temperate areas. Adult parasites can survive in the environment without feeding. Eggs laid by the adult parasites hatch in 3-5 days. There are five nymphal stages, each of which feed on birds. Growth to adult parasite takes one to three months, depending on temperature.

SIGNS

- Lethargy
- Anaemia
- Reduced production when infestation is serious.

TREATMENT

Appropriate treatment of the environment, in particular the cracks and crevices where the parasites hide during the daytime using insecticide or fumigation. Insecticides include: Malathion 50%, Carbaryl 80%, Diazinon 48% and Acetellic (Primiphos-Methyl), which have proven to be safe and effective solutions.

PREVENTION

Thorough treatment of the empty building at turn-around with an appropriate insecticide.

CANNIBALISM, FEATHER PECKING

A complex multifactorial behavioral problem of poultry and game birds seen worldwide. Chickens will literally pick each other to death. This problem can be expensive for the producer and makes life uncomfortable for the flock. Once cannibalism starts, it readily becomes a habit that must be stopped. Morbidity is usually low but mortality is high among affected birds. Predisposing factors include overcrowding, excessive light intensity or variation (e.g. through shafts of light in the house), high temperatures, nutritional deficiencies, tenosynovitis and other diseases affecting mobility, boredom, and strain of bird. Prevention is much easier for man and bird than is treatment.

SIGNS

- Pecking at feet (especially young chicks) and vents, head, face, wings.
- Feather-pulling, wet vent feathers

CAUSES

- Overcrowding
- Insufficient feeders and waterers
- Flock nervousness or overexcitement (may be breed related)
- Dietary absences or deficiencies
- Incorrect lighting (usually too much light)

- Lame birds left in the flock
- Stresses due to moving birds or making other necessary management changes
- Timid birds in the flock that are not getting enough feed or water
- Extremely high environmental temperatures
- Abrasions or tears that may be the result of an accident.
- Diseases, especially if the nervous system is affected.
- Pure meanness on the part of the birds.

TREATMENT

The first step in a cannibalism control program is to give the birds the best care possible. Correct management conditions that may contribute to an outbreak before one occurs. Soluble multivitamins such as HiProvit with Celmanax, Formula One Plus and Mineralytes Plus Biotin, or Methionine may be of benefit in some circumstances.

PREVENTION

Ensure proper density and temperature are appropriate at all times, and control ectoparasites. Remove all sick, weak, small, or odd colored chicks. Birds will attack and kill these chicks as a survival instinct, resulting in widespread cannibalism throughout the flock. Provide plenty of feed and water; birds should have access to feed and water at all times. Bright lighting increases bird activity and cannibalism, so reduce brightness of light. Keep the house temperature comfortable as hot house temperatures aggravate birds and make them more irritable.

COCCIDIOSIS

Coccidiosis is a parasitic disease of the internal intestinal tract of which the causative agent is ***protozoa***. A warm environment and high humidity (wet litter) is perfect for the organism to multiply.

Coccidial oocyst (developing eggs) are ever present in used litter contaminated by the droppings of previous flocks. Birds are infected by ingesting the sporulated oocyst in feed, water, litter and soil. The organism can be transported on dust, shoes, baby chick boxes and can survive for months in the litter.

SIGNS

- Bloody faeces
- Ruffled feathers
- Anaemia
- Reduced head size and somnolence
- Droopiness and listlessness

Flock Health Management continued

- Loss of appetite
- Loss of yellow colour in shanks
- Pale combs and wattles

- Huddling or acting chilled
- Blood or mucus in the faeces
- Diarrhoea
- Dehydration
- Death.
- Poor feed digestion, weight gain and feed efficiency

CAUSE

The disease is caused by 9 different species of coccidia of which the most important are: Elmeria (E)) acervulina, E. necatrix, E. tenella, E. maxima and E. brunetti, each affecting a different part of the intestine.

TREATMENT

Amprolium or some sulphonomides in addition to Celmanax is the remedy of choice.

PREVENTION

- Use feed containing appropriate coccidiostats such as Hi-Pro Feeds
- Practice proper litter management to eliminate wet areas in the house
- Maintain and use the footbath as a method of preventing house to house contamination
- Keep your coop dry; coccidia proliferate in wet conditions. Remove and replace any wet litter.
- Keep water and feeders level to chickens backs to prevent them from pooping in them.
- Keep chickens in coop or enclosed in a roofed run during a long spell of rain and no sun. Let them out when the ground has dried out.
- Keep grass short and make sure that the sun hits all the grass at least for some time of the day. No deep shade spots if you have trees.
- Replace bedding and sanitize coop ensuring you use a product made to kill protozoans. If this is not possible add a 6 inch layer of new bedding or gravel to coops and runs.
- Sanitize all feeders and waterers rinsing with natural- not synthetic- white vinegar and placing in the sun to dry.
- Administration of Celmanax in drinking water after transfer to the coop.

CHRONIC RESPIRATORY DISEASE (CRD)

Also known as ***airsacculitis*** and MG ***(mycoplasma gallisepticum),*** CRD affects the entire respiratory tract including the air sacs. The disease is important, not by itself, but because it attracts secondary invading organisms such as ***E. Coli.***

Stress conditions (moving birds, debeaking, cold or poor ventilation) increases the susceptibility of birds. Mortality is usually low and economic losses are due to reduced body weight and poor feed conversion.

CAUSE

CRD is due to *Mycoplasma gallisepticum* and the condition is frequently triggered by respiratory viruses (IBV and NDV) and bacteria that have an affinity for the respiratory tract. Other factors such as nutritional deficiency, high ammonia level and dust contribute to the severity of the disease.

SIGNS

- Respiratory distress, coughing and sneezing
- Snicks, rales, sometimes with eye and nasal discharge
- Decreased feed intake, body weight and poor feed conversion

TREATMENT

Menorox® and Neo-Oxytetracycline.

PREVENTION

- Good management and sanitation must be the daily practice in the event of infection
- Avoid high ammonia levels, dust, overcrowding, and poor ventilation
- Remove infected flocks; then clean, disinfect and rest house for 3-4 weeks before re-stocking

COLIBACILLOSIS OR COLISEPTICEMIA

Coli-septicaemia is an infectious disease of farmed poultry. It is most commonly seen following upper respiratory disease. Caused by the bacterium *Escherichia coli*, it is seen worldwide in chickens and turkeys.

SIGNS

- Respiratory distress, coughing, sneezing
- Snick
- Dejection
- Reduced appetite
- Poor growth

Flock Health Management continued

TREATMENT

Amoxicillin (Avimox®), Neomycin (intestinal activity only), Neo-Chlor Plus®, Potentiated Sulphonamide (Trisulvitrim®,) and Menorox®.

PREVENTION

- Good sanitation of house, feed and water.
- Control of predisposing factors and infections by vaccination.
- Ensure proper ventilation and chlorination of drinking water to reduce the levels of environmental contamination.

GANGRENOUS DERMATITS

Gangrenous dermatitis (GD) is a disease affecting growing birds, characterized by gangrene of different skin areas and of the subcutaneous tissue. The sudden and quick increase in death rates is often the first signal for the incidence of GD. The lesions range from dark red to blue green macerated skin areas, usually featherless, beginning generally from wings and adjacent areas. Affected birds die after less than 24h.

CAUSE

Bacterial infection by the ***Clostridium*** and ***Staphylococcus*** species, independently or combined. The associated infection is more severe. The skin lesions are often crepitating and are detected in the regions of breast, abdomen, back or wings in both alive and dead birds.

PREVENTION

- Good management and sanitation must be the daily practice in treating the infection.
- Maintain good litter management, by removing dead birds and any other animal carcasses immediately from the house.
- Remove old, rusty nails or sharp objects, ends from the litter or mesh inside of the house.

NEWCASTLE DISEASE (ND)

Newcastle disease (ND) is highly infectious. The disease usually occurs in chicken but can affect all other species of poultry. Transmission is through oral and respiratory discharge and faeces of infected birds. By law, this disease must be reported at once.

CAUSE

The disease is caused by ***Paramyxovirus***, a virus that is heat sensitive.

SIGNS

- Respiratory distress and nervous disorder
- Transient coughing, sneezing and rales

- Marked depression and prostration (laying down) in young chicken with abnormal positioning of the head ('star gazing')
- Dyspnea (short of breath), violent green diarrhoea, conjunctivitis, and paralysis
- Death usually occurs within 3 days and mortality can be high as 100%

TREATMENT

There is no known treatment for ND which makes prevention very necessary.

PREVENTION

- Vaccination (live or inactive vaccine) of the day old chicks is the only reliable method of control
- Proper sanitation and hygiene

INFECTIOUS BRONCHITIS (IB)

Infectious bronchitis (IB) is a highly contagious viral respiratory disease. The importance of IB infection is its negative effect on the bird's growth rate and feed efficiency; flocks also have a high percentage of condemnation at processing.

SIGNS

Baby chick

- Wheezing, coughing and sneezing are detectable at night
- Watery eyes, nasal discharge and swollen sinuses can be seen
- Mortality is usually low but in cases of secondary infections may reach 50%

Growing broiler birds are not generally affected by infectious bronchitis.

TREATMENT

There is no known treatment of IBV making prevention highly critical.

PREVENTION

- Vaccination is a reliable means of control
- Sanitation and good hygiene
- Where there is infection, avoid the spread from house to house through equipment, feed and vehicles.

INFECTIOUS BURSAL DISEASE (IBD)

The highly infectious Bursal Disease (IBD) is also known as Gumboro in reference to the district of Delaware, USA where it was first recognized. The disease usually affects birds that are 3-6 weeks old. The course of the disease is very short, stunting the bird's growth and affecting their immunity.

CAUSE

The disease is caused by a *Birnavirus* which is quite stable and resistant to environmental conditions and many disinfectants

SIGNS

IBD can be either clinical (apparent infection) in birds 3-6 weeks or sub-clinical (unapparent infection) in birds 1-3 weeks

Flock Health Management continued

Clinical IBD
- Whitish watery diarrhoea observed at 2-3 days with paste vents and vent pickings is very common
- Sudden loss of appetite, ruffled feathers, trembling and lack of coordination
- Listlessness, paleness and depression, huddling and droopiness
- Mortality can be as much as 20% and morbidity ranges from 20% to 100%

Clinical signs usually disappear within 10-14 days

Subclinical IBD
- Little or no signs are observed
- Decreased body weight gain an increase feed conversion ratio
- Increased susceptibility to other diseases
- Reduce response to the vaccines as a result of immunosuppression

TREATMENT
There is no treatment for IBD but the water administration of vitamins and electrolytes can alleviate the severity of the disease.

PREVENTION
- Vaccination of parent flocks
- Vaccination of Day old chicks at the hatchery
- Sanitation, though absolutely necessary, it is not totally effective because of the high resistance of the IBD virus

FOWL POX (Yaws)

Fowl pox or yaws is a viral disease illustrated by lesions on the skin, neck, and feet and internal lesions of the digestive and respiratory tract. The virus is transmitted by direct contact through water and feed. Mosquitos and other insects are vectors of the virus.

With vaccination, incidence of the disease have significantly reduced making fowl pox of reduced economic importance.

CAUSE
The disease in chickens is caused by a *Poxivirus (Avipox genus)*.

SIGNS
The disease spreads slowly and quietly and may go unnoticed until cutaneous lesions are observed. There are two forms of the disease:

1. Cutaneous or 'dry pox'
   - Progressive decrease in body weight gain
   - Yellowish to dark brown wart-like lesions on the head, comb and wattles
2. Diphtheritic or 'wet pox'
   - Depression and lack of appetite
   - Dyspnea, nasal and ocular discharge
   - Mortality is generally by suffocation or dehydration

PREVENTION
Vaccinate birds by the wing web with the fowl pox vaccine.

External parasite (Lice and Mites) infestations significantly affect table egg production and can be very difficult to eradicate. Treatment options especially for large scale operations are time and labour intensive and in some cases ineffective. The tropical fowl mites are blood suckers that lay its eggs on the feather shaft and can exist both on and off the hen. Moderate to severe flock infestation may result in irritability, anaemia, weight loss and production loss of 5 – 15%.


Tropical Fowl Mite

Detecting and monitoring the mite population level is an important factor for effective control. A minimum of 10 randomly selected birds should be examined for mites weekly. Infestation levels can be estimated by blowing on the bird's feathers and counting the mites that are immediately seen. The following index can be used to estimate mite infestation levels (John, 2008):

TABLE 5: MITE INFESTATION INDEX

MITES COUNTED ON A SINGLE BIRD	TOTAL MITE POPULATION
5	Bird may be carrying from 100 to 300 mites
6	Bird may be carrying from 300 to 1,000 mites (light infestation)
7	Bird may be carrying from 1,000 to 3,000 mites. Small clumps of mites seen on skin and feathers (moderate infestation)
8	Bird may be carrying from 3,000 to 10,000 mites. Accumulation of mites on skin and feathers (moderate to heavy infestation)
9	Bird may be carrying 10,000 to 32,000 or more mites - numerous large clumps of mites seen on skin and feathers; skin pocketed with scabs (heavy infestation)

Infestations exceeding 200,000 mites will produce fatal conditions due to anaemia and its interference with the bird's immune response. Birds stressed by mites will have pink combs and their feathers are generally soiled with mite excrement. Feathers around the vent area also become soiled. Treatment of mite infestation will require a complete cleaning of the hen house followed by spraying with any of the following insecticides:

1. Sevin powder (carbaryl)
2. Permethrin
3. Dichlorvos
4. Mallathion

Extra label use of Ivermectin under supervision of a veterinarian is another effective method of controlling tropical fowl mite in commercial flocks. Two treatments are generally required, with the material most often administered through the watering system (2 cc per Gal) without trauma to the birds.

Flock Health Management continued


Lice Eggs at the base of a feather shaft

Poultry lice are tiny, wingless, flat-bodied, insects. They lay their eggs on the host bird's feathers, especially near the base of the feather shaft (Figure 12). A female louse will lay 50 to 300 eggs at a time, which she cements to the feather shaft. There are several species of lice that affect poultry, and multiple species can affect a bird at any given time. Some species can be localized on specific locations like the quill lice; or others can be found over most of the body surface like the chicken body lice. The lice found on poultry do not suck blood as the lice found in other species of animals; rather they feed on dry skin scales, feathers, and scabs. However, they will ingest blood extruding from irritated skin. The entire life cycle of the lice occurs on the host bird, primarily in the feathers.

Poultry lice are host specific and cannot be transferred to humans (Pickworth & Morishia, 2003). Treatment options are similar to those employed against mites and are more successful if the hens are inspected regularly and the infestation detected early.

TABLE 6: COMPARISON CHART TO DISTINGUISH BETWEEN LICE AND MITES

	Lice	Mites
Size	2-3 mm long	1 mm diameter (ground pepper)
Speed	Fast-moving	Slow-moving
Colour	Straw-colour (light brown)	Dark reddish black
Egg location	Base of feather shaft	Along feather shaft
Egg colour	White	White or off-white
Best detection time	Day	Night or Day
Location	Lives only on host	Lives on host and in environment

INTERNAL PARASITES

Severe roundworm infestation

Intestinal parasites (worms) are very common in chickens in the backyard type poultry flocks. The presence of a few parasites does not usually cause a problem. However, large numbers can have a devastating effect on growth, egg production, and over-all health. The concentration of parasite eggs in the chickens' environment is one factor which plays a major role in determining the severity of the infection. The chickens pick up the parasite eggs directly by ingesting contaminated feed, water, litter or other insects which can carry the eggs.

Clinical signs of parasitism are poor growth and feed conversion, decreased egg production, and even death in severe infections. Furthermore, parasites can make the flock less resistant to diseases and worsen existing disease conditions.

Of all the intestinal worms, large roundworms (Ascaridia galli) probably inflict the most damage. Young birds are affected more severely.

A mild infection is often not noticed. Large numbers of worms, however, interfere with feed absorption causing poor growth and production. In severe infections there can be actual intestinal blockage by the worms, causing death. Affected birds are unthrifty and more susceptible to other diseases.

TREATMENT

Cleaning out houses and placing new litter at least two weeks before the replacement pullets arrive will minimize exposure to intestinal worms. Houses that are not thoroughly cleaned and sprayed with an approved insecticide to control insect vectors like the darkling beetle will have litter that serves as a reservoir for worm eggs. Prevention programs that are part of the overall flock health management are the ideal situation however occasionally outbreaks will occur. It is recommended that flocks should be treated for roundworms once every six weeks. Farmers should rotate worm medications in order to maintain effectiveness. This may require the use of extra-label products e.g. Ivermectin under the guidance of a veterinarian.

To calculate dosages:

1. Calculate total flock body weight (Average weight of 10 birds X number of birds in flock)
2. Dose mg per kg live weight X Flock weight = Total mg for flock
3. Be sure active ingredient and dose are in the same unit
4. Total grams needed for flock divided by grams active ingredient per package = # of packages for flock.

Calculation example:

1. A hen house with 3000 birds with an average weight of 2 kg. Total weight is 6000 kg.
2. If the dose is 32 mg per kg:
   a. 6000 kg X 32 mg = 192000 mg (for the flock)
   b. Convert to same unit on label e.g. grams 192000/1000 = 192 grams
3. If there are 96 grams of active ingredient per packet the number of packets required is:
   a. 192 grams needed / 96 grams active ingredient = 2 packets for that flock

Flock Health Management continued

Mix the packets in enough water to last 4 to 8 hours. It is best to treat the flock early in the morning as this allows for the withdrawal of water prior to treatment without subjecting the flock to heat stress. Water withdrawal prior to treatment will encourage consumption of the medication over the prescribed time period.

BIO-SECURITY

In order to maintain acceptable levels of productivity a flock health management programme must be in place. The main focus of the programme should be disease prevention rather than treatment. This is achieved by implementing measures to start the flock in clean surroundings and maintaining those conditions right through the productive life of the flock. Maintaining bio-security measures will ensure that the birds are protected from viruses and bacteria transmitted by workers, feed delivery trucks, wild birds or rats. The main critical success factors governing a bio-security programme are as follows:

1. Hen house cleaned and disinfected at least two weeks before the pullets arrive.
2. Hen house repaired to prevent the entry of wild birds.
3. Hen house foot bath, clean footwear and coverall station in place.
4. Feed bins and hoppers, water lines and founts cleaned and disinfected.
5. Bait stations replenished and rodent control measures in place.
6. Surrounding areas cleared of all debris and grassed areas cut.
7. Bathroom and toilet facilities for farm workers in place and functional.
8. Farm worker hygiene program in place and enforced.
9. Property properly fenced to keep out stray animals.
10. Signs warning unauthorized entry prohibited in place and fully visible.
11. Dead bird disposal compost area in place.
12. Motor vehicles (feed trucks, pullet delivery truck etc) undercarriage disinfected.
13. Mosquito and fly breeding sites eliminated and regular fogging using approved insecticides implemented.
14. Reporting mechanism in place in case of an outbreak of a “Class A” disease.

Moulting

Moulting is a natural physiologic process whereby layers cease laying eggs, moult or drop their feathers and undergo certain physiological changes that prepare hens for resumption of egg-laying. Feathers are lost from the head first, followed by those from the neck, breast, body, wings and tail. Body weight is reduced considerably due to reduction in body fat and the reproductive tract. Feed intake reduces and as a result the bird does not produce eggs.

After moulting the bird grows new feathers, increases her bodyweight and resumes egg production. Even when birds are maintained on a nutritionally balanced layer ration and provided ample light stimulation (in excess of 15 hours per day), they will still go into a gradual moult. However, moulting under these circumstances is prolonged with many of the birds continuing in production. Moulting can also take place as a result of stress such as disease, lack of feed or water, improper lighting or any other faulty management practice.

Economic considerations

"Compare the salvage value of the hen plus the cost of feed required to complete the moulting period with the cost of a 20-weeks-old pullet" is a common rule of thumb. Egg Farmers must weigh the demands of the current egg market and feed

Moulting continued

costs against future projections. A pullet may lay five dozen fewer large eggs than a moulted bird in the first eight months of production. However, based on the type of moulting programme and layer ration used, 3-4 kg of feed are required to moult a hen until 50% production is attained.

Objectives of inducing layers to moult

- To avoid having to purchase pullets which might be too expensive or unavailable.
- To continue producing large eggs, which might be preferred by customers.

Advantages

1. Hens in one flock are all moulted together.
2. Initial replacement costs are spread over a longer production period.
3. Shell strength and interior quality are restored to a level approximately equal to that of a flock in production for four months.
4. A flock can be moulted at the discretion of the producer (i.e. when eggs are selling below or at the cost of production)
5. The percentage of large eggs is increased.
6. Cost of feed to bring a flock into optimum production is reduced.

Disadvantages

1. Risk of perpetuating diseases on farms with multiple-age flocks.
2. Income from laying facilities stops during the moult while overhead costs continue.
3. The amount of feed to produce a dozen eggs may be increased as much as 10%
4. Slightly higher mortality may occur during the second cycle of production
5. Culls should be removed before initiating the moult
6. Eggs from moulted hens may not be acceptable for the existing market.

Conditions

The birds should preferably be between 55 – 65 weeks of age (sometimes as early as 35 weeks or as late as 84 weeks). The older the birds, the easier they are to moult as long as there are not too many individual pullets in the flock that have already moulted. Under normal circumstances, it is not economically sound to moult birds before 60 weeks of age.

Forced moulting is the practice of jolting laying flocks into a sudden and complete stop of all egg production within a few days. Several methods of forced moulting have been used with success including the 'Normal method' outlined below:

For a Normal Moulting (return to 50% production in 6 to 8 weeks)

a. Turn off artificial lighting.
b. Remove all feed for 10 days. Do not remove water.
c. Oyster shell feeding is optional.

d. Starting on the eleventh day, full-feed cracked corn for 2 to 3 weeks
e. At the end of the grain feeding period:
    i. Feed a normal laying ration
    ii. Turn lights back on.

Due to the severe stress of feed deprivation, plus normal crowding, it is advisable to follow accepted management practices before and during moulting. Generally, all weak, sick or otherwise abnormal birds are removed from the flock before moulting.

Another stress encountered in recycling laying hens is the need to revaccinate for common disease where protection has run out. Studies show that moulted layers should be revaccinated for Newcastle, Infectious Bronchitis and, in some instances, for Infectious Laryngotracheitis and Fowl Pox. It is important to revaccinate at onset of moult in order to incur the stress well before birds are returned to egg production.

Culling

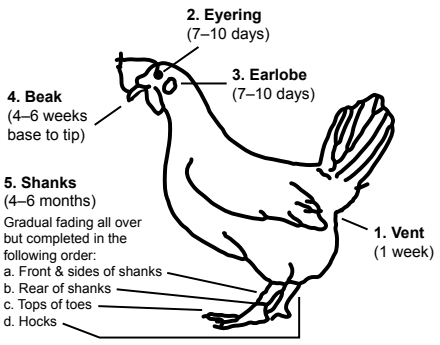
Culling is to remove only very obvious non-productive birds from the flock, and proper implementation of a culling program may be of benefit to producers. The most obvious reason for culling is the feed cost savings as a result of the exercise. Mortality is reduced and removal reduces competition and provides more space for the remaining hens, usually resulting in less stress and more eggs. Nightly inspection and removal of poor producers should be the job of a trained employee.

It is relatively easy to determine whether or not a hen is in production by checking the condition of the comb, pubic bones, abdomen, and vent. If a hen is in production, her comb and wattles should be large, red, soft, and waxy; the pubic bones should be flexible and wide apart; the abdomen should be full, soft, and pliable; and the vent should be large, moist, and free of pigment. A good layer should have more than two fingers spread between the pubic bones and three or more fingers spread between the pubic bones and the tip of the keel.

Other characteristics of producing hens include an active and alert appearance. Minimal loss of pigment, and little feather wear, means the bird has probably been in production for a short period of time.

On the other hand, a hen that appears to have been in production for a long period of time but has not lost much pigment (a hen with bleached vent and beak but with shanks still showing pigment long after other hens are completely bleached) is probably laying few eggs.

When a hen is out of production, her comb and wattles may be small, pale, and shrivelled; the pubic bones are rigid and close together; the abdomen is hard and tight; and the vent is small, dry, and pigmented. Do not confuse a fatty abdomen with one that is soft and pliable due to laying condition.



You can estimate past production from the amount of yellow pigment left in the bird's body (in yellow-skinned breeds). A hen will have yellow pigment in the vent, around the eyes, earlobe, beak, shanks, and feet when she begins production. Less pigment is deposited in these body areas as she goes into her egg production cycle, so the yellow colour gradually fades.

Record Keeping

THE NUMBER ONE PROBLEM AFFECTING THE JAMAICAN TABLE EGG INDUSTRY IS POOR RECORD KEEPING!

Records are kept in order to:

- **Assist in making management decisions.**
- **Successfully analyse current flock performance problems.**
- **Determine production cost.**
- **For on farm food safety and HACCP certification**

During the laying period the following records should be kept:

- **Feed and water intake**
- **Feed delivery dates**
- **Egg production**
- **Egg size**
- **Hen body weights**
- **Mortality**
- **Medication usage**
- **Flock health maintenance schedules e.g. internal parasites, lice control**
- **House and ambient temperature and humidity**
- **Pest control**

(See Appendix for copy of suggested Farm Record Keeping Sheet)

Two types of egg production measures are used:

1) **Hen-day egg production**

   Egg productivity of live hens on a given day is calculated as follows:

   (Number of eggs produced / number of live hens) X 100

   This measure of flock productivity has the following advantages:

   a) Removes mortality from calculations

   b) Can be adjusted for long periods: (Number of eggs during period / number of hen-days in period) X 100

2) **Hen-Housed egg production**

   (Number of eggs produced / number of hens housed) X 100

   a) Because egg production numbers and dead birds are all included, many combinations of mortality and production can lead to the same hen-housed egg production number.

   b) Primarily used to assess performance over the entire laying cycle.

Without these critical figures, the farmer does not have a real idea on how the farm is performing; this means he is unable to make sound decisions about his operation.

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Preparation and Grading of Eggs

PREPARING TABLE EGGS FOR MARKET

Eggs are fragile and perishable; therefore they must be properly handled, graded, packaged and stored to ensure they reach the consumer in the best possible condition. The preparation of the egg for market starts with the successful adoption of all the good agricultural practices already outlined in this guide. The final responsibility of egg preparation for sale is just as important as all the other husbandry practices you employed to get to this stage. The following recommendations will help to market eggs of excellent quality:

1. **Clean nest boxes often and close entrance at night to prevent fouling of the nest with faeces**
2. **Collect eggs often during the day especially during the summer months**
3. **Remove eggs promptly from the coop after collection to a cool area for processing and storing**
4. **Collect, store and process floor eggs separately they have a shorter shelf life compared to eggs from a properly maintained nest box**
5. **Place eggs in flats or dozen cartons large side up**
6. **Never soak eggs in water prior to cleaning**

Preparation & Grading of Eggs continued

7. Eggs devoid of faecal matter should only be wiped with a damp cloth that has been dipped in an approved sanitizer
8. For eggs that are dirty or stained clean with a non-abrasive cloth previously dipped in an approved cleaner/sanitizer
9. Carefully check or candle the shell for hairline cracks. If present, package separately for bakeries
10. Discard eggs that are leaking from large cracks and keep a record of how many you discard per day. If this number is growing check the number of nest boxes in relation to the number of hens, check the age of the flock; older flocks have larger thin shelled eggs
11. Candle eggs to look for blood and meat spots in the egg and discard if found
12. Grade your eggs based on the external (shell) and internal (yolk and albumin) condition, egg weight is not a criteria for grade but is used to classify egg size as follows:

Weight Classification	Weight range in Grams
Peewee	< 42
Small	42 to 48
Medium	49 to 55
Large	56 to 63
Extra Large	64 to 69
Jumbo	> 69

13. A grade "A" egg is free of shell defects, dirt or faecal matter with an interior free from blood or meat spots.
14. If your eggs are sold in 1 dozen cartons, place a label on the carton that among other information specifies the grade and the weight category i.e. "Large" or "Medium"
15. Never mix large and medium eggs in the same carton as this encourages customers to sort your eggs at the display cabinet.

Dealer Listing

HI-PRO FEEDS & FARM SUPPLIES –

Telesales Department: (876) 749-0682 **Toll Free:** 1 (888) 994-4776

CLARENDON

Agrinova Farm Supplies
Main Street, Spalding
Clarendon
964-0004

Bennett's Agricultural Supplies
Main Street, Spalding
Clarendon
964-0368

Bushville Farm Products Ltd.
Bustamante Drive, Lionel Town
Clarendon
383-4276

Carib-Gro Agro & Garden Supplies
Main Street, Spalding
Clarendon
964-0568

Church Trends
Main Street, Sandy Bay
Clarendon
986-8468

Consolidated Farm Supplies May Pen
14 Main Street, May Pen
Clarendon
567-3788

CTS Farm Store
Main Street, Chapelton
Clarendon
987-2257

Douglas Farm Store
Main Street, Kellits
Clarendon
458-9093

Island Farm Supplies Ltd.
Howard Avenue, May Pen
Clarendon
9021908

Kellits Farm Store
Main Street, Kellits
Clarendon
350-6486

Osborne Store Farm Store
Main Street, Osborn Store
Clarendon
541-7769

Pennants Enterprise
Main Street, Kellits
Clarendon
966-8011

PH Agri Farm Supplies
Main Street, Spalding
Clarendon
579-3377

Spaldings Variety Store
Main Street, Spalding
Clarendon
964-0777

Reid's Farm Store (Successors)
2-4 Church Street, May Pen
Clarendon
902-7169

Tropical Feeds
138 Murhead Avenue, Denbigh
Clarendon
787-4628

Dealer Listing continued

True Friends Emporium
2 Decoy Road, Tollgate P.O.
Clarendon
987-1017

Value-Plus Hardware & Farm Supplies
Nine Turns Road, Frankfield
Clarendon
904-4419

HANOVER

Best Choice Hardware Ltd.
Mosley Drive, Lucea
Hanover
956-2565

Consolidated Agri Supplies Limited
Main Street, Hopewell
Hanover
460-6365

JAS Feed Store
Miller's Drive, Lucea
Hanover
543-2801

L'Astro Haberdashery
Main Street, Lucea
Hanover
375-5040

O&S Farm Store
Cambleton, Hanover
367-9494

Western Landscaping & Farm Products Ltd.
Old Lucea Bus Park, Lucea
Hanover
854-2681

KINGSTON / ST. ANDREW

Bellies Wholesale
2 Golding Avenue, Kingston 6
631-8095/ 289-5028

Betta Farms
Belmont, Lawrence Tavern
St. Andrew

Cheung Ying Cheng
9 Slipe Road
Kingston

Chancery Farm Supplies
Fairdene Avenue, Kingston
St. Andrew
879-5450

Consumer Goods
99 Orange Street, Kingston
922-4140/924-1897

Kenneth Sham Wholesale
Hamilton Plaza, Red Hills
St. Andrew
876-945-8213

Monica Bigby-Milloy
Shop #2, Gavell's Plaza, Main Street,
Stony Hill, Kingston 9
312 6660/648-6610

Spanish Grain Store Limited
15 Second Street, New Port West
Kingston
923-4510

Super Pet & Garden Center
128 Constant Spring Road
Kingston 8
969-5182

Super D2
Rose Hall Square
Lawrence Tavern
St. Andrew

Super Valu Supermarket Ltd.
56 Mannings Hill Road
Kingston 8
969-1035

T. Geddes-Grant
109 Marcus Garvey Drive
Kingston

Vineyard Farm & Garden Store
49A Deanery Road
Kingston

Willy Bee
56 Molynes Road,
Kingston 8

9-5 Convenience Store
Rockhall District
Rockhall P.A.
St. Andrew

MANCHESTER

Christiana Midway Farm Supplies
Shop #4, Moravia Road, Christiana
Manchester
964-5756

D.A.S.H. Farm Supplies
18 Mandeville Plaza, Mandeville
Manchester
962-2121

D&D Farm Supplies
Main Street, Christiana
Manchester
964-4588

Farmers Bargain Hut
Main Street, Christiana
520-6453

K.D.L. Agri Supplies
Shop #4 Lane Plaza, Mandeville
Manchester
625-4247

Linclaude Agricultural Supplies
Shop 2-3 Wesley Plaza, Mandeville
Manchester
625-0437

Manchester Livestock
Lot 4 Leaders Plaza, Mandeville
Manchester
632-4799

Palmer's Enterprise
Mile Gully, Manchester
610-7256

Price Vault Farm Store
Main Street, Christiana
Manchester
870-1170

Super Farm Store
32 Mandeville Plaza, Mandeville
Manchester
961-0255

PORTLAND

Denroy Palmer
Manchioneal, Portland
734-5393

Diversity Farm & Garden Supplies
Main Street, Annotto Bay
Portland
996-2357

Eastern Total Supplies Co. Ltd
6 William Street, Port Antonio
Portland
993-9778

Gavin Scott Farm Store
Main Street, Annotto Bay
Portland
386-1037

Dealer Listing continued

J&M Farm Supplies
Golden Grove, Portland
450-0437

J Mars Farm & Garden Store
7 Thompson Avenue, Buff Bay
Portland
465-4780

Marie Speight Farm Store
Hope Bay
Portland
285-5301

Peat's Self Serve
3 Nelson Avenue, Buff Bay
Portland
996-1502

Quadaccey Farm Store
Mount Pleasant
Portland
416-2837/ 569-5668

Walcott Kirkland Farm Store
Orange Bay
Portland
866-0099

ST. ANN

A&G Enterprise
Wakefield
St. Ann
610-2056

A&G Agricultural Supplies
Claremont
St. Ann
972-1243

A&G Agricultural Supplies
3 Musgrave Street, St. Ann's Bay
St. Ann
972-1243

Besenti Newland
Main Street, Iverness
St. Ann
964-4588

Cave Valley Farm Supplies
Cave Valley
St. Ann
902-8172

Huang Farm Store
3 Huntley Ave, Brown's Town
St. Ann
484-6126

K&R Farm Supplies
5 Main Street, Brown's Town
St. Ann
917-8360

Meeks Farm Store
McNie
St. Ann
375-6040

Morris Hill Limited
Main Street, Alexandria
St. Ann
975-1687

Northeast 2008 Agri Supplies
139 Main Street, Ocho Rios
St. Ann
974-2124

Northern Agri & Hardware
Claremont
St. Ann
876- 972-3130

New Plus Supermarket
All National Complex, Salem
St. Ann
8769736483

Plum Line Farm Store
Main Street, Alexandria
St. Ann
975-1375

PRC Traders
Evelyn Street, Ocho Rios
St. Ann
974-5715

PRC Traders
Moneague
St. Ann
876-973-0505

Reliance Farmstore
Main Street, St. Ann's Bay
St. Ann
972-2629

Ringo's Farm Store
Alexandria
St. Ann
418-5944

Vassell Long
Moneague
St. Ann
583-4086

Wilson's Farm Supplies
27 Top Road, Brown's Town
St. Ann
876-466-2189

ST. CATHERINE

B&D Harris Grain Store
1 Gilette Street, Linstead
St. Catherine
985-2877

B&S Farm & Hardware Supplies
79 King Street, Linstead
St. Catherine
451-0923

Big Tree Enterprise
Big Tree Plaza, Bog Walk
St. Catherine
708-2082

Carib-Gro-Agro & Garden Supplies
Guy's Hill
St. Catherine
994-3570

Cee Bee's Hardware
Little Greendale, Spanish Town
St. Catherine
349-1972

D&C Feeds
Church Road, Bog Walk
St. Catherine
452-0508/350-2863/866-6389

Doreen Chambers Farm Store
Allman Hill, Golden River
St. Catherine
428-1358

Esau Graham
Shop #85 Bus Terminus, Spanish Town
St. Catherine
984-9655

Farm and Garden Depot
6 Royal Avenue, Linstead
St. Catherine
322-4995

Fong Food Trading Co. Ltd.
70 King Street, Linstead
St. Catherine
468-1429/591-5881

Farm Grain & Variety Store
55 Charlton Drive,
Ewarton, St. Catherine
306-5642/ 851-2368

Good Price Feed & Farm Store
Lluidas Vale, St. Catherine
406-4601

Dealer Listing continued

Hayes Hardware
Haycity, Guy's Hill
St. Catherine
893-4395

Marquita Tulloch
113 St. John's Road, Spanish Town
St. Catherine
342-7416

Mission T Farm & Garden Supplies
Priority Plaza
Main Street, Bog Walk
St. Catherine

Retreat Grocery & Snack Shop
Glengoffe
St. Catherine
458-4368

S&L Farming & Garden Supplies
99 Darlington Drive, Old Harbour
St. Catherine
850-5477

Smith Grocery
38 Old Harbour Road
St. Catherine

Spanish Town Farm Store
Shop 67, Gateway Plaza
Spanish Town
St. Catherine
984-9655

W&B Enterprise Variety Store
Gordon Wood, Old Harbour
St. Catherine
983-0489

Waves Farm Store
9 Darlington Dr
Old Harbour
St. Catherine
424-8497

WT Feeds
Kitson Town
St. Catherine
468-4314

ST. ELIZABETH

Agri-Care Farm Supplies
Shop #10 Manifest Plaza
Santa Cruz
St. Elizabeth
966-9618

Agri-Chem Farm Supplies
Balaclava P.O., St. Elizabeth
277-5479

AR's Farm Store
Main Street, Balaclava
St. Elizabeth
369-3590 or 894-3169

Carib-Gro-Agro & Garden Supplies
High Street, Black River
St. Elizabeth
965-2033

Carib-Gro-Agro & Garden Supplies
Shop 16, Beagles Plaza, Santa Cruz
St. Elizabeth
966-2636

Cole's Farm Store
Main Street, Santa Cruz
St. Elizabeth
966-9788

Consolidated Agri Supplies
North Street, Black River
St. Elizabeth
529-8455

Dawkins Cost U Less
Beacon, St. Elizabeth
457-7657

Deliver On Time Hardware
Maggotty, St. Elizabeth
963-9272

Evans Farm Store
Red Bank P.O.
St. Elizabeth
340-3146

Green P Farm Store
Potsdam District, Monroe
St. Elizabeth
792-1736

F.V. Farm Supplies
Southfield
St. Elizabeth
965-6166

Farmers Paradise
Main Street, Lacovia
St. Elizabeth
773-4636

Four Roads Farm Store
Four Roads Shopping Centre
Lititz, St. Elizabeth
4351812

Golden Harvest Farm Store
Claremont Park, St. Elizabeth
357-1317

Farmers Paradise
Main Street, Lacovia
St. Elizabeth
773-4636

Hampton Wholesale & Retail Centre
Hampton District
Malvern P.O., St. Elizabeth
341-6698

Junction Farm Store
Junction, St. Elizabeth
965-8417

KB's Farm Store
Seaview District
Southfield, St. Elizabeth
433-0550

L&M Farm Store
Main Street, Santa Cruz
St. Elizabeth
966-9756

Leed's Farm Store
Leeds, Santa Cruz
St. Elizabeth
776-9017

M & K Farm Supplies
Nain, St. Elizabeth
963-6026

M & S Farm Supplies
11 North Street, Black River
326-2309

Nelson's Enterprise
Farm Supplies
Coke Drive, Santa Cruz
St. Elizabeth
966-9085

Oswald McLean Farm Store
Flagaman, St. Elizabeth
965-0484

Outta Road Farm Store
Pepper District, St. Elizabeth
452-0464

PJ's Distributors
Main Street, Santa Cruz
St. Elizabeth
966-2386

Rui Pan Farmstore
Lot 39, Beadles Plaza
Santa Cruz
413-2188

September Farm Store
5 Great George Street
Savanna-La-Mar, Westmoreland
292-2577

Sito Nature Farm and Variety Store
Links Plaza, Braes River
St. Elizabeth
459-8713

Dealer Listing continued

Sito Nature Farm and Variety Store
Links Plaza, Braes River
St. Elizabeth
459-8713

Spencers Farm Store
Red Bank P.O., St. Elizabeth
404-7915

Spring Field Farm Store
Springfield, St. Elizabeth
883-3724

Stop and Shop Mini Mart
Goshen District, St. Elizabeth
966-0827

Sunlight Agricultural Supplies
Junction, St. Elizabeth
399-3759

Sunnymount Farm Store
Leif Mountain
Southfield, St. Elizabeth
842-9662

T&C Farm Store
Main Street, Lacovia
St. Elizabeth
862-4517

Top Grower Agro-Supplies
34 High Street
Black River
St. Elizabeth
374-4333

White Hall Harberdashery
White Hall
St. Elizabeth
988-7281

Williamsfield Farm Store
Williamsfield, St. Elizabeth
290-4774

You Ask for It Farmstore
Main Street, New Market
St. Elizabeth
361-0147

ST. JAMES

Born & Grow Community Wholesale
2 Roosevelt Ave, Montego Bay, St. James
489-1334

Chin's Harberdashery
5 Lawrence Lane, Montego Bay
St. James
367-6855

Howverne Enterprises Limited
Anchovy, St. James
912-3036

Jacinth Nelson Farm Store
Cambridge, St. James
396-9724

Li Ka Lap - Happy Garden Farm Supplies
50 Railway Lane, Montego Bay
St. James
405-0028

The Farm Hut
7 Fustic Road, Montego Bay
St. James
940-4148

Wanbo Agro Farm Supplies Limited
8 Fustic Road, Montego Bay
St. James
952-1739

Wards Mini Mart
Wiltshire, St. James
956-4207

West Gate Farm Supplies
13 Fustic Road, Montego Bay
St. James
964-3038

ST. MARY

Ann's Farm Store
2 River's Lane, Port Maria
St. Mary
894-3916

C&W Hardware
Eden Park, St. Mary
441-0205

Diversity Farm & Garden
Annotto Bay, St. Mary
996-2357

DPS Farm and Garden Supplies
8 Stenetts Street
Port Maria, St. Mary
994-2411

Farmville Home & Garden
Rio Nuevo Plaza
Tower Isle, St. Mary
975-4089

Gayle Farm Supplies
Gayle, St. Mary
925-9123

Geen Plunkett Farm Store
Albion Mountain, St. Mary
789-1131

Golden Gem
Mary Mount, St. Mary
393-7752

Hugh Radway Farm Store
Charleston Shoppers
Retreat, St. Mary
296-7188

Jackie's Variety Farm Store
Trinity, Port Maria
St. Mary
280-2749

Jeffrey Town Variety & Farm Store
Jerffrey Town, St. Mary
384-9170 / 327-7968

Karon Andrews Farm Store
Islington, St. Mary
870-2252

PDS Farming
Annotto Bay
996-9009

Port Maria Super Centre
6 Stenneth Street
Port Maria
994-9413; 398-8632

Schlimn Chicks & Feed
Highgate, St. Mary
456-9622

ST. THOMAS

Frontline Liquid & Feeds
11 South Street
Morant Bay, St. Thomas
982-1392

Hugo's Farm & Garden Supplies
10 Nutts River Road
Leith Hall, St. Thomas
982-0147

Phill's Feed Store
Seaforth, St. Thomas
896-5601

PMC Farm & Garden Supplies
Poorman's Corner, St. Thomas
371-7804

St. Thomas Farm Store
Main Street, Morant Bay
St. Thomas
734-1109

Superior Farm & Garden Centre
3 Miramar Drive, Morant Bay
St. Thomas
734-7390

Dealer Listing continued

TRELAWNY

Binn's Farm Store
Duncans, Trelawny
439-6216

Clark's Town Variety Store
Clark's Town, Trelawny
463-4646

Falmouth Farm Store
18 Falmouth Street
Falmouth, Trelawny
395-5522

Lorimers Farm Supplies
Lorimers, Trelawny
372-4345

NuGreen Farm Supplies
Albert Town, Trelawny
610-0448

Walker's Grocery
Dumfries, Trelawny
912-8447

Wirefence Farm Store
Wirefence Road
Wire Fence District
Trelawny
486-5997

WESTMORELAND

4 D's Chemical
115 Great George's Street
Savanna-la-mar, Westmoreland
377-1366

Big M Hardware
59 Great George's Street
Savanna-la-mar, Westmoreland
955-2940

Chue's Farmstore
Seaford Town District
Leonard's P.O., Westmoreland
355-7386; 865-1149

Consolidated Agri Supplies
71 Great George's Street
Savanna-la-mar, Westmoreland
831-8871

Leamington Farm Store
Leamington, Westmoreland
376-9624

Palmers Hardware
Main Street White House
Westmoreland
963-5197

September Farmstore (Yanling Chen)
5 Great George Street
Savanna-La-Mar, Westmoreland
833-8289

Source One Trading
2 Queen Street
Savanna-la-mar, Westmoreland
955-2485

References & Acknowledgement

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1995 – Hanley & Wildish, Effects of dietary Protein reduction on the performance of Late-cycle laying hens, Jamaica Broilers R&D Committee
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2008 – Daghir & Jones, Poultry production in Hot Climates, p. 167

Additional information was obtained from the following Management Guides:

1) ISA Babcock B300 Management Guide
2) Hy–Line Brown Commercial Management Guide (2002 – 2004)
3) Babcock B380 Management Guide (1996)
4) Hy–Line W-36 Management Guide (1998-1999)
5) ISA White Management Guide
6) ISA Brown Management Guide (2000)
7) Bovan Brown Management Guide

ACKNOWLEDGEMENT

TThe Hi-Pro team is pleased to share the very first edition of the Hi-Pro Layer Management Guide with our readers. We wish to recognize Mr. Norman Williams for his contribution to this publication; also, Mr. Mordecai Tulloch (Field Operations Officer, JES), Dr. Michael Motta (Senior Veterinarian, Hi-Pro), Dr. Lenworth McCalla (Veterinarian, Hi-Pro) for enriching the contents of this book with their technical expertise.

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We hope this publications helps you to **'Grow with Hi-Pro'!**

EGG RECORD

Name _____ **Month** _____ **Date Originally Housed** _____

Address _____ **Pen or House No.** _____ **No. Birds Originally Housed** _____

Address _____ **Breed: Strain** _____ **No. Birds Start This Month** _____

	EGGS Collections				**FEED**			**BIRDS**			**LIGHTS**		**NOTES** (Per cent production, Cause of Mortality, Medication etc.)
Date	1	2	3	Total	Crumble /Mash	Grit	Total	Died	Cull	Total	On	Off	
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
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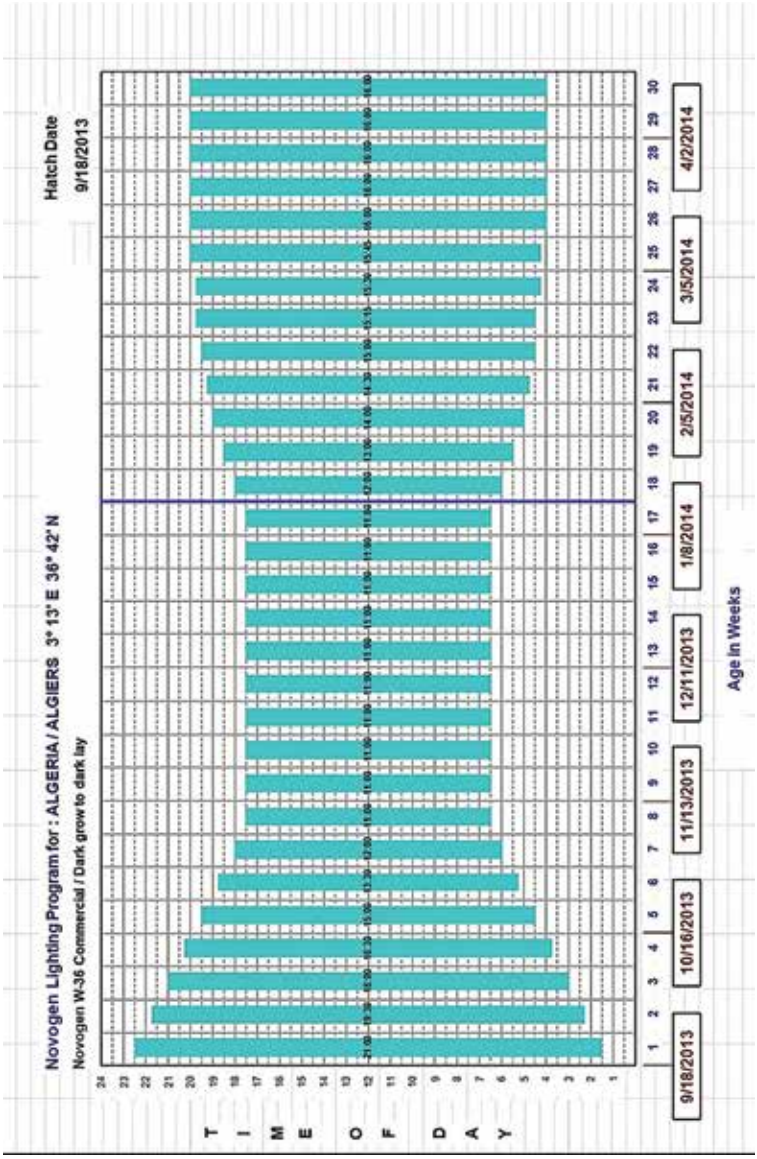
28													
29													
30													
31													
			TOTALS										
			This Month			**This Month**				**This Month**			
			Thru Last Month			**Thru Last Month**							
			Year to Date			**Year to Date**				**No. of Birds end of this Month**			

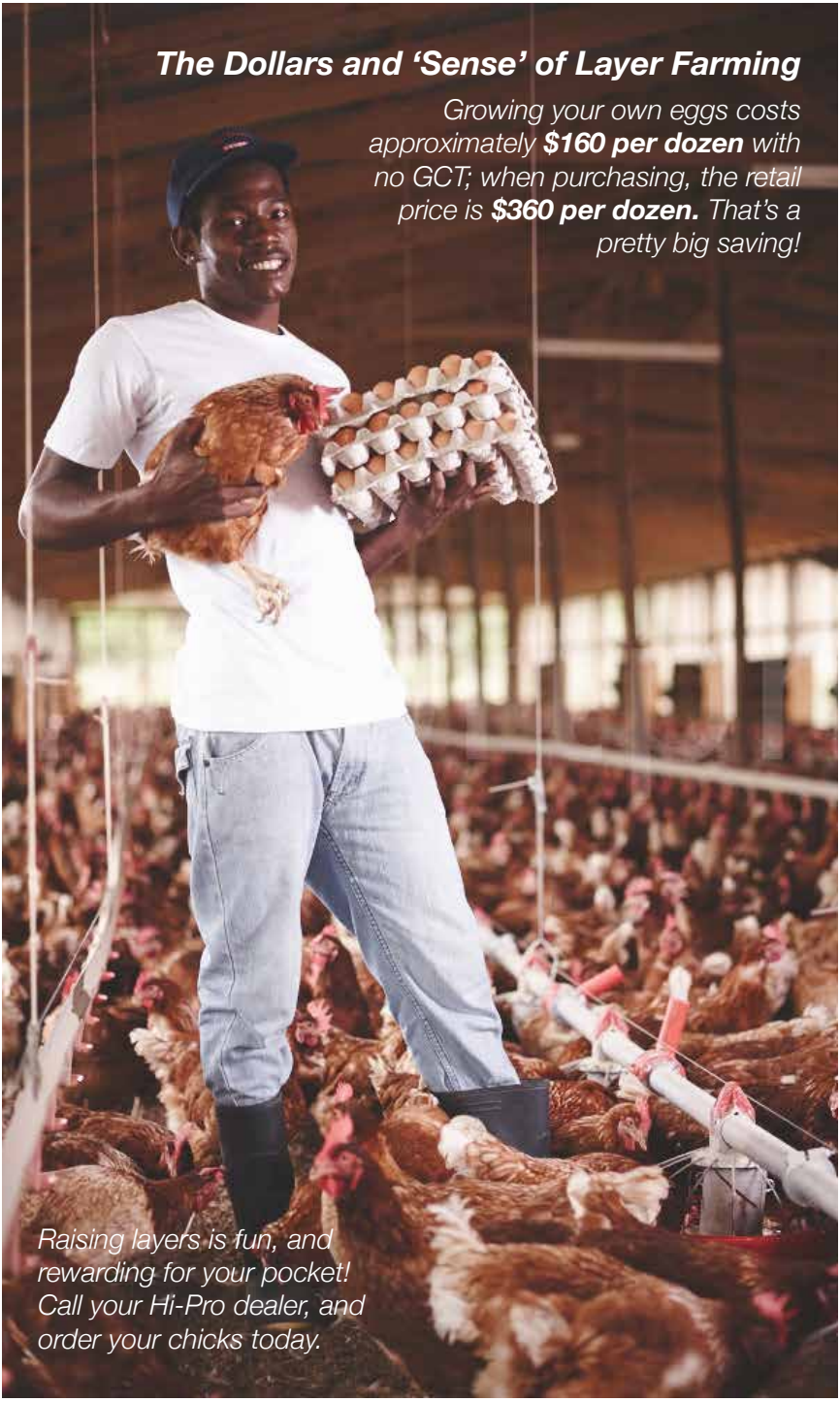
Lbs. Feed to produce 1 Doz. Eggs = $\frac{\text{No. Lbs. Feed f/Mo.}}{\text{No. Lbs. Feed f/Mo.}}$ =

Feed cost per Doz. Eggs = $\frac{\text{Total Feed Cost f/Mo.}}{\text{No. Doz Eggs f/Mo.}}$ =

Appendix


Novogen Lighting Program for : ALGERIA / ALGIERS 3° 13' E 36° 42' N
Novogen W-36 Commercial / Dark grew to dark lay
Hatch Date
9/18/2013
TIME OF DAY
Age in Weeks
9/18/2013
10/16/2013
11/13/2013
12/11/2013
1/8/2014
2/5/2014
3/5/2014
4/2/2014

NOTES


The Dollars and 'Sense' of Layer Farming
Growing your own eggs costs approximately $160 per dozen with no GCT; when purchasing, the retail price is $360 per dozen. That's a pretty big saving!
Raising layers is fun, and rewarding for your pocket! Call your Hi-Pro dealer, and order your chicks today.

Hi-Pro

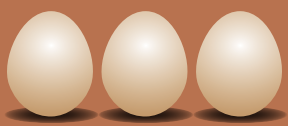
In just a few weeks from now

you could be raising a layer bird

Order your day old layer chicks **NOW**

At **18** weeks

your bird will lay **EGGS**



Save **$200**

Home grown Hi-Pro eggs cost about **$160/doz.**

Store bought eggs cost over **$360/doz.**

What are you waiting for?

ORDER YOUR BIRDS TODAY! Hi-Pro