INTRODUCTION

At Kenchic, we are committed to providing technical assistance to our farmers. Such assistance will include, but is not limited to, appropriate advice on housing, husbandry and health management. In this light, we would like to issue this manual as part of our technical services to our customers.

The information presented in this manual is based on actual flock results obtained under good environmental and management conditions in Kenya. However, this information does not constitute a guarantee or warranty of performance in any way but should be regarded as performance objectives.

All programs outlined in this manual are suggestions and should be modified according to the individual farmer's solution. Our technical team is available to assist you in determining the appropriate management program for your operation. The team can be contacted on the following contacts:

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P. O. Box 20052 Nairobi
Phone: 254 (020) 558102 / 555009 / 350809 / 350810
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ALSO AT:

Technical and Laboratory Services Department, Mbuchia House, Westlands, Nairobi
Phone 254 (020) 444812
Mombasa Depot P. O. Box 97067, Phone 254 (041)2490535
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HOUSING

The ideal house should provide the birds with a comfortable environment and protect them from the extremities of the prevailing climate (rain, wind, sunshine etc). the house should provide adequate space for the flock to be kept in the house. The ideal stocking density is two square foot per bird (2 foot²/bird).

In the tropics, the ideal house is open-sided to allow natural ventilation and have an east-west orientation to minimize the amount of sunlight entering the house directly. It is important that the house be rectangular in shape and have walls not higher than three feet on the longer side. The wall can be made from off-cuts, iron sheets, silver boards or bricks. The rest of the side to the wall should have a wire mesh. The roof of the house should have a reflecting surface and be pitched with overlaps (see diagram). All these factors aid in ensuring that the house is comfortable and well ventilated.

Cement floors are the best finish as they are easier to clean. There should be a foot-bath at the entrance to the house for those entering the house to disinfect their foot ware.

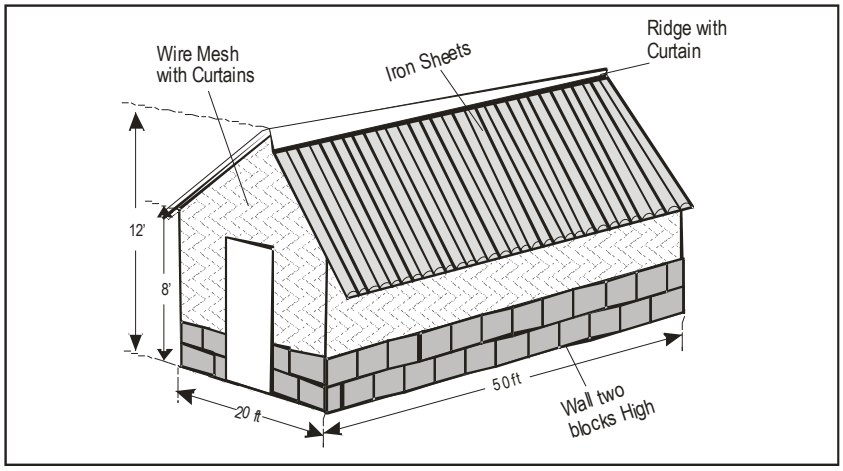
To reduce the risk of rodents gaining entrance into the flock house, clear all the vegetation in an area 3-4 meters around the flock house. The feed store should also be separate from the house.

HYGIENE AND SANITATION

In commercial layers farms an all-in all-out system is the best management practice as it prevents the build up of disease causing organisms and disease outbreaks. In cases where farmers want to keep flocks of different ages, then each flock MUST be housed in its own house, and have a distance of 10m between the units.

The flock house should be constructed in isolated areas to decrease the risk of contamination. The house should be fenced to exclude stray animals and visitors. The door should always be locked.

LAYERS HOUSE WITH DIMENSIONS FOR 500 LAYERS



The wire mesh on the sides of the house should be of a small gauge ½" mesh, to prevent entry of wild birds, cats, dogs and rodents.

Only essential staff should enter the flock house. When visitors are allowed access to the flock house, a record showing name, purpose of visit and previous farm visited should be maintained.

Poultry workers should always wear clean, disinfected foot ware and clothing. When visiting birds of different ages, start with the youngest flock and always visit sick flocks last, irrespective of their age.

Take measures to control all rodents, wild birds and insects as they are known vectors of poultry diseases. Such measures can be mechanical, biological or chemical.

Do not permit the introduction of materials and / or equipment into the poultry house without thorough cleaning and disinfection as these items can be carriers of disease-causing organisms.

PREPARING THE HOUSE

As soon as the spent flock has been depopulated, the layer house and equipment must be thoroughly cleaned and disinfected.

It is important to allow the house to remain empty for at least 2 weeks (after the manure has been removed) before the next flock is placed. This allows time to reduce the build up of disease-causing organisms and to prepare the house effectively for the next flock.

After the birds have been removed from the house, remove all the equipment from the house and dampen the ceiling, walls and litter with water. This helps to minimize dust during litter removal.

Remove all old litter and dispose of it at least 1.5km from the farm. Do not store it on, or spread it near the farm as it can re-contaminate the clean house when the wind might

blow it back into the house, or via workers boots if they walk over it on their way to the house.

All unused feed in the feeders should be disposed of and not stored for the next flock to minimize chances of disease transmission. Only feed in bags stored in a store separated from the house can be kept for the next flock.

Wash the house with water and soap starting with the roof followed by the walls and finally the floor. Allow the house to dry before spraying the whole house with disinfectant solution again starting from the roof. Simultaneously, wash and disinfect all the equipment from the house. Repair and maintenance to the house and / or equipment should be done during this time.

Once the house is dry, place four inches of litter material and put back all the clean and disinfected equipment into the house. Common types of litter are wood-shavings, straw, rice husks and coffee husk. Good litter should insulate the floor and absorb moisture from the chicken droppings.

Prepare the brooder area at least 24 house before the chicks arrive.
Depending on the climatic conditions, the brooders MUST be turned on at lease 6 hours prior to the arrival of the chicks. This ensures that the house environment, water and feed are at the right temperature when the chicks arrive.

CHICK ARRIVAL AND BROODING

On collecting the chicks, ensure that you have the correct number and that the chicks are uniform, alert, active, and free of any obvious deformities, unhealed navels or signs of infection.

Chicks should be transported in a well-ventilated but not windy vehicle without direct exposure to sunlight or rain. The chick boxes should be loaded so that the air circulation is not impeded nor are the lower boxes squashed. The transport should go straight from the source (hatchery/sales office) to the farm without any unnecessary stops.

On arrival at the farm carefully remove the chick boxes from the transport vehicle into the flock house. Carefully remove the chicks from the boxes into the brooder ring.

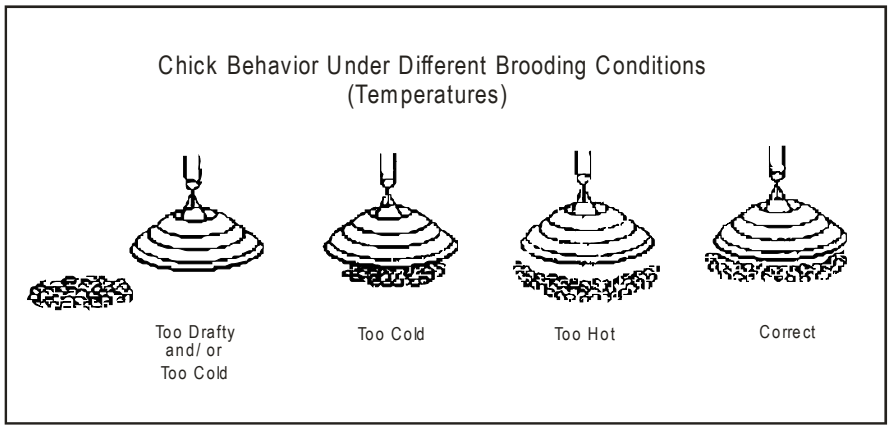
Ideally, chicks should be placed under the brooder hovers 6 to 12 hours after hatching. The longer the time between the hatch and placement, the more the chicks become adversely affected.

Once the chicks are in the brooder, they should be provided with wholesome drinking and feed. It is advisable to add Glucose (or Sugar), Vitamins and liquid paraffin (not kerosene) to this water. This provides the birds with a ready source of energy and helps in over coming stress caused by the traveling while the liquid paraffin assists in the passage of faeces.

During the first 48 hours spread feed on a paper placed on the litter or placed in trays or feeder lids that are evenly distributed in the brooder area. This makes the feed more accessible to the chicks for a better start.
During brooding, it is important to maintain the proper temperature in the brooder. Below are the guidelines of the temperatures to be maintained:

AGE (WEEKS)	TEMPERATURE (°C) AT CHICK LEVEL	TEMPERATURE (°C) IN THE HOUSE
1	33 - 35	30 - 32
2	30 - 32	27 - 29
3	27 - 29	24 -26
4	24 - 26	21 - 23

Temperatures should be monitored by installing maximum-minimum thermometers in the brooder area at the height of the chicks. Observing the chicks' behavior is also a good guide of the ambient temperature (see diagram).



Excessive chick noise during brooding is an indication that the chicks are uncomfortable. This is commonly due to improper temperatures and symptoms include:-

Chilled chicks

- Chicks huddle together especially under the brooder.
- Watery intestinal and cecal contents leading to watery / wet, droppings leading to wet pasted vents.
- Overheated Chicks
- Chicks lie prostrate with their heads and necks stretched out on the floor.
- Chicks pant.
- Increased water consumption by the chicks, leading to distention of the crop and intestines by the extra water.
- Chicks move away from the heat source and seek cooler parts of the house. Sometimes crowed around the drinkers.

It is essential to maintain the proper temperature during brooding as chicks which are chilled in the first days of life will be stressed, have increased mortality, dehydration,

retarded growth, poor uniformity and a higher incidence of ascites. While overheated chicks will be dehydrated, resulting in high mortality, runting / stunting syndrome and poor flock uniformity.

The brooding area should be enlarged progressively to avoid overcrowding. The birds should be allowed to occupy the whole house by the time they are three (3) weeks of age.

During brooding it is essential to maintain proper ventilation regardless of the cost of maintaining the brooder temperatures. Ventilation is important in removing the ammonia from the house and ensuring that the litter is dry thereby reducing disease challenge. Layers also require fresh air to grow and produce eggs.

LIGHTING PROGRAMS

An appropriate lighting program is important but not critical. In the absence of electricity alternatives such as kerosene lamps can be utilized.

Layers are sensitive to change in the period of illumination, and these influence the age of sexual maturity and feed consumption.

During rearing these programs encourage growth and control the bird's sexual maturity while in production the objectives is to encourage feed intake hence increased lay.

Long day-lengths through out the rearing allow the birds to increase their feed intake and hence growth. Hence it is advisable to use slowly decreasing light program for the first 7 weeks before leaving the birds on natural day length. The long day-length allow the birds to eat during the cooler parts of the day.

In the absence of photo-stimulation, the age at the start of production is determined by body weights. Weight varies depending on climatic conditions and the day-length experienced during rearing. Once photo-stimulation has started, age at point of lay is no longer influenced by the pullet's weight. It is therefore important not to start light stimulation until the pullets have achieved the target weights.

It is important to achieve the target weights as a low body weight at sexual maturity not only reduces the mean egg weight, but can also lower the overall performance (egg per hen housed, egg-shell quality and liveability) of the flock.

Irrespective of the production system and the location of the farm, three rules that MUST be observed are:

- NEVER increase the day-length during the growing stage (8-14 . weeks)
- NEVER increase the day-length when the flock's average body weight is below 1250grams

- NEVER decrease day-length after the start of lay.

Below is a suggested lighting program for naturally lit housed in the tropics:

AGE (WEEKS)	LIGHTING PROGRAM
1-2	23 hours for 2-3 days then 22 hours
3	22 hours
4	20 hours
5	18 hours
6	16 hours
7	14 hours
8-16	Natural day length (12 hours)
17	14 hours (increase by 2 hours)
18	14.5 hours (increase by half hour weekly to 17 hours week 23

WATER

Distribute drinkers evenly throughout the whole house, alternating them with the feeders so that they are easily accessible to all birds. No bird should walk more than 1.5m to get to either feed or drink.

Provide one chick fount for 50 chicks during the first week and gradually replace them with the regular drinkers allowing space as indicated below:

TYPE OF DRINKER	RECOMMENDED WATER SPACE
TROUGH	2.0 cm per bird
BELL SHAPPED (35cms diameter)	10-13 per 1000 birds but not less than 4
NIPPLES	8-10 birds per nipple

Wash and disinfect chick drinkers daily. Ensure the drinkers are filled with fresh water after washing. Ensure that birds have access to wholesome drinking water at all times and NEVER allow the drinkers to go dry. During vaccinations do not disinfect the drinkers after washing, if the drinkers will be used for vaccination.

The table below shows the approximate daily water consumption of layers at different ages.

AGE (WEEKS)	CONSUMPTION (m/s / bird)	AGE (WEEKS)	CONSUMPTION (m/s / bird)
1	20-30	11	160-165
2	40-50	12	165-170
3	50-60	13	170-175
4	60-70	14	175-180
5	70-80	15	180-190
6	80-100	16	190-195
7	100-120	17	195-200
8	120-130	18	205-220
9	130-140	19	210-220
10	150-160	20	220-230

The actual consumption depends on the ambient temperature and humidity. Above 20%, consumption increase to enable the bird to maintain body temperature by respiratory evaporation.

In hot periods it is essential to provide the flock with cool water as this will improve productivity. It is therefore extremely important to protect the water tanks from direct sunlight or ensure they have a reflective surface.

Always adjust the drinkers and feeders levels as the birds grow to ensure that the equipment is always slightly above the level of the birds' back. This minimizes spillage.

Use a reliable water sanitizer (like chlorine) to control disease-producing organisms in the water.

FEEDING

Feed is the greatest expense in commercial layer establishments, therefore it is important to purchase feed from a reputable miller who can assure consistency in the quality and performance of the feed.

Variations in the nutrient composition and quality of feed ingredients result in variations in feed composition and texture. These are due to variations in raw feed ingredients from season to season and even shipment to shipment.

It is important to avoid mixing feeds from several millers, adding other protein sources (fish meal, etc) and minerals salts (DCP) as this changes the balance in the feed thereby

affecting performance. Excess of some of these products also negatively affects the final products e.g. fishy taint in eggs due to more than 5% fish meal in feed.

To start a flock, feeder lids or plastic feeder trays (one per 50 chicks) should be used. Feed should also be spread on paper placed over the litter, covering 40% of the floor.

Gradually remove the feeder lids or trays, replacing them with the adult feeders. By the time the birds are two weeks (14) days old, all the lids and trays should have been removed.

Raise the feeders gradually as the birds grow. Always ensure that the top lip of the feeder is at the same level with the birds' backs.

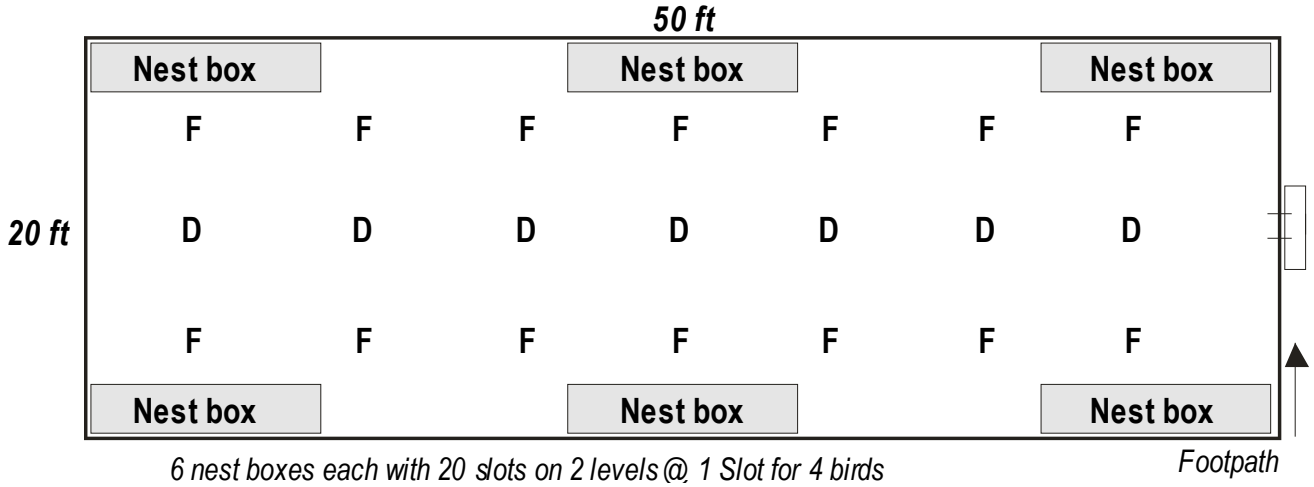
Provide adequate feeder space as recommended below for proper growth of the birds.

TYPE OF FEEDER	RECOMMENDED FEEDER SPACE
TROUGH	5.0 cm per bird (minimum)
PANS (33cm diameter)	30 - 50 birds per pan
TUBES (42 cm diameter)	30 - 50 birds per tube

Chick and Duck Mash should be fed in the first eight weeks of life followed by Growers Mash up to two (2) weeks before the expected point of lay. The flock is then put on Layers Mash until the end of production. During the changes of the rations, mix the two rations so that the change is gradual. An abrupt change is stressful to the bird and can affect performance. Vitamins can be provided during this time to reduce the stress. The average feed consumption expected with the corresponding weights of the birds are indicated below.

AGE (WEEKS)	TYPE OF FEED	FEED CONSUMPTION (gms / bird / day)	AVERAGE LIVE WEIGHT (grams)
1	CHICK AND DUCK MASH	12	40-60
2		18	95-120
3		25	150-200
4		31	220-300
5		36	380-400
6		41	470-500
7		45	560-600
8	Gradual Change to GROWERS MASH	49	650-690
9		52	740-780
10		60	830-870
11		70	920-960
12		75	1010-1050
13		80	1100-1140
14		85	1185-1230
15		92	1270-1320
16	Gradual change to LAYERS MASH	100	1355-1410
17		107	1440-1500
18		114	1530-1600
19		120	1580-1680
20		120	1645-1750

EQUIPMENT OUT LAY FOR A LAYER HOUSE HOUSING 500 LAYERS



Ventilation can be described as the circulation of fresh air through the flock house. This is achieved by the air passing from one side of the house and exhausting through the opposite side.

Ventilation of layer houses serves several functions including

* Removing excess heat and moisture
* Providing oxygen while removing harmful gases
* Reducing dust hence improving the air quality

In the tropics, where houses are open sided, ventilation is managed by opening the curtains when it gets warm. This lets air from outside into the house. When it gets cold, curtains are closed to restrict the flow of air.

Curtains are normally made from used, clean and disinfected feed sacks stitched together, or canvas material. The curtains should be fastened to the side-wall at the bottom and opened from the top. This will minimize wind or drafts blowing directly on the birds.

To ensure effective ventilation, every effort should be made to open the curtains on both sides of the building to the same level unless wind is consistently from one side of the flock house then the curtain on this side should be opened less than the other side.

House should be constructed to take advantage of the prevailing winds to improve efficiently of natural ventilation. Narrow houses (10 meter [33 feet] or less) with high pitched roofs provide more natural air movement. An east-west orientation of the house on its long axis reduces the solar heat level in the house.

DISEASE CONTROL AND PREVENTION

Infectious diseases are the greatest risk to a commercial layer operation and attempts must be made to control and prevent disease. In most instances, the cost of treating clinical outbreaks of disease is enormous.

Sub-clinical, mild or chronic disease also leads to losses due to poor performance of the affected flocks.

To detect disease in their early stages, it is important for the flock attendants to be aware of the daily status of the birds. They should judge this by the behavior of the birds, droppings, feed intake, mortality rates, etc.

Any signs of ill health should be reported immediately to a veterinarian who can make the correct diagnosis and prescribe the appropriate treatment. Since most poultry disease have very similar manifestations diagnosis by the farmers is strongly discouraged.

A vaccination program to meet both area and individual farm needs is essential for flock health management. Vaccination programs need to be reviewed periodically and any changes approved by an experienced veterinarian.

It is important to follow the manufacturer's directions on storage and administration of vaccines. Generally vaccines must be stored between 2 and 8 degrees centigrade, and transported in a cool box and should not be exposed to direct sunlight.

When vaccinating through the drinking water, the water supply system should be completely free of chlorine, medication and / or other chemical agents for 48 hours prior to and for 24 hours after the vaccination. Depending on the ambient temperature, water should be with held for 2-3 hours prior to the vaccination. The vaccine should be mixed with water which the birds will consume within two hours of being mixed.

Vaccinations should be done during the cooler part of the day either early morning or late evening. Before vaccinating always ensure that, there are sufficient vaccine doses to cover the flock and the birds are healthy. Also ensure that the vaccines have not expired.

In eastern Africa, layers should be vaccinated against Mareks Disease, Infectious Bronchitis (IB), Newcastle Disease (NCD), Infectious Bursal Disease (IBD/ Gumboro Disease), Fowl pox, Fowl Typhoid and Fowl Cholera. Below is a suggested vaccination program for layers purchased from Kenchic:

AGE	VACCINATION	METHOD
DAY 1 (Done By Hatchery)	MAREKS IB + NCD	INTRA MUSCULAR SPRAY
DAY 10-14	GUMBORO	DRINKING WATER
DAY 14-18	IB + NCD	EYE DROP
DAY 24-28	GUMBORO	DRINKING WATER
DAY 28-32	IB + NCD	EYE DROP
WEEK 6-8	NCD killed / IB + NCD - Live FOWL TYPHOID	IM / SPRAY INTRA MUSCULAR
WEEK 8-10	FOWL POX FOWL CHOLERA	WING STAB SUB CUTANEOUS
WEEK 12-14	FOWL TYPHOID	INTRA MUSCULAR
WEEK 16-18	NCD + IB + IBD (K) / IB + NCD (L) FOWL CHOLERA	IM / SPRAY SUB CUTANEOUS

Due to the high maternal antibodies in the chicks obtained from Kenchic it is important that the first Gumboro vaccination is not done before 10 days of age as the maternal antibodies neutralize the vaccine, leaving the chicks unprotected.

It is important to purchase your chicks from a hatchery where the vaccination history of the parents is available as this determines the level of protection the chicks have acquired from their parents and the vaccination program to follow.
Such hatcheries would also ensure that the appropriate day-old vaccinations are done effectively.
It is also important that vaccines are purchased from reputable vaccine manufactures or their appointed outlets (pharmacies, agrovet shops, etc)
Such outlets are capable of ensuring that the vaccine cold chain is maintained and normally offer professional advice on various aspects of vaccinations.

BEAK TRIMMING

Beak Trimming is done for two main reasons: To prevent feather pecking, cannibalism and to reduce feed wastage. The operation is delicate and should be performed by specially trained personnel only. Poor beak trimming often leads to unevenness of the beaks and in some birds cause difficulties in feeding and drinking thus low body weight.

In commercial laying flocks beak trimming should be done twice. A light trimming at 10 days and the second operation between 8 and 10 weeks of age. This is because trimming only at around 10 days will not prevent pecking entirely while if done too severely at that age will lead to a reduction in growth rate and uniformity.

Before Beak Trimming

- Ensure that the birds are healthy and have not been vaccinated recently .
- Add vitamins (especially vitamin K) to the drinking water to prevent hemorrhages.
- Ensure that the temperature of the trimming blade is high enough To prevent hemorrhages but not so high as to burn the birds. .

Beak trimming at about 10 days

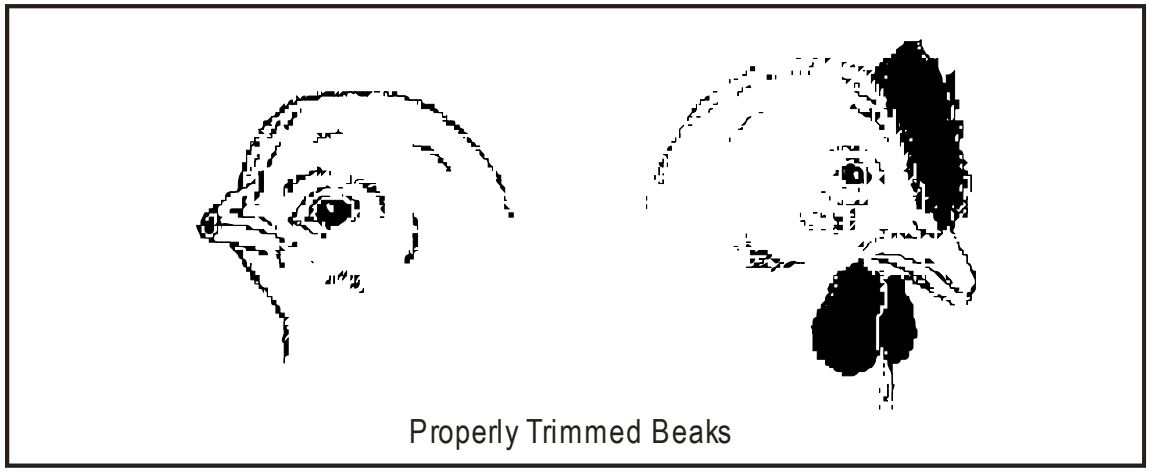
- Hold the chick in one hand with the thumb behind the head
- Hold the head firmly in position resting on the thumb
- Cauterize or cut the beak tip and the lateral edges at least 2mm from the nostrils (see diagram).

Beak trimming at 8 to 10 weeks

It is necessary to cut the beak perpendicularly at a right angle to its long axis, so that after cauterization, about half of the beak between the tip and the nostrils is left.

To beak trim correctly at 10 weeks, insert a finger between the 2 mandibles and then beak trim and cauterize each mandible. For day 10 debeckig, put both mandibles through the middle hole of the machine. The blade should be at the right temperature. Cauterize with care, particularly at the side of the beak to ensure that the sides are rounded off to avoid lateral re-growths.

It is advisable to check the state of the beak trimming just before point of lay and, if necessary do a re-trim of the over grown beaks.



Properly Trimmed Beaks

After beak trimming
Make it easier for the birds to drink and eat by increasing the level of water in the drinkers and providing an adequate depth of feed in the feeders.

DEWORMING

Layers are susceptible to infestation with a variety of species of worms, especially if raised on deep litter system. These parasites reduce feed conversion efficiency causing a reduction in weight gain during the growing period and a drop in egg production in the production period.

The most common drugs for de-worming layers flocks are Piperazine or Levamisole based and should be used according to manufacturer's instructions. These drugs cause production drops if used during production and should only be used on a veterinarian's advice.

Layer flocks are routinely de-wormed at around 8 weeks of age and again at around 18-20 weeks of age, just before production commences. The flocks are not de-wormed again until after peak production, unless there is a serious worm infestation. This is because de-worming during this time would lead to the flock NOT attaining peak production.

Subsequently the flock is de-wormed every 2-3 months or when worms are detected or identified.

EXTERNAL PARASITES:

Layer flocks are at times infected with red mites and fleas which suck blood and affect the performance. The birds should be dusted with an approved poultry insecticide and also the nest boxes and perches. After depleting the flock use an insecticide in the final disinfection.

RECORD KEEPING

Keep complete and accurate records of daily feed intake, mortality, culls and egg production. These will help you determine the level of profit or loss the system is making. Samples of record cards are attached at the end of the manual.

It is also important to weigh the flock every week during its growing period. It is important that the weighing be done on the same day and time each week. This gives the farmer an idea of the growth rate of the flock and an indication of when the first egg is expected.

Vaccination and medication records are also important. This should include the age of flock when vaccinated / medicated, vaccine / drug type used, method of administration, batch numbers, expiry dates and who has given the medication. These are important in a disease situation as it guides the veterinarian to the probable source of the problem and the best management protocol.

GENERAL MANAGEMENT TIPS

The following factors may predispose layers to disease or poor productivity

- Over-crowding or over-stocking
- High environmental temperatures
- Poor ventilation and sanitation
- Inadequate drinkers and / or feeders
- Poor feed quality or inadequate feed
- Changes in feed texture
- Disease outbreaks in the surrounding areas
- Improper lighting system / program
- Some medications or vaccinations during production
- Stress due to sudden noise
- Stress due to poor handling of birds
- Changes in climatic conditions

CONCLUSION

The company hopes that this manual has met its main purpose for providing our customer with the basic management ideas and practices that will help in maximizing the performance of the flocks hence maximizing the farmers' returns.

However, the farmers are advised to seek assistance from the company on an on-going basis in order to enhance the benefits from this partnership.

ISA BROWN - *REARING CARD*

DATE PLACED ..... NUMBER PLACED .....

AGE (WEEKS)	WEEK ENDING	WEEKLY MORTALITY	FEED (gms/ bird/ day)	AVERAGE WEIGHT (gms)	COMMENTS
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
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19					
20					

VACCINATION CARD

DATE	AGE	VACCINE	BATCH	EXPIRY	COMMENTS

ISA BROWN - *PRODUCTION CARD*

WEEK OF PRODUCTION	AGE (WEEKS)	WEEK ENDING	TOTAL EGGS	% HEN DAY PRODUCTION	COMMENTS
1					
2					
3					
4					
5					
6					
7					
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