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| 9. ABSTRACT This guidebook is designed to assist teachers in Philippine agricultural schools in preparing lesson materials for training students in better methods of poultry production. Its introductory section discusses such topics as site selection, selecting and obtaining chicks, obtaining chicks suited to one's intended purposes, crosses between types, and setup procedures. The next section, on incubation, discusses selection of eggs for hatching, artificial incubation, turning eggs, testing eggs, putting out the hatch, and natural incubation. Next, the section on brooding discusses selection and management, types of brooders, management of the brooder, types of floor brooding, natural brooding, feeders, waterers, feeding recommendations, and general management of chicks. A section on raising pullets discusses the barrio, range rearing, preparing laying house for pullets, and culling pullets. An extensive section on the management of a laying flock includes discussions of housing, construction of buildings, roofing, laying house equipment, feeding, determining ration ingredients, proteins, minerals, vitamins, antibiotics, ration mixtures, producing and marketing quality eggs, producing hatching eggs, upgrading, manure handling, and culling. A final section on poultry diseases and their prevention discusses a health program, immunization, parasites, and nutritional disease. | | |
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**TEACHING
GUIDE**

**IN
POULTRY
MANAGEMENT**

Department of State
Agency for International Development
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TEACHING GUIDE IN
POULTRY MANAGEMENT

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REFACE

The Bureau of Public Schools recently conducted a survey of the vocational agriculture schools as well as a number of general secondary schools. The teachers of these schools reported that poultry production was one of the most important school projects. Poultry plays a very important role in increased Philippine food production. Every family can raise a few chickens and thereby help increase the family income and balance the family diet.

The barrio or backyard poultry project is maintained for the same purpose as a commercial poultry project, to produce eggs and meat. The same basic management principles apply to both. The quality of the feed, sanitation practices, selection of chicks, and housing will determine production level of the hens.

At present, there are only about forty eggs per capita per year produced in the Philippines, thus indicating the need for increased production. There are opportunities for persons in the field of poultry production to make substantial profits, for it has been shown that eggs can be produced for 5 centavos each under proper management practices. Current prices range from 10 to 15 centavos for each egg.

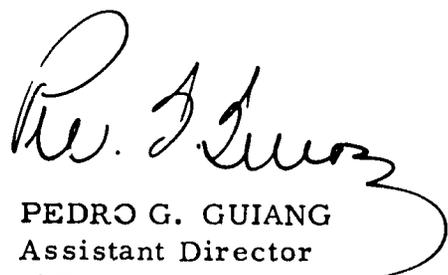
When chickens are allowed to run free and must be self-supporting, they exist on a bare maintenance diet. With the increase in population and the attending demand for more poultry products, an effective productive system of raising poultry must be developed. If large flocks of laying hens or broilers are to be produced to satisfy the demand, they must be housed, fed and managed properly.

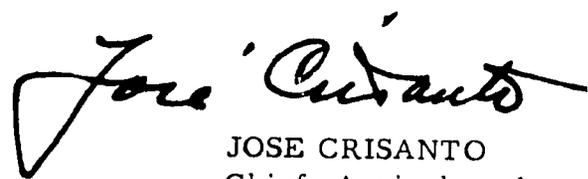
A study of poultry in its natural environment reveals many interesting things related to the problem of housing the high-producing domestic fowl. Observations have shown that wild fowl normally select shelter where they have most protection from harmful animals, where they have adequate ventilation and accessibility to abundant sunshine, where the temperature and humidity are favorable, and where light is available. They also select shelter near a supply of food and water and lay only a few eggs during the most favorable season of the year. However, natural environment does not insure quality eggs, meat, and high production. Inbreeding and free range are limiting factors fostering low egg production, small body size, tough meat, and disease. The poultryman's objective in housing is to improve the unfavorable conditions observed in the natural environment and yet not

destroy any of the favorable ones, thus stimulating the production of the flock of hens.

After the war, poultry breeding stock was imported to rehabilitate and upgrade poultry production in the Philippines. Faster growth, higher meat production, and much higher egg production were some advantages of these new breeds. This stock, however, lacked native hardiness, and required increased care and efficient management. Therefore, new feeding, management, sanitation, and breeding practices had to be adopted.

This guide has been prepared to assist the teachers in the agricultural schools in preparing lesson materials for training the students in better methods of poultry production. In the preparation of this guide on poultry production, Philippine conditions and needs of the consumer and producer have been taken into consideration.


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PDULTRY

INTRODUCTION

Poultry is produced to provide:

1. Wholesome food for the family in the form of eggs and meat.
2. Employment, either on a part-time or full-time basis.
3. A source of income.
4. Additional volume of business to supplement income.
5. A means of utilizing by-products of the farm effectively.
6. Excellent fertilizer for the farm, garden, and orchard.

Top quality food can be obtained through the production of poultry and poultry products. Eggs and poultry are excellent sources of protein and nutrition. Poultry meat is a popular food in every home.

Poultry production can supplement farm income and, at the same time, afford profitable part-time employment for farm youths. Through such participation, these youths will obtain skills and managerial abilities that will enable them to be successful producers of quality poultry.

Poultry is big business in many areas of the world. Poultry production can become big business in the Philippines, too. Perhaps, the most logical way to create a big poultry business is for each school to start a campaign to establish a poultry enterprise on every farm. This is easier said than done. For a person to be successful in poultry production, he must have a desire to succeed; and must be interested to such an extent that he is willing to study, work, and accept new ideas. There is considerable literature available on poultry raising which, if followed carefully, enables one to become successful if he has good judgment and is willing to work diligently.

Most of us would like to start with a large poultry business enterprise; however, for a beginner, it is considered best to "grow into a poultry business" rather than to "go into the business." By growing into a business, one should start with a small flock

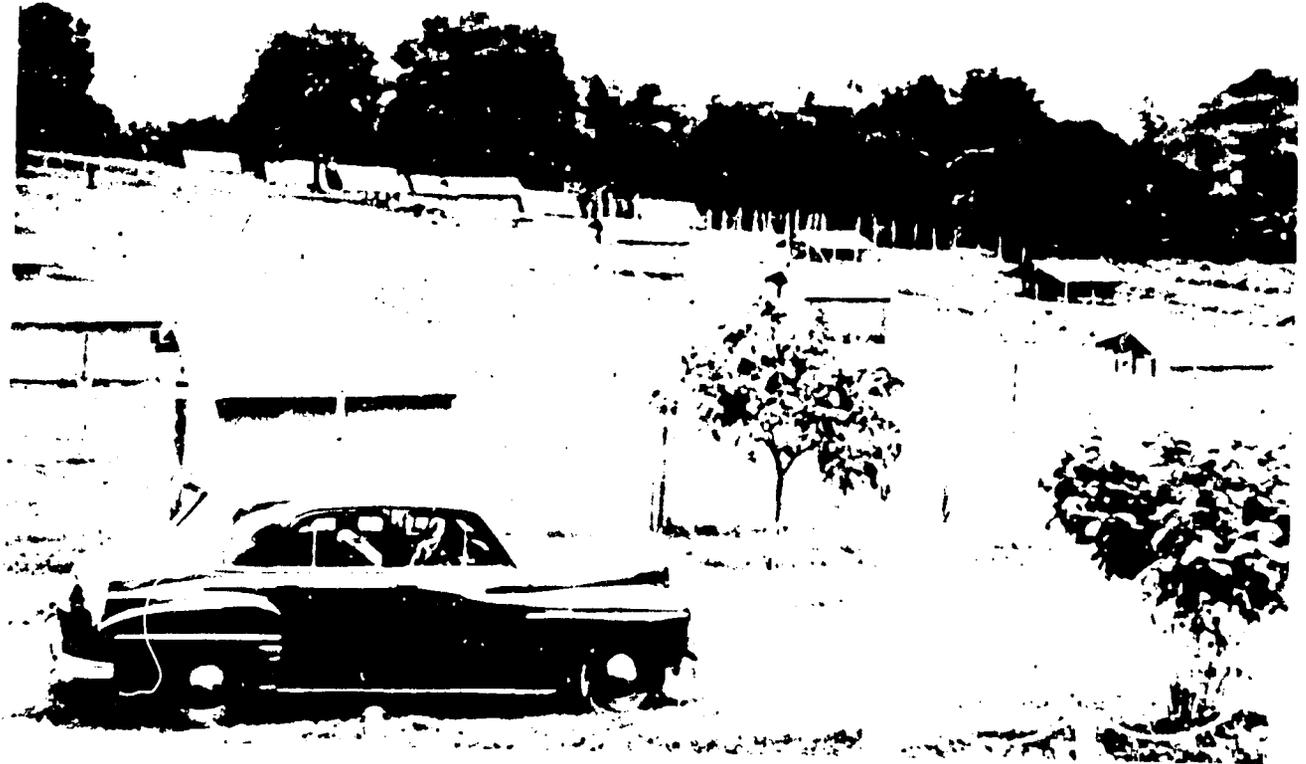
which he can gradually increase and, as a result, he can adjust himself to new situations as they are presented and thereby become successful.

As a means of getting started, a student in school should obtain a sufficient number of baby chicks to grow into 15 to 25 laying hens for egg production. If suitable proficiency is developed during the first year, obviously, the second year should be a year of expansion and building toward a business-size flock. The flock owner can soon become a poultry producer as a principal means of livelihood.

It might be well, at this juncture, to point out some comparisons of the poultry enterprise with other livestock. A hen is a small animal; a hog is as large as 40 hens; and one cow is as large as 200 hens. If one is to make a business of poultry production, he should plan to grow continuously each year -- 100, 200, 300, 400, 500, to 1,000 hens. Two thousand laying hens are considered a full-time farming enterprise.

Development of Modern Poultry

- A. Originally, all fowl were wild:
1. They only laid enough eggs to hatch a brood.
 2. Most wild fowl were small in size.
 3. They were domesticated by man.
 4. Breeds and production were improved by selective breeding such as:
 - a. Selecting highest laying hens for breeding flock.
 - b. Mating these hens with cockerels from unrelated high laying hens.
- B. Selection of Poultry Sites
1. Select a well-drained area:
 - a. A slight slope aids drainage during rainy season.
 - b. The best site is in an area protected from strong winds. Trees or brush belt serves this purpose.
 - c. Allow ample space for future expansion.
 - (1) Allow a large enough area for runs and pasture.
 - (2) Practice rotation by moving chickens from one area to another.



A poultry site slopes for good drainage and is surrounded by trees to afford protection from the wind.

2. If poultry and eggs are produced, they must have a market, the closer the better.
 - a. Be sure transportation is available for moving produce to market.
 - b. Locate an all-weather road, if possible.
 - c. Site must have adequate, clean water to supply the needs of entire flock throughout the year.

- d. Locate near large cities where there is a market and a demand for the poultry produce.
 - e. Establish efficient communication facilities.
 - (1) For ordering feed.
 - (2) For taking orders for produce.
3. Site must be fenced.
- a. Without good fences (woven chicken wire), it is impossible to practice proper pasture rotation with the growing flock.
 - b. Bamboo or other local materials can be used advantageously for fences.
 - c. When laying out the lots and putting up the fences, be sure there are gates for accessibility to all of the lots.



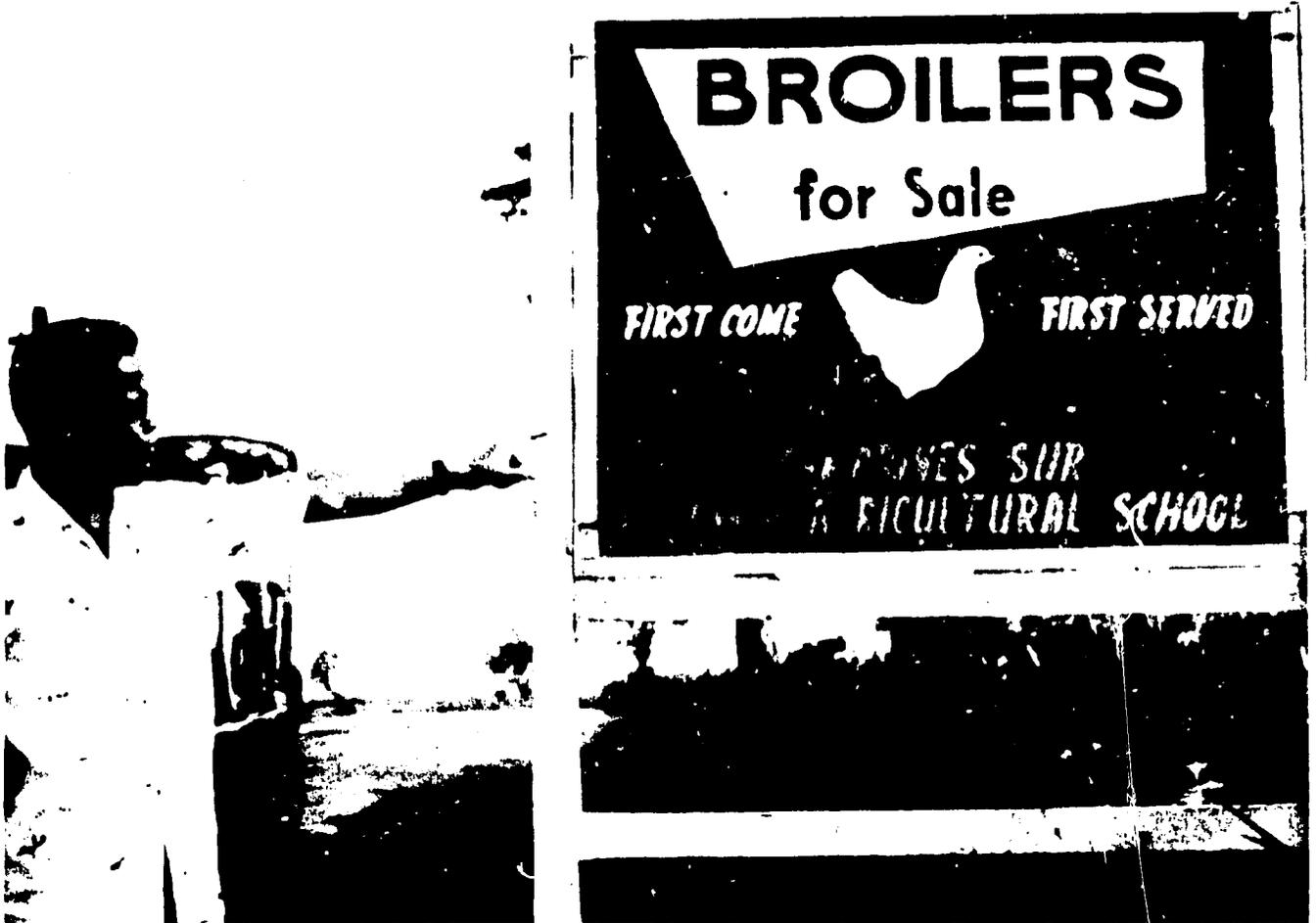
A two-meter wire fence keeps chickens in the lot.

C. Selecting and Obtaining Chicks.

1. Type of project depends upon time and facilities.
 - a. Part-time supplemental poultry enterprise
 - b. Full-time poultry enterprise.
2. Determine breed and strain of chicken to be produced
 - a. Observe the type of chickens kept by successful poultrymen in your area.
 - b. Estimate the cost of growing pullets of different breeds.
 - c. Estimate the amount of feed the hens will eat.
 - d. Study prospects of a market for hens after productive period.
3. After the breed is selected, select a strain from high-producing flocks.
 - a. Deal only with a reliable hatchery. The reputation of the breeder is perhaps as important as any other factor in the poultry business.
 - b. Chicks will be similar to their parents in their ability to grow, to lay, to resist disease, etc.; therefore, buy chicks from stock that has been bred for high egg production and is free from disease. Select chicks from flocks having very few deaths from disease.
 - c. The difference in egg production in a year's time

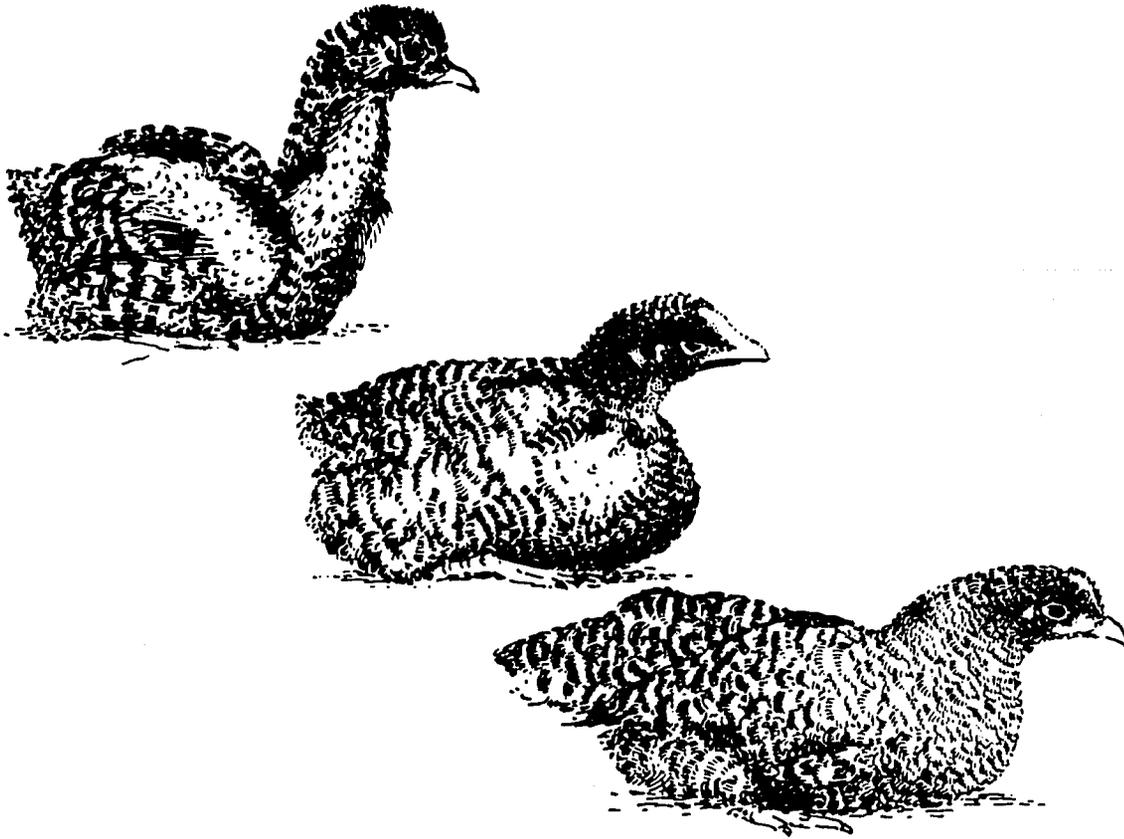
may be from 3 to 5 dozen more eggs per hen depending upon quality of chicks procured. This could be the difference between success or failure in one project.

4. Criteria for evaluating a hatchery:
 - a. If a hatchery offers "bargains" or special inducements to get one to buy, it may be a sign of poor quality chicks.
 - b. Is the breeder flock of the hatchery certified disease-free? The certification by government veterinarians is an assurance of a disease free flock.
5. Get chicks bred for purpose intended.
 - a. Broilers
 - (1) Fast and efficient growth - broilers that weigh 1.36 kg. at 10 weeks on 4.09 kg. of feed.
 - (2) Fast feathering (body completely covered at market time).
 - b. Replacement pullets. Select from hens with:
 - (1) High egg production (200 or more eggs per year).
 - (2) Good livability (mortality rate low).



Advertise to inform the public where products are for sale.

- c. If egg production is desired, buy chickens bred for egg production. If meat production is desired, buy chickens bred for meat production.



These chicks are of the same age but the rate at which they feather varies. The completely feathered broiler will have fewer pin feathers, thus making a cleaner appearing dressed fowl.

(1) If a light weight egg-producing hen is crossed with a heavy weight meat-producing cockerel, the offspring will not produce as much meat as the heavy breed, nor as many eggs as the light breed. Therefore, if a cross is to be made, make it between breeds of the same type. Do not cross between the types.



Commercial companies conduct research, crossing Lancaster cockerels with New Hampshire hens to produce fast-growing broilers.

(2) Types

(a) Egg producing: White Leghorn

(b) Dual purpose (meat and egg production - heavy breeds): New Hampshire, Rhode Island Red, Parmenter, Lancaster, White Plymouth Rock, Barred Plymouth Rock, Wyandotte.

6. Rules for Selecting

- a. Sometimes more variations exist within a breed than between different breeds in regard to production.
- b. Inspect and compare production records of different sources of chicks.
- c. Investigate and compare experiences of other broiler and egg producers.

7. Estimate number of chicks to order.

- a. Consider experience, capital, and time available.
- b. For beginners, a small brood is recommended, not more than 50 chicks.
- c. Guides for replacing laying hens:
 - (1) Straight run (mixed sexes) - Get three chicks for every hen to be replaced. 50% will be cockerels. Cull one third of remaining

pullets before placing in laying house to assure strong, healthy layers.

(2) Sexed pullets - The replacement rate is 1 1/2 chicks for every hen. Cull 1/3 of total pullets before placing in laying house.

8. Season to obtain chicks.

a. Broilers can be brooded successfully during any season of the year.

(1) Attention must be given to labor, equipment, and market conditions.

(2) Many producers raise four or more lots of broilers in one year.

b. Start replacement pullets so they can reach their laying peak during high egg prices.

(1) Chicks hatched during November, December, and January usually have more vitality and will be better producers in most regions of the Philippines.

(2) Some large operating poultrymen successfully brood chicks the year round.

c. Place order for chicks well in advance to insure receiving them at desired time. Three weeks are required for hatching and the hatchery must have time to obtain high quality eggs.

d. Beginning procedure.

(1) Either buy hatching eggs to be home incubated, day-old chicks or full-grown pullets.

(2) Replenish your entire flock with chicks of the same age, so that:

(a) Pullets will start laying at the same time; or

(b) Broilers will all be ready for sale at the same time. This is especially important if you are going to raise more than one lot of broilers a year.

(c) Housing facilities must be emptied and cleaned properly before putting the next lot of broilers or replacement pullets in the house. This will be very difficult if the poultry matures at different times.

CUBATION

Job I

A. Preparations Necessary for Incubation of Chicks.

1. Prepare room to house the incubator
 - a. Thoroughly clean and disinfect.
 - b. Be certain floor is level.



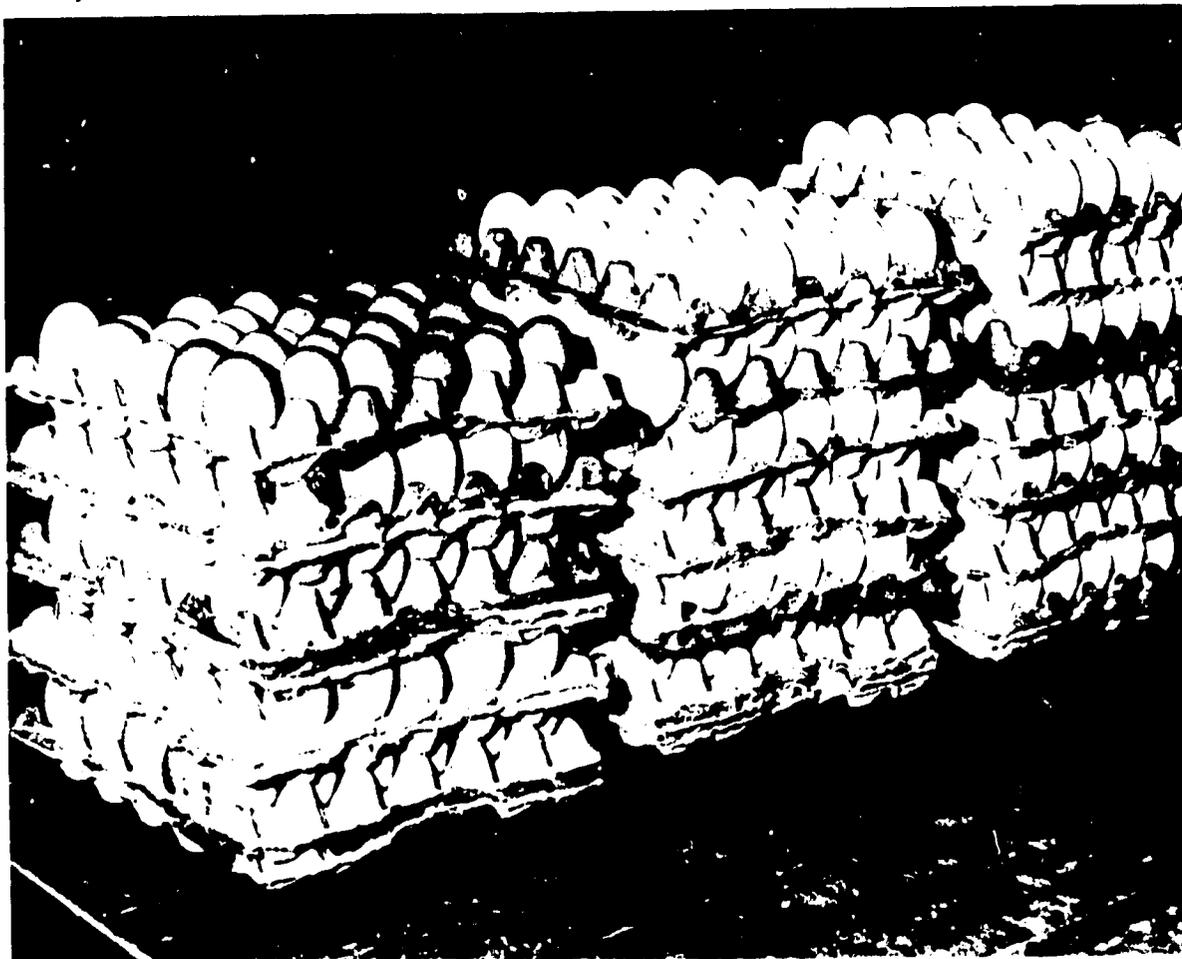
An ideal incubator room must be well-ventilated but free from drafts; not affected by outside temperatures; easy to clean and keep sanitary. Solid walls with high windows allow controlled ventilation; also, concrete floor is easy to clean and keep sanitary.

- c. Adequate ventilation without drafts, windows which can be opened or closed.
- d. Must not be affected by outside temperatures during adverse weather.
- e. Do not place incubator where direct sunlight coming through a window falls on the incubator. This will cause a temperature rise of several degrees.

2. Selection of eggs for hatching.

- a. Select eggs from a mature, well bred flock with a high production record.

Uniform eggs selected from high producing hens ready for incubator.



(1) Select eggs of uniform size, texture, and color.

(a) Medium-sized, regular-shaped eggs, weighing 2 ounces (28.34 grams).

(b) Select clean eggs; dirty or cracked eggs will not hatch.

(c) Color to be uniform, either brown or white not tinted.

(2) Chicks hatched from selected eggs are more likely to be large, healthy and vigorous, and uniform in quality.

(3) Rigid culling of hatching eggs reduces the number of culls in the laying flock.

b. Secure eggs from a reliable producer of hatching eggs.

(1) Must have a high quality flock.

(a) Factors indicating a high-quality flock:

1) Healthy stock

2) High production record

3) Rigid culling of laying flock is followed

4) Flock's health and production record maintained satisfactorily for several years.

(b) Factors that produce a poor quality flock:

- 1) Poor culling of laying flock.
- 2) Failure to remove from flock and burn or bury sick, diseased hens as soon as they are noticed.
- 3) Failure to practice proper sanitation in laying house and with equipment and surrounding grounds.
- 4) Feeding a ration which is not balanced in all needed nutrients (nutritional diseases develop).

3. Artificial incubation.

a. Preparation of the incubator.

(1) Clean, disinfect, and fumigate the incubator - between every hatch.

(a) Faulty sanitation of the incubator will produce diseased chicks.

(b) Formaldehyde gas treatment.

- 1) A strong non-poisonous disinfectant.
- 2) Gas liberated by interaction between potassium permanganate and formalin.
- 3) Proper dosage.

a) For each 20 cubic feet of incubator content -

1 - 1/4 ounce of 40% formaldehyde

solution mixed with 1/8 ounce of potassium permanganate, or 2- 7.00 cubic centimeters of 40% formaldehyde solution and 3.50 grams of potassium permanganate.

4) Heat will be generated so take precaution by:

- a) Placing the permanganate in an earthenware vessel partially submerged in a pan of water; then,
- b) Pouring the formalin into the permanganate.

(c) Other disinfectants.

1) Various coal - tar products are on the market.

- a) They are satisfactory for general disinfection.
- b) Disinfecting powers vary, so
- c) Purchase with germicidal value in mind.

(2) Fill the water tank and water pipe with hot water (hot water incubator).

(3) Level the incubator.

(4) Light the lamp.

(a) Operate incubator for 3 days prior to setting eggs.

(b) Will insure proper adjustment.

(5) Adjust the thermostat to maintain a temperature of 100° - 103° F.

(6) Set the eggs.

b. Management of the incubator. For successful operation of the incubator, consider the following points:

(1) Proper temperature is 101° . The rate must not be less than 100° or more than 103° to get the best results.

(2) Proper humidity.

(a) Keep a pan of water inside the incubator and moisten the floor of the room.

(b) The evaporation will supply the proper humidity inside the incubator and incubator room.

(c) Optimum relative humidity for incubation is 60 per cent.

(3) Proper ventilation

(a) Both inside incubator and incubator room.

(b) Starting the 17th day, open the covering over the ventilation holes on the floor

and wall of the incubator a little more each day. The holes should be completely open as hatching is going on or as the chicks emerge from the shell.

(c) On 21st day of incubation, approximately 140 to 150 times as much air is required as on the first day.

(1) Good ventilation is a must especially during latter stages of incubation.

(2) Carbon dioxide content in air increases during this time and must be removed or hatchability of egg decreases.

(4) Sufficient turning of eggs.

(a) Decrease number of turnings as the hatching date approaches. As the developing embryo grows, its position in the egg becomes fixed.

(b) Five times per day at equal time intervals for the 1st week.

(c) Four times per day at equal time intervals for the second week.

(d) Three times per day at equal time intervals for the third week.



Turn eggs systematically by hand which prevents the embryo from adhering to the shell membrane resulting in adhesion between the yolk and allantois. Keep the large end of the egg up.

(5) Testing of eggs.

(a) Candle eggs on the 7th and the 14th day to determine which eggs contain live embryo.

(b) Dispose of eggs with dead embryo.

This is good protein supplement for pigs.



An electric light or lantern inside the candling box is concentrated on the holes in two sides of box. As the egg is placed in the hole, the concentrated light plainly shows if the egg contains a growing or dead embryo.

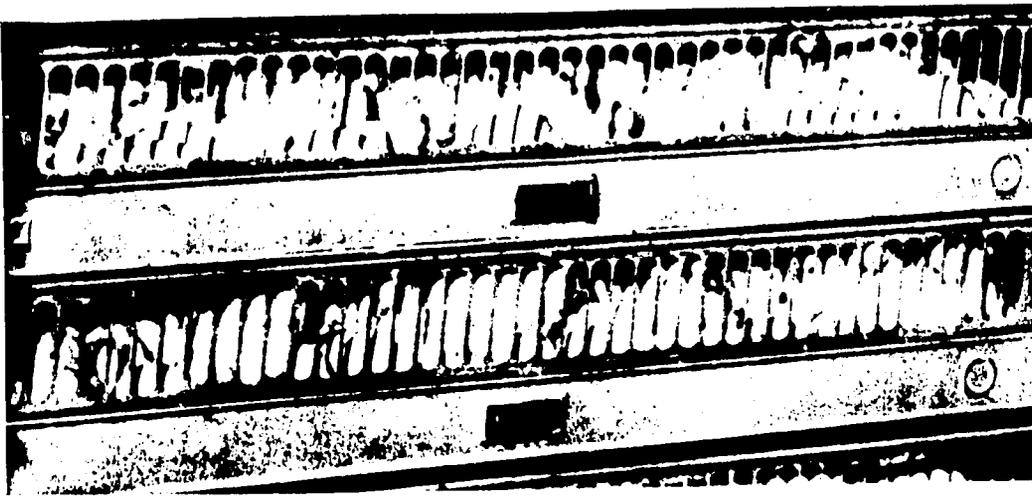
(6) Putting out the hatch.

(a) Leave hatched chicks in incubator for one day.

(b) This one day hardening process for chicks in incubator is required for better livability.

1) Leave chicks in the incubator until dry and fluffy.

- 2) Allow chick a chance to acclimatize itself before going to brooder.
- 3) Maintain temperature at 95°F.
- 4) Heating unit must be regulated or shut off as body heat from hatching chicks increases.
- 5) Constant attention is necessary at this time.



A hatch ready to be removed from the incubator.

- (7) Clean and disinfect the incubator to make ready for the next hatch.
4. Natural incubation for barrio or backyard project using setting hens.
 - a. Use broody hen - A broody condition is external evidence of the maternal instinct and the inherited tendency to reproduce the species.

- (1) Hen walks around with wings lightly spread, feathers ruffled and clucking. She also wants to set on the nest, and if removed will immediately get back on the nest.
- (2) Necessary if eggs are to be incubated by natural means.
- (3) Very good for a small home flock.
- (4) Heavy breeds are best setters.
 - (a) Prefer Plymouth Rocks, Rhode Island Reds, Wyandottes, New Hampshires, etc., for setting hens as they cover more chicks than a small sized hen.
 - (b) The lighter breeds such as leghorns are not reliable for hatching eggs.
 - (1) Select a large tame hen with a quiet gentle disposition.
 - (a) A nervous hen will not allow herself to be handled.
 - 1) She is easily frightened and may leave the nest for long periods of time allowing the eggs to become cold.
 - 2) Chilled eggs will not hatch.
- (5) Placement and preparation of hatching nest.
 - (a) Need secluded room that is slightly darkened, cool and apart from the laying hens, or

(b) In a shady, well protected area where:

- 1) Rain cannot blow in on the hen or nest
- 2) Where hen will not be disturbed by other activities of the farm.

(c) Place nest where hen will not have to fly or jump into it, but high enough so she will not be annoyed by dogs or other animals.

- 1) Use fine straw or leaves to make a soft nest.
- 2) If hatching eggs during dry season, place a layer of moist earth under the nesting material to reduce evaporation from the eggs. Moisten earth slightly twice a week during extremely dry weather.
- 3) Low humidity will dry out the egg and kill the embryo.
- 4) Place a few tobacco stems in the nest to keep mites away.
- 5) Large enough, but shallow, so the hen will fit nicely, giving complete protection for eggs.
- 6) Place eggs in single layer under hen - 12 to 15 eggs only.

7) If the nest is deep, the eggs may pile up and break.

b. Parasites

- (1) Never use a hen infested with lice or with scaly legs.
- (2) Hens may become so badly infested with lice they will leave their nests.
- (3) Dust the hens thoroughly with sodium fluoride before setting them.
- (4) To dust hen, hold her by the legs head down and rub pinches of sodium fluoride well into her feathers especially around:
 - (a) base of tail
 - (b) below vent
 - (c) both sides of keel bone
 - (d) outside thigh region, both legs
 - (e) along wings
 - (f) on back, just back of wings
 - (g) throat
 - (h) back of head
- (5) Provide hen with a dust box, containing a mixture of:
 - (a) 1 part ordinary clean road dust, 2 parts wood ashes and 1 part lime.

- b) Sodium fluoride is a poison and must be kept stored where children cannot accidentally get it. Wash hands thoroughly after using sodium fluoride.
- c) Recommended brooding practices with setting hen.
 - 1) Test hen for broodiness
 - (a) Place infertile or artificial eggs under her the first few days.
 - (b) When setting well, place hatching eggs under her.
 - (c) Set hen after dark because she will be less excitable than during daylight.
 - (d) Examine nest occasionally to be sure no eggs have been broken.
 - 1- If eggs are broken, remove soiled nestling material.
 - 2 -Wash the rest of the eggs in warm water to remove any material that came from the broken eggs.
 - 3- Confine each hen to her own nest.

- 2) The hens may be fed together
 - (a) Use hard grains such as cracked corn, rice, sorghum, etc.
 - (b) Green feeds such as grass, camote, peanut vines, etc.
 - (c) Keep grit and clean water available at all times.
 - (d) After feeding, see that each hen returns to her own nest.
- (3) It is best that the hen remain on the nest and brood the chicks for one day after they are hatched.
 - (a) Be sure the hen does not leave her nest when the first chicks are hatched.
 - (b) Confine hen on nest at hatching time
 - 1) Less chance the chicks will chill.
 - 2) Do not feed baby chicks for 48 hours after hatching.

BROODING

Job II

A. Preparation of the Brooder House

1. Reduce opportunity for disease to travel from hens to chicks.
 - a. Locate brooder house at least 100 meters from the laying house.
 - b. If impractical to have brooder house 100 meters from laying house, keep traffic between them at a minimum.
2. Brooder house ventilation
 - a. Adjustable windows which can be opened and closed provide proper ventilation and reduce ammonia fumes.
 - (1) Windows one meter or more above the floor will allow ventilation without drafts.
 - (2) Windows less than a meter above the floor will allow a draft on the chicks.
 - (3) Windows one meter above floor in one wall and windows two meters above floor in opposite wall will allow proper cross ventilation without drafts. Place low windows opposite side where prevailing winds blow.

- b. Inside the brooder room, allow for proper ventilation, but also have a sun porch for the chicks. This will allow them to get away from the heat of the brooder and will help to harden them and make them stronger, healthier, and more vigorous.
- c. Must be dry and flooded with as much sunshine as possible.
- d. Open housing keeps poultry flock as cool as possible.



Small portable brooder is protected under a roof made of local materials. It is practical to have a sawali wall on the windward side which prevents draft on the chicks.

- e. Too little ventilation causes wet litter and unthrifty chicks.
- f. Drafts cause colds, especially if closed wall housing is used and the windows are shut at night. This overheats the chicks and when turned out they tend to chill, causing respiratory diseases. If in open-type house continually, they do not overheat or chill.

B. Selection and Management of Brooder

1. Brooders are heated by:

- a. Charcoal
- b. Crude oil
- c. Sawdust
- d. Rice hulls
- e. Wood
- f. Fireless brooders (a box without heater)
- g. Electricity
 - (1) Infra-red light bulb
 - (2) Light bulb
- h. Kerosene

2. Provide proper temperature when brooding chicks.

- a. Be sure brooder is reliable and will operate properly without close supervision.

- b. Allow 78 square centimeters per chick under hover-type brooder.
- c. Do not subject chicks to high brooding temperature 24 hours per day. Provide a means to permit chicks to get away from the heat, such as a sun porch attached to the brooder.
- d. Start at 95°F reducing temperature by 5° to 7° per week until heat is no longer needed; but ordinarily, heat is needed only 5 days unless adverse weather conditions prevail. Heat can be used at night if it is chilly, but only in isolated cases would heat be needed during the day, after five days. Chicks subjected to too much heat during brooding are devitalized.
- e. Best indication of proper temperature is action of chicks.
 - (1) If temperature is correct, chicks bed down evenly under hover with a few on outside edge.
 - (2) If temperature is too cold, chicks pile up in the middle under the hover.
 - (3) If temperature is too hot, chicks stay on outside of hover panting for breath with wings drooping and feathers ruffled.

f. Effects of improper temperature on chicks are:

(1) Too hot: Slow growth, slow feathering, poor utilization of feed.

(2) Too cold: Piling up, smothering, colds, pneumonia.

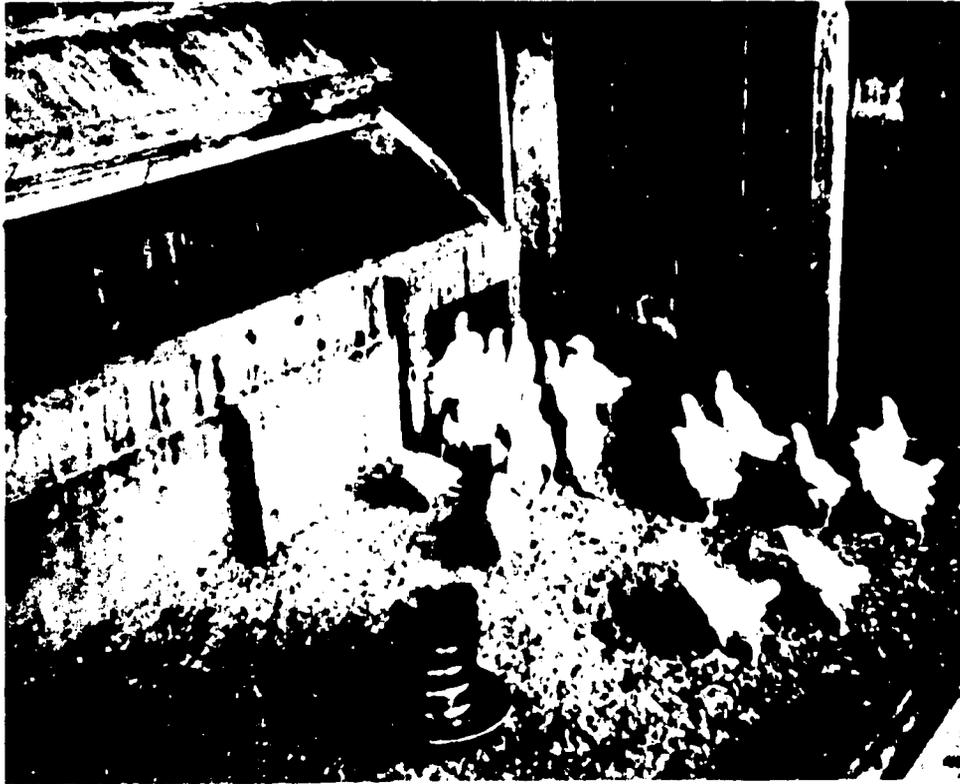
C. Types of Brooders

1. Hover-type brooder. The rice hull brooder is a simple, effective, and very efficient brooder. It was developed to utilize rice hulls, an abundant waste product. The captions under the photos which follow describe the materials needed.

2. Fireless brooders

a. No heating required. The brooder is a small, almost air-tight box with limited ventilation. The body heat from the chicks furnishes the heat. Only enough ventilation is allowed to furnish oxygen for the chicks.

b. Because the brooding compartment is small, the chicks need a space outside to get away from the close confinement. A room or wire runway serves this purpose.



A fireless brooder is a compartment built on the floor in the corner of the brooding room. With the lid closed and the floor opening nearly closed, the body heat of chicks warm the compartment.

3. Backyard (barrio) or sunshine brooders can be used for brooding, rearing and laying houses.
 - a. Self-contained brooders that require no other buildings.
 - b. Adapted to brooding small lots of chicks in limited space.



A 20-liter paint or kerosene can, with a handle, is an ideal container for the burning fuel. Punch air holes, 3 centimeters in diameter, 7 centimeters from the bottom all the way around the can, to provide draft for the fire. First, a bed of burning wood embers is started; then, the rice hulls are added until the can is full.



The hover is placed over the can containing the burning rice hulls to hold the heat close to the chicks. A wire suspended from the rafters, fastened to the handle of the can, holds the can about 20 centimeters above the floor, otherwise there is danger of fire. ▼



The rice hull brooder provides adequate heat to keep the chicks comfortable. A cloth curtain attached to the hover reaching within 5 centimeters of the floor holds the heat on the chicks when they are under the brooder.

The rice hull brooder is an effective, efficient means for brooding chicks.



Family-size backyard brooders using kerosene lantern for heat with sun porch for chicks.



c. Can easily be constructed in the home or school shop.

d. Improper management of kerosene lantern is dangerous.

(1) Keep wick and burner properly cleaned.

(2) Keep wick trimmed so that flame does not give off excessive smoke.

(a) Chicks subjected to this smoke will be
harmed by carbon poisoning.

(b) Signs of this poisoning are:

- 1) feathers become stained grey or black.
- 2) eye ring becomes a stained grey and the
eye is dull.

(c) Chicks brooded for extended periods under
these conditions will not develop properly

- 1) will lack vitality and vigor
- 2) will not develop into healthy high
producers.

(3) Do not fill lamp entirely full of kerosene.

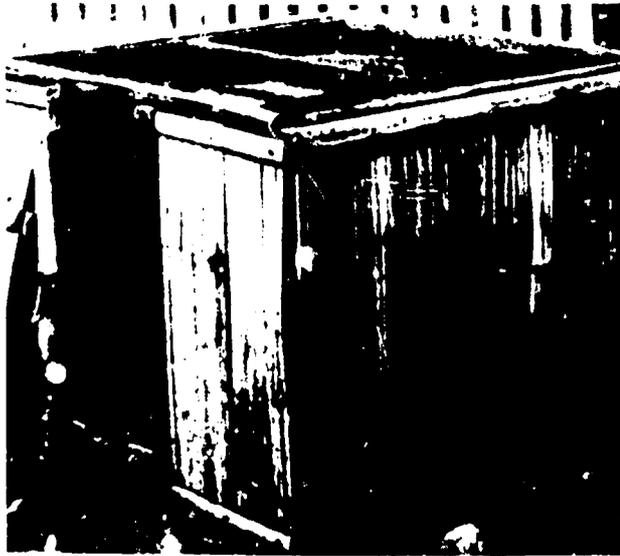
(a) Heat from lamp will expand the kerosene.

(b) Kerosene may overflow and catch fire.

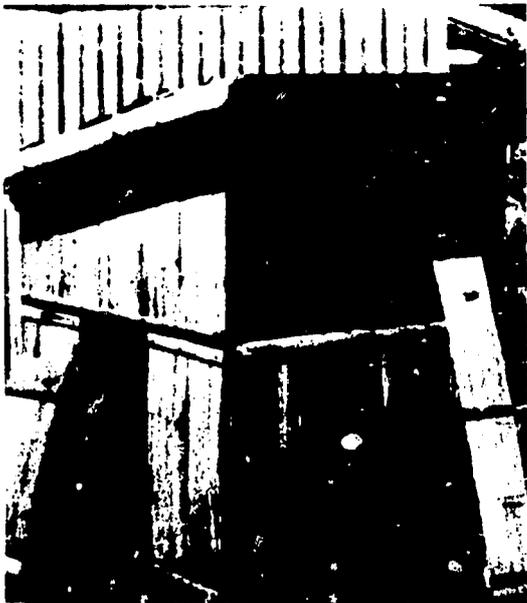
(4) Inspect brooder and kerosene lantern several
times a day.

4. Warm floor brooder

- a. The captions under the pictures which follow, describe
the materials needed.

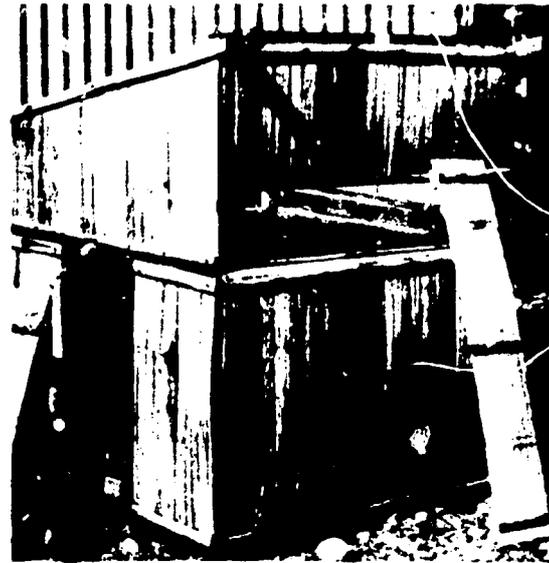


▲ A box type frame is covered with bamboo. Leave an opening large enough to insert a kerosene lantern. Poultry wire used for the floor allows the droppings to drop away from the chicks. Ten centimeters below the poultry wire, place a sub-floor made of flat G. I. sheet. When the lighted lantern is placed inside, the heat flows up to the chicks through the G. I. sheet keeping them warm.



▲ The weight of the roof will hold it in place.

▼ The top section is built with a slope to the rear so water will drain off the roof. Construct with a removable opening in the front for ventilation. An overlap between sections is essential to keep out drafts or rain while the chicks are being brooded.



▼ A nipa or cogon grass roof is both cool and inexpensive. The roof must overlap and be constructed to keep drafts and rain off the chicks. Construct roof so it can be raised for ventilation when the chicks are a few days old.



This knock-down brooder made of local materials is small, easy to construct, inexpensive, and easy to disassemble, move, and reassemble.

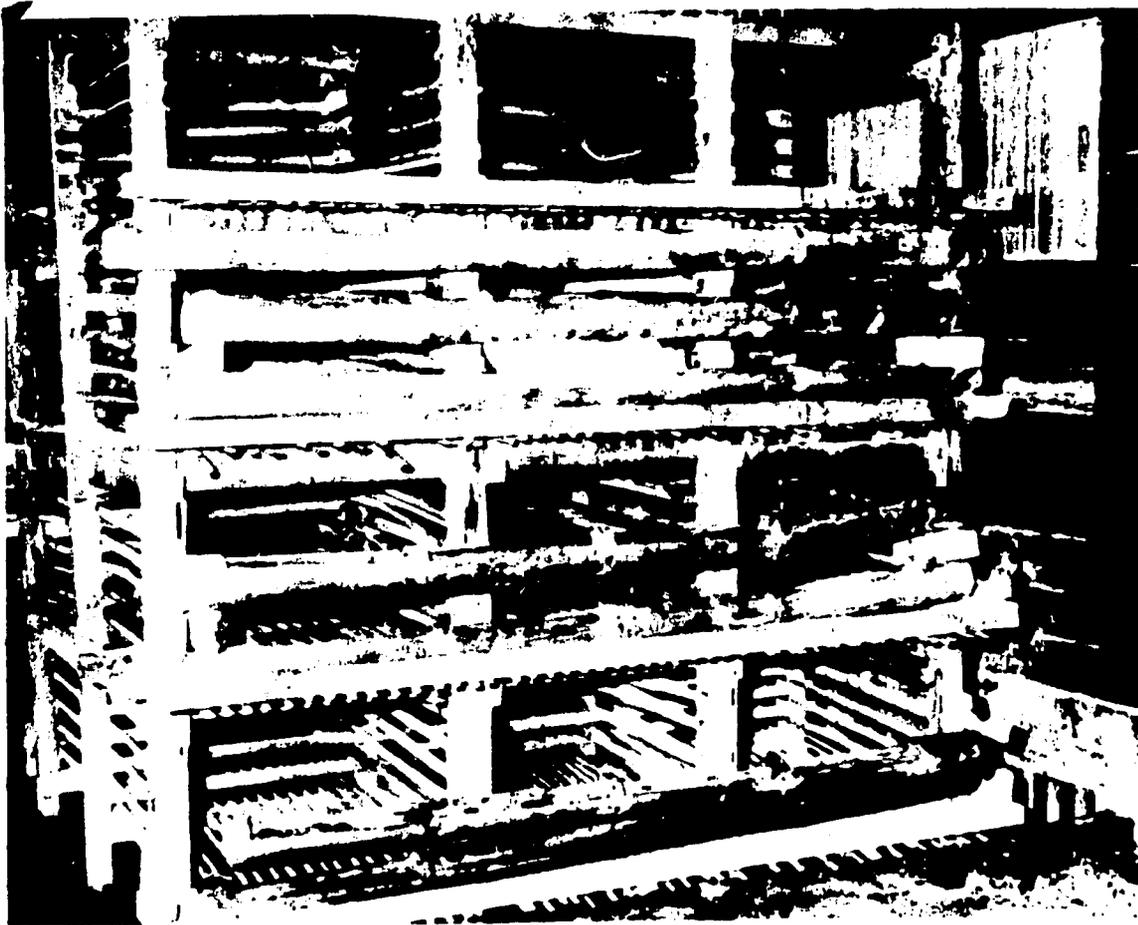


Multiple purpose houses used for brooding, rearing and laying. Cover the sides with sawali, cardboard, etc., while brooding. After brooding, remove covering from walls to allow adequate ventilation. A small sun porch added on the back is an advantage.



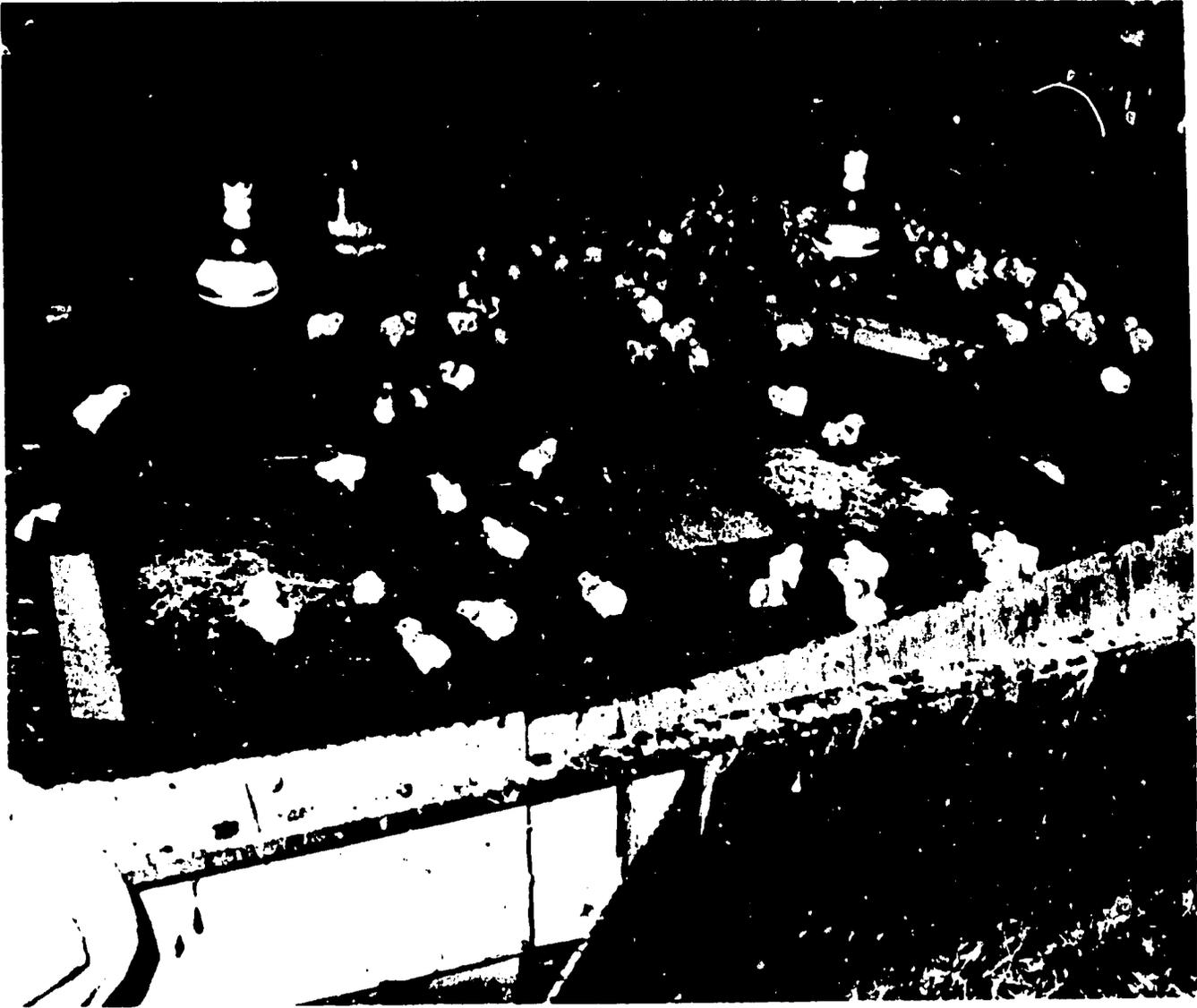
5. Battery brooder

- a. Conserve space. Poultrymen with limited brooding space can brood with batteries to advantage. Each tier of battery brooder will brood as many more chicks as the floor is capable of brooding.



Battery brooder, four tiers high, allows four times as many chicks to occupy the same floor space.

- b. Due to increased number of chicks in the same room space, better management and sanitation practices must be used.
 - c. Plenty of ventilation must be provided in the room as more chicks are occupying the same room space than in floor brooding.
 - d. Temperatures maintained in brooding compartment of battery brooders are the same as in floor brooding.
 - e. Space requirements for batteries:
 - 0 - 2 weeks - 64 sq. centimeters per chick
 - 3 - 4 weeks - 132 sq. centimeters per chick
 - 5 - 6 weeks - 196 sq. centimeters per chick
 - 7 - 8 weeks - 240 sq. centimeters per chick
 - 9 - 10 weeks - 380 sq. centimeters per chick
 - 10 - 12 weeks - 462 sq. centimeters per chick
6. Infra-red bulb brooder is recommended, if electricity is available and is not too expensive.
- a. Can be used for large or small broods.
 - b. One 50-watt bulb broods 80 to 90 chicks. (Cluster of bulbs is used for larger broods.)
 - c. Locate bulbs at proper distance above litter.



Even distribution of chicks in brooder with infra-red bulb and retaining wall indicate their general comfort.

- (1) 45 centimeters if slanted.
 - (2) 36 centimeters if pointed perpendicular.
 - (3) Bulbs located closer than 15 centimeters may start a fire and may injure chick's eyes.
 - (4) Bulbs close to water jars will break jars.
- d. Bulb type brooding requires slightly more electricity than hover type.

D. Management of Brooder

1. Thoroughly clean two weeks before chicks arrive.
 - a. Four "S's" - Scrape, Sweep, Scrub, Sanitize.
 - (1) Particularly important if disease occurred in previous flock of chicks.
 - (2) Remove dust from walls and ceilings.
 - (3) Sanitize with:
 - (a) Lye solution (one can of lye to 60 liters of water).
 - (b) Other commercial poultry house disinfectants.
2. Make a test run at least one week before chicks arrive.
 - a. Determine if brooder is functioning properly.
 - b. Allow time to get new parts if necessary.
3. Brooder room must have adequate ventilation without drafts.
4. Use only highly absorbent litter.
5. Prevent wastage of feed and water.
6. Provide a solid retaining fence around hover and infra-red light types.
 - a. Use this fence for one week.
 - b. This keeps drafts off chicks and holds them close to brooder.

- c. Board or cardboard makes a good retaining fence.
 - d. Place 30 centimeters to 45 centimeters from the outside edge of hover.
 - e. Move fence gradually away from the hover until it is removed.
7. Protect chicks from enemies, such as, rats, snakes, etc.
8. Provide sufficient floor space.
- a. Broilers require 1 sq. meter per 10 chicks until market time (10 to 11 weeks).
 - b. Replacement chicks (pullets) - require same space as number 1 above. Need more space after 10 weeks. If chicks are crowded, the following results will be observed:
 - (1) Feather picking and cannibalism.
 - (2) Uneven growth within a group.
 - (3) Poor utilization of feed.
 - (4) Wet litter, if litter is used instead of a raised slat or wire floor.

E. Types of Floor Brooding

- 1. A raised wooden slat, split bamboo, or wire floor is much preferred to a solid floor and litter in a warm climate.

- a. Easier to maintain in a sanitary condition.
- b. Better ventilation is possible.
- c. Use slats 1/4 inch wide and leave spaces of 1/2 inch between the slats.
 - (1) If slats are wider than 1/4 inch the droppings stick to the slats and do not fall away from the chicks.
 - (2) If spaces between slats are less than 1/2 inch droppings cannot fall through.
 - (3) If spaces between slats are more than 1/2 inch, the spaces will be too wide for the chicks' feet.

2. Litter

- a. Materials for litter are: wood shavings (chips), straw, saw dust, (coarse sawmill dust, not saw dust from hand sawing) cane pulp, sand, peat moss, or rice hulls.
- b. Use the kind of litter available in the locality; regardless of price, use only litter which is:
 - (1) Dry
 - (2) Fresh
 - (3) Free from mold
 - (4) Free from dust
 - (5) Free of contamination from other poultry

c. Management of litter

- (1) Cover litter the first few days to prevent chicks from picking at litter while they are learning to eat. Use rough, absorbent paper as chicks slip on slick paper causing crooked toes and legs.
- (2) Start with 5 centimeters of litter and add clean litter during brooding until it reaches a depth of 10 centimeters.
- (3) Litter need not be changed during any one brood, unless it becomes wet.
- (4) Wet litter is undesirable because it provides a breeding place for diseases and parasites.
- (5) If litter becomes packed, stir it up.
- (6) If litter becomes damp, or if ammonia smell gets strong, sprinkle with dehydrated lime or super-phosphate and mix.
- (7) Change litter for each brood of chicks.

F. When Chicks Arrive at the Farm

1. Chicks can be kept in hatchery shipping box, if necessary. Chicks will be comfortable in the box, if it is kept closed, in a room where the temperature is 75° to 80°F

with adequate ventilation. Do not keep chicks in shipping box if they have been very long in shipment (24 hours or longer).

2. Fill feed hoppers with chick starter mash containing 20 per cent animal, plant, and marine protein.
3. It is well to place some feed before the chicks on paper plates or sheets of paper until the chicks learn to eat out of the hoppers. Do not fill hoppers more than half full after the first 3 days.
4. If chicks have not been fed for 48 hours after hatching, feed them the first day with chick-size grain, feed mash and chick-size grain-the second day; and all mash rations after the second day. Feeding scratch grain the first two days will reduce pasting. (Feces accumulate on feathers around vent and hardens. This sometimes stops the discharge of the feces and the chick dies.)
5. Fill water fountains with clean water.
 - a. If chicks have been subjected to a long period in transit, they are in need of water.
 - b. Insure the necessary intake by individually placing the beak of each chick in water and watch it drink. This can be done as the chick is transferred from the shipping box to the brooder.

- (1) Best results are obtained by holding chicks' body with three fingers and thumb and placing index finger on head and gently pushing beak into water.
 - (2) Do not allow water to reach nostril level.
 - (3) Use lukewarm water the first day.
6. Keep brooder temperature 90° to 95° F.
 7. Watch chicks to see that they do not pile up. If possible, keep a small electric light or kerosene lantern burning under the brooder as a pilot light to teach chicks where the heat is located.
 8. Complete sanitation is the most essential part of poultry production - and cannot be over stressed.
 9. Watch for symptoms of disease. Immediate action must be taken. "Tomorrow will be too late."
 10. When chicks are three weeks old, begin using broiler-size feed hoppers and larger watering devices.
 11. Chickens grow by eating. A well-balanced ration and sufficient feeder space must be maintained throughout the growing period.
 - a. At least one-half of the brooding chicks must be able to eat at any given time.
 - b. Keep feed and water in front of the chicks 24 hours a day.

G. Natural Brooding

1. For barrio or backyard project
 - a. One hen can brood 15-20 chicks.
 - b. When giving additional chicks to a hen to brood:
 - (1) Add chicks of the same age and color as those already with her.
 - (2) Hen may peck the late arrivals if they are of a different color or age from those already being brooded.
2. If chicks are allowed on pasture
 - a. Confine to a grassy area on which no poultry has been allowed for at least one year.
 - b. Area well drained and exposed to sunshine.
3. Confine hen in a brood coop with a floor.
 - a. An A shaped coop 2 meters long, 1 meter wide, 1 meter high at the peak is recommended.
 - b. Construct brood coop so chicks can run in and out, but so hen is confined in coop.
 - (1) Chicks can be kept at coop easier if hen is confined.
 - (2) Construct in such a way that coop can be closed at night to keep out cats, rats, snakes, etc.

- (3) Allow plenty of ventilation but keep rain off chicks and hen.
 - (4) Must be easy to clean.
 - c. Move the coop to fresh ground at least once a week.
 - (1) Prevent soil from becoming contaminated
 - (2) Less chance of parasites or disease in chicks
 - d. When the hen weans the chicks
 - (1) Separate the sexes.
 - (a) Put large, well developed pullets in rearing pen.
 - (b) Cull the smaller, slow developing pullets.
 - 1) Place these pullets with the cockerels which are to be used for eating.
 - 2) These slow developing pullets will not develop into good layers.
4. Feeding chicks
- a. Use a good commercially mixed starter mash for 8 weeks, if possible.
 - (1) This will give the chicks a good start.
 - (2) Develop them into better producers than home mix feeds.
 - b. Home mix feeds
 - (1) Chicks grow best on high quality feed.

(2) The more constant the quality of the ingredients
the better the quality of the feeds.

(3) Suggested ration

| | |
|--------------------------|---------|
| 1) Ground corn | 37 1/2% |
| 2) Rice* | 35% |
| 3) Copra meal | 5% |
| 4) Protein** | 20% |
| 5) Ground shell or coral | 2% |
| 6) Salt | 0.5% |

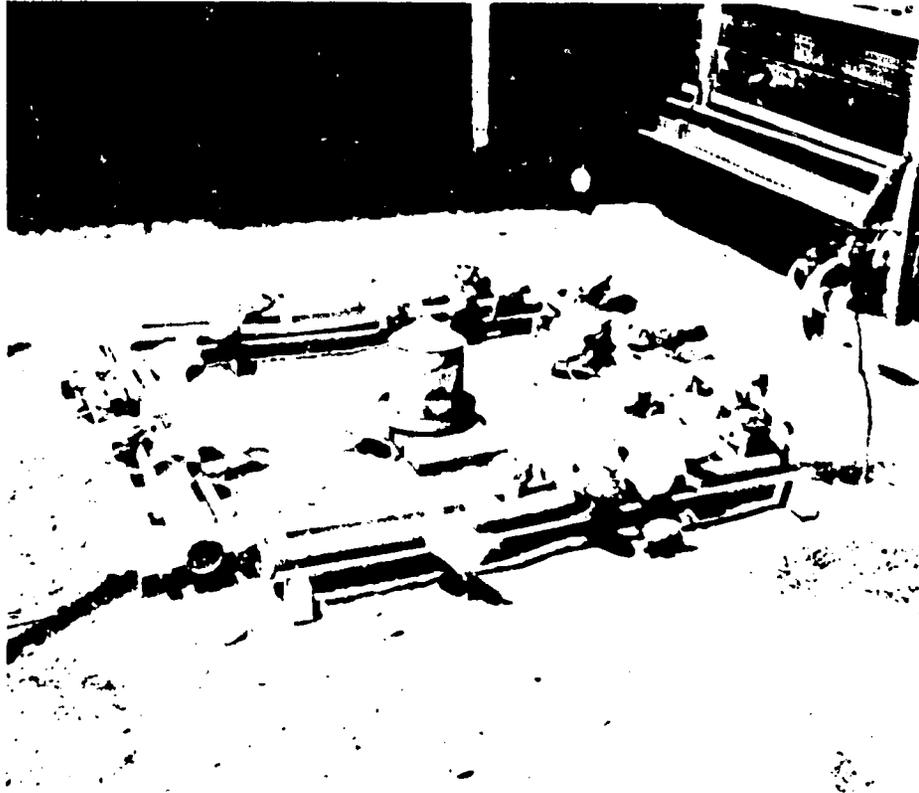
*Any of the by-products of rice will be good, rice middlings or binlid, rice bran, etc.

** Protein can be a mixture of any of the following which is available: fish meal, soybean meal, mongo, sunflower seeds, shrimp meal, meat scraps, ipil-ipil meal, etc. Give chickens 20% protein. They will live and produce on less protein, but they will not lay eggs or grow to the fullest extent of their inherited capacity to do so.

H. Feeders

1. Have the proper amount of feeding equipment available.
 - a. Thoroughly clean and disinfect all equipment before and during use.
 - b. Do not allow wet feed to ferment as this will cause intestinal disorders.

Feeders and waterers made of local materials serve just as well as expensive, manufactured containers.



2. Mechanical (automatic), open boxes, troughs, and hoppers are common types.
 - a. The mechanical type is expensive and should only be used for 2,000 or more chicks.
 - b. Open boxes are satisfactory if used correctly.
 - (1) Cut down the boxes chicks were shipped in for feeders (open box).

- (a) Cut sides down to level of lower holes.
 - (b) Can be used until chicks are two weeks old.
 - (c) Eliminates purchasing small feeders for chicks.
- (2) Provide 930 sq. centimeters per 20 chicks up to 8 weeks; increase space proportionately with the size of chicks.
- (3) The sides of the box should be 9 centimeters high until chicks are 5 weeks old, then the sides should be 18 centimeters high.



Open box feeder, relatively cheap, simple, and can be constructed in the home or school shop.

(4) Add feed 3 to 4 times daily. Keep box $\frac{1}{3}$ full at each feeding.

(5) If too much space is provided, feed becomes contaminated with droppings and litter.

c. Feed hoppers or troughs are most popular.

(1) Make these 10 centimeters deep, 10 to 15 centimeters wide.

(2) Provide small lip on inside top edge of each side. This will keep chicks from billing feed out of the hopper.

(3) Place a revolving reel or spaced wire grill on top to prevent chicks from roosting on the hopper.

(4) Feed space requirements:

(a) 0 through 2 weeks of age -- $2\frac{1}{2}$ linear centimeters per chick.

(b) 3 to 6 weeks of age -- $4\frac{1}{2}$ linear centimeters per chick.

(c) 7 to 13 weeks of age -- $7\frac{1}{2}$ linear centimeters per chick.

I. Waterers

1. Waterers for week-old chicks
 - a. Small fruit jar type waterers are recommended for first week.
 - b. Keep water and container clean and disinfected at all times.
 - c. Never allow the container to get empty.
2. Waterers for chicks over a week old -- V-troughs, automatic cups, fountains, etc., if dependable.
3. Requirements for waterers
 - a. Provide enough water and keep spillage to minimum
Place water fountains on wire platform to keep litter out of water and to avoid wet area around the fountain.
 - b. Be easy to handle, adjust, and clean.
 - c. Provide cool water at all times.
4. Water requirements per 100 chicks.
 - a. First 2 weeks -- 51 linear centimeters or 3 four-liter fountains.
 - b. 3 to 12 weeks -- 100 linear centimeters or 6 four-liter waterers.

Gravity flow waterer can be constructed in school shop.



J. General Feeding Recommendations

NOTE: When using commercial feed, follow the manufacturer's directions.

After two days, start chicks on an all-mash ration.

- a. Oyster shell or other source of calcium must be supplied if it is not contained in the feed.

- b. Must keep chick-size grit in the hoppers.
- 2. Most broiler growers feed the same high energy type broiler mash from brooding until marketing time.
- 3. Replacement chicks get a starter mash until they are 6 to 8 weeks old.
 - a. After 6 or 8 weeks, change feed to growing mash plus scratch grains.
 - b. Gradually increase scratch grain until 50 per cent of total feed consumed is scratch grain (cracked grain such as palay or corn).

NOTE: Make all changes in feeds and feeding equipment gradually.

K. Proper Feeding of Chicks

- 1. Have feed and water available when chicks are put under brooder.
- 2. Feed chicks with 20 per cent protein content starter mash, either commercial or home mixed.
 - a. Schools with excess dairy products have an excellent source of protein feed for young chicks.
- 3. Size of the yolk being absorbed in the abdomen of the chicks determines time to start feeding. Feel the abdomen when the chicks are put into the brooder. If the abdomen is soft, it is better to delay feeding 24 to 48 hours, or until the abdomen

is hard. Give them only water during this period. If the abdomen is hard, chicks can be fed immediately. Feeding too early results in chicks failure to absorb the yolk, thus, causing diarrhea.



Locally grown grains being utilized for home-mixed feeds. The ingredients must be ground and thoroughly mixed with care and utmost sanitation. The grain, plus minerals and other supplements, is shoveled from one pile into another. This action is continued until all ingredients have been completely mixed.

4. For beginners and most others, it is best to use commercial feeds.
 - a. The lowest priced feed is not always the most economical. Poor quality feed does not promote growth or production. Most well-known brands are reliable.
 - b. Consume feed within 4 months after it is mixed; otherwise quality deteriorates. (See section on feed rations.)
5. Average feed consumption
 - a. For average broilers about 4.09 kg. of feed up to 10 weeks of age. They should weigh about 1.3 kg. at this time.
 - b. Approximately 11.3 kg. of feed is required to raise a light weight breed, such as a White Leghorn, to maturity (5 to 6 months), and approximately 13.3 kg. to raise a heavier breed, such as a New Hampshire, to maturity for laying stock.

L. General Management of Chicks

1. Care upon arrival from hatchery.
 - a. Have feed and water available immediately.
 - b. Cull out any weak or crippled chicks.

- (1) Cull all weak, deformed, and inferior chicks at hatching time. To leave these chicks in the flock not only will be unprofitable but may endanger the health of the other chicks.
- (2) Make frequent examination of the growing flock and dispose of all weak, diseased, or slow-growing chicks immediately.
 - c. Place chicks under brooder immediately.
 - d. Count chicks as they are placed under brooder.
2. Observe chicks closely during the entire brooding period, but especially during the first two weeks for:
 - a. Sufficient feed.
 - b. Sufficient water.
 - c. Proper temperature.
 - d. Proper ventilation.
 - e. Proper feed consumption (a drop in consumption means something is wrong).
 - f. General comfort of chicks
 - (1) If chicks are busy eating, evenly distributed in brooder, and quietly resting, they are all right.
 - (2) When constantly peeping, it is an indication that something is wrong.

3. Cannibalism, toe and feather picking.

a. Exact cause not known, but chicks properly fed and housed give less trouble. Causes might be:

(1) Too much heat.

(2) Too crowded.

(3) Deficiency in nutritional requirements, especially minerals and vitamins.

b. Controlling cannibalism

(1) Darken room

(a) Paint windows

(b) Put sacks or paper over windows

(c) Be sure there is just enough light so chicks can see to eat.

(d) Additional feeding of green feed

1) Chopped green feed once a day

2) A bunch of green feed tied in a bundle and hanging about head height.

a) decreases cannibalism caused by over-crowding, but over-crowding must be discontinued.

b) the picking of green feed will give chicks activity and reduce picking of other chickens.

(2) Apply anti-pick paste.

(a) Commercial or pine tar

(b) Apply to area on chick which has been picked.

(c) Apply to same area on a few chicks which have not been picked.

(d) Is a better preventive than cure.

(3) Debeak chicks

(a) Debeak chicks three to five weeks old.

(b) Cut off 1/4 to 1/2 of upper beak.

(c) Use sharp knife, side cutters, or electric debeaker.

(d) Debeaking does not affect growth of chick.

(4) Advantages of debeaking

(a) A means of controlling cannibalism

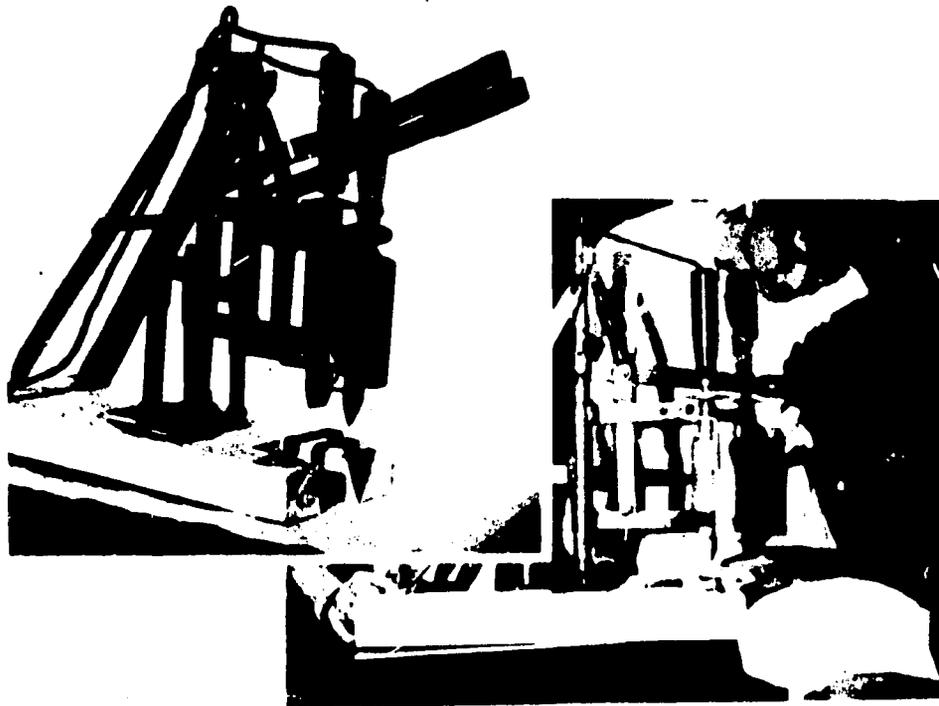
(b) Will sometimes stop egg eating.

(5) Roosts

(a) Broilers do not require roosts.

(b) Teach pullets, to be used as laying flock

An electric debeaker constructed by the Poultry Department and Farm Mechanics staff, Baybay National Agricultural School. The electric soldering iron cuts and sears the beak at the same time. This is an effective homemade debeaker. May be used to debeak adult birds as well as young ones.



replacements, to roost as soon as possible.

(c) Put roost in brooder house when chicks are three weeks old.

(1) Watch for piling or crowding the first few nights after placing roosts in the brooder house.

(2) Place chicks on roosts to teach them where roosts are located.

RAISING PULLETS

Job III

A. Rearing Pullets to Maturity

1. Rearing pullets in confinement.

- a. Ration must be complete in all needed nutrients. If pullets are raised in confinement, a special effort must be made to see that green feeds or leafy vegetables are available.
- b. Mash must be supplemented with the necessary minerals, vitamins, and protein otherwise secured from range pasture.



Pullets raised on wire or split bamboo floor where they cannot come in contact with contaminated soil are healthier birds. This is an efficient system when a very small area is available for a poultry yard and proper rotation cannot be followed.

2. Raising pullets

a. For backyard project

b. Where area for poultry range is very limited:

(1) Raise pullets in confinement on a raised split bamboo
or wire floor.



A poultry house constructed with a nipa roof, split bamboo for walls and floor is easy and cheap to construct. This house will serve as a rearing pen and a laying house.

- (a) Sanitation standards are easier to maintain.
- (b) Poultry are kept at home.
- (c) Less apt to contact disease or parasites present
in other poultry of community.



Weaving the bamboo slats eliminates the expense of nails producing an inexpensive, portable, and cool house. Pullets easily can be raised in confinement.

(d) Easier to conduct an upgrading program.

1) If running loose, hens may be bred by any native cockerel.

2) When penned up with a purebred cockerel upgrading will result.

(2) If allowed on ground, which is not a disease free grassy area, and exposed to sunshine, parasites and disease result.

(a) Disease and parasites prevalent in most barrio poultry because all chickens are allowed to run free.

1) Each chicken with disease or parasites spreads them from one end of the community to the other end as it travels looking for food.

2) Many areas under trees or houses remain damp thus are excellent areas for parasites and disease organisms to grow.

3) If healthy disease and parasite free chickens, which will be high producers, are to be raised, they must not be allowed access to such places.

A permanent type, portable house is constructed with an aluminum roof which is cooler than galvanized metal and is resistant to rust. The sawali sections can be put on the side to keep out rain or wind.



c. Sunshine is a great asset to the poultry producer. Give pullets an opportunity to take sun baths. If poultry is grown on wire, give them a sun porch and watch them enjoy the effects derived from sun-bathing. Provide 930 sq. centimeters to 2025 sq. centimeters per pullet before laying age.

Open type house provides ample ventilation, sun porch for sun-bathing, and cool roomy quarters.



- d. Watch pullets carefully for indications of internal or external parasites or disease symptoms. Take immediate steps toward prevention or eradication of such symptoms.

3. Range rearing

- a. Poultry are good rangers and forage well for a portion of their feed. Feed costs can be reduced from 10 to 20 per cent when pullets forage on green areas; legumes and succulent grasses are best foraging crops. Eight to ten week old pullets may be placed on range if the range is clean and has not had poultry on it for at least one year. Have plenty of green feed and shade available; clean water is a must at all times. Perhaps, more poultry suffer from lack of sufficient clean water than from inadequate feed. All ranges must be fenced if the pullets are to be kept on ground free from contamination. Where the poultry area is properly fenced, different sections of it can be used alternately; thereby facilitating sanitation of the whole area. Green feed can be grown continuously for the flock if different sections are plowed, aerated, and planted to forage in rotation.
- b. Range must have been completely free of chicks for at least one year. A rotation plan allowing chicks on the same ground only every third year is a recommended production practice in raising healthy, vigorous pullets.

Rotation plan for poultry yard rotation system, using 6 yards over a three-year period, pasture rearing two broods of chicks per year. The yards will be used in the following order: 1-2-3-4-5-6-1. This will allow each yard about two years of cropping, free from poultry, which will eliminate parasite and disease infestation from the soil.

Poultry Yard Rotation System



Yard 1 - Pullets were reared to maturity in Yard 1 then transferred to laying house. Range houses were cleaned and transferred to Yard 2. Yard 1 was planted to vegetable crops, to be followed in crop rotation system by corn, peanuts, mongo, upland palay, etc.

Yard 2 - Present brood of replacement pullets being reared to maturity, soon to be transferred to a laying house, then Yard 2 will be planted to vegetable crops.

Yard 3 - Another brood of pullets will soon be old enough for pasture rearing, so Yard 3 is being plowed and planted to pasture for use by these pullets.

Yard 4-5-6 - Before the succeeding broods of pullets are ready for pasture rearing, these yards will be plowed and planted to pasture for the corresponding brood of pullets.

- c. On the average range, allow up to 750 pullets per hectare.
- d. Range shelter can be used effectively.

- e. The range or rearing house of the pullets can be portable .
Open type is recommended to provide adequate ventilation.
It must be cleaned regularly and completely disinfected
after a flock of pullets has been removed, especially if
these quarters are to be used for a new flock.



An open type portable range house constructed of bamboo and nipa.

(1) A simple 2 1/2 meters x 3 meters portable shelter houses 100 pullets adequately.

(a) Roosts are the only equipment needed in the shelter.

(b) Place raised bamboo or wire floor in shelter to prevent pullets from feeding on the droppings.

(c) Provide skids for easy moving.

f. Provide feeders and waterers.

(1) Protect feed from rain.

(2) A 200-liter fuel barrel with float valve and trough is a recommended waterer.

(3) Feeders and waterers must be portable.

g. Provide 6 to 8 nests per 100 pullets as they approach maturity (5 months) 20 nest per 100 pullets or hens in full production.

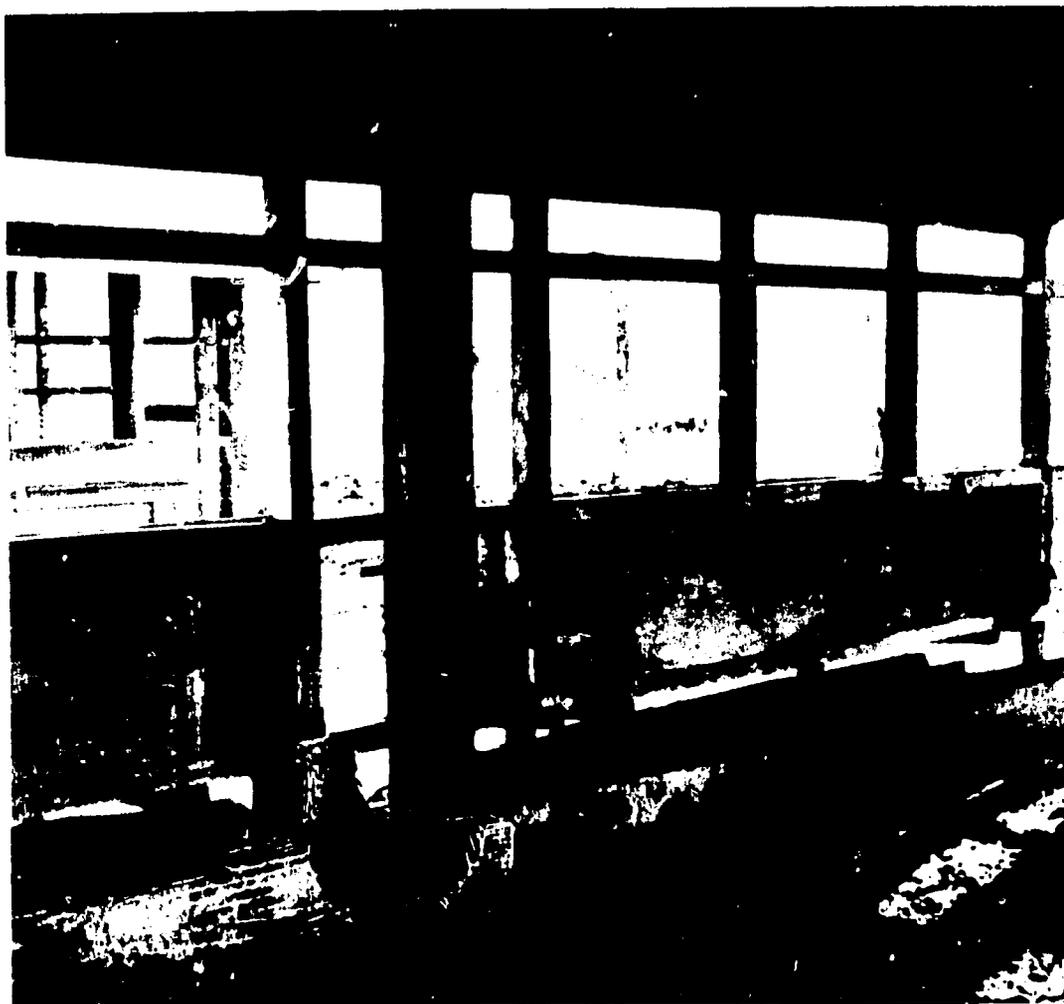
h. House pullets before 10 per cent of them begin to lay.

i. Growing mash and scratch grain must be accessible when pullets are on range.

(1) A pullet will grow until she is about one year old.

(a) During the first year the pullet is in production, while she is still growing, she must be fed in

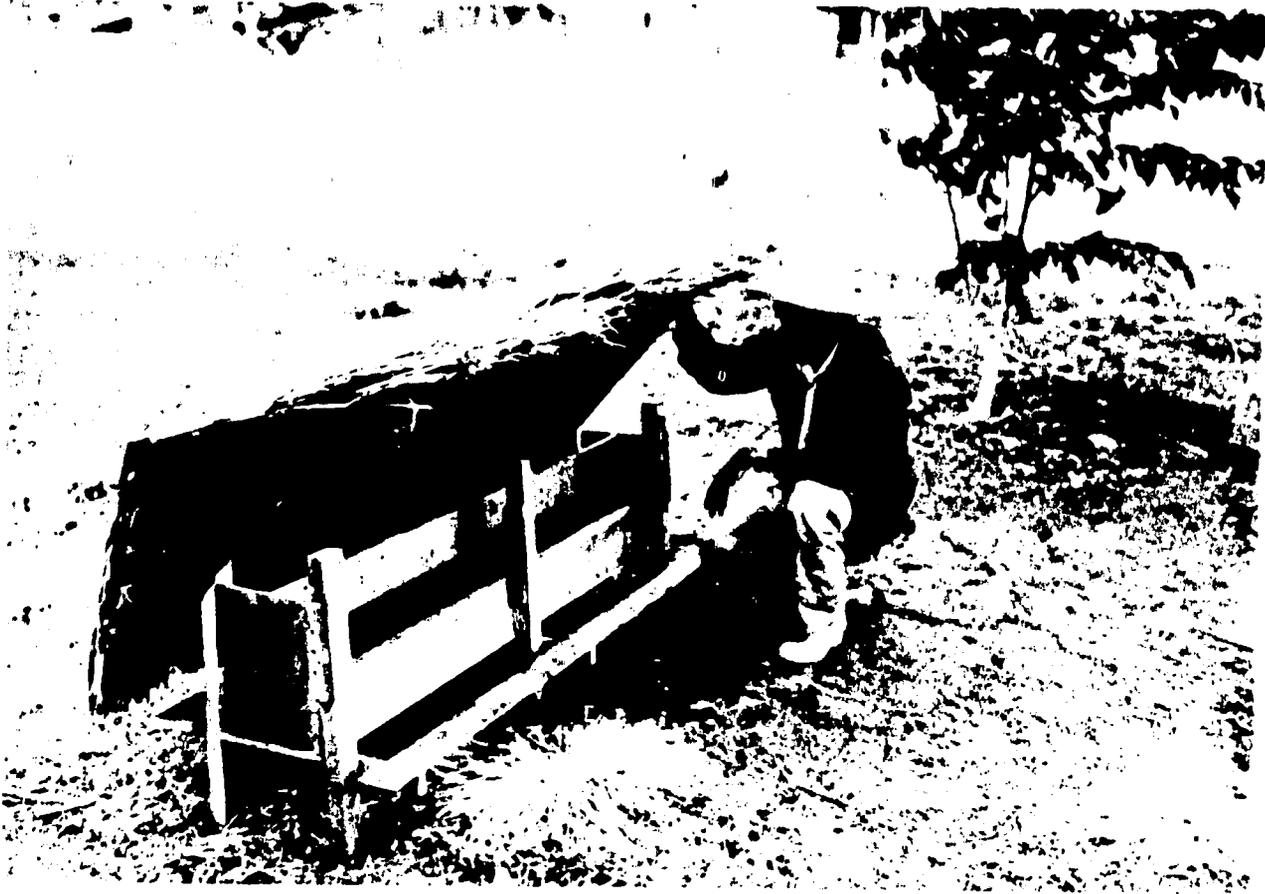
A six-month old pullet looking for a nest.



such a way that this normal increase in weight can and will continue.

(b) If the poultryman does not feed to safeguard against this hazard, the pullet will be forced into an abnormal molt (pullet molt) and stop laying.

This self-feeder keeps the feed dry and its capacity is large enough to feed one flock all day.



(c) A growing pullet requires some minerals for growth, thus, she will need minerals in excess of that required for egg production to foster growth.

- j. Guard against the pullets piling up in the corners and smothering for the first few nights after transferring them to the range shelter. This will mean actual handling and close supervision.

k. Train pullets to roost if they have not been trained in the brooder.

l. Separate the cockerels from the pullets as soon as they can be distinguished.

(1) Separating the sexes as soon as this can be determined accurately is a standard practice of all good poultrymen. In the light breeds, this can be done in five or six weeks; in the heavy breeds, it requires eight to ten weeks or more before sex can be determined accurately by the ordinary poultryman.

(2) Advantages of separating the sexes.

(a) Extra floor space for the remaining pullets is provided.

(b) Pullets develop rapidly and uniformly into maturity.

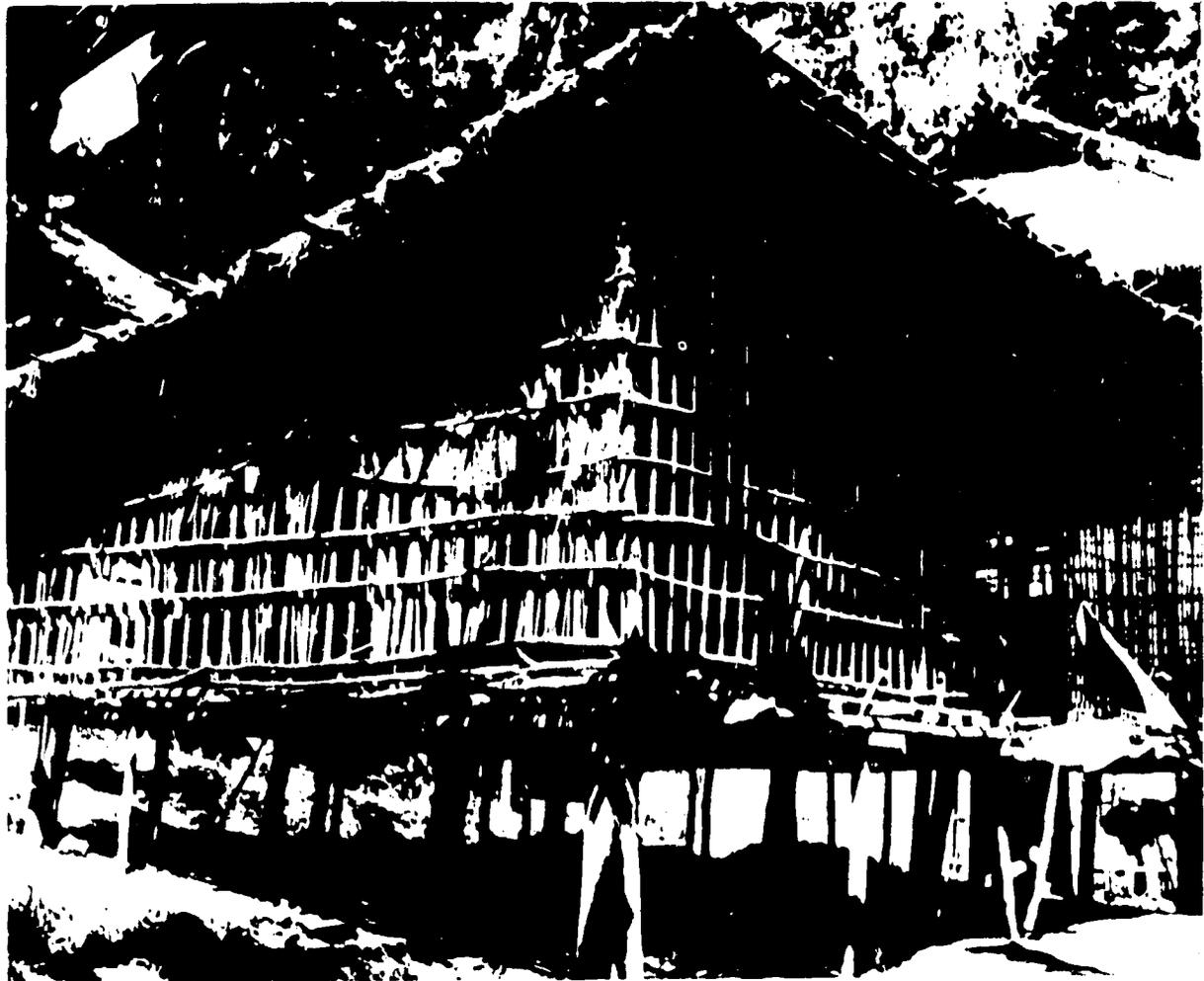
B. Preparing the Laying House for the Pullets

1. Proper housing aids increased egg production.

2. The poultryman's objective in housing is to encourage maximum egg production.

3. Do not attempt to mix the new pullets and the old hens in the same house. Remove old hens before placing pullets inside and completely sanitize the laying house.

A rearing house adequate for a backyard poultry project



- a. Remember the Four "S's" -- Scrape, Sweep, Scrub and Sanitize.
- b. The old hens being kept for breeders must be put in a separate pen.
 - (1) Old hens may build up resistance or partial resistance but not complete immunity to parasites or diseases,

but the new pullets may become diseased due to contact with them.

(2) Old hens peck and chase new pullets away from feeders.

4. The ground surrounding the poultry house must be cleaned and kept free from litter.
 - a. When litter or manure is removed from the poultry house, haul it immediately to the field, or put in compost pit. Do not leave it piled by the house or in the yard to breed and spread disease.
 - b. Burn or bury dead chickens; do not throw them in the yard outside the house.
 - c. Do not allow debris to accumulate in the yard.
 - d. Stack old lumber, roofing, etc., away from poultry houses or yard as this is an ideal breeding place for rats and mice.
 - e. Sanitation in the poultry yard is one key to success.
5. Thoroughly clean the nests.
6. Provide sufficient feed and water containers, nests, and roosts.
 - a. If feed containers are well constructed, waste will be avoided.
 - b. 30 centimeters of feeding space for every four pullets or 8 meters for every 100 pullets

The ground surrounding this poultry house has good drainage, and growing grass.



- c. 28 to 32 liters of water per 100 layers.
 - d. 20 linear centimeters roost space per light breed;
25 linear centimeters per heavy breed.
 - e. 1 nest per five layers.
7. Worm pullets before putting them in the laying house.
(See section on diseases)
 8. Protect pullets from enemies, both animal and human.

C. Culling Pullets

1. Pullets cannot be culled on the same basis as hens. Hens that have been in heavy production show certain signs like: beak bleached, shanks bleached and feathers worn and broken. These signs are not present in pullets just beginning to lay.
2. Cull pullets before putting in laying house.
 - a. Cull the pullets constantly during their growing period.
 - b. If pullets show lack of vitality and vigor, cull them immediately.
 - c. Certain characteristics of pullets that should be culled or kept are:

| <u>Cull</u> | <u>Keep</u> |
|--|--|
| Droopy, ragged feathers which lack luster. Slow feathering is associated with slow growth. | Full feathered, glossy & full of luster. Fast feathering is associated with fast growth. |
| Face pale and bleached, dull, and sunken eyes. | Face bright, eyes bright and not sunken. |
| Comb and wattle small, shriveled dull red color, scaly in appearance. | Comb and wattle developing well, bright red in color, waxy in appearance. |
| Look dumpy, sickly, weak slow-moving, slow developing. | Active, strong, healthy looking, vigorous, moving about normally. |
| Shallow, poorly balanced body. | Deep, full, well-balanced body. Large & well fleshed. |

Cull

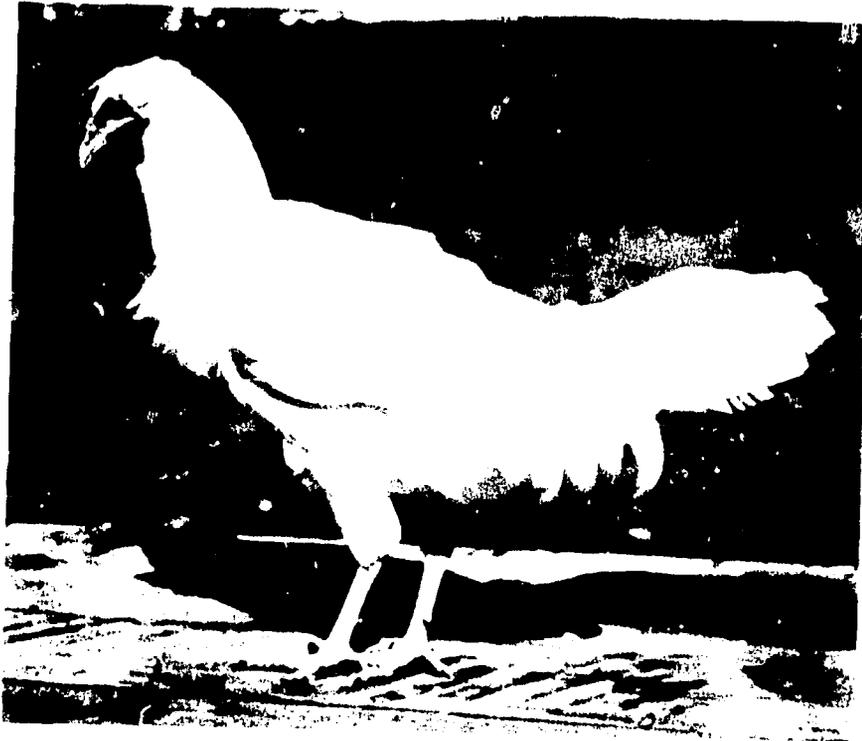
Skin, shanks, and beak bleached and pale.

Weak, snake or crow headed, crooked keelbone (breastbone).

Keep

Skin, shanks and beak deep yellow.

Strong, feminine, refined heads, straight keelbone.

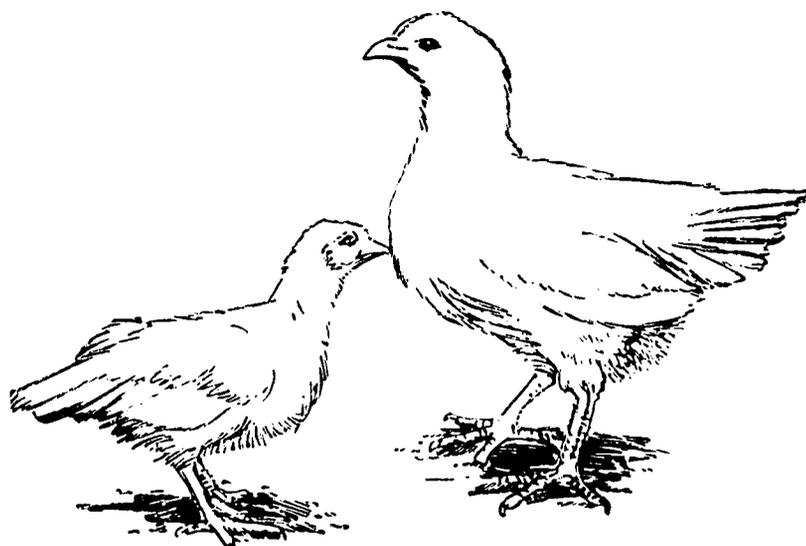


A pullet with all the cull factors such as: long narrow snake or crow head, long curling cockerel feathers, pale bleached face, shallow body, shanks and beak bleached, comb and wattles shriveled, and scaly.

3. Cull close and often.
 - a. Remove any pullet showing one or more points for culling.

Do not keep her thinking she will eventually become a good layer.

- b. The good poultryman culls everytime he sees pullets that are inactive, look dumpy, or show any signs of slow growth or disease. Remove the culls from the flock.
 - c. Culling by handling each pullet individually is necessary only just prior to housing the pullets and at intervals during the laying season when the percentage of production drops below 60 per cent.
4. Successful poultrymen have proved that about one-third of the day-old pullets started must be culled before reaching the laying house, if only top-quality are to be kept. If one anticipates having 200 layers, he must start with 300 sexed pullets or 600 straight run chicks.



These pullets are of the same age. One has a deep, well-developed body and will be a good layer. The other has a poor, shallow body and will not develop into a layer.

LAYING FLOCK MANAGEMENT

Job IV

A. General

1. Factors influencing egg production

a. Good management of the laying flock is necessary if economical egg production is to be maintained. It is not enough just to feed and house the flock properly; close attention must be given to many other factors influencing egg production, such as:

(1) Separating the sexes,

(2) Providing yard or range,

(3) Gathering eggs regularly,

(4) Removing manure,

(5) Keeping the house sanitary,

(6) Very often, the success or failure of a poultry enterprise depends on the attention given to these factors.

2. Providing proper environment.

a. Laying hens must be kept in a clean and comfortable environment to obtain maximum egg production.

b. Keep house sanitary

It is much easier and more economical to prevent diseases and parasites by following regular cleaning, allowing plenty of sunlight, and providing proper ventilation, than to cure the flock after it is diseased.

(1) Disinfecting the house and equipment:

(a) The frequency of disinfecting will depend upon existing conditions. If no outbreak of diseases occur, the house may be disinfected after each cleaning when the flock is removed. When outbreaks occur, houses and equipment are cleaned and disinfected at once.

(b) Sweep down the ceilings and side walls, and scrape other equipment free of caked manure.

(c) If a commercial disinfectant is used, follow carefully the directions on the container.

(d) A three per cent solution of lye makes a satisfactory germ destroyer. Dissolve one 340 grams (12-ounce) can of lye in 20 liters of warm water. (Use with care - avoid spilling on body or clothing.)

- (e) When using coal tar disinfectants, mix according to directions and apply with a pressure sprayer.
- (f) A five per cent solution of crude carbolic acid is a recommended disinfectant. (Avoid body contact.)
- (g) Do a thorough job of disinfecting the nests.
- (h) Be sure to clean and disinfect all equipment.
If possible, scald in boiling water feeding and watering equipment.
- (i) It is not practical to attempt to disinfect the yards and ranges.
- (j) Lime is a deodorant and not a disinfectant.
- (k) Houses and equipment must be kept free from mites or lice, and the soil free from internal parasite eggs.
- (l) Check the yards frequently; fill with soil any holes likely to catch water after rains.
Ample shade will keep the hens comfortable and help maintain higher production. Clean soil may be provided by cultivating yards and ranges in a rotation system.

These yards are fenced. The yard in the foreground has recently been used by the hens. After transferring the hens to a new yard, the old yard was plowed. It will be planted to a poultry pasture crop for new chickens. This kind of rotation is a means to prevent parasite and disease infestation.



3. Fencing the yards

a. Fence the yards to keep the laying hens from running with other poultry or livestock.

(1) White Leghorn requires a fence from two to two and one-half meters high.

(2) Use posts of durable materials.

4. Feeding regularly

- a. High egg production depends on maximum feed consumption.

Unless the hens are fed regularly, egg production will decrease. Hens are very sensitive to any changes in either the quality of feed and/or feeding schedule, therefore, ration qualities must be constant and feed schedules regular.

5. Overcrowding, cannibalism, and other management factors can either directly or indirectly reduce feed and water consumption, and the hens inherent egg-laying capacity will never be utilized.

- a. Four important factors in properly developed pullets

which contribute to profits from a laying flock are:

(1) The inherited ability to lay eggs.

(2) The management and care received from the man in charge.

(3) The amount of nutritious feed given in excess of the amount required to maintain body weight.

(4) The availability of clean water at all times.

- b. Be sure there is adequate feed and feeding space.

(1) Profits come from eggs produced.

(2) Hens must have the necessary food elements to produce eggs.

(3) Feed them the proper rations in the proper amounts.

Good feeding methods will guarantee proper growth, weight, and vigor and insure good results during the laying season. Keep feed in front of the hens constantly.

(4) Provide sufficient feed hopper space to avoid crowding and construct hopper to make the feed easily accessible to the hens. At the same time, prevent contamination from the hens by preventing them from roosting over the feed or getting their feet into the feed.

(5) By handling the hen, her body condition can be determined.

(a) If she is in poor condition, increase the amount of energy concentration feed (corn, rice, sorghum) without necessarily increasing the protein content.

(b) An over fat hen is a poor layer.

B. Housing

1. Adequate housing is important.

a. The house must be so constructed as to be as cool as possible.

(1) The open type with no solid portions on the walls or floor, roofed with native materials or aluminum is best.

(2) G. I. sheets are too hot and the extra heat will lower egg production and vitality.

- b. Hens are very sensitive to favorable as well as unfavorable weather conditions.
- c. Feed is used more advantageously.
- d. Temperature, humidity, and ventilation must be controlled.
- e. Diseases and parasites are more easily controlled in good houses than where poor construction is used.
- f. Egg prices are highest during seasons with adverse weather conditions. Unless comfortable houses are provided, the hens are not likely to respond consistently to feeding and management practices. The houses need not be expensive but they should be spacious, comfortable and convenient.
- g. Hens will not produce their maximum capacity during the extreme hot months unless they are comfortable. A few shade trees near the laying house will aid in keeping the hens cool. Locate the shade trees where

they will not prevent all sunshine from entering the house. Trim the branches of the shade trees near the ground to provide air drainage. Ipil-ipil will serve two purposes, shade and plant protein.



A poultry house built in pens or bays enables the poultryman to start with one bay and add a bay at a time as finances allow. The banana and other trees help keep the hens cool; the bamboo sun-porch gives the birds access to sunshine.

2. Construction of buildings

a. The best housing is the open type.

- (1) Use split bamboo or other local materials for the floor, leaving cracks between the slats of 2 1/2 to 4 cm., or;
- (2) Use heavyduty welded wire with holes 2-1/2 cm. wide and 10 cm. long for the floor.
- (3) Construct floor about one meter from the ground.
- (4) Use split bamboo or other local materials for the walls.
 - (a) Leave cracks between the wall slats of 6 1/2 cm. to 7 cm. for a laying house.
 - (b) Leave smaller cracks for growing chicks.
- (5) Regular woven wire fencing can be used for walls. This will allow the house to be open with no closed walls to cut off ventilation.
- (6) Adequate protection can be provided by overhanging roof, or shutters, so as to keep the house as dry as possible.
- (7) The roof can be made of any local material like nipa, or cogon, or of permanent material like asbestos or aluminum.



The floors are one meter from ground. The floor slats allow the droppings to fall away from the chickens. The open type walls allow ample ventilation. The top laying house is constructed of commercial materials; it is more expensive, but permanent. The bottom laying house is made partially of local materials; it is cheaper, but semi-permanent. A producer can start with the type made of local material and expand into the permanent type. The hens will produce as well in one as in the other.



Open type walls allow ventilation. Overhanging nipa roof keeps the house dry. The framing of the house is permanent, the rest is semi-permanent. It can be portable by placing on skids.



(8) Adequate ventilation in the laying house is necessary to supply the layers with plenty of oxygen for breathing and to remove the carbon dioxide and moisture which

accumulates in the air inside the house. Several gallons of water are given off by 100 hens daily through respiration and excretion. Unless this moisture is removed by good ventilation, regulated in such a way as not to cause drafts, the house and equipment will become damp and endanger the health of layers, thereby causing a decrease in their production.

(a) In the Philippines, the problem is to keep the hens cool, not to keep them warm.

(b) Start them and rear them in open type housing and the problems of respiratory diseases due to overheating will be reduced to a minimum.

b. The laying house can be temporary or permanent but must be kept clean.

(1) Remove droppings regularly, preferably weekly.

(a) Spread sand 5 centimeters to 10 centimeters deep for droppings to fall on.

(b) Will absorb moisture.

(2) Keep feed and water troughs clean.

(3) Clean the house (floor, etc.) regularly.

Bamboo slat walls and floor
with cogon grass roof.



- (4) After removing a flock of old hens, completely clean and disinfect the house before putting in a new flock of pullets.
- (5) This will prevent any disease or parasites of the old hens from being passed on to the new pullets.

c. Roofing

(1) A comparison between different types of permanent roofing:

| | Corrugated | Size of Sheet | Cost of Sheet | Centavos/Sq. Ft. | Life Expectancy in Years | If Installed Properly Will Withstand Winds - M.P.H. | Gauge or Thickness | Weight Sheet in Kilos |
|--------------|------------|-------------------------|---------------|------------------|--------------------------|---|--------------------|-----------------------|
| G. I. Sheets | yes | 32''x 8' | ₱8.10 | .38 | 10 | 125 | 24 | 11.6 |
| Asbestos | yes | 38 $\frac{1}{2}$ ''x 8' | ₱8.50 | .327 | 15 | 125 | 1/4'' | 31.8 |
| Aluminum | yes | 29'x 8' | ₱8.06 | .403 | 50 | 125 | 24 | 3.3 |

(a) The cost per sheet of different types of material is comparable. Asbestos costs slightly more per sheet than either aluminum or G. I. but each sheet is slightly larger. The cost per square foot of each type is computed on the basis of the figures given in the above chart.

(2) Weight

- (a) Aluminum sheets are the lightest of the 3 types of roofing.
- (b) G.I. sheets are heavier than aluminum but lighter than asbestos.
- (c) Cogon grass and nipa - about the same as G. sheets.
- (d) The important factor in regard to the weight of the roofing is the strength and structure of the rafters and other supporting parts of the building. The heavier the roofing material, the stronger the super structure supporting the roof must be. Permanent roofing materials can withstand stronger winds and keep the rain out of the building better during a storm, than the native materials.

(3) Life expectancy of roofing in the Philippines.

- (a) G.I. sheets - 10 years.
 - 1) This can be lengthened by painting the surface of the sheets every two or three years. This reduces the rate of rusting which is the enemy G.I. roofing.

(b) Aluminum sheets - 50 to 60 years.

1) Aluminum manufacturing companies have developed an aluminum sheet which requires no painting for weather protection. It is rustproof, does not support the growth of mold, mildew, or any other fungus and does not corrode.

It is made from heavier gauge stock.

2) It is resistant to fire, vermin, and is termite-proof, reflects 98 per cent of the sun's infra-red (heat) rays away from the building and keeps interiors up to 15°F. cooler than outside.

3) Aluminum, properly installed in accordance with the specifications of the manufacturer, will last a lifetime (approximately 50 to 60 years). Half this long would be a long-term roof, and would outlast most buildings.

(c) Asbestos

1) According to asbestos manufacturers, the life expectancy of asbestos corrugated sheets is indefinite.

2) Experience in other places have shown that after 14 to 16 years, asbestos will harden and become brittle and a hard wind or other pressures may break it, although with the proper care and treatment, there is no reason why it will not last many years longer.

(d) Cogon grass and nipa

- 1) Lasts about 3 to 4 years
- 2) Available in any local market

(4) Storage

(a) G. I. sheets

- 1) Keep sheets dry, under shelter, off the ground, and standing on edge or end.
- 2) If sheets are stored flat and have become wet, stand on end or edge immediately to keep from rusting.

(b) Aluminum sheets

- 1) Keep sheets dry, under shelter, off the ground, and standing on end or edge.
- 2) If sheets are stored flat and become wet, stand them on end or edge immediately to dry in order to avoid water stains.

3) Keep sheets away from cement, lime, acids, alkalis, fertilizer or manure.

(c) Asbestos and cogon grass and nipa must be kept dry, under shelter and off the ground.

(5) Installation

(a) G. I. sheets and asbestos

1) Follow the installation instruction of the manufacturer regarding slope, type and number of nails to use per sheet, amount of lap, etc.

2) Follow instructions for satisfactory results.

(b) Cogon grass and nipa

1) Tie securely to rafters.

2) Allow plenty of overlap.

(c) Aluminum

1) Before installing sheets, apply asphalt paint to all surfaces of contact with masonry, pressure treated lumber (treated against anay and buk bok), and asbestos cement. Where aluminum contacts other metals, such as structural steel and galvanized iron gutter aprons, separate surfaces of contact

with coats of either asphalt or aluminum paint. Stainless steel in contact with aluminum needs no electrolysis protection.

- 2) Use only aluminum nails with neoprene washers to install aluminum sheets. Iron nails will cause corrosion. Be sure you follow the installation instructions of the manufacturer in regard to slope, number of nails to use per sheet, amount of lap, etc. If these instructions are followed, satisfactory results will be obtained.
- (6) Temperature in buildings using different types of roofing.
- (a) A test was run on open type poultry houses with no closed walls. The types of roofing used were G. I. sheets, asbestos sheets and aluminum sheets. No record of temperature readings is available, but G. I. sheets were the hottest, asbestos sheets were coolest of the three types. This is in respect to the temperature inside the building. To gather

this data, a thermometer was hung inside the building with each of the different types of roofing. This experiment was conducted to determine which type of roofing furnished the most comfortable quarters for the poultry.*

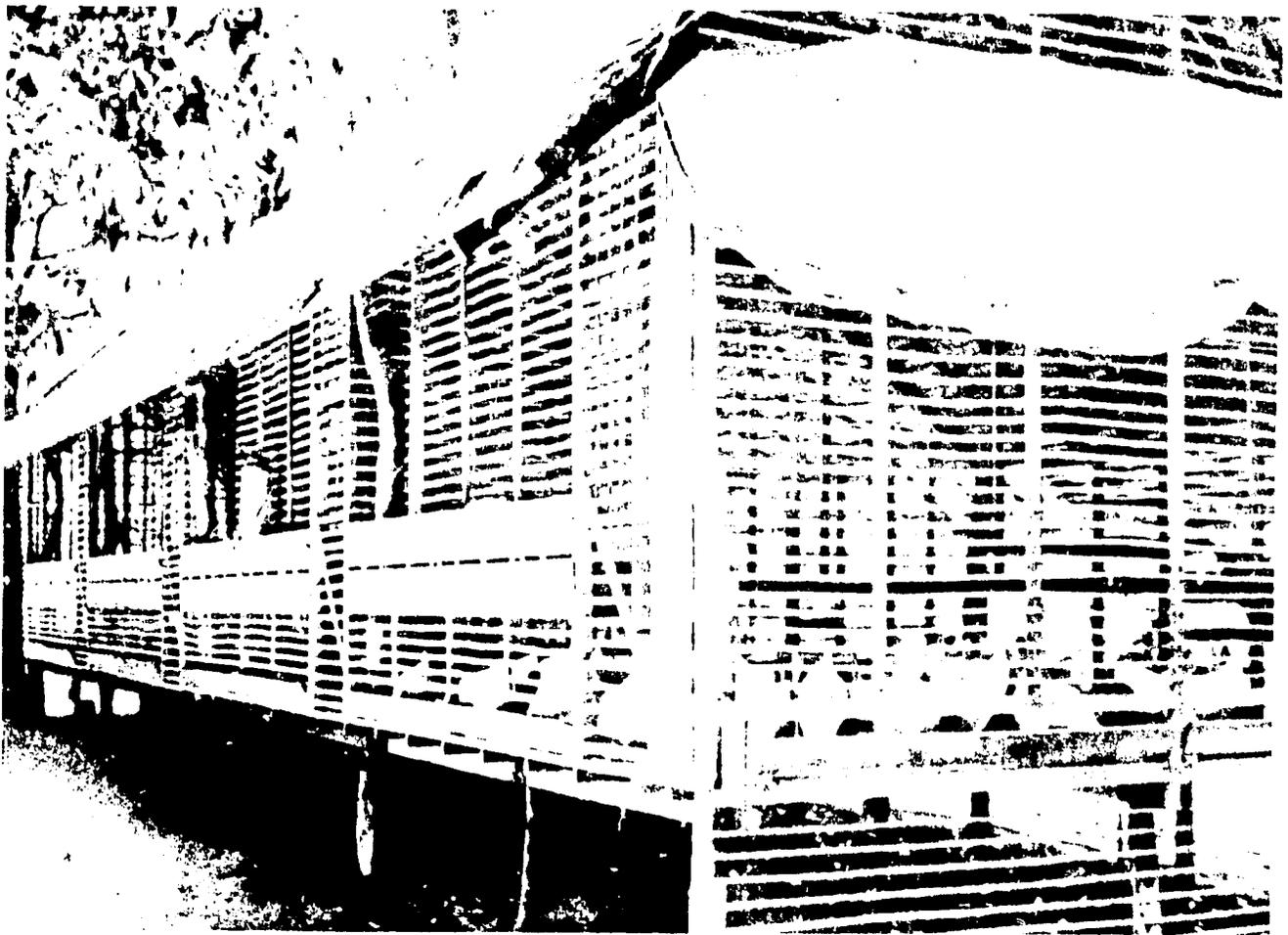
(b) Native roofing materials, nipa and cogon grass, are also used extensively for poultry housing. These are excellent and in some cases superior to the permanent types of roofing in regards to the comfort of the hens.

(7) The Administrator and staff members of Baybay National Agricultural School, Baybay, Leyte, remarked: "Records kept at the Baybay National Agricultural School show it is cheaper to use permanent types of roofing materials than it is to use the temporary native materials." The permanent roofing lasts over a long period of time. The nipa or cogon has to be replaced every few years. By the time the permanent roof needs replacing the native roofing material will have been replaced many times. The cost of

*Experiment conducted by the poultry experiment farm of B-Meg Feed Company, San Miguel Brewery.

replacing the native roofing over this period of years will be greater than the cost of the permanent roofing plus the labor and inconvenience of doing the job.

3. Provide favorable housing conditions for efficient egg production.
 - a. Must be well ventilated.



This is an ideal poultry house, constructed of bamboo and nipa. It is well ventilated, cool and practical.

- b. Construct house so that sunlight will flood as much of the floor as possible.
 - (1) This will help keep down disease and parasites.
 - (2) Will help keep the house dry.
 - (3) Will help keep the hens healthy and contented.
- c. Allow adequate floor space per hen -- 5 hens per square meter for light breeds; 3 hens per square meter for heavy breeds.
- d. Supply adequate equipment for the hens and the caretaker.
- e. Points to remember:
 - (1) A dry house is a must. If chickens were meant to be waterfowl, they would have webbed feet and enjoy swimming. They must be kept dry.

Laying house constructed from native materials including nipa roof, bamboo slat side-walls, and floor, which provides adequate ventilation and sanitation. In areas of high rainfall the steep pitched roof will last longer because the water is drained off faster and has less chance to wet the nipa.



- (2) In a tropical climate, chickens must be kept as cool as possible, a condition which requires maximum natural ventilation plus shade without dampness.

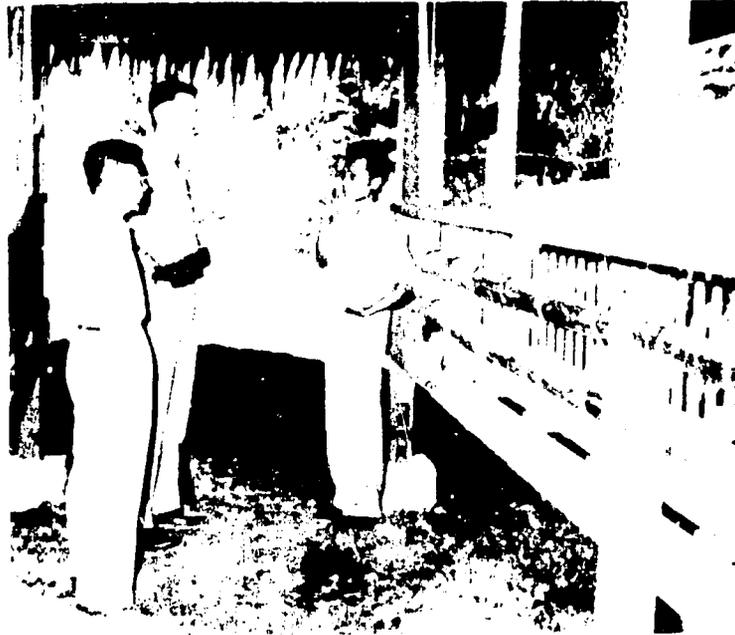
A backyard family poultry house using squash vines for shading part of the yard and house.



4. Equipment for the laying house
 - a. Types of feeders. - Any type of feeder is satisfactory as long as hens can adequately feed from it without waste. Feeders which come to rest on or near the surface of the floor are preferred for heavy breeds.

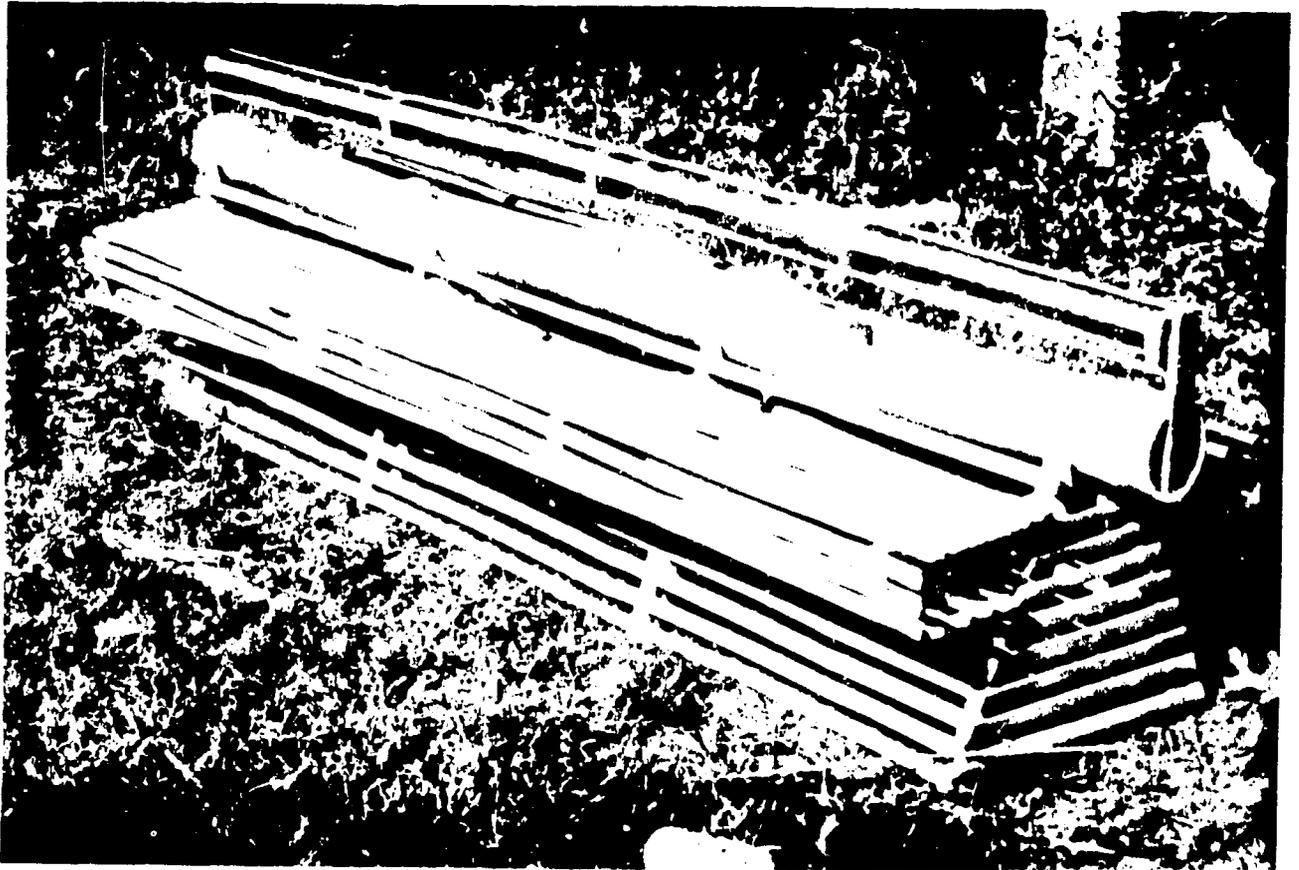
- (1) Bamboo feeder - a portion of approximately 7 1/2 centimeters wide is removed from a bamboo, 8 to 12 centimeters in diameter.

Bamboo feeders and waterers in the center isle of a laying house. Hens reach through slatted openings to eat and drink.



- (a) Leave a partition on each end of the bamboo intact. This will act as the end of the feeder.
- (b) Can be fastened to outside of laying house so hens reach through slatted openings to feed or as a range feeder.
- (2) Feeder constructed in a V-shape from two boards. If less than 10 centimeters deep feed will be billed out and wasted by the hens.

- (a) If less than 10 centimeters wide at top, the hens will have difficulty eating.
- (b) To reduce waste from feed being billed out, nail a slat 1 1/2 centimeters square, the full length of the feeder, to both top inside edges of the feeder.



A feeder and stand constructed of bamboo materials with a rotating reel placed above the feeder to prevent hens from roosting.

(3) Self feeder

(a) Large feeder into which enough feed can be put to last from one day to several days, depending on the size of the feeder and the flock. The feed drops by gravity from the feed compartment into the feed trough as the hens eat.

(b) Guard against waste - the feed the hens waste, falls to the floor or the ground and will not produce eggs or meat.

(c) Feeder space - A minimum of 13 1/2 linear meters of feed hopper space is recommended per 100 layers when all feed is provided in hoppers. Provide approximately 15 linear centimeters of grit hopper space per 100 layers. (A linear meter means one meter of feeding or watering space. For example, a 2 meter long feeder open on both sides has 4 linear meters of space if chickens eat from both sides of trough, 2 linear meters if chickens eat from one side only. The same principle applies to watering space.

b. Types of waterers:

- (1) Bamboo - made in the same way as a bamboo feeder is made.
- (2) Metal V waterer - constructed from G. I. sheet and soldered to be water tight.
- (3) Can - a paint or kerosene can cut off so hens can drink the water easily.
- (4) Water space - a minimum of one-32 liter gravity flow tank waterer or its equivalent per 100 layers. When trough type waterers are used, provide a minimum of 2.8 linear meters per 100 layers. Extra drinking space is advisable in hot weather.
- (5) Distance between feeder and waterer - It is recommended that all feeders be within 5 meters of a waterer within the pen.

c. Roost space

- (1) When roosts are used, provide a minimum of 20 to 25 centimeters of roost space per hen depending upon the size of the laying hen.
- (2) This allows 20 1/2 to 33 1/2 meters per 100 layers.

d. Nest space

- (1) A minimum of 20 individual box type nests per 100 hens.
- (2) If community-type nests are used, provide two nests, 60 centimeters wide by 2 meters long by 45 centimeters high per 100 hens.
- (3) Individual nests which slope from front to the back are the most efficient.



Nests constructed from kerosene cans.

(a) The bottom part of the back end has an opening approximately 6 to 7 1/2 centimeters high.

(b) The egg rolls down the sloping nests to the back, out the opening, and into an egg rack outside the laying pen.

1) Eggs can be gathered without getting inside of the laying house.

2) Less chance for eggs to be broken.

3) Cleaner eggs.

(c) Kerosene (square) cans, lumber, split bamboo, etc., can be used to construct this type of nest.

C. Feeding

1. Why feed a balanced ration.

a. Feed a balanced ration to provide proper nutrients for egg production.

b. Analysis of an egg will give us an idea of what materials are needed to produce it. One egg contains about 7.5 grams of crude protein, about two grams of calcium, and about 95 calories of energy. One hen laying 66 per cent production, if fed corn alone, would need over and above any requirement for maintenance, about

43.3 grams daily to furnish the energy for egg production.

It would take 112 grams of corn a day to supply the protein needed. If no other source of calcium is available, it would take 12 kilograms of corn to furnish the calcium.

Feeding 12 kilograms of corn a day to one hen is out of the question. Therefore, one must use feeds that contain more protein and minerals and vitamins.

- c. As the number of eggs produced per hen increases, the cost per dozen eggs decreases.

2. Determining the ration

- a. Use, where possible, at least three different kinds of grain. (75 to 80 per cent of ration). Rice, corn, sorghum, etc.
- b. Use at least one animal-protein supplement (5 to 10%).
 - (1) fish meal
 - (2) shrimp meal
 - (3) meat scraps
- c. One or more plant-protein supplement may be used (5 to 10%).
 - (1) Ipil-ipil leaf meal
 - (2) Soybean meal
 - (3) Copra meal
 - (4) Mongo bean meal

h. Be sure that the fiber content of the ration does not run too high (5 to 7 per cent of the ration).

i. Clean, fresh water.

3. Providing yard or range

a. The importance of providing fresh, clean ground for laying hens cannot be over emphasized. Do not allow laying hens to run with other poultry or with the other livestock, as internal parasites cannot be controlled under such conditions.

b. Provide one-fifth hectare of yard for 100 hens. A

desirable arrangement of yarding is to have two yards of equal size for each house - one in front and the other in the rear. These yards may be planted to a green crop and grazed alternately.

(1) Legume pasture plants. Keep cut short so the forage will remain tender.

(a) Tropical kudzu

(d) Peanuts

(b) Centrosema

(e) Mongo bean

(c) Ipil-ipil

(f) Soybean

(2) Non-legume pasture plants.

(a) camote

(c) para-grass

(b) ramie

(d) alabang x grass

(e) culape

4. Feeding the laying flock

- a. In feeding the hens, the object is to provide enough of the feed nutrients to meet the requirements for maintenance, growth, fattening, and egg production.
- b. Maintenance: One of the purposes of feeding is to maintain life. Until that purpose is met, no provisions can be made for other functions. Maintenance requires more feed than is required for egg production, growth, and fattening all combined.

(1) Feeds high in carbohydrates and fats can furnish most of the energy needed for the heart beat, for breathing, for digestion, and for the other processes necessary just to maintain life. Altogether, the maintenance requirement of a 2.2 kilo hen for one year is about 32 liters of corn or its equivalent. To find out how much is needed to maintain a hen for one year, multiply the weight of the hen by 8 and add 11.35 kilos.

For example:

| <u>Weight of hen</u> <u>in kilos</u> | | | | | <u>Feed required for</u> <u>maintenance alone in</u> <u>kilos</u> |
|---|---|---|---|-------|---|
| 1.81 | x | 8 | + | 11.35 | = 25.83 |
| 2.2 | x | 8 | + | 11.35 | = 28.9 |
| 2.7 | x | 8 | + | 11.35 | = 33.11 |

(2) A mature hen will use little or none of her feed for growth.

c. Egg production: The main reason for feeding the laying flock is to get as many eggs as possible. When the various nutrients are supplied in the correct proportions, it takes one kilogram of feed in excess of the amount needed for maintenance to produce 15.4 eggs. For example, 2.2 kilo hen laying 200 eggs a year would require 13 kilos of feed for egg production ($200 \div 15.4 = 13$). She needs 28.9 kilos of feed for maintenance, or a total of 41.9 kilos for both egg production and maintenance. ($28.9 + 13 = 41.9$)

d. Fattening: Nearly every hen uses some of her feed to produce fat, but the hen that fattens too easily will not be a good layer. A hen that has stopped laying and is to be kept for another year should put on some soft fat to act as reserve material so that she will not get too thin during her next egg-laying period.

(1) Not all feeds have the same value in producing eggs.

They differ in the amounts of the food nutrients (carbohydrates, fats, proteins, vitamins, minerals, and water) which they contain and they differ in

palatability. If the hen won't eat them, they can't have any food value for her. In feeding hens, use feeds that are readily available, that are economical, and that will give the best results. To be able to select feeds that are most satisfactory, the poultryman needs to know something about the value of different feeds for certain uses.

(2) The chief sources of energy-producing nutrients (carbohydrates and fats) are the cereal grains and their by-products. It is a good practice to build the ration around grains that are easiest to obtain and most reasonable in price. Use two or more kinds of grains for variety (copra meal when not used too extensively in the ration is a good source of fats). Rice, corn and sorghum grain are the most commonly used grains.

(3) Regardless of the source of feed, the quality and quantity must be constant if maximum production from the hens is to be expected.

e. Protein

(1) Why needed

(a) For muscle building and egg production, protein must be added to ration. The protein in cereal grains is often poor in quality and insufficient to meet the needs of a laying flock. The protein in legume plants is better in quality, but hens eat only small amounts of such feed, so one cannot depend entirely on this source.



Dried fish being ground into fish meal to be used as protein supplement in poultry feeds. A hammer mill is very effective for this purpose.

(2) Sources

(a) Plant

- | | |
|---------------------|--------------------|
| 1) Soybean meal | 5) Copra meal |
| 2) Mongo beans | 6) Peanut meal |
| 3) Peanut meal | 7) Sunflower seeds |
| 4) Ipil-ipil leaves | |

(b) Animal

- 1) Shrimp meal
- 2) Fish meal
- 3) Meat scraps

(3) 15 percent of total ration

(4) Description of protein sources

(a) Protein of animal origin is usually more nearly complete and can be better than that of plant origin. Animal protein feeds also contain many of the minerals needed by poultry, whereas plant protein is usually low in minerals.

(b) Fish Meal: Contains 50 to 60 per cent crude protein and up to 20 per cent mineral matter. The better grades, usually made by vacuum drying, are excellent sources of protein for

poultry. Fish meal under normal conditions can be obtained from local markets.

(c) Soy bean meal: Is about the best of the plant protein feeds. It contains about 40 per cent, and is palatable. It can be a very important ingredient in poultry rations.

(d) Peanut meal: Where available, and where animal protein is scarce, peanut meal can be utilized in poultry rations.

(e) It is logical to use a variety of ingredients. For instance, use a mixture of any of the following which are available: shrimp meal, fish meal, soybean meal, mongo beans (ground), peanut meal, ipil-ipil leaf meal. Use part animal protein and part plant protein. Regardless of the combination used, the best ration will contain 14 to 16 per cent protein. This means that about 15 per cent of a good all-mash ration consists of high-protein feeds, at least one-half of which is of animal origin.

(f) Vitamins

1) Why needed

a) Only very small quantities of vitamins are needed in a poultry ration, but they are absolutely essential for growth, egg production, hatchability, and maintenance of normal health. Vitamins A, D and G are the ones most commonly deficient; so when the ration is being planned, special consideration should be given to providing these vitamins.

1- Poultry use larger amounts of these vitamins A, D, G, than any of the other vitamins.

2- Many feeds do not contain these vitamins.

2) Vitamin A

a) Natural source

1- Fresh green forage

a- pasture, or

b- silage

2- Fish oils

3- Ipil-ipil leaf meals

4- Yellow corn

b) Essential

- 1- Is necessary for the normal functioning of the mucuous membranes of the body.
- 2- Builds up resistance to infections.
- 3- It is also needed in egg production as well as in increasing the hatchability of eggs.
- 4- Vitamin A deficiency is quite common in chickens, although hens which have access to an abundance of fresh green forage normally get all they need from this source. Hens confined indoors need vitamin A added to their rations. They need greater amounts in dry weather.
- 5- The daily requirements of vitamin A needed by 100 hens could come either from 12.7 kilos of yellow corn or from about 1 kilo of fresh green forage.

Ordinarily, a combination of these feeds, such as 2 1/2 to 3 1/2 kilos of yellow corn and 1 kilo of green forage is better than either alone.

3) Vitamin D

a) Natural source

1- Sunshine- Hens exposed to direct sunshine even for a short time each day are able to manufacture their own Vitamin D.

b) Essential

1- Needed by hens to help utilize the calcium and phosphorus in their feed.

2- When this vitamin is lacking, the egg shells are usually weak and many of the eggs fail to hatch.

4) Vitamin G

a) Natural source

1- Liver

2- Dried whey

3- Dried milk

4-A small amount is found in fresh green forage, alfalfa leaf meal, and ipil-ipil leaves. Fish meal and meat scraps also have vitamin G. Cereal grains contain very little of it.

b) Essential

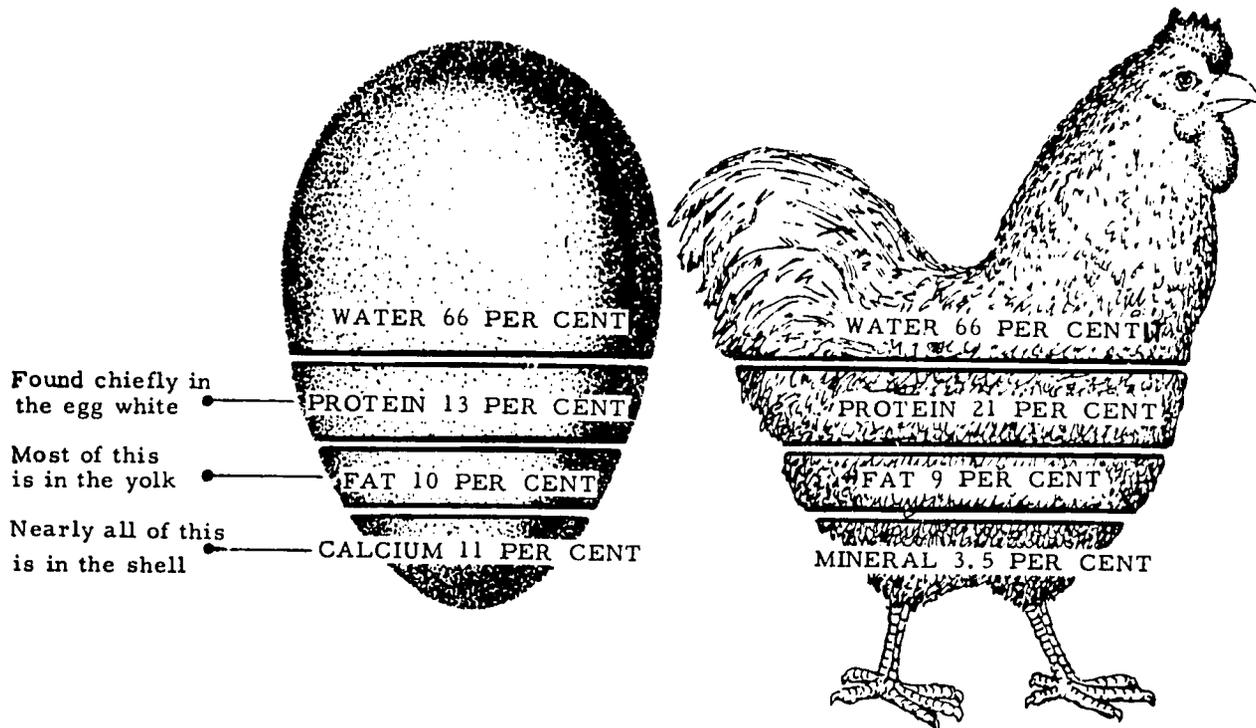
1- Necessary for chicks before and after hatching. In fact, one outstanding cause of poor hatchability is the lack of Vitamin G in the ration.

g. Minerals

(1) Why needed

(a) A hen laying 200 eggs a year must deposit 40 ounces of mineral matter in the egg shells. She has only about 2 ounces of mineral matter in her entire body, and therefore must have mineral added to her daily ration to provide the needed amount.

The relative amounts of water, protein, fat and mineral found in the chicken and the egg.



(2) Calcium

(a) Sources

- | | |
|-----------------|---------------|
| 1) sea shell | 3) lime stone |
| 2) oyster shell | 4) coral |

(b) Essential

- 1) Needed in larger amounts than any other mineral, because the shell of the egg is almost pure calcium carbonate.

(c) May be fed free choice, or it may be added to the ration to make up to 2 per cent of the total ration.

(3) Phosphorus

(a) Sources

- 1) Meat scraps
- 2) Fish meal
- 3) steam bone meal, if available.

(b) Essential for building strong bones

(c) 1% of total ration.

(4) Salt

(a) All farm animals require salt, and poultry is no exception. Use enough salt to make up 1/2 to 1 per cent of the entire ration.

h. Grit

(1) Why needed

(a) Hard grit is needed by all chickens to help grind the feed in the gizzard. Unless there is gravel or some other natural grit in the poultry yard, provide some form of grit. The harder the material the better it is.

(2) Source

(a) Gravel

(b) Break hard rocks into small pieces - granite
is the best.

(c) Sand can be used when the ration is a commercially
prepared mash.

Water

(1) Must be clean

(a) In all cases, cool and sanitary drinking water
must be available to the hens at all times.

(b) Keep the waterers clean and sanitary.

(2) Requirements

(a) A flock of 100 laying hens may use as much as
28 liters of water a day. A good rule is to
have from three to four drinking fountains for
every 50 hens.

(b) Water is an essential factor in successful egg
production because the white of a fresh egg
contains about 85 per cent water and fresh egg
yolks about 49 per cent. Water is also of
prime importance in the process of digestion

and other body functions. Ample and suitable water containers must be provided in the laying house, and these must be so constructed as to keep poultry away from dampness immediately under them and must be of such a type as to be easily cleaned.

(c) Types of waterers:

- | | |
|-------------|------------------|
| 1) bamboo | 3) can type |
| 2) V trough | 4) fountain type |

j. Antibiotics

(1) Why needed

- (a) For treatment and control of poultry disease

(2) Source

- (a) Drug stores
(b) Veterinary supply houses
(c) Poultry supply stores

(3) Advantages

- (a) Improved egg production
(b) Improved feed-egg ratio.
(c) Improved livability and reduced culling.
(d) Increased egg size.

(e) Increased hatchability .

(f) Larger profit returns per hen.

(g) Disease prevention and control.

Caution: The antibiotic preparations are expensive to use but the increased egg production will pay for the cost. When using antibiotics, the directions on the label of the bottle must be strictly followed.

5. Poultry ration mixture

- a. The basic ingredients in poultry rations are fish meal or shrimp meal, rice bran, corn (ground or cracked), copra meal, salt, and source of calcium. Other ingredients (animal feeds) may be used to replace any of the above feeds to suit the purpose of feeding and the availability and cost of the ingredients.
- b. The following basic mixtures are recommended by the Bureau of Public Schools.

| Ingredients | Growing Stock | Laying Stock | Breeding Stock | Chicks # 1 | Chicks # 2 |
|--------------------------|---------------|--------------|----------------|------------|------------|
| Rice bran (fine) | 45% | 40% | 40% | 56% | 50% |
| Copra meal | 20% | 25% | 25% | - | - |
| Corn meal | 23% | 20% | 20% | 24% | 30% |
| Shrimp meal or fish meal | 12% | 15% | 15% | 20% | 20% |
| Calcium | 2% | 2% | 2% | 2% | 2% |
| Salt | .5% | .5% | .5% | .5% | .5% |

c. Ready mixed feeds may be bought from poultry feed mills and poultry supply stores at reasonable prices.

(1) Be sure the producer is reliable.

(2) Be sure the dealer is reliable.

6. Barrio or backyard project

a. Kitchen and farm left overs, papayas, pechay, rice, bread "seysal," trimmings of meat, head of shrimps, pounded shell of crabs, palay grain, etc.

(1) Use left over material as supplement to regular ration not to replace it.

(2) Do not force chickens to eat spoiled or non-palatable feeds.

7. Methods of feeding

a. There are several methods of feeding layers:

- (1) Hand-feeding of grain and self-feeding of dry mash mixture. One third of the grain for the day is scattered in the clean and grassy yard. This gives the hens sufficient exercise and encourages them to stay outside the poultry house. The remaining two-thirds of the grain is given in the afternoon. By this system of feeding, every hen will have its crop full before going to roost.
- (2) Dry mash mixture is self-fed. A sufficient amount for the whole morning may be placed in a feeding trough. Same amount or less is given in the afternoon.
- (3) Self-feeding of dry mash mixture and grain in different troughs. The feed is available to the hens throughout the day.
- (4) Self-feeding of dry mash mixture with the corn for scratch finely ground and mixed with the mash. No scratch grains are given.

- (5) Chopped young green grass is given to the birds when the pasture is depleted especially during the dry season or when the layers are kept on a floor and not allowed on pasture.
- (6) During the hottest months, the hens can be coaxed to eat more feed by sprinkling corn or chopped green feed in the troughs or by giving them pelleted feeds.
- (7) At noon a part of the mash may be moistened to encourage the intake of feeds by the hens.
- (8) At schools with dairy projects, use milk and water mixture (50-50) to moisten feed -- or (milk - 50%, molasses - 8% and water - 42%).
- (9) Only a flock of hens with a full crop will lay a full basket of eggs.

D. Producing and Marketing Quality Eggs

1. Economic importance of producing and marketing quality eggs.
 - a. A study of the price paid for eggs in consuming centers will show a wide variation. This variation is due to the quality of the eggs offered for sale.
 - b. Many consumers prefer an egg of high quality and are willing to pay a premium to get it. The extra trouble

to produce high quality eggs will pay dividends, provided eggs are sold in a market which buys on a grade basis.

- c. Eggs are very delicate, very perishable, and subject to rapid deterioration. The consumer is anxious to receive eggs in their original quality. That is, he wants a fresh egg. The producer and the retailer must cooperate to satisfy market demand. The producer's big job is to produce high quality eggs. The retailers buy eggs on a quality basis and handle them quickly and efficiently so that they will reach the consumer in the best possible condition.

2. Producing table eggs

a. Management practices

(1) Study consumers' demands for eggs and select the breed of chickens which best meets this demand.

(2) Provide plenty of nests - one for every five hens.

(Sufficient clean nests reduce the number of dirty and cracked eggs.)

(3) Have hens on wire to keep the birds from having access to the droppings. Reduces danger of disease and internal parasites.

(4) Remove males from flock as soon as breeding season is over, or produce eggs entirely without males.

(Infertile eggs keep better than fertile eggs.)

(5) Provide a broody coop and break broody hen of wanting to set as soon as they are noticed. A broody coop is a wire cage 1/2 meter square without a nest.

(Confining hens in the broody coop will cure them of their broodiness or wanting to set.)

(a) Broodiness decreases the egg production of the laying flock.

1) keep record of number of times a hen has a broody period.

2) remove a hen from the laying flock after she has two broody periods.

b. Caring for eggs - After large, uniform, clean eggs have been produced, they must be cared for properly in order to maintain their original quality. Follow these practices:

(1) Gather eggs at least three times a day.

(a) Eggs deteriorate rapidly in a hot laying house.

(b) The same is true where the hen is allowed to set on the eggs for most of the day.

(c) Eggs are broken and soiled if left in the nests too long.

(2) Gather the eggs in a basket (wire or open woven).

Either leave them in these baskets or spread the eggs on trays overnight to permit cooling. Eggs so handled will not deteriorate as quickly and will retain their original quality.

(a) The price received for eggs is determined by the condition of the eggs when they reach the consumer.

(3) If eggs have to be stored for a few days, store them in a cool, moist, and well-ventilated place.

(4) An iceless egg cooler may be used for keeping eggs cool and fresh.

(a) Construct in a room where temperature and humidity can be partially controlled.

1) Use chicken wire or screen for walls and shelves.

2) Be sure shelves which are 15 cm. apart, have enough supporting frame so wire does not sag or break.

(b) Place a pan of water above the cooler.

- (c) Place a pan of water below the cooler.
- (d) Using a piece of fabric, place one end of the fabric in the pan of water above the cooler.
- (e) Place the other end of the fabric in the pan of water below the cooler.
- (f) In this manner, the cooler will be surrounded by fabric.
- (g) As the moisture is absorbed into the fabric and evaporates, the temperature in the cooler will be reduced.
- (h) This method can be used successfully only when the humidity is low enough to permit free evaporation.

c. Market eggs often, at least twice per week.

- (1) The poultryman who is producing high quality eggs will want to sell to a buyer who pays for quality eggs. The local situation will determine whether the producer will want to sell in local markets or to distant markets. If eggs can be marketed to select customers, the poultryman will usually be rewarded for clean, fresh, large eggs of quality.

3. Producing hatching eggs

a. Selection of breeders

(1) Select the hens with the highest egg production record.

(a) The best transformers of feed into eggs and meat.

(b) Those in the best condition at the end of the laying season. If the nonlayers have been culled out regularly during the laying season, only the good producers will be left.

(c) Those most vigorous and alert.

(2) New cockerels must be purchased each year from a reliable source.

(a) From high-producing hens.

(b) Do not attempt to raise breeding cockerels from the same flock as the pullets come from as this will tend to lower the quality and production of the birds, due to in-breeding.

(c) Select the cockerels even more carefully than the hens for the breeding flock.

(3) Selection of breeding stock must be based on:

(a) Early maturity

(b) Rate of laying of parent stock.

- (c) Non-broodiness.
 - (d) Persistence of laying (length of time)
 - (e) Length of clutch.
- (4) Proportion of cockerels to hens.
- (a) 1 leghorn cockerel for 15 hens.
 - (b) 1 heavy breed cockerel to 10-12 hens.
 - (c) The wise breeder has extra cockerels which are kept in a rest pen. Rotating the cockerels from the flock of hens to the rest pen will keep the cockerels more aggressive. After two weeks of breeding, put a cockerel in the rest pen and replace him in the flock with a cockerel from the rest pen.



Place cockerels in a rest pen segregated from laying flock when not producing hatching eggs or to give them a rest from breeding.

(5) Confinement

(a) In most cases, it is best to confine all breeder flocks. A shaded, grass-free run may be desirable, if it is kept free of disease and no other poultry are allowed on the run.

(b) Management practices

1) Provide plenty of nests - one for every five hens.

(Sufficient clean nests reduce the number of dirty and cracked eggs.)

a) Dirty or cracked eggs do not hatch.

b) Use type nest which allow eggs to roll out of the nest.

2) Have hens on wire to keep them from having access to the droppings. This practice reduces danger of disease and internal parasites.

(c) Caring for eggs

1) Do not store hatching eggs longer than five days.

They must be in the incubator before five days or fertility will decrease.

2) Store them in a cool, moist and well ventilated place.

In a small laying house where it is not practical to have an aisle down the center, an arrangement where hens are fed and watered and the eggs are gathered from outside is desirable.



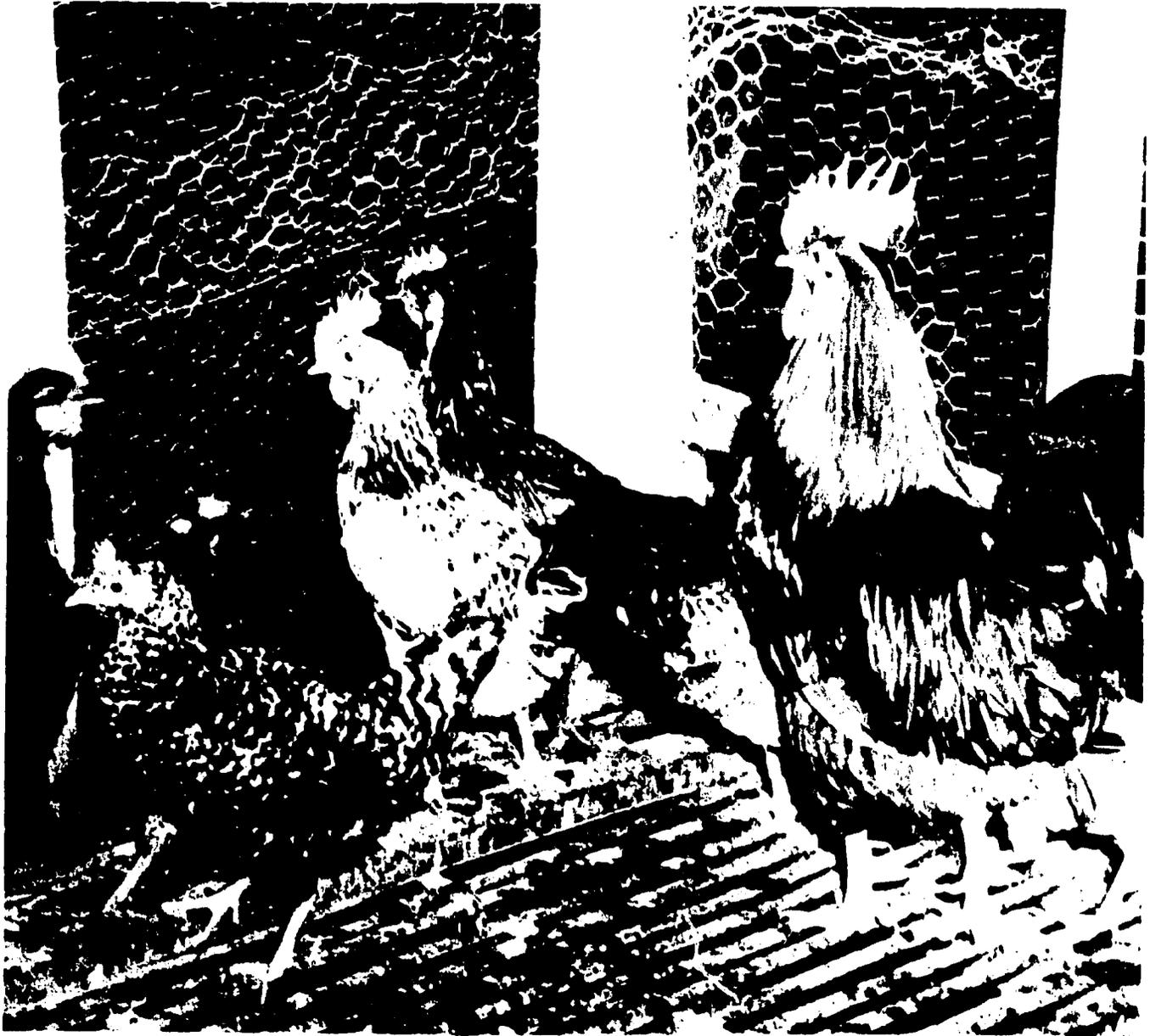
Gather eggs at least three times a day, clean them, and store them in a cool place.

NOTE: Adequate feeding - Good Management - Practical Sanitation, Disease Prevention -- all favor good production in any flock.

E. Upgrading

1. For barrio or backyard project.

a. The mating of mongrel or native females to pure bred males.



A pure bred New Hampshire cockerel being mated with native hens to upgrade the offspring.

(1) Fastest way of improving the productivity of native stock.

(2) F1 females exhibit a very big jump in production compared to the original stock.

(3) The egg production of grade pullets show a big improvement, When selected white leghorn males were mated to the native farm hens of Batangas, as reported by the Alabang Poultry Station the following average egg production records were obtained.

| | |
|--------------------------|-----------------|
| (a) Original native hens | 44 eggs /year |
| F1 pullets | 108.2 eggs/year |
| F2 pullets | 144.0 eggs/year |

(b) The grade pullets were fairly uniform in color and body type after the third generation (F3).

(4) Select the best layers from each generation (as described in selecting breeding hens).

(5) Obtain a new pure bred cockerel of unrelated blood to mate with each generation of upgraded females.

(a) If the same cockerel (the father of the pullets) is used to mate the succeeding generations.

1) Inbreeding will result - body size and quality will decrease.

2) Production losses due to inbreeding will cancel out the benefits of upgrading.

3) Upgrading and stock improvement is impossible when inbreeding is practiced.

(b) Do not use the grade cockerels to mate with females.

1) Grade cockerels will not upgrade the flock.

2) Eat these grade cockerels.

(c) After using pure bred males for 3 consecutive generations

1) Mate the resulting upgraded females with the best native male available.

a) A pure bred chicken may not produce well under barrio conditions.

b) Mating upgraded females back to a native male every 4th generation will retain enough native blood in the hens to give hardiness and resistance for local conditions.

Recommend the upgrading of native stock as described. However, at this writing there are no results from experiments under barrio conditions indicating that (1) pure-bred strains do not acclimatize in a 2 to 3-year period, (2) that hardiness from using native cockerel the 4th generation compensates for lowered egg and meat production which will result.

(6) Advantages of upgrading native stock

- (a) Increased egg production
- (b) Increased body size
- (c) Faster growth
- (d) Increase resistance to disease and parasites

F. Handling of Manure

1. Poultry manure is a very valuable fertilizer and is a source of profit that most poultry raisers have not fully realized. One hundred hens will produce more than 2 metric tons of manure a year, containing 566 kilos of organic matter, 41 kilos of nitrogen, 12 kilos of potash, 23 kilos of phosphoric acid and 22 kilos of calcium oxide.
2. Poultry manure is richer in plant food than that of other farm animals.
3. The average chemical analysis of poultry manure is:
 - a. Moisture 52.93 per cent.
 - b. Organic matter 29.30 per cent.
 - c. Total nitrogen 2.12 per cent.
 - d. Total potash (K_2O) .60 per cent.
 - e. Phosphoric acid (P_2O_5) 1.21 per cent.
 - f. Calcium oxide (CaO) 1.16 per cent.

4. Due to the way poultry manure is usually handled, about one-half of the nitrogen is lost. To reduce this loss, apply directly to the soil or mix with substances, such as damp soil, straw, or other material (compost pit) to assist in the drying process and to absorb the ammonia. Phosphate sprinkled lightly over the manure pile and mixed with the manure will tie up or chemically fix (nitrogen) and keep it from being lost. When the manure is applied to the soil, the phosphate aids plant growth.
5. Haul manure to a lot or field on which no poultry will be allowed for one year after the manure has been applied.

G. Culling

1. The objectives in culling are:
 - a. To rid the flock of unprofitable and devitalized hens.
 - b. Many culls are disease carriers.
 - c. To help guard against disease.
 - d. To save on feed.
 - e. To give hens left more room in the house and more feeding space.
 - f. To increase egg production per hen.
 - g. It increases profits.

h. To reduce labor costs.

i. Begin culling with the selection of hatching eggs and continue until disposition is made of the hen. If culling is delayed until the pullets are matured, many pounds of feed that could have been fed to high producers are wasted on culls.

2. Procedures in culling

a. Catching the hens.

(1) Accurate culling requires that each hen be handled separately.

(2) A good catching crate about 61 cm. wide, 122 cm. long and 30 cm. deep will be needed to confine the hens.

(3) The crate can be set in front of the door used by the hens and the hens driven into the crate. Catching hooks made of stiff wire will be found useful in catching the hens that fail to go into the crate.

(4) Fishing seines have been used satisfactory for catching poultry. Hens are not likely to be injured by catching them in this manner.

b. Holding the hens.

- (1) There is a technique in holding the hen that makes the examination easier and keeps the hen comfortable. The following procedure is suggested;
 - (a) Place the breast of the hen in the palm of left hand.
 - (b) Have the head of the hen pointing towards you when handling.
 - (c) Grasp the shanks by the fingers of the left hand with the forefinger between the hen's legs.
 - (d) Use the right hand for examining the hen. Always handle the hen gently and avoid frightening it.
 - (e) Do not throw the hen into the coop after examination.

Caution: Do not attempt to cull hens while they are in poor condition. Feed and manage them properly so they will be in the best possible condition when culling time comes. Do not cull a hen on the basis of any one factor alone, but on all factors indicating good and poor production.

3. Characteristics of a good laying hen:
 - a. Comb and wattle - warm, large, fully developed, bright red and waxy in appearance.

- b. Face - bright red
- c. Vent - enlarged, moist, wide, oval in shape.
- d. Pubic bones - spread apart, pliable, room for three to four fingers between the pubic bones.



A. Pubic bones wide apart indicating a hen in laying condition.



B. End of pubic bones and end of keel wide apart indicating good body capacity and laying condition.

e. Abdomen - expanded and soft, room for three to four fingers between pubic bones and keel.

f. Skin - loose, soft and pliable.

g. Eyes - bright and clear.

h. Hens having yellow pigment:

(1) Yellow pigment is bleached or nearly absent from the vent, eye ring, beak, shank or leg. It takes 5 months of production or laying to bleach the pigment.

(2) The pigment bleaches from the following parts in the order named:

a) Vent

b) Eye ring

c) Ear lobe

d) Beak - base to tip

e) Bottom of feet

f) Shank of leg from front to back

g) Hock and tops of toes

(3) The heaviest layers will be more bleached than the lighter layers.

- i. As the rate and length of lay increase the feathers tend to become ruffled and rugged.
 - (1) After a few months of heavy production a hen rarely has a full coat of smooth, slick, unbroken, or unruffled feathers.
 - (2) Getting in and out of the nest, wear and tear of laying, etc., cause this condition.
- j. If a hen is a good layer, she will molt late - after a long period of laying and then will molt fast - coming back into production soon.

4. Characteristics of a hen that is not laying:

- a. Comb and wattle - Shrunken, cold, dull red, and not waxy (scaly).
- b. Face - Dull red in color.
- c. Vent - Small, dry, and round (not oval in shape).
- d. Pubic bones - Non-pliable, close together, room for two fingers or less between the pubic bones.

Cull these hens!!
- e. Abdomen - hard, skin thick and coarse, room for two fingers or less between the pubic bones and keel.
- f. Skin - hard, coarse, non-pliable.



A. Pubic bones close together indicating a hen in poor laying condition.

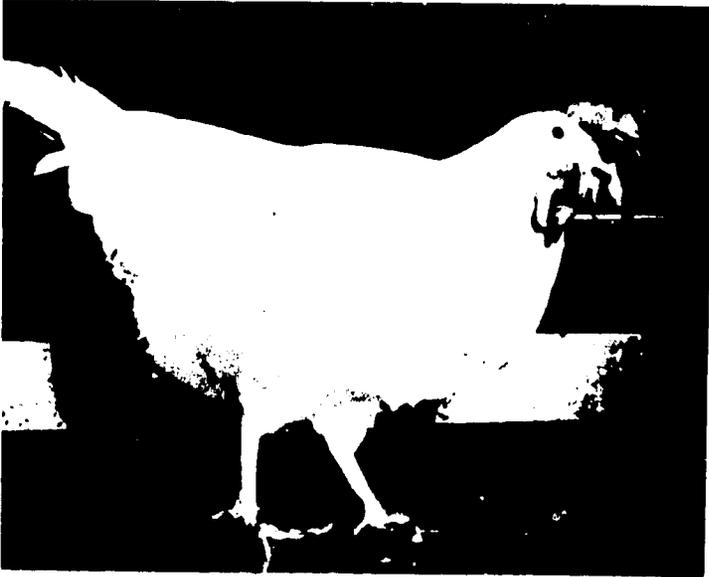


B. Ends of pubic bones and end of keel close together indicating a non-layer.

g. Birds with yellow pigment:

- (1) Yellow pigment is evident in the vent, eye ring, beak, shank or leg.
- (2) These named parts are very yellow showing no bleaching.

Comparison between expenses and receipts for a good layer and a poor layer.



- a. The good layer has a large, waxy comb and wattles; eyes are bright and ear lobes are full; body is deep and well filled.

| | | | |
|-------------------------------|-----------|-------------------------------|-----------------|
| Rearing to maturity | -- 11 | kilos feed @ 30¢ | - ₱3.30 |
| Body maintenance for one year | -- 28.83 | kilos feed @ 30¢ | - 7.74 |
| Egg production | -- 16.2 | kilos feed @ 30¢ | - 4.86 |
| Total feed | | <u>56.03</u> kilos feed @ 30¢ | <u>- ₱15.90</u> |
| Eggs produced -- 230 @ 10¢ | - - - - - | - - - - - | <u>23.00</u> |
| | | Profit - - - - - | <u>₱ 7.10</u> |

- b. The none layer has a small shrunken dull comb and wattles; eyes are dull and ear lobes are shrunken.

| | | | |
|---------------------------|-----------|------------------|---------------|
| Rearing to maturity | -- 11 | kilos feed @ 30¢ | - ₱3.30 |
| Body maintenance per year | -- 28.83 | kilos feed @ 30¢ | - 7.74 |
| Egg production | -- 3.9 | kilos feed @ 30¢ | - 1.17 |
| Total feed | -- 43.73 | kilos feed @ 30¢ | - ₱12.11 |
| Eggs produced -- 60 @ 10¢ | - - - - - | - - - - - | <u>6.00</u> |
| | | Loss - - - - - | <u>₱ 6.11</u> |

Other expenses for housing, labor, incubation, brooding, rearing are the same for each hen.

5. Molting:

- a. Complete or normal molt at the end of the laying season (loss of feathers).
- b. Temporary molt caused by a sudden change of management, sudden change of feed, being moved from house to house or range to housing during laying period. Sometimes being scared or molested too much will bring on a temporary molt.
- c. The hens that molt late and fast are good layers.
- d. The hens that molt early and slow are poor layers.
- e. Very few hens can grow feathers and lay eggs at the same time. If a hen molts slow, that is, over a long period of time, she cannot lay eggs.
 - (1) It is the eggs the hen produces which pay for her feed.
 - (2) Dispose of her when she is not laying eggs.

POULTRY DISEASES AND THEIR PREVENTION

Job V

A. Disease Prevention

Only vigorous, healthy poultry can bring to their owner a profit. The poultryman, therefore, must plan and follow a health and sanitation program that will protect the flock from diseases and parasites.

1. Environment which generates poultry diseases.

a. Poor sanitation practices

(1) Housing

(2) Range

(3) Feeding

(4) Other management practices

b. Failure to treat chickens for parasites and diseases.

(1) Germs (bacteria, virus)

(a) Chickens weakened by parasites are very susceptible to diseases.

(b) Diseases and parasites do not just happen. They spread from one chicken to another.

(c) The parasites, germs, or viruses escape from the diseased chickens through droppings, the mouth, wounds, or blood taken by blood-sucking

insects. After these disease-producing agents leave the body, they can be carried to other chickens in a number of ways.

2. A health program

a. Precautions

(1) Practice good management, feeding, and breeding to increase resistance of the flock to diseases and to increase production.

(2) Complete sanitation and precautionary protection is the key to keeping the flock healthy. You cannot overdo this part of the job. Every new brood of chicks deserves a clean place to live. Likewise, pullets should have a clean place for them when they are ready to lay.

(a) Clean the brooder house several days before chicks arrive. Remove litter and remove entirely away from poultry yard. Scrape, sweep, dust, and spray building with a good disinfectant; scrub, disinfect, and sun all equipment (sunshine is a great disinfectant).

- (b) Spray house and equipment with carbolineum or other good oil sprays to kill mites.
 - (c) Spray entire building with DDT or chlordane to control flies and mosquitoes (1 pound of 50 per cent wettable DDT in 10 liters of water).
 - (d) To control lice, dust on litter 1 kilo of agriculture sulphur to each 9 1/2 square meters of floor space. Dust at same rate in the nests. Repeat in 7 to 10 days.
- (3) Bring only disease-free chicks. or hatching eggs on to your premises.
- (4) Normally, it is cheaper to grow your chicks than to buy started ones. If started chicks are grown on disease-infested areas, they will spread these diseases to your flock. (If you do use started chicks, carry them directly to an isolated range area; keep them away from other chickens) until you are certain they do not have parasites or diseases.
- (5) Keep growing pullets on a clean range that has not been used by poultry for at least two years.

Locate this range at least 100 meters from the area being used by mature hens.

- (6) Keep good sod of green crops on the range; do not use poorly drained areas. Have range divided so that the different sections can be used in rotation.
- (7) People often spread diseases. Control traffic. Have other persons admire the chickens from a distance. Do not visit flocks elsewhere that are diseased without taking proper precautions upon returning to your flock. (Change clothes and shoes and wash as you will carry the disease with you and infect the healthy hens. Always have a sanitary box containing disinfectant to step in before entering or leaving a house.)
- (8) Rats and wild birds can be a source of contamination. Three rats will eat or waste as much feed per year as two hens. Start a war on rats. There are many rat poisons in the market. The most effective is sold under the trade name of warfarin. Follow directions on container when poisoning rats and use caution so children, chickens, pets, etc., will not be poisoned.

(9) Immunize flock against fatal diseases every year.

(a) Know how to vaccinate. Know what to vaccinate for.

1) Vaccinate against diseases likely to cause trouble in your area.



A pullet being vaccinated.

- 2) Vaccinate earliest against those diseases
that cause the most trouble in the area.
 - 3) Use fresh vaccine according to manufacturer's
directions.
 - 4) Keep "hold over" vaccine in a well stoppered
container and out of direct sunlight.
 - a) Make use of banana stalk for storage if
refrigeration is not available.
 - b) Banana stalk refrigeration is good to
use during immunization operation period.
 - 5) Vaccinate beneath the skin, not the feathers.
 - 6) Vaccinate only healthy chickens.
- (10) Cull out and isolate diseased, crippled, and out-of-condition chickens. Remove these chickens from the farm. Weak, unhealthy chickens are far more likely to contract diseases, multiply the germs and spread them to the entire flock.
- (11) Dispose of all sick or dead chickens in such a way as not to spread disease -- burn, or bury them deeply.
- (12) Observe flock everyday to detect sick chickens.

(13) At first indications of sickness among chickens, consult the Bureau of Animal Industry or a provincial veterinarian.

3. Suggested general measures:

- a. Proper feeding of the stock, giving the right feeds and feed mixtures (balanced rations) in adequate quantities. If available, include the feeding of antibiotics.
- b. Maintain cleanliness in the poultry house and surroundings as well as watering and feeding troughs and other poultry fixtures.
- c. Use disinfectants.
- d. Practice pasture or yard rotation.
- e. Provide proper housing for the stock.
- f. Restrict other animals and persons from the house and premises.

B. Diseases and Parasites

Destruction of the flock or reduction in its production efficiency is caused chiefly by diseases and parasites affecting the stock. The common diseases and parasites, together with detection, prevention, and treatment are as follows:

1. Avian Pest (New Castle Disease). This disease is known as "Peste."

a. Symptoms

- (1) Inactive and loss of appetite.
- (2) Droopy, with ruffled feathers.
- (3) Pale comb and wattles which later become deep bluish.
- (4) Full and distended crop.
- (5) Mucous, odorous discharges.
- (6) Gasping for air.
- (7) Green diarrhea.
- (8) The head may be drawn backwards, twisted to one side, or drawn down between the legs. Mortality usually runs very high in very young chicks.

b. Prevention

- (1) Strict hygiene and sanitation must be observed.
- (2) Isolate sick chickens.
- (3) Proper regular immunization
 - (a) Avian pest vaccine (drop-intracloacal) - 1 day old.
 - (b) Avian pest vaccine (drop intranasal) - 3-4 weeks old.
 - (c) If chicks are hatched from eggs of recently vacci-

nated hens or disease-recovered hens use:

1) Avian pest vaccine (drop intracloacal) -

1-2 days old.

(d) Otherwise, if they are not vaccinated within the age of 1-2 days old. Postpone vaccination until they are 3 weeks old.

(e) Avian pest vaccine (injectable - intramuscular) -

3 months old.

(f) Avian pest vaccine (prick) - after first laying

season, molting time.

(g) If the flock is infected with avian pest:

1) Avian pest vaccine (injectable) should be used

for all classes of stock irrespective of age,

but adjust the dosage as follows:

a) 0.25 cc. for 1 day to 7 days old.

b) 0.5 cc. for 8 days to 3 weeks old.

c) 0.75 cc. for 1 month to 3 months old.

d) 1.00 cc. for 4 months to 6 months old.

e) 2.00 cc. for adults.

(4) Kill and burn all infected chickens

(a) Medical treatment. There is no known cure for

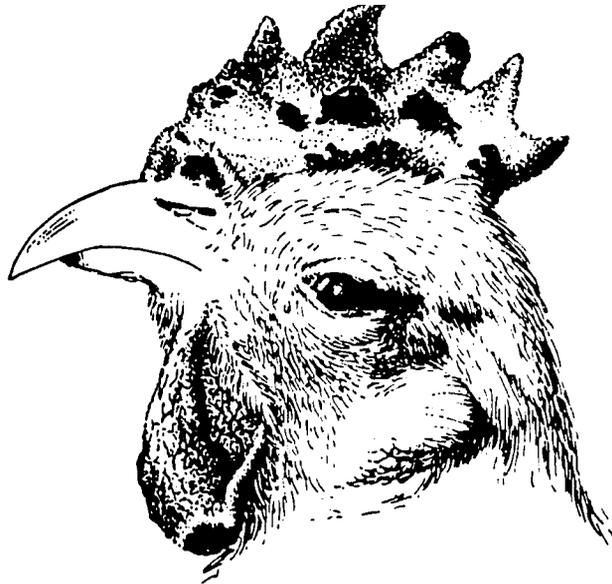
this disease. Consult a veterinarian. Use of aureomycine, water soluble, may help.

2. Fowl Pox (Bulutong)

a. Symptoms

- (1) Appearance of grayish spot blister on the skin.
- (2) After several days, the blister enlarges, fuses with other adjacent lesions forming wartlike eruption.
- (3) Removal of scales resulting in rough, raw bleeding wound.
- (4) In ten to fourteen days, dark hard crust is formed.

Typical fowl pox eruptions.



b. Prevention

- (1) Observe hygiene and sanitation.
- (2) Avoid overcrowding.

- (3) Vaccinate with pigeon pox vaccine (follicle) when chicks are one month old followed by fowl pox (prick) when they are three to four months old.

c. Medical treatment

- (1) Potassium permanganate (1:5000 sol) in drinking water.
- (2) Apply tincture of iodine on raw wound.
- (3) Consult a veterinarian.

3. Fowl Cholera

a. Symptoms

- (1) In severe cases, no symptom is noted. Chickens die suddenly.
- (2) In mild cases:
 - (a) Listless and sleepy.
 - (b) Ruffled feathers.
 - (c) Neck thrown backward.
 - (d) Pale comb and wattles.
 - (e) Loss of appetite and increased thirst.
 - (f) White diarrhea.
 - (g) Some chickens make rattling noise when breathing at night.

b. Prevention

- (1) Observe hygiene and sanitation.
- (2) Confine sick birds or kill and burn them.
- (3) Vaccinate with fowl cholera vaccine (intramuscular) at 3 months old and above, 1/2 to 3/4 cc. per chicken. Repeat injection 4 to 6 days later increasing dosage by 50 per cent.

c. Medical treatment

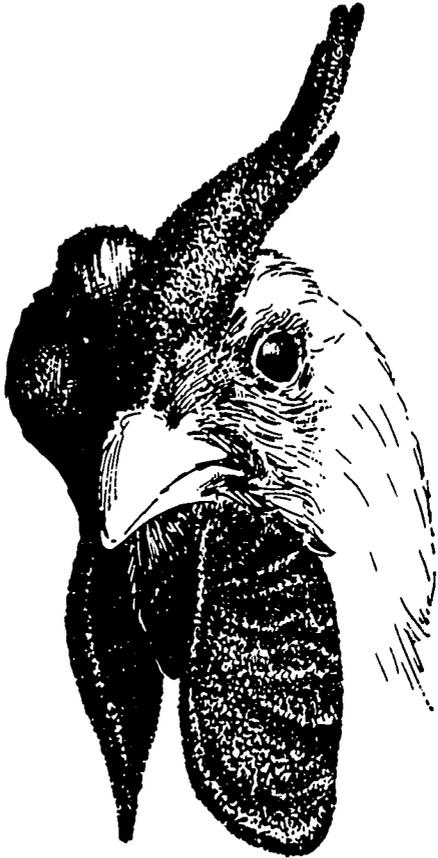
- (1) Consult a veterinarian.
- (2) Administer or give the following:
 - (a) Sulmet
 - (b) Sulfamethazine (1:1000) in drinking water or feed (0.5% feed for 2 days) or sulfaguanadine.
 - (c) Aureomycin, water soluble. (Follow the manufacturer's direction.)

4. Roup (Sipon) Coryza, Nasal Catarrh, or Rhinitis

a. Symptoms

- (1) Nutritional form - watery discharge from eyes and nose.
 - (a) Discharge from eyes and nose.
 - (b) Shaking of head.

- (c) Loss of appetite and flesh.
- (d) Offensive discharges cheesy.
- (e) Soiled feathers under the wings with foul odor.



Roup, accompanied by inflammation and development of cheesy matter, causing the eye to close and swell up.

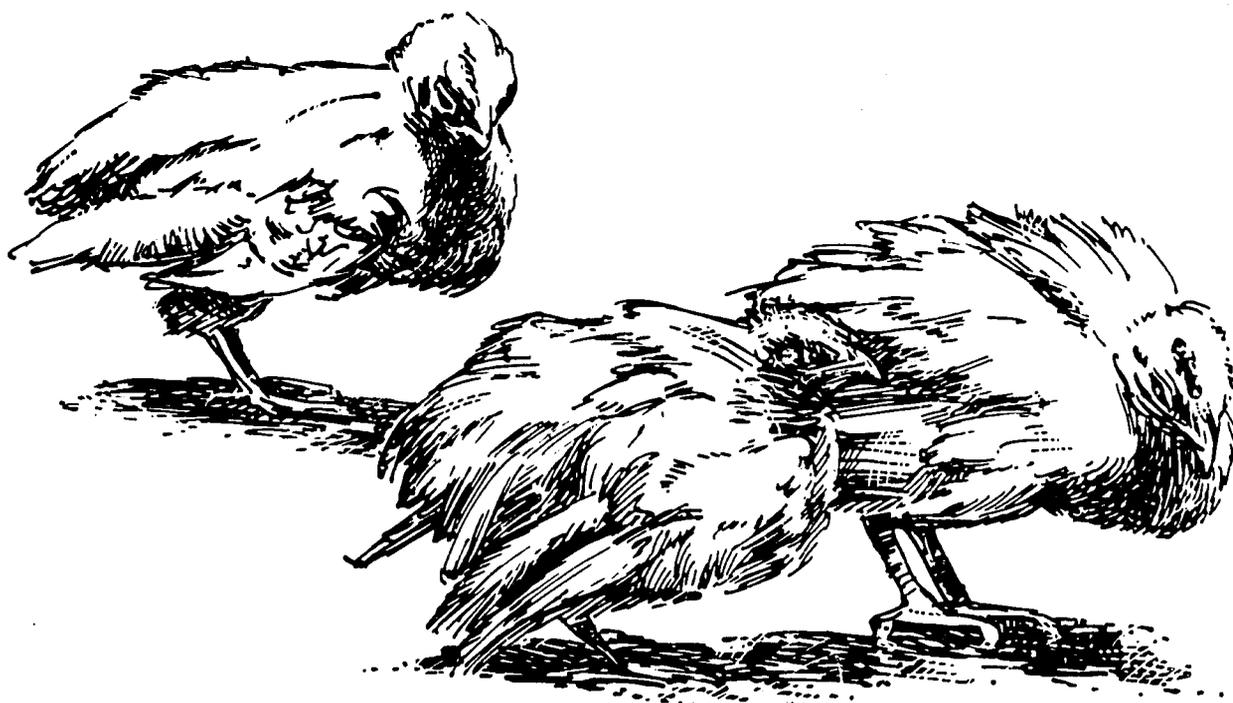
b. Prevention

- (1) Strict hygiene and sanitation.
- (2) Vaccinate when chicks are one month old and over,
preliminary dose at one month.
- (3) Confine sick birds.

c. Medical treatment

- (1) Consult a veterinarian.
- (2) Correct diet if nutritional, add cod liver oil and green feed to ration.
- (3) Give an injection of streptomycin, 1 cc. per kilogram live weight (1 gram dissolved in 30 cc. water).
- (4) Add myzon to drinking water (1 scoop per gal.)
- (5) Roupe vaccine (intramuscular) - 2 months old.

5. Coccidiosis



Chicks infected with coccidiosis.

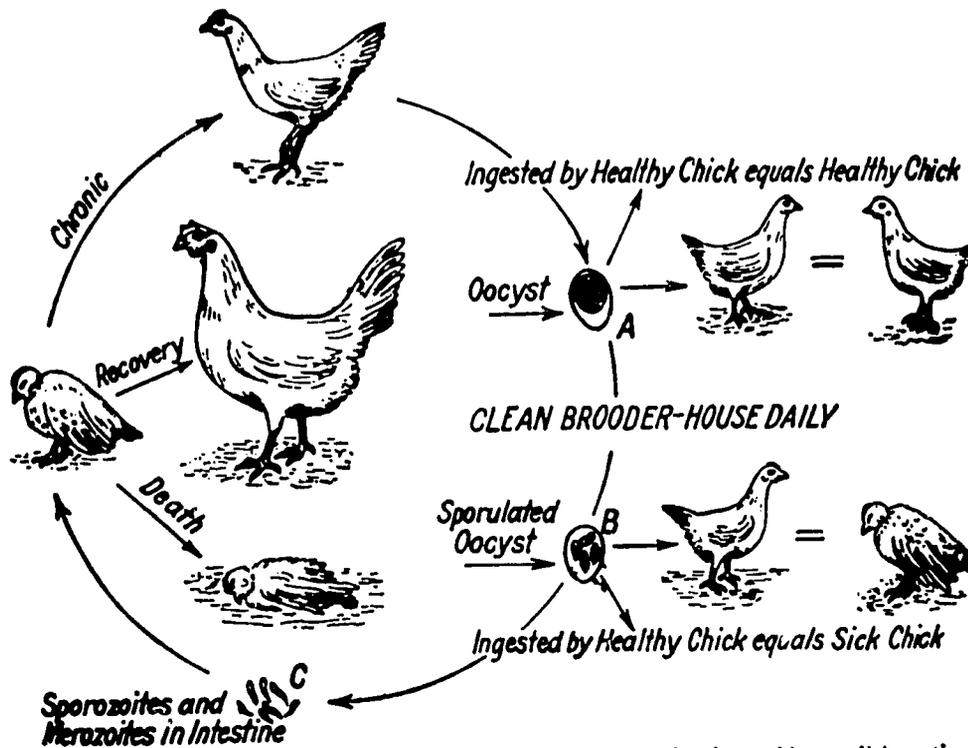


FIG. 150.—The life cycle of the coccidiosis parasite. Under favorable conditions the entire life cycle of the parasite which causes coccidiosis may be completed in from eight to ten days. In the egg stage it gets into the intestinal tract by means of contaminated feed and water. (Calif. Agr. Exp. Sta.)

a. Symptoms

- (1) Pale comb and wattle.
- (2) Huddle in corner.
- (3) Droopy and depressed.
- (4) Ruffled feathers and soiled vent.
- (5) Wings drop on sides.
- (6) Loss of appetite and flesh.
- (7) Bloody discharge in droppings.
- (8) Usually affects young birds.

b. Prevention

- (1) Observe hygiene and sanitation.
- (2) Keep chicks in dry, ventilated place.
- (3) Isolate sick chicks.
- (4) Brood and raise chicks on raised flooring. Do not put on ground until they are 2 months old.

c. Medical treatment

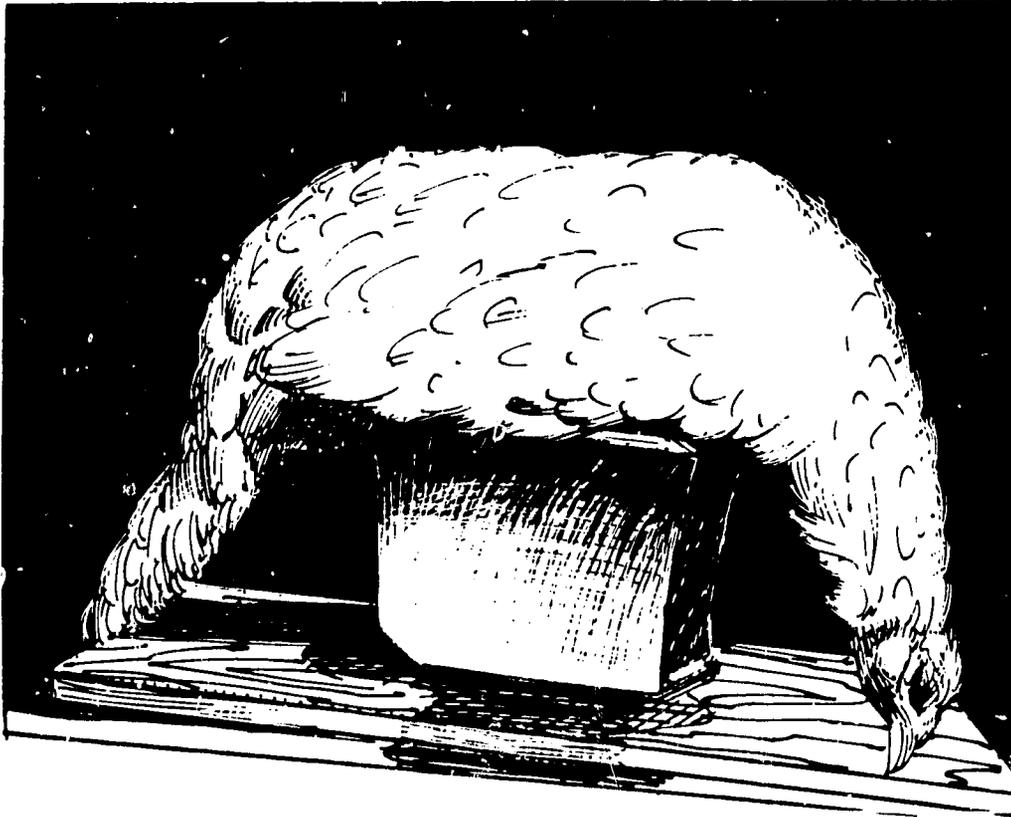
- (1) Renosal or sulfamethazine in drinking water, 2 tables mixed in 4 liters of water.
- (2) Sulfaguanadine. 10% sulfaguanadine mixed feed for one day, regular feed for four days, 10% sulfaguanadine mixed feed on the fifth day. If flock is heavily infected, use sulfaguanadine for 3 or 4 days successively, or
- (3) Mixture of aureomycin and sulfamethazine added to feed, or
- (4) Add furazolidone in the amount of 5 to 10 grams per ton feed.

6. Limberneck (Botulism)

a. Symptoms

- (1) Dullness and sleepiness.
- (2) Fall into stupor and coma.
- (3) Head, neck, and wing, rest on the ground.

A hen with limberneck. She is alive
but helpless and limp.



(4) Paralysis.

b. Prevention

Observe hygienic measures.

c. Medical treatment

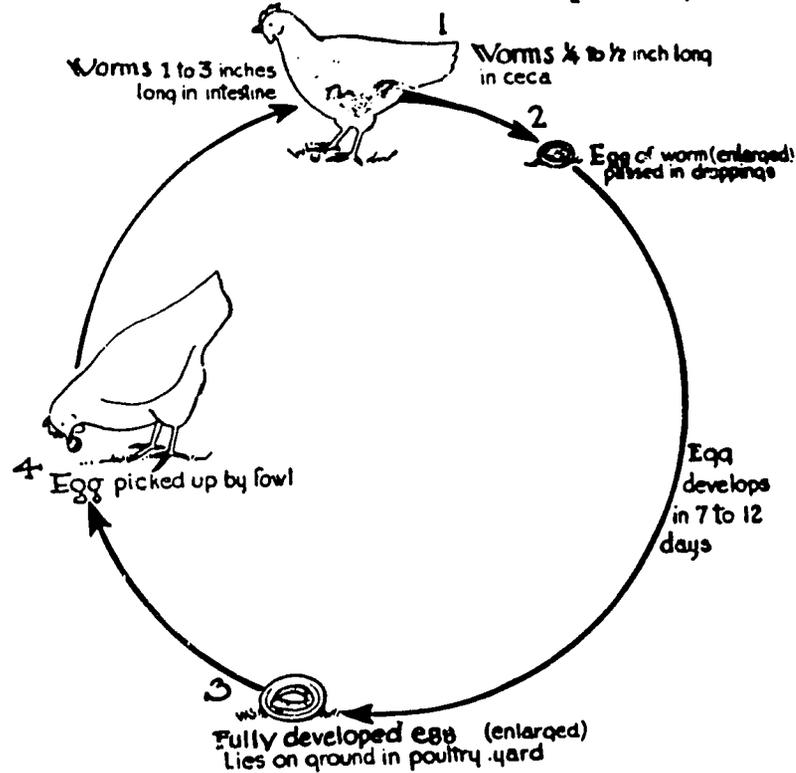
(1) Consult a veterinarian.

(2) Epsom salt in drinking water.

(3) Empty crop of accumulated feed.

7. Ascariasis (Internal Roundworms)

**LIFE CYCLE OF LARGE ROUND WORM
and of cecum worm of poultry**



How to Break It

Clean poultry yards and houses.

a. Symptoms

- (1) Lazy and weak.
- (2) Variable appetite.
- (3) Stunted growth.
- (4) Loss of flesh.
- (5) Pale comb, wattle, and eyelids.

- (6) Diarrhea.
- (7) Low egg production.

b. Prevention

- (1) Observe sanitary measures.
- (2) Yard rotation.
- (3) Burn litters.
- (4) Isolate sick birds.

c. Medical Treatment

- (1) Consult a veterinarian
- (2) Rota cap.
- (3) Aviton.
- (4) Phenothiazine tablet (PN). 1/2 gram pill or
capsul per bird.

8. Taeniasis (Tapeworm)

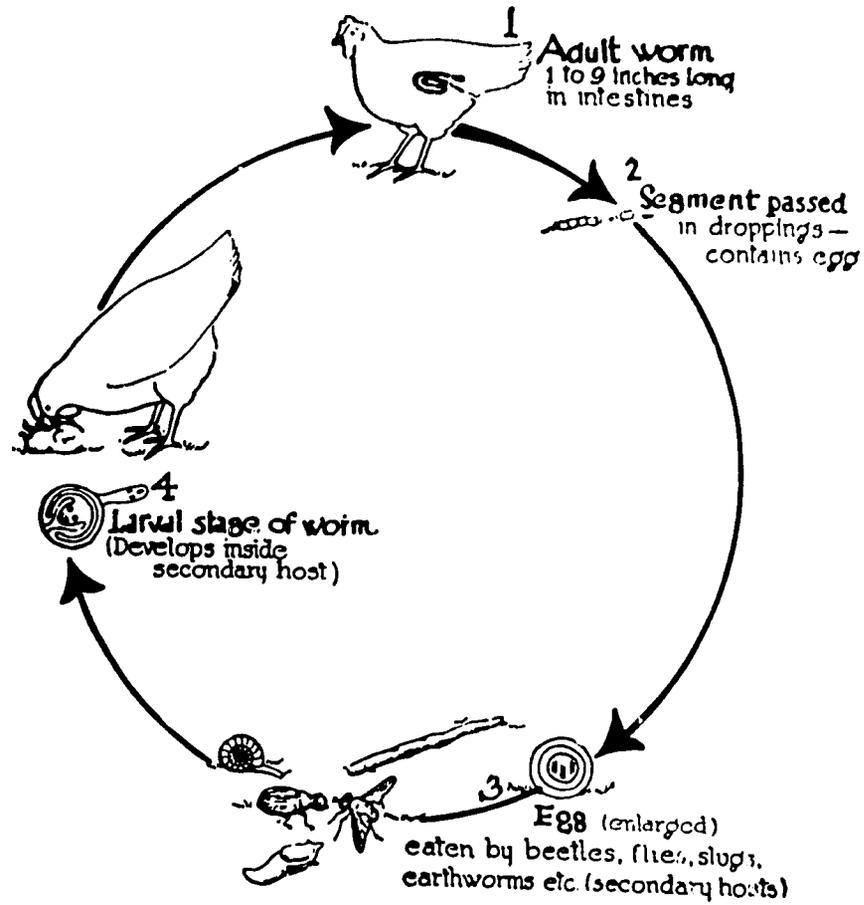
a. Symptoms

- (1) Droopy, weak, ruffled feathers.
- (2) Pale comb, wattle, and eyelids.
- (3) Heavily infested - unthrifty.
- (4) Paralysis of the legs.

b. Prevention

- (1) Sanitation should be observed.

LIFE CYCLE of poultry tape worm



How to Break It

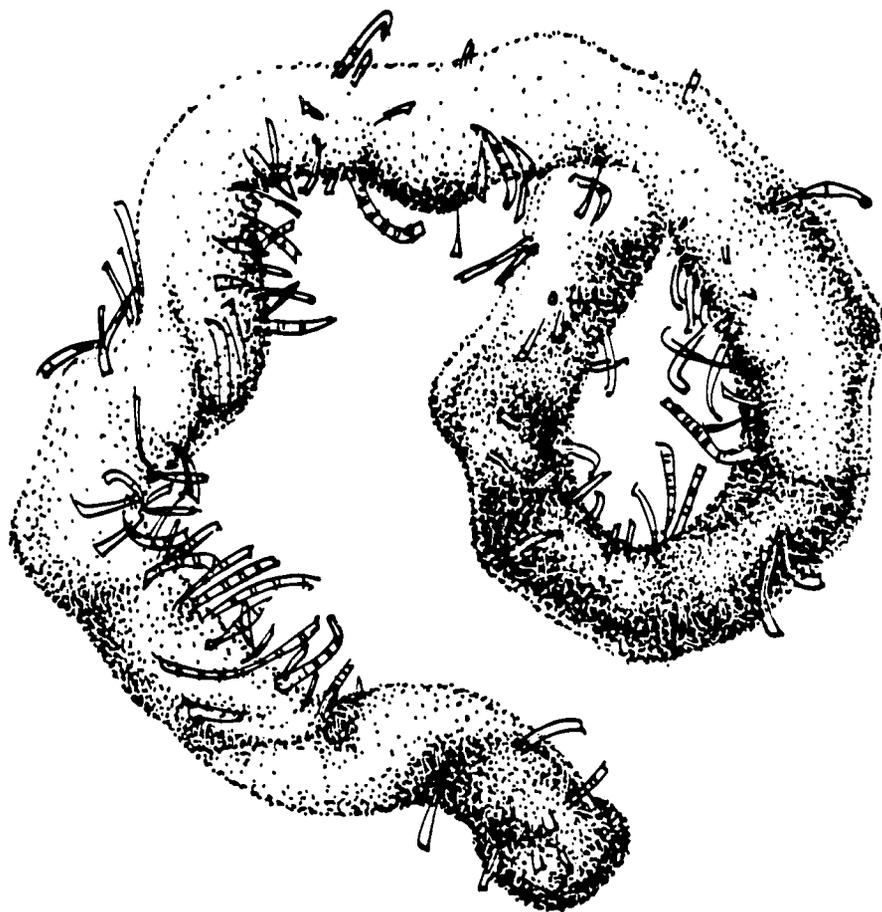
Clean poultry yards and houses.

(2) Burn all trash.

(3) Keep chickens away from manure heaps.

c. Medical treatment.

Consult a veterinarian.



Tape worms attached to inside walls of intestines.

9. Gizzard Worms

a. Symptoms

(1) In mild cases - no symptoms seen.

(2) In severe cases:

(a) Pale comb and wattle.

(b) Very thin.

b. Prevention

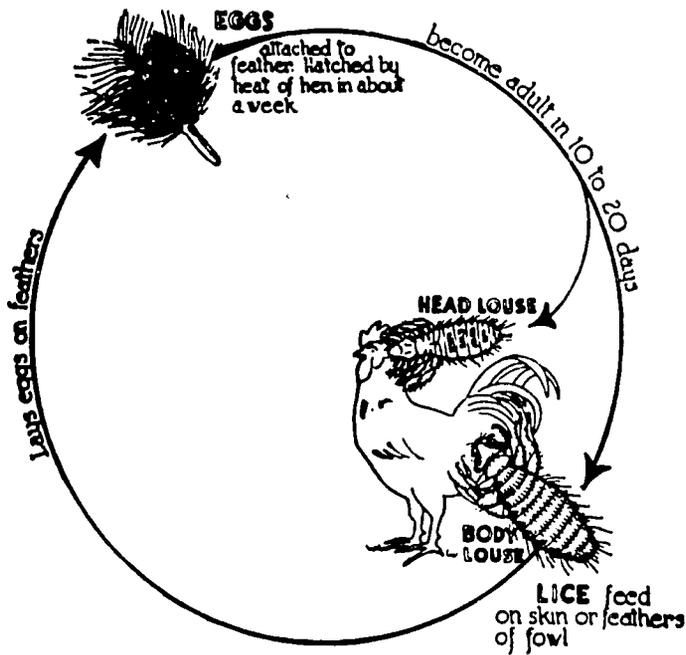
- (1) Observe sanitary measures.
- (2) Burn droppings.
- (3) Destroy manure heaps.

c. Medical treatment

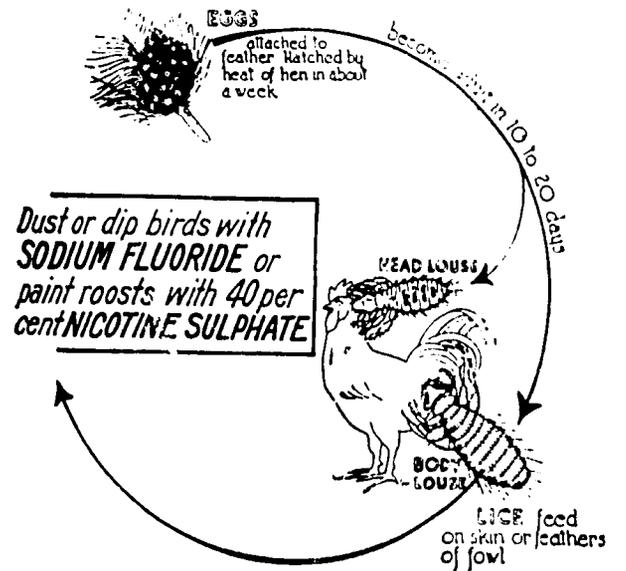
No treatment. Consult a veterinarian

10. Lice Infestation (Pediculosis)

LIFE CYCLE of chicken lice



HOW TO BREAK IT



a. Symptoms

- (1) Restless and nervous.
- (2) Pale comb and wattle.
- (3) Low egg production.
- (4) Always searching for parasite with the beak.

b. Prevention

- (1) Clean nests frequently.
- (2) Burn infested materials.
- (3) Use tobacco midribs for nests.

c. Medical treatment

- (1) Consult veterinarian.
- (2) Tobacco dust in nest and on birds.
- (3) Pyrethrum
- (4) Sodium fluoride (1%)
- (5) Phenothiazine
- (6) DDT powder
- (7) Use kerosene emulsion.

1. Mites (Hanip)

a. Symptoms

- (1) Restless and nervous
- (2) Pale comb and wattle
- (3) Low egg production

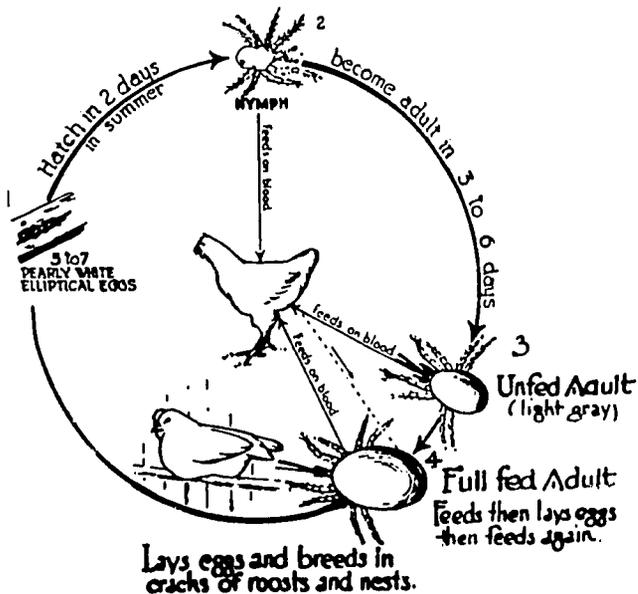
b. Prevention

- (1) Burn all litters and nest beddings.
- (2) Paint the coop and fill the crevices.
- (3) Keep chicks out of weeds.

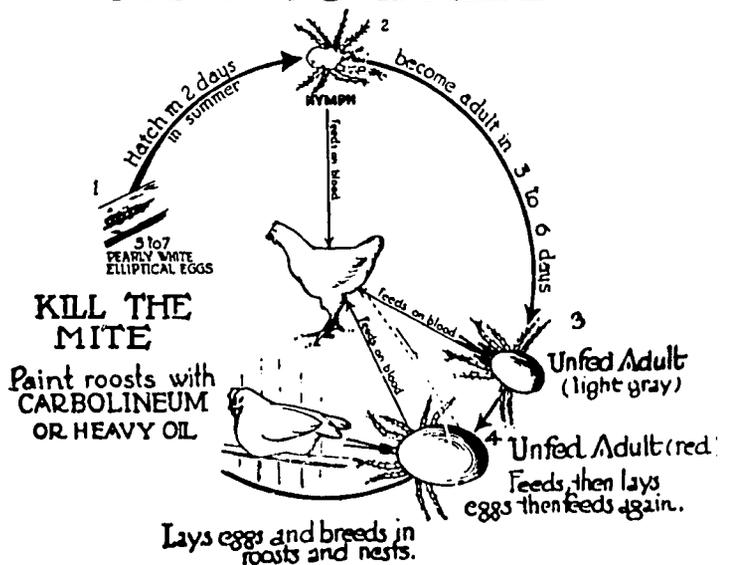
c. Medical Treatment

- (1) Coal tar dip.
- (2) Lime sulphur.
- (3) Kerosene emulsion and soap.
- (4) Dust poultry runs with sulfur - 55.5 kg. per ha.

LIFE CYCLE of common chicken mite



HOW TO BREAK IT



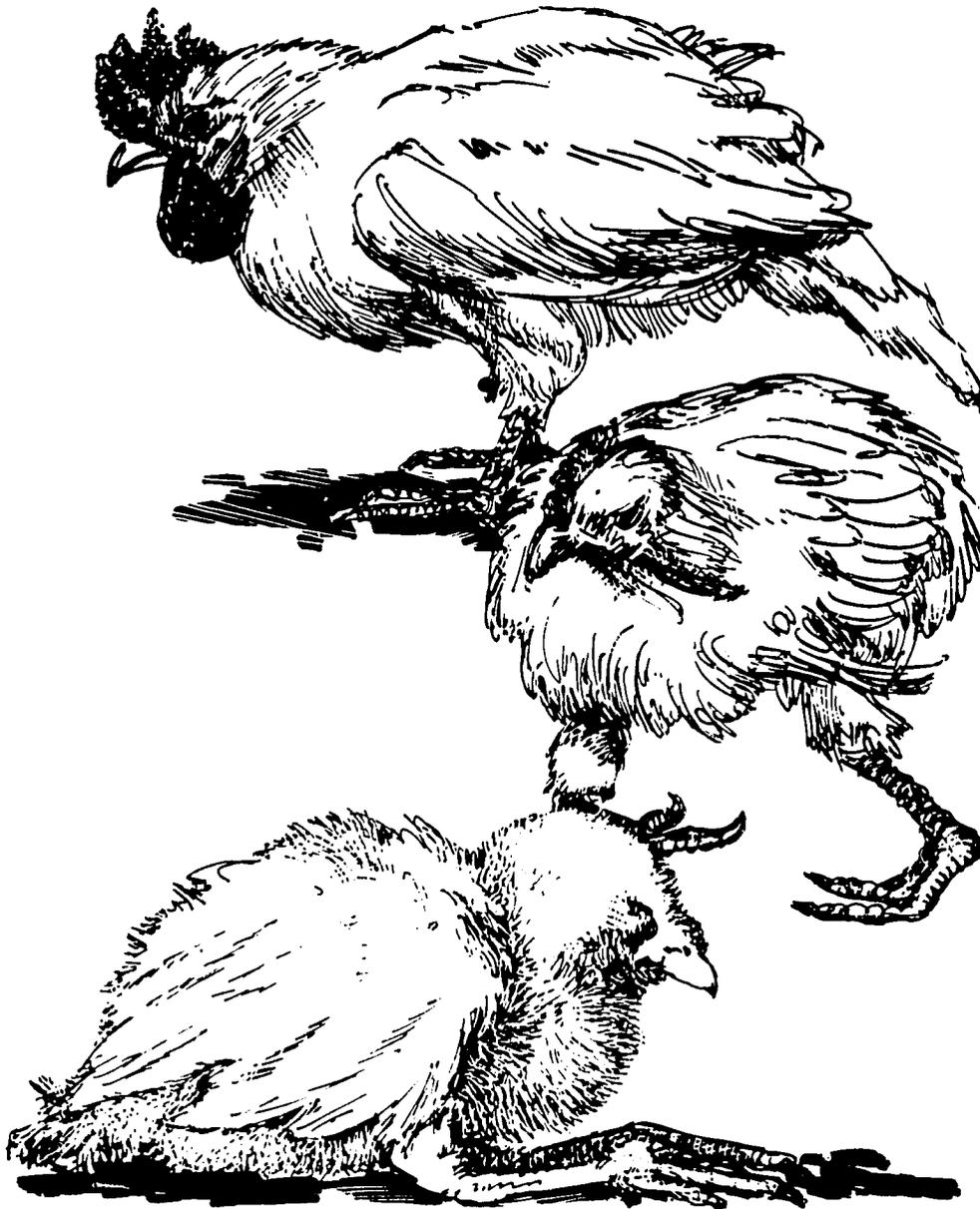
12. Avitaminosis (Nutritional Deficiency in Vitamins A, B, C, D, and E)



These chicks are suffering from vitamin deficiencies. Top: last stages of Vitamin A deficiency. Middle: Vitamin B (Thiamin) deficiency. Bottom: Nutritional encephalomalacia or crazy chicks disease.



A deficiency of mineral matter
causes leg weakness.

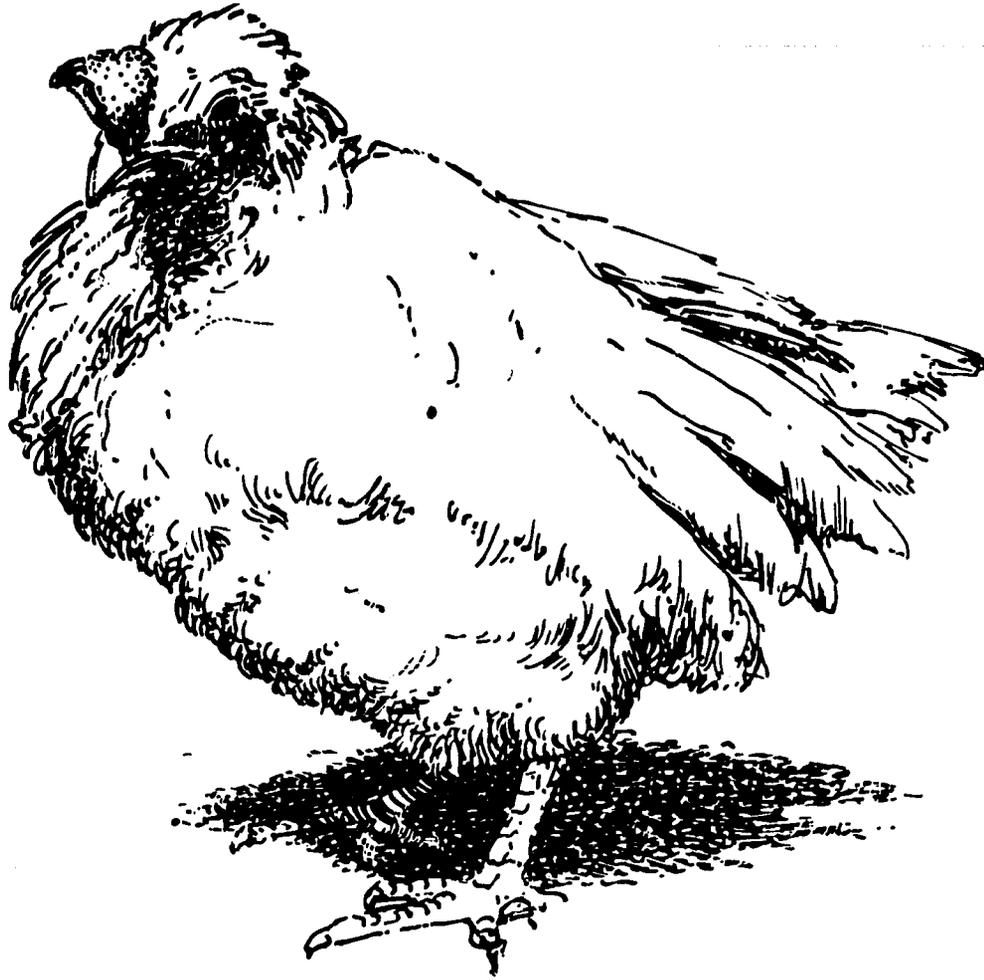


TOP: Rickets - caused by Vitamin D. deficiency.

MIDDLE: Nutritional leg paralysis - caused by ribo-
flavin deficiency.

BOTTOM: Dermatitis - caused by a deficiency of
pantothenic acid.

General nutritional deficiency. Outward physical appearance similar to coccidiosis, but there are no signs of blood in the droppings.



a. Symptoms

(1) May be confused with coryza.

(2) Loss of weight, ruffled feathers, blue comb, unsteady gait, paralysis, retarded growth, leg weakness, nervousness.

b. Prevention

(1) Give full balanced ration.

c. Medical treatment

(1) Give vitamin and mineral supplements.

(2) Consult veterinarian.

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BIBLIOGRAPHY

1. Burgos, Carlos X., Questions and Answers on Chicken Raising, Republic of the Philippines, Department of Agriculture and Natural Resources, Manila, Bureau of Printing.
2. Coronel, Anacleto B., Questions and Answers on Common Poultry Diseases in the Philippines, Popular Bulletin No. 41, Republic of the Philippines, Department of Agriculture and Natural Resources.
3. Jull, Morley A., Poultry Husbandry, McGraw-Hill Book Co.
4. Jull, Morley A., Successful Poultry Management, Whittlesey House.
5. Diseases and Parasites of Poultry, Farmers Bulletin No. 1652, U. S. Department of Agriculture.
6. Waite, Roy H., Poultry Science and Practice, McGraw-Hill Book Co.
7. Rice, J. E. and Botsford H. E., Practical Poultry Management, John Wiley and Sons, Inc., New York.
8. U.S. Operations Mission (F. O. A.) and National Media Production Center, Manila, Producing Poultry for Profit.
9. Johnson, Larry, Poultry Practices, Oregon State College, Corvallis, Oregon, January 1955.
10. Fronda, F. M., 1949, Poultry Raising, Second Edition
Manila: D. P. Perez Company
11. Gapuz, R. B., 1957, Poultry Management in the Philippines, 1st Edition, The Farmers Guide Publishing Co., Malabon, Rizal, Philippines