INDIGENOUS CHICKEN FARMING

TRAINING MANUAL

TECHNOSERVE

KENYA AGRICULTURAL RESEARCH INSTITUTE

Credits:

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FOREWORD

Kenya has an estimated poultry population of 32 million birds, with indigenous chicken forming the largest proportion of 75%, layers and broilers 24% while other poultry species make up 2 %. The industry is thus an important source of food, income, employment and has many social and cultural uses in addition to having linkages with other sectors of the economy.

Indigenous chicken offer a flexible production system, adaptable to many agro-ecological zones and are often ranked highly as an existing resource whose productivity can be increased with minimal inputs. As such, they are highly suitable for vulnerable households and are often owned and managed by women and children. Products from these chickens can improve nutrition security by providing high-quality animal protein (eggs and meat) at the household level. Commercializing the indigenous chicken sector has had several challenges among them frequent disease outbreaks, poor access to improved breeding stock, inadequate management skills, knowledge and information leading to poor productivity and loss of market opportunities.

It is important for producers to learn and adopt good management practices that keep their chicken healthy and productive. Training of service providers is thus an important part of a comprehensive indigenous chicken improvement program. Good management practices and information should also be accompanied by appropriate organizational and cost effective practices by all value chain stakeholders.

This manual is a reference material for trainers and other service providers who embark on an indigenous chicken improvement program. The manual focuses on the use of good management practices for a successful indigenous chicken business.

TOPIC 1.

ROLE OF INDIGENOUS CHICKEN IN HOUSEHOLD ECONOMY

Introduction

Indigenous chicken are the most abundant livestock in many rural and peri-urban households in Kenya. These chickens are also referred to as rural, village, backyard, scavenging, traditional or family chickens, and have various names in local languages. They play an important role in household economies in that they convert feed resources available in the homestead or household into highly nutritious and valuable protein products. Although their output in terms of weight gain and number of eggs per hen per year is low, it is obtained with minimal labour and other inputs. This factor of low input and, consequently, low risk is one of the major advantages of extensive indigenous chicken production systems. Significant returns can be achieved from indigenous chicken without the need for expensive housing, complex technology and funding just by utilizing locally available resources.

Interventions aimed at improving productivity will consequently improve incomes and knowledge of household members. Improvement programs should thus take advantage of the natural competitive advantages inherent in indigenous chicken production systems.

Animal protein consumed in rural areas frequently comes from indigenous chicken meat and eggs. Chicken can also be sold or bartered to meet family needs such as medicines, clothes and school fees. In this way, they act as a ready source of cash for emergencies and small purchases. They also provide manure and play a role in pest control. These birds are also important during special festivals, traditional ceremonies and treatments..

Chicken meat and eggs provide a readily available, high-quality source of proteins, vitamins and micronutrients. Eggs are an excellent source of iron, zinc and vitamin A, all of which are essential to health, growth and wellbeing. Chicken and eggs contribute to a nutritious, balanced diet, which is especially important for children, nursing mothers and many vulnerable groups.

Ownership of Indigenous Chicken

Fig. 1: Feeding indigenous chicken in the homestead.

Nearly all rural and peri-urban households keep small flocks of indigenous chicken, mostly owned and managed by women and children. Simple changes in management of indigenous chickens can significantly improve production and the living conditions of many rural families in terms of enhanced nutrition and income generation through the sale of surplus chickens or eggs. Improved indigenous chicken production is therefore a low-cost and important aspect of enhancing food and nutritional security.

TOPIC 2.

GENDER AND INDIGENOUS CHICKEN FARMING

Analysis of gender relations is of major importance for any type of intervention in rural areas, because the paradigms of access, control and benefits of resources and consequently of exclusion are based on the social relations between men and women.

Therefore, the understanding of gender relations and their implications for livestock rearing are important in promoting appropriate interventions. Different members of the household can have different, even contradictory, interests in agricultural production and livestock. The processes of decision making in households and communities are complex and dynamic. Although male and female farmers have a lot in common, they often have different interests and problems. Men and women may have different interests in relation to animals they have access to and control over. With the animals raised, each species plays a specific role and is owned and cared for by different individuals in the household.

When commencing an intervention to support indigenous chicken production, it is advisable to work with both male and female farmers to determine:

1. *Level of chicken production in the area?*
2. *Major constraints and opportunities for increased productivity*
3. *The most efficient way to promote the selected intervention?*

These issues have to be considered in the interest of establishing successful collaboration and dialogue with male and female farmers.

Fig 2: Gender roles in indigenous chicken breeding management.

TOPIC 3.

INDIGENOUS CHICKEN PRODUCTION SYSTEMS

Indigenous chicken production systems may be divided into three different categories based on management practices;

A: Traditional free-range;

B: Improved semi-free-range and

C: Small-scale confined system

i) Free range system

ii) Improved semi-free range system

iii) Small scale confined system

Fig. 3: Indigenous chicken production systems

Table 1: Indigenous Chicken Production Systems

Criteria	A: Traditional free range	B: Improved semi-free range	C: Small scale confined
Flock size	1-10 birds	5-50 birds or above	More than 100
Inputs	Low	Medium	High
Ownership	Mostly owned by women	Owned by women and family	Businessmen and women
Purpose	For home consumption	Home consumption /income generation	Income generation
Social Role	Social & cultural importance	Social importance	No social importance
Genotypes	Indigenous	Indigenous/improved	Improved
Mortality	High mortality	Moderate mortality	Low mortality
Feed Source	Scavenging	Scavenging+ Supplementation	Commercial feeds
Disease control	No vaccination	NCD vaccination and occasionally Fowl pox	Various vaccination schemes
Housing	Shared with other household members at night	Simple housing made of local material with a run	Housing made of conventional material
Annual egg production	30-50	50-180	250-300
Broodiness	Long	Short	No
Growth rate	Low	Moderate	High
Market orientation	Minimal	Moderate (Based on need)	High (Must have readily available market)
Labour	Minimal	Average	Intensive

Basic production characteristics for indigenous chicken:

1. Hens will start laying when aged 24 - 30 weeks' old
2. At any given time, only about half the hens are productive and some 8 - 10% are out of lay.
3. Egg weight averages 40 g (range 35 - 65 g).
4. Most birds produce 2 - 4 clutches per year, although some birds may produce 5 - 6 clutches. There are about 10 eggs per clutch, with a range of between 5 and 20.
5. About 70 - 90% of the eggs will hatch (*depending on management practices*). Only 20 - 50% of chicks hatched will reach productive age. Approximately 85% of these losses occur in the first 3 weeks of life. Adult mortality is very variable and depends on specific local conditions and the occurrence of diseases.
6. Both sexes have a body weight of about 1.2 kg at 10 - 12 weeks (although males are slightly heavier). Adult hens weigh between 1.0 and 1.5 kg, while roosters weigh between 1.3 and 2.5 kg.

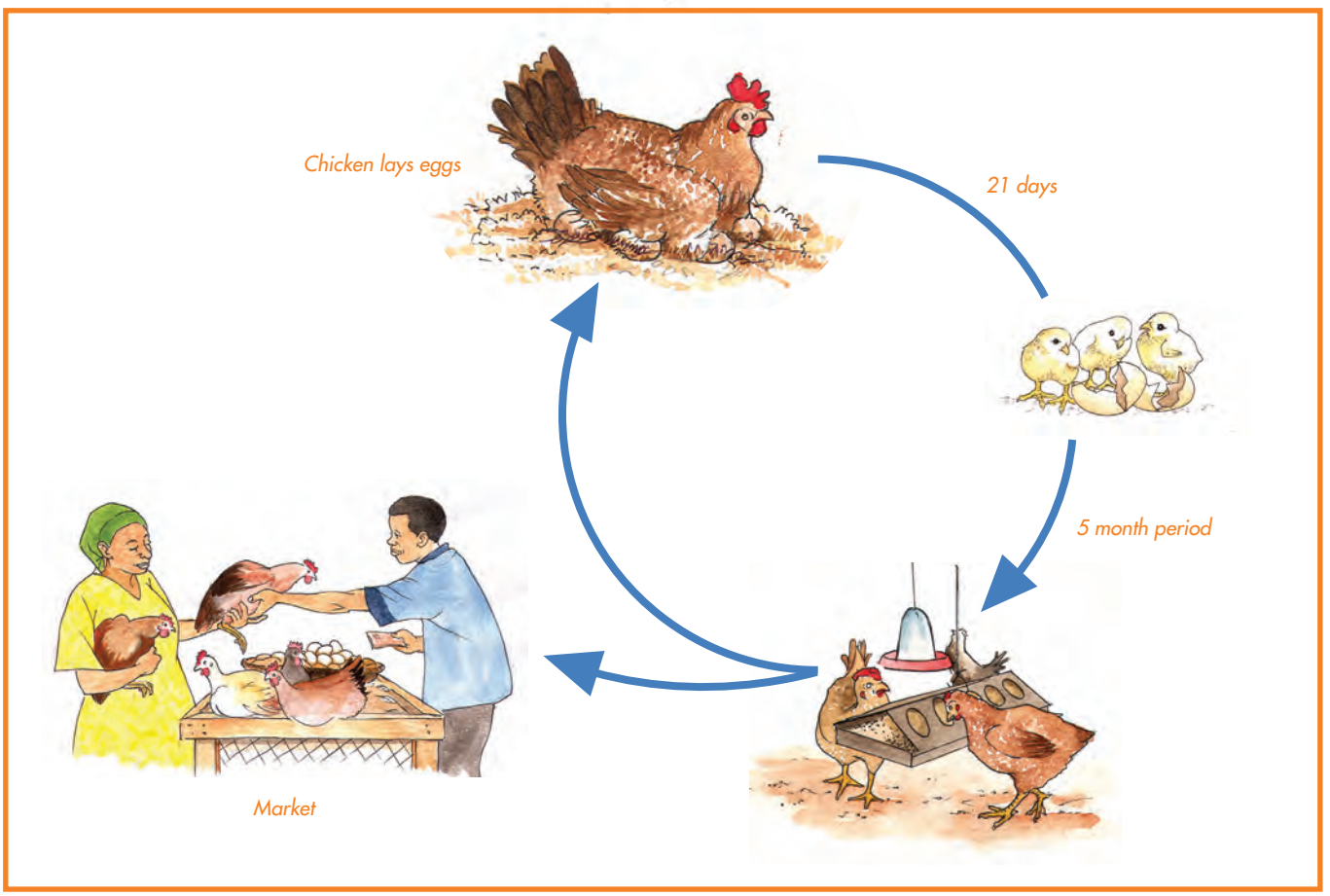


Fig. 4: The life cycle of an indigenous hen

TOPIC 4.

COST BENEFIT ANALYSIS OF A SMALL SCALE INDIGENOUS CHICKEN PRODUCTION SYSTEM

52 weeks plan

In the example referred to in Table 2 (below), the flock size is initially 5 hens and 1 cock, all indigenous chicken. A production may also start with less, i.e. only 1 hen laying eggs, fertilized by a free range cock from a neighborhood. Figures will then have to be adjusted accordingly. With 1 cock and 5 hens, of which no more than 3 hens at any given time are allowed to go broody, the flock size may grow to a maximum of 24 growers and 6 adults which is manageable for a free range poultry enterprise. Under a free range system the scavenging feed resources on the farm will be less depleted if the flock size is kept small *(below 6 - 10 adults and 20 - 30 growers and chicks).*

1. *3 hens sitting on eggs, 1 cock roaming with 2 hens*

2. *3 hens each with 8 chicks walking and feeding*

3. *Vaccinating chicken through an eye drop.*

4. *Selling of chicken (hens and cockerels)*

Fig. 5: Production Plan

Table 2: Input and output of a free range indigenous chicken enterprise

Flock size	**Numbers**
Hens laying and brooding	3
Hens laying and not broody	2
Cocks	1
Surviving chicks/hen/batch*	8
Growers. Weeks 4-24	24
Total flock size	30
Feed consumption: *Assumption(1 kg/bird/4 weeks = 35 g/bird/day)*	**Kg**
Adult feed: 1 kg x 6 birds x 52 /4 weeks	78
Chicks/growers feed: 1 kg x 24 birds x 46/4 weeks	276
Egg production	**Numbers**
Broody hens. 72 eggs/bird/year	216
Hens not going broody. 104 eggs/bird/year	208
Eggs for hatching. 3 hens x 12 eggs x two batches/year	-72
Home consumption:1.5 egg/week	-82
Saleable birds: 3 batches x 8 growers	**Numbers**
Cockerels. 22 weeks of age	24
Pullets for sale. 24 weeks of age	24

**(12 eggs laid=10 eggs hatched = 8 chicks surviving after 4 months)*

Supplementary feeding should also be low to reduce costs. However, chicks aged a day old-to-8 weeks should be supplemented. On average each bird will be given 2 kg feed for 8 weeks. This corresponds to 2,000 g/56 days. Chicks will eat or feed on less while older birds will eat more. 2 batches of 24 growers will require feed two times 22 - 24 weeks, i.e. 44 - 48 weeks, on average 46 weeks. The total annual need for feed in a flock of 6 adults and 24 chicks and growers is calculated below.
Supplementary feed needed for a flock of 30 birds in one year.

1 cock: 1 x 1 kg/ 4 weeks x 52 weeks = 13 kg

5 hens: 5 x 1 kg/ 4 weeks x 52 weeks = 65 kg

24 chicks/growers: 24 x 1 kg/ 4 weeks x 46 weeks = 276 kg

Total: = 354 kg

Improved management and feeding increases egg production of the non-broody hens to 104 eggs per hen per year, i.e. 2 eggs per week on average.

Broody hens will also on average lay 2 eggs per week, excluding 2 x 3 weeks hatching (sitting on eggs) + 2 x 5 weeks brooding, i.e. 2 x 8 weeks = 16 weeks non-laying period per year.

Annually each hen will then lay;

52 - 16 weeks = 36 weeks x 2 eggs = 72 eggs/hen/year.

For three hens going broody only twice a year, the total egg production will be

3 x 72 = 216 eggs/year.

A production of 24 cockerels and 24 pullets per year (Table 2 and 3) is based on the following assumptions:

1. *The sex ratio of hatched chicks is assumed to be 50:50.*
2. *A well-managed broody hen will sit on 12 eggs and hatch on average 10 chicks (about 80% hatchability).*
3. *Using the basket system (housing) and improved management, chick mortality will reduce to a maximum of 1 chick out of ten during the first 4 weeks (equal to 10%) and 1 grower out of nine in the remaining 20 weeks.*
4. *At the age of 22-24 weeks, when the growers are sold, on average 8 growers per batch will be alive.*
5. *Using three broody hens, a total of 3 x 8 growers = 24 birds may be sold twice a year.*

A well-managed production plan means selling birds at the time of highest price, and buying feeds, new hens or inputs (e.g.feeders and drinkers) at the time of the lowest price. For many farmers this means keeping the birds in the flock until the festive season (e.g. IDD, Christmas, Easter or national holidays), where they may get a price often two or three times the normal price. However, it is important to stress that keeping birds in the flock means more feed and a higher risk in terms of loosing birds through predators, diseases or theft. In general birds should be sold no later than at the age of maturity, e.g. 22 - 32 weeks of age.

In the example, in Table 2 and 3, the cost of feeding one bird was KES. 110.50 every 4 weeks, as one kg feed costing KES.15 would be spent during 4 weeks. In this case, if you want to keep a chicken for 4 weeks longer in the flock, you should be sure to gain more than KES. 110.50, from the market price. Otherwise, it would be better to sell 4 weeks earlier at a lower price, and thus be able to restock with new growers. Thus, by knowing the market and environmental conditions and by doing simple economic calculations, you will be able to plan when you should sell your birds, when you should let your hens go broody, and when you should keep your birds in the flock.

Table 3: Cost-benefit analysis

Cost benefit analysis	Description	Unit cost	Cash flow
Cost		***KES.***	***KES.***
5 hens and 1 cock		(5 x 300) + (1 x 400)	1,900
Basket, night + day baskets	2 baskets	600	1,200
Low cost home – made feed	354 kg	15	5,310
Vaccine + medicine	60 doses/year	3	180
Miscellaneous			
Cash out – flow			8,590
Income (Benefit)			
Sale of eggs	424-154=270	10	2,700
Sale of cockerels, 22 weeks (Cockerels grow faster than pullets)	24	400	9,600
Sale of pullets, 24 weeks	24	300	7,200
Total cash in flow			19,500
Net Cash Flow			***10,910***

TOPIC 5.

POULTRY DISEASE CONTROL

What is disease?

Disease can be defined as any change or impairment of normal body function that affects the chickens' ability to survive, grow or reproduce.

An understanding of the cause of a disease and its method of spread (transmission) will assist in controlling it. Knowledge of the clinical signs of a disease and the characteristics of lesions found at Post-mortem will help in its diagnosis and instituting preventative measures.

Why Learn Disease Management and Control?

- Diseases kill
- Interfere with normal growth
- Reduce productivity (eggs/ meat)
- Diseases lead to heavy losses
- Affects local and international trade

Causes of Disease

Many diseases – called infectious diseases – are caused by organisms that can be transmitted from one bird to another. Such organisms include viruses, bacteria, fungi and protozoans. Other infectious organisms are external (lice, fleas and ticks) or internal (roundworms, tapeworms, flukes) parasites.

In many cases, disease results from a combination of factors such as husbandry, nutrition, environmental factors and flock management. All these have a direct and important influence on the health and productivity of chickens.

Factors Influencing the Health Status of Indigenous Chicken

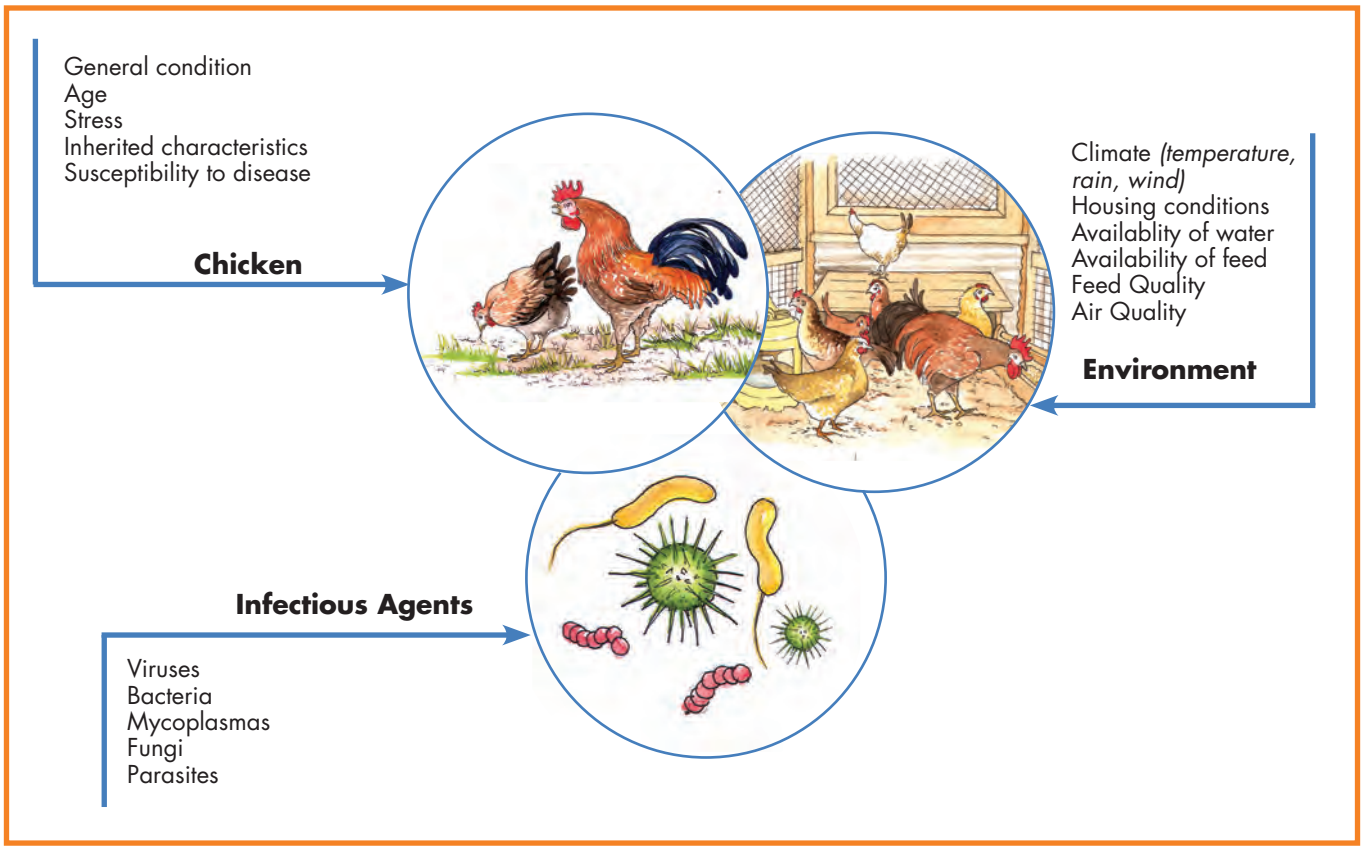


Fig. 6: Factors influencing the health status of indigenous chicken.

Characteristics of Healthy Birds

- Alert and on guard
- Bright eyes and comb
- Walk, run, stand and scratch
- Continuously eat and drink
- Normally lay eggs
- Normally smooth and neat feathers
- Soft compact droppings
- Breathe quietly

Fig.7: Healthy chicken

Characteristics of Unhealthy birds

- Tired and lifeless
- Dull eyes and comb
- Sit or lie down
- Eat and drink less
- Diarrhea
- Lay less or stop laying eggs
- Ruffled and loose feathers
- Wet droppings with blood or worms
- Cough, sneeze and breathe noisily.

Costs Associated with Disease

- Mortality
- Morbidity
- Reduced productivity- weight gain/egg production
- Downgrading at processing
- Treatment
- Vaccination
- Surveillance and monitoring
- Loss of market
- Public health control
- Welfare perceptions
- Fowl Typhoid

Note: *Preventing disease is better and generally cheaper than treatment. Preventing diseases in indigenous chicken by use of vaccination and improved management is the most cost-effective approach for disease control.*

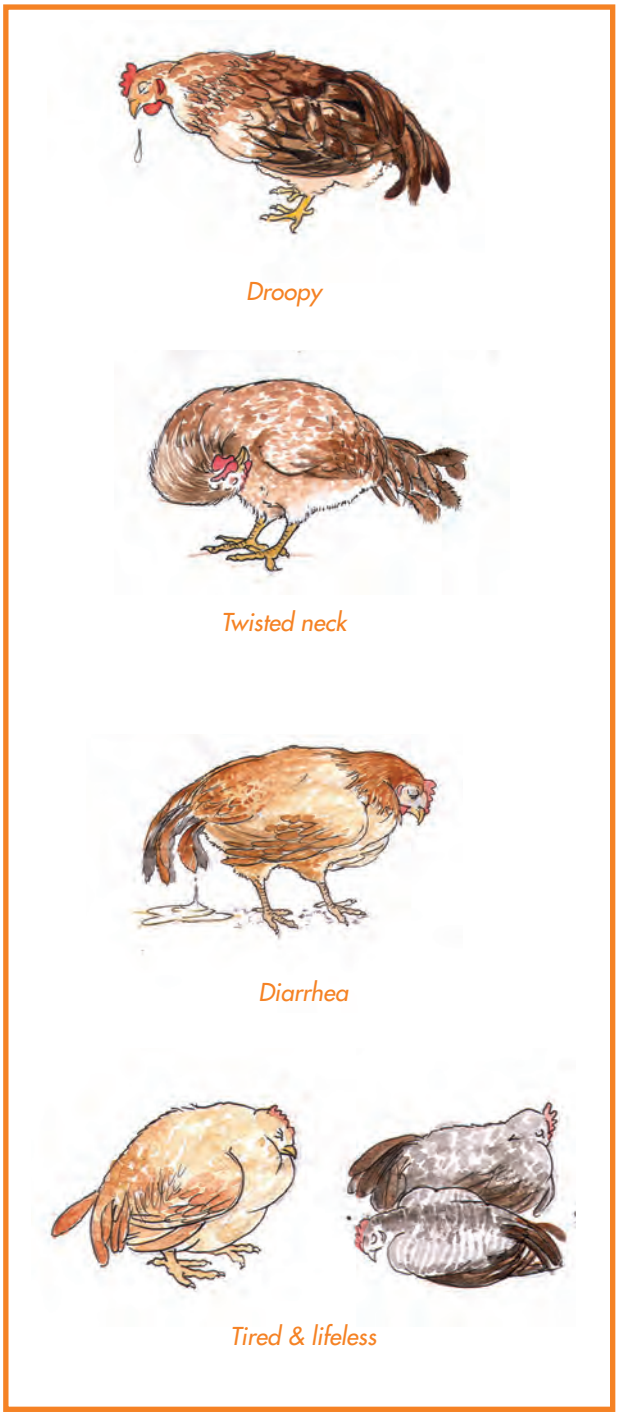


Fig. 8: Sick chicken

Categories of Common Poultry Diseases

Diseases in poultry are divided into three categories and the importance of a disease is judged by its mortality rate and effect on production;

a) Diseases of High importance:

These are diseases with high mortality (more than 30% of the flock), highly contagious and difficult to treat. They include diseases such as;

- Newcastle Disease
- Avian Influenza (AI)
- Fowl pox
- Fowl cholera (pasteurellosis)
- Coccidiosis (internal parasites)

b) Diseases of Medium importance

These are diseases with medium mortality (10 - 30% of the flock) and/or difficult to treat. They include diseases such as;

- Pullorum disease (*Baciillary white diarrhoea*)
- Gumboro (*Infectious Bursal Disease, IBD*)
- Infectious coryza
- Chronic respiratory disease (Mycoplasmosis)
- Roundworms and tapeworms (Internal parasites
- Mycotoxicosis (fungal poisoning)
- External Parasites

c) Diseases of less importance:

Not common, with lower mortality and/or easy treatment.

- Marek's disease
- E. coli infection
- Scaly legs
- Nutritional diseases

TOPIC 6.

BIO-SECURITY

Biosecurity is a set of management practices which when followed, collectively reduce the likehood of introducing or spreading disease causing organisms onto and between sites.

Most infectious agents enter the chicken via the beak while eating, drinking or cleaning its feathers, or during breathing. Other infectious agents can infect a wounded chicken. The agent then multiplies within the chicken and may spread, causing damage to certain organs result into clinical signs. After multiplication, some of the infectious agents leave the chicken through droppings, in discharges from lesions, in its breath, or even on dropped feathers. When other chicken come into contact with these contaminated items, then they too may get infected.

Infectious agents can survive outside the chicken for variable periods. Worm eggs and coccidia, for example, can survive for several months in the environment while some other infectious agents are easily destroyed by sunlight, disinfectant or heat.

In the spread of diseases caused by agents that are easily destroyed, a direct contact between the chicken and agents is necessary. Infectious agents that can survive for a certain period in the environment can also be spread via persons, animals and materials that might carry the agent. The infectious agent might be carried with small traces of droppings on shoes, or in the dust or small feathers attached to any rough surface, on the eggshell or any part of a dead chicken.

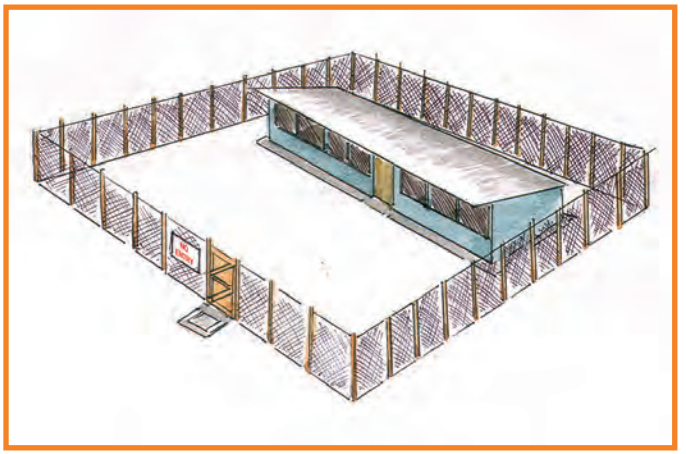


Fig. 9: A fenced poultry unit with restricted entry and a pedestrian foot bath at the entrance.

NOTE: *Some infectious poultry diseases for example Newcastle disease cannot be controlled by good production and flock management alone. Such diseases are caused by contagious viruses and can lead to high losses in chicken or other poultry species. Because of their huge impact on the poultry industry, they are referred to as notifiable diseases. Outbreaks must be reported to, and control measures coordinated by, the veterinary departments.*

Once infectious agent enter the chicken, the chicken does not get sick immediately. It usually takes some days for the bird to show signs of illness. This period is reffered to as the 'incubation period'. During this period the bird does not show any signs of disease but the number of infectious organisms inside it increases rapidly and some organisms may leave the bird when it breathes or drinks or passes droppings. This means that the agents causing an infectious disease can be spreading even before clinical signs of the disease are manifested.

Some infectious diseases can also be spread vertically, i.e. from the hen to its offspring, via the eggs. To date, vertically transmitted diseases are more of a problem in commercial poultry enterprises.

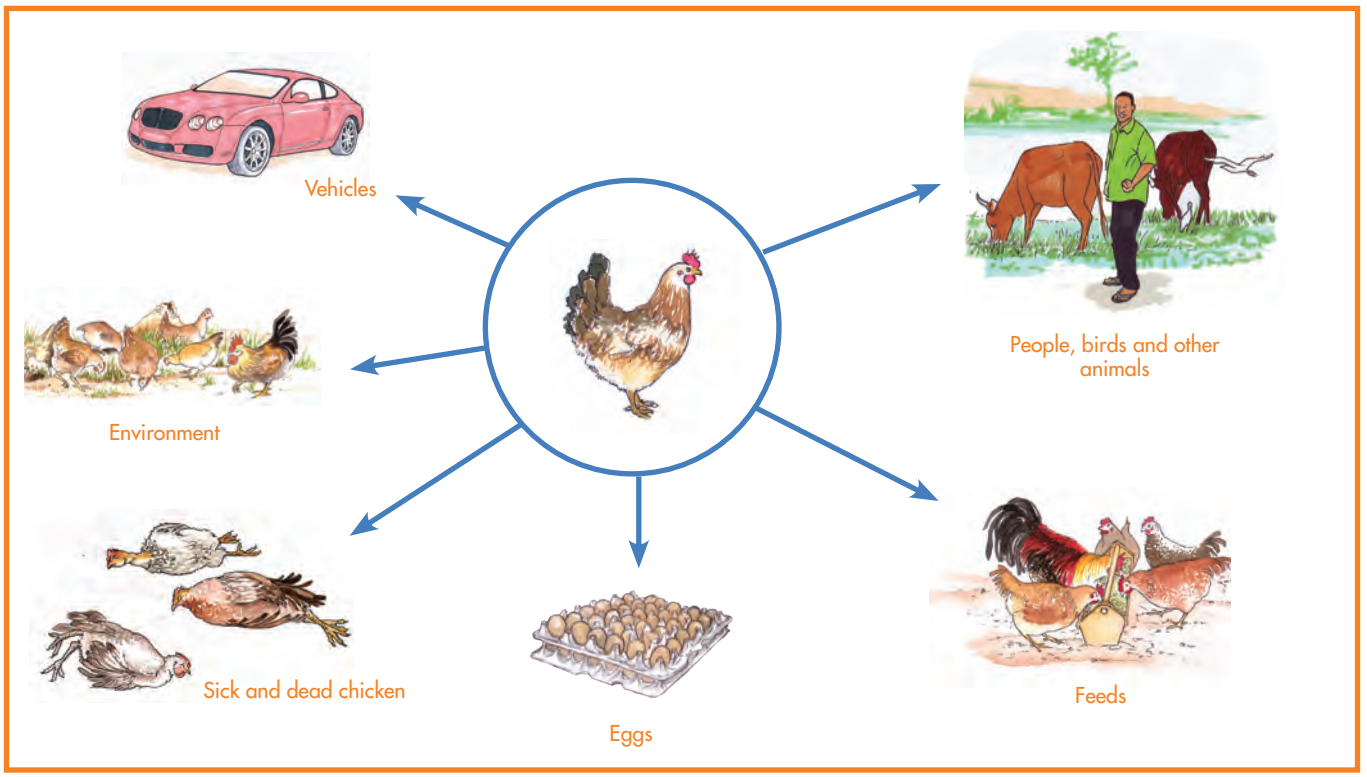


Fig.10: How diseases are spread

Common Bio-security Measures

- **Location:** Avoid locations close to existing premises (between farms 500m-1 km); Use prevailing wind directions when planning to minimize risk of airborne infection
- **All-in-all-out:** Reduce build up of disease causing organisms by breaking the rearing-cycle for different ages.
- **Litter disposal:** Remove used litter and properly dispose and disinfect it.
- **Site security:** Reduces possible introduction of infection to premises mainly from personnel moving between houses and flocks, equipments and other innate objects.

Fig. 11: Bio- security measures;
Disposing dead birds through burying and burning.

TOPIC 7

VACCINES AND VACCINATION

Vaccines protect chicken from infectious diseases but they cannot treat diseases. Moreover, vaccines are disease-specific and protect chicken against a specific disease rather than all diseases. Vaccines work best on healthy, well-managed chicken.

Why Vaccinate?

1. Because many infectious disease agents are always present in the environment and are difficult to control even with the best bio-security measures
2. To reduce losses due to morbidity and mortality caused by infectious agents
3. To protect chicken against diseases causing egg production drop and egg shell deformities

NOTE: *Never vaccinate sick chicken.*

Vaccine Specificity

A particular vaccine will protect chicken against a specific disease. Chicken may suffer from other diseases despite successful vaccination. VACCINATION can NEVER provide 100% protection; but it is part of a complex preventative policy of which biosecurity and hygiene are equally essential.

Rules of Vaccination

1. Vaccination should not to be administered to sick birds
2. Always adhere to the genetic make-up of the chicken
3. Cost the benefits of vaccination against potential loss
4. Maternal antibody status - often have a significant effect on the design of a vaccination programme.

Vaccine Administration

Vaccines should be stored at 4 - 8°C and protected from heat and direct sunlight. Vaccines should be transported in a coolbox. All equipments used for vaccination should be disinfected in boiling water.

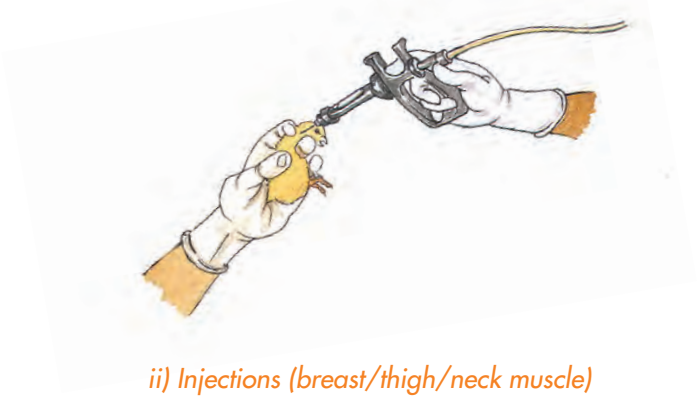
NOTE: *Vaccination programmes are NOT universal and have to be designed based on:*

- *Type of chicken*
- *Production systems*
- *Disease prevalence in the local area*

DO NOT USE CHEMICALS *to disinfect vaccination equipment. Instruction on vaccine dilutions should be followed as per the manufacturer's instructions*

Some vaccination methods are shown below:

i) Eye drops



ii) Injections (breast/thigh/neck muscle)

iii) Skin piercing (wing web)

iv) Orally (in feed or water)

Fig. 12. Some vaccination methods

> ***NOTE:*** *It is best to vaccinate birds during the cool hours of the day, either in the morning or evening. Vaccines should be used within 60 minutes after reconstitution. Always consult a veterinarian when in doubt before vaccination*

Vaccination tools include Vaccines, Distilled water, Sterile needles, syringes, Cool box and a clean apron and gumboots.

Table 4: Common Poultry diseases

Disease	Causative Agent	Transmission	Common Signs	Effects to Birds	Management & Control
Newcastle	Viral Virus can survive in dead host or excretions up to 12 months; Virus is sensitive to disinfectants, fumigants and sunlight.	Aerosols, Ingestion, Contact (Human, dead birds, droppings, eggs-contaminated shells)	Coughing, nasal discharge, gasping, Drooping wings, Paralysis Twisting of head and neck Swelling of head Greenish/watery diarrhoea High mortality PM-Petechiae in proventiculus, gizzard and enteritis	• Death in high numbers • Drop in egg production • Blood spots in eggs • Rough/ shell-less egg • Reduced hatchability	• Quarantines • Institute biosecurity measures • All in-all out • Vaccination
Gumboro	Viral Ages severely affected 14 -28 days; signs commonest at 4-6 weeks of life. Virus resistant in houses and droppings.	Oral, Respiratory tract	Vent pecking, Diarrhoea with urate in mucus, Sudden death, PM-Skeletal bleeding, Swollen Bursa of Fabricious, Dehydration, Swollen kidneys with urates.	• Moderate deaths • Secondary infections	• Vaccination as scheduled
Fowl pox	Viral	Contact	Cutaneous form: Nodular lesions or non-feathered skin Diphtheritic form: Lesions on mucus membranes of mouth, oesophagus, pharynx and trachea	• Retarded growth • Decreased egg production • Low or moderate mortalities	• Vaccination and Quarantine

Infectious Coryza	Bacteria Survives for 2-3 days outside the bird but is easily killed by heat,drying and disinfectant.	Conjuctiva or nasal	Incubation period of 1-3 days, fast spread of disease to the whole flock Facial swelling Purulent ocular and nasal discharge Sneezing and dyspnoea	• Loss of condition • Drop in egg-production • Low mortality	• Antibiotic; Flouroquinolones, might prevent carriers. • Keep Coryza-free birds • Proper management of the flock.
Fowl Typhoid	Bacteria	Contact	In chicks- acute infections with sudden deaths of up to 90% Vent pasting with chalky-white excreta	• High death up to 90% • Poor growth, • Poor feathering of survivors • Decreases egg production	• Antibiotic and Vaccination
Coccidosis	Coccidia A protozoan with several species Parasites multiply intracellularly, infection common in over-stocked flocks Oocysts remain viable for many months but killed by freezing, extreme dryness and high temperatures	Ingestion of contaminated feed with bird droppings containing oocysts	Bloody stained droppings or yellowish diarrhoea High mortality around the 6-8th week of life	• Impaired feed utilization or conversion • Uneven growth • High death rates • Low production	• Outbreaks treated immediately using coccidiostats • Avoid contamination of feeds and water by droppings • Avoid wet-litter • Avoid over-crowding • Coccidiostats mixed in feeds for young flocks
Internal parasites	Several worms Infestation with e.g Round worms, Ascarides, Cestodes, Tapeworms	Ingestion of infective stage of worms	Loss of body condition Death in heavy infestations	• Downgrading of eggs - Loss of shell colour, strength, yolk colour and egg size • Poor weight gain, poor feed conversion • Increased cannibalism via vent pecking due to straining	• Use appropriate dewormers e.g. Fenbendazole, Piperazine or Levamisole • Strict sanitation • Segregate birds by age group • Clean house before introduction of new batch
External parasites	Mites, Fleas, Lice and Ticks	Contact	Uncomfortable-Scratching, pecking, irritation, blood loss, loss of feathers	• Retarded growth • Reduced egg-production • Damaged plumage • Death	• Use appropriate acaricides e.g. Synthetic Pyrethroid, Organophosphates • Ensure strict hygiene

POULTRY DISEASE DIAGNOSIS

History

The case history will give information about the course of disease (number of birds affected, severity and duration of the disease), the means of introduction into the flock and whether or not the disease is infectious. The person looking after the chicken should be asked the following questions since they generally have a better understanding of what is going on in the flock.

Fig. 13: A farmer observing her chicken.

Observations of chicken:

a) Why do you think the chickens are sick?
b) Describe the signs observed.
c) What age groups are affected by the disease (chicks, growers, adults)?
d) When did your chicken become sick?

Severity and nature of the disease:

a) How many chicken do you have?
b) How many of them are sick?
c) Have any of your chicken died? OR Have any chicken been disposed recently because they were sick? If yes: how many?
d) Do you have other poultry besides chickens? Are they sick too?

Management factors:

a) Do you provide feed and water for your chickens?
b) If yes: how often do you provide them with fresh feed and water?
c) What do you feed your chickens with and how much do you give them?
d) Where do you keep the chickens at night?
e) If you provide housing for your chickens, how often do you clean the shelter?•
f) Did you use any traditional remedies or drugs for your chickens?

g) Have the birds been vaccinated?
h) When and what vaccine was used?

How the disease might have entered the flock:

a) Do birds in neighboring flocks show the same signs? If yes, how many flocks are affected?
b) Did you bring new birds to your household recently?
c) Did you recently visit someone whose chickens were sick? OR Has someone whose chickens are sick recently visited your homestead?

Clinical examination of the whole flock and its environment

This examination will provide information on the health status of the flock and confirm the information provided by the person attending to the chickens. Since chicken in poor condition are more likely to get sick from any infectious agent, an assessment of housing and nutrition is also important.

Examination of the whole flock:

a) Are the chicken active?
b) Do they scavenge for their feed?
c) Is feed and water provided? If so, is the feed fresh or old and/or mouldy?
d) How many of the chickens are sick?
e) Which age groups are affected by the disease?
f) What does the plumage (feathers) look like?
g) What do the droppings look like?
h) Are the hens laying eggs as normal?
i) What do the eggs look like?

Examination of the environment:

a) If the farmer provides housing:
   i. Where and how are the chicken kept at night?
   ii. Is the shelter clean?
   iii. Is the shelter crowded at night?
b) If the farmer provides feed/water:
   i. What is the quality of feed or water provided?
   ii. Is the drinker or feed trough clean?
c) Do the chickens find feed and water from the surroundings?
d) Are there many droppings close to the chicken house, waterer or feed trough?

EXAMINATION OF A BIRD

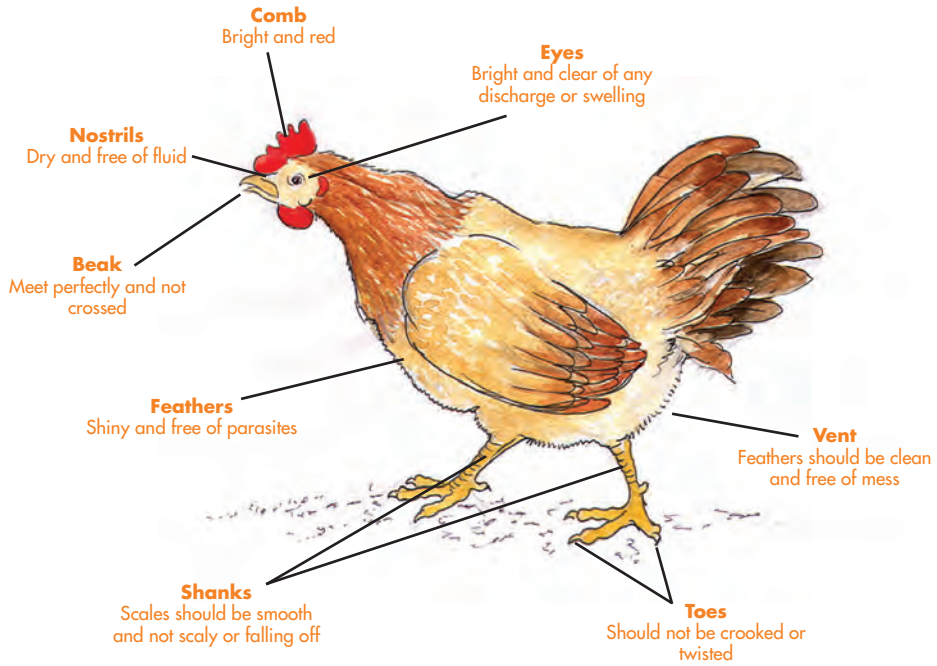


Fig. 14: Characteristics of a healthy chicken

To examine a sick chicken you will have to catch and hold it in your hands in a way that does not injure the bird. Examine the bird thoroughly for the following signs:

General signs

a) Is the bird active or sleepy?
b) Are the feathers smooth, clean and free of external parasites?
c) Is the bird well nourished? (*Feel the breast muscle of the bird: birds that have been sick for a long time lose body weight and have a thin breast muscle. Feel the muscle of other birds for comparison.*)
d) Has the bird eaten within the last few hours? Feel the crop to confirm.

Respiratory signs

a) Is the bird breathing through an open beak?
b) Is the breathing noisy?
c) Is the bird coughing or sneezing?
d) Are there swellings around the eyes and discharge from the eyes, nose or beak? If present, nasal discharge can be squeezed out by pressing gently above the nostrils.

Diarrhoea

a) Are the feathers around the vent dirty? The feathers will be dirty when the bird has diarrhoea.

Nervous signs

a) Does the bird show any nervous signs (e.g. twisted neck, trembling)?

Movement

a) Is the bird lame?
b) Are the joints swollen?
c) Are the legs and wings in a normal position

Skin and feathers

a) Are there external parasites on the feathers and other body parts (head, under the wings, above the vent)?
b) Are there injuries or lesions on the bird's skin, especially on the head, comb and wattles?
c) Are the feathers damaged?
d) Are there changes in colour (pale, dark, bluish) or size of the comb or wattles?

> ***NOTE:*** *Submit whole chicken (dead or alive) to the lab when necessary for confirmatory diagnosis.*

TOPIC 8.

CHICK PLACEMENT AND BROODING

Handling of the day-old chick and management of the brooding program has a direct relationship on life-time production of the bird – whether indigenous chicken, breeders, layers or broilers, as well as flock mortality. The four factors to control are;

1. Feed
2. Water
3. Temperature
4. Air quality
5. Hygiene

NOTE: *Effective chick management begins before the day-old chicks arrive.*

Prerequisites for brooding

1. Brooding houses should be isolated from other houses containing older birds. The producer should follow an ***"all-in, all-out"*** program, never mixing birds of different ages.
2. All facilities must thoroughly be cleaned, and disinfected.
3. Before the arrival of chicks the brood ring and heaters must be checked to ensure that they are working properly.
4. On arrival chicks should be offered fresh water containing glucose where applicable.

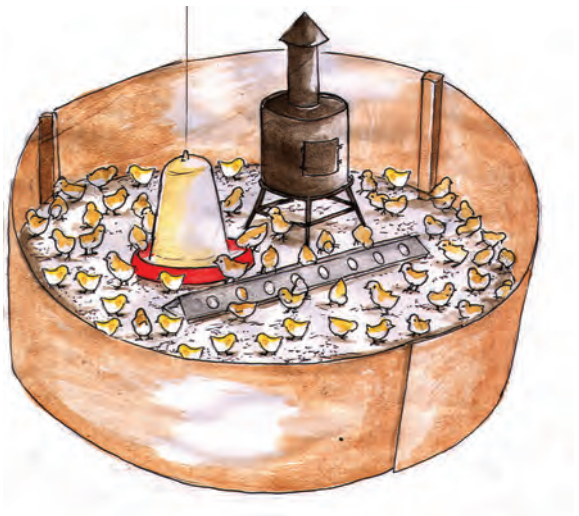


Fig. 15: A brooder ring with a heat source (jiko), water and feed

Why Brood?

A newly hatched chick has not developed the mechanism to regulate its body temperature. Therefore, it cannot maintain its body temperature properly for the first few weeks and is subject to chilling.

Artificial brooding is mainly aimed at providing the right temperature for the chicks. Brooding will help to provide extra heat, from external sources to newly hatched chicks. When artificial heat is not provided the chicks will not take sufficient feeds and water. This leads to retardation of growth and poor development of internal organs, responsible for digestion. Thus the chick will not be able to digest the yolk completely.

Egg yolk is a highly nutritious feed for chicks. As such if it is not absorbed completely by the chick, there is growth and multiplication of bacteria on the yolk leading to Early Chick Mortality (ECM) and growth retardation. A condition called **omphalitis** (yolk infection).

Preparations for Chick Placement

The brooding house ***MUST*** be cleaned and disinfected, preferably using a sprayer. Feeders and drinkers should be washed and disinfected two days before use. All equipments in the house should be arranged and the litter spread. The brooder ring should be prepared and curtains fixed on the open sides to insulate the brooder house. Use of a good quality terminal disinfectant, for the final spraying before the chicks are placed is recommended. Provide foot baths at the entrance with lime powder or any other disinfectant such as Ominicide or, TH4.

i) Cleaning of house and removal of cobwebs

ii) Spraying the unit for disinfection

Fig. 16: Preparation for chick placement

Preparation of a Brooder Guard

Use an 18 inch cardboard sheet, aluminum sheet, coffee wire as brooder guard material to make a circle that uses 20 feet in diameter of the brooder guard for 50 chicks; 25 feet for 100 chicks; 30 feet for 150 chicks; 35 feet for 200 chicks. The brooder should be ready prior to disinfection. Fill the ring with suitable litter material such as wood shaving or straw up to 4 inches thick from the floor, and then spread newspapers to cover the litter on the floor. The heat source should be placed at the centre of the brooder ring.

Chick Check

The crops of chicks should be checked the morning after placement to ensure they have found feed and water. At this time, a minimum of 95% of the crops should feel soft and pliable indicating chicks have successfully located feed and water. Hard crops indicate chicks have not found adequate water and water availability should be checked immediately. Swollen and distended crops indicate chicks have located water but insufficient feed and in this case the availability and consistency of the feed should be immediately evaluated.

Feed Management

The use of supplemental feeder trays at placement is recommended to help chicks get off to the best start possible. Trays should be provided at the rate of 1 per 100 chicks and should be placed between the main feed and drinkers adjacent to the brooders. Supplemental feeders should be provided for the first 7-10 days.

Light Management

Continuous lighting should be provided for the first 48 - 72 hours post placement. For the first 7 days light is required to help chicks find feed and water.

Brooding Temperature

The ideal brooding temperatures are as measured at the edge of the hover and 5 cm above the litter surface. The best time to observe the chicks and make temperature adjustment should be during the coldest times of the day. Thermometers may not always be available. Therefore, use the behaviour of chicks as a guide.

Chick Behaviuor

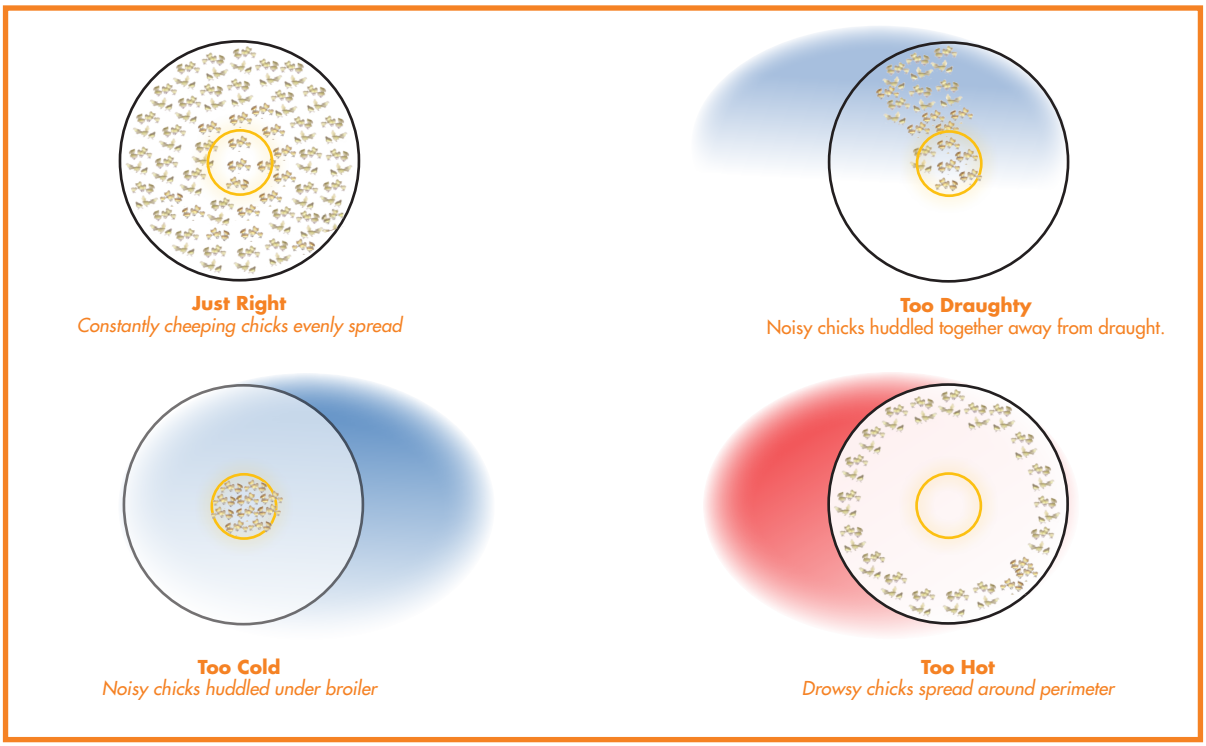


Fig. 17: Chick behaviour at different temperatures.

Adequate floor, feeder and drinking spaces are also important, relative humidity, light and ventilation should be provided for optimum comfort of the chicks. Free moving spaces should be provided all around the feeders and drinkers, so that the chicks can feed and drink freely.

Induction of Chicks

1. Light the brooder heat source an hour prior to chick arrival so that the ring temperature is 32°C.
2. Count the chicks properly while receiving.
3. Release the chicks into the brooder ring after dipping their beaks in water.
4. Wait for some time to allow the chicks to take water before introducing feed in a chick feeding tray or clean egg tray. Do not sprinkle feed on the newspaper as this will get contaminated.
5. For the first 3 days watch whether the chicks have taken feed and water at 2-3 hours interval
6. Remove and replace the top newspapers daily and remove any wet litter immediately

Temperature Step Down

Step down temperatures in the brooder at the rate of 2° C every 7 days. This will ensure that chicks adapt to the ambient temperatures of 18 - 22° C after the brooding period of 28 days.

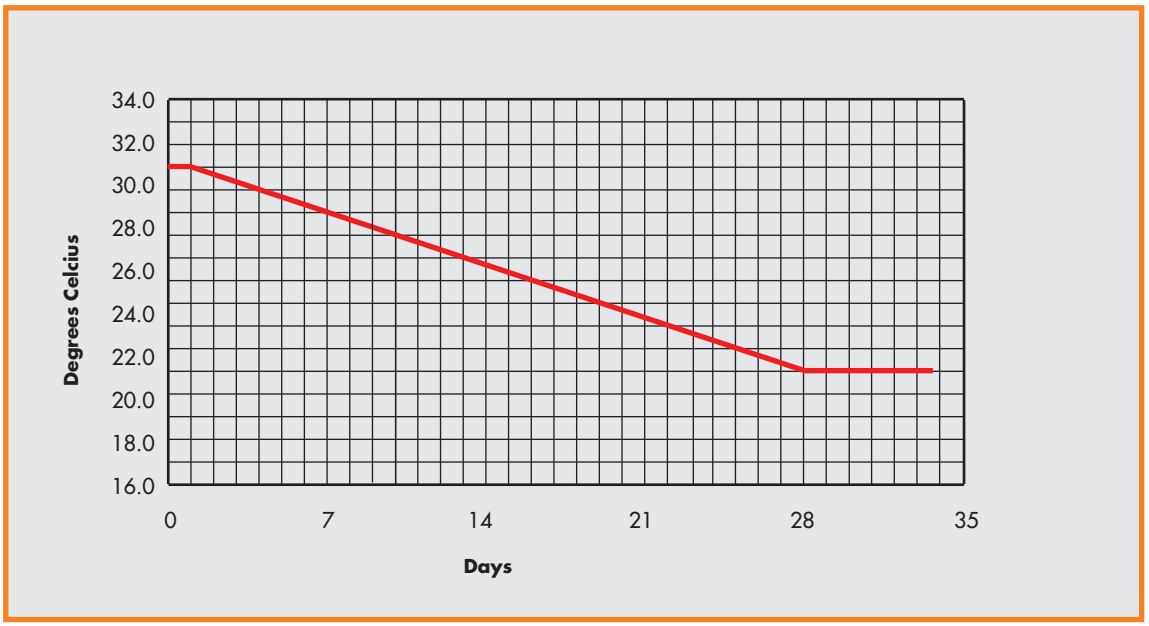


Fig. 18: Temperature step down.

Chick Mortality

It is important to know the reasons for early chick mortality as they can be prevented. These may include; poor brooding conditions high and low brooding temperature, feed poisoning, fungal, toxins, litter poisoning (ingestion of sawdust), injuries rough handling and pro-longed transportation stress, starvation, humidity, nutrition, deficiency, genetic disorder, predators.

TOPIC 9.

HOUSING

Why Should Chicken be Housed?

Housing is necessary to protect chicken against predators, thieves, adverse weather (rain, sun, cold winds, and low night temperatures) and to provide shelter for egg laying and broody hens. Suitable poultry houses are important for efficient production and management.

Poultry houses and shelters vary depending on availability of materials, weather and tradition. Choice of chicken housing should be based on cost, durability and usage.

The simplest and often most cost-effective housing system is the basket system. Night baskets may be placed in a quiet and dry place in the house, in a sheltered place on the farm either on the floor or hanging from the roof. A night basket may hold 5-10 chickens depending on size.

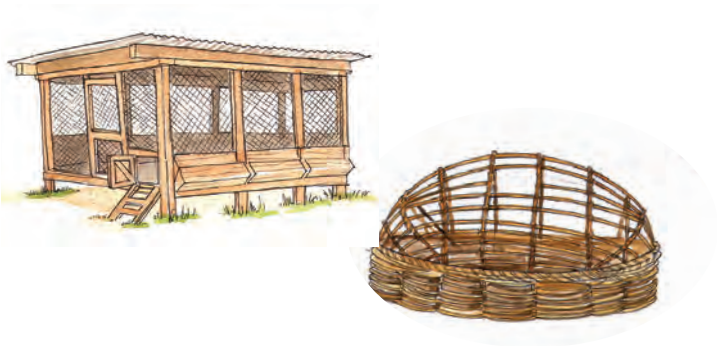


Fig. 19: Simple housing systems

i) A farmer inside a chicken house standing normally

ii) A farmer squatting inside a chicken house

Fig. 20: Access into a chicken house

Site Selection for Poultry Houses

The site should be dry and flat or alternatively the house can be elevated from the ground. Trees and bushes close to the site will provide shade, windbreaks and protect birds from flying predators. The site should be secured near the family house so as to hear the chickens get disturbed at night by predators or thieves. In a rectangular house the end walls should face East and West to ensure that only the end walls face the hot afternoon sun and wind. Clear all grass and bushes for about 3 meters on all sides of the house to keep snakes and rats away

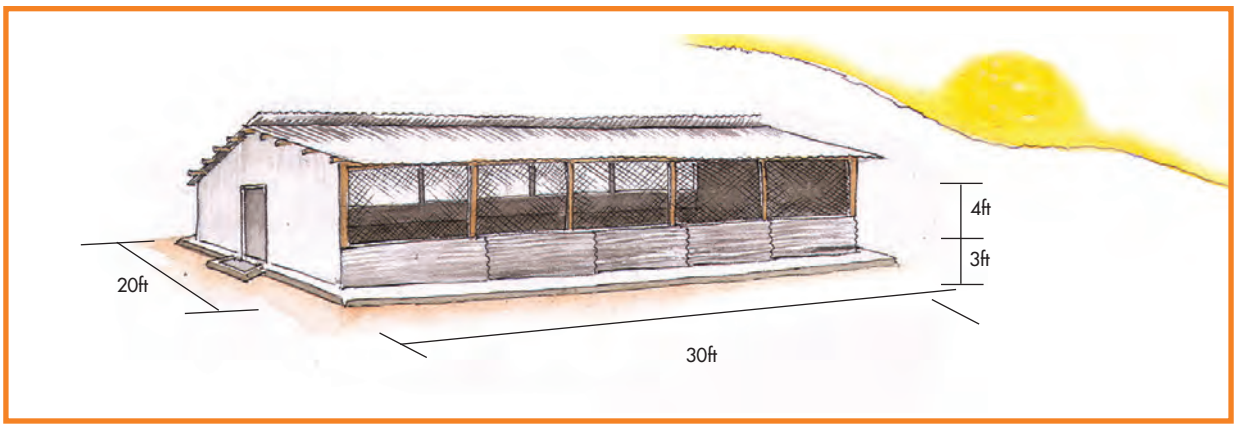


Figure 21: A chicken house (to accommodate upto 300 birds) set in an East West direction fully covered on the east and western sides and open on other sides.

Materials for Building a Poultry House

- Use cheap and locally available material like timber, off-cuts, reeds, and thatch grass or clay bricks.
- Remove the bark from the wood to reduce the parasites load. Parasites often hide beneath the bark
- Poultry houses should have openings on either side for ventilation.

In addition a hole or ridge on the roof will ensure proper ventilation and give light making it easier to work in the house. Make sure winds ventilate the house without causing draughts (cold). Heat, humidity, and harmful gasses may be considerably reduced through good ventilation. High temperatures may cause deaths, a drop in egg production, low shells quality and reduced weight gain. A combination of high temperatures and high humidity may cause death in young chicks.

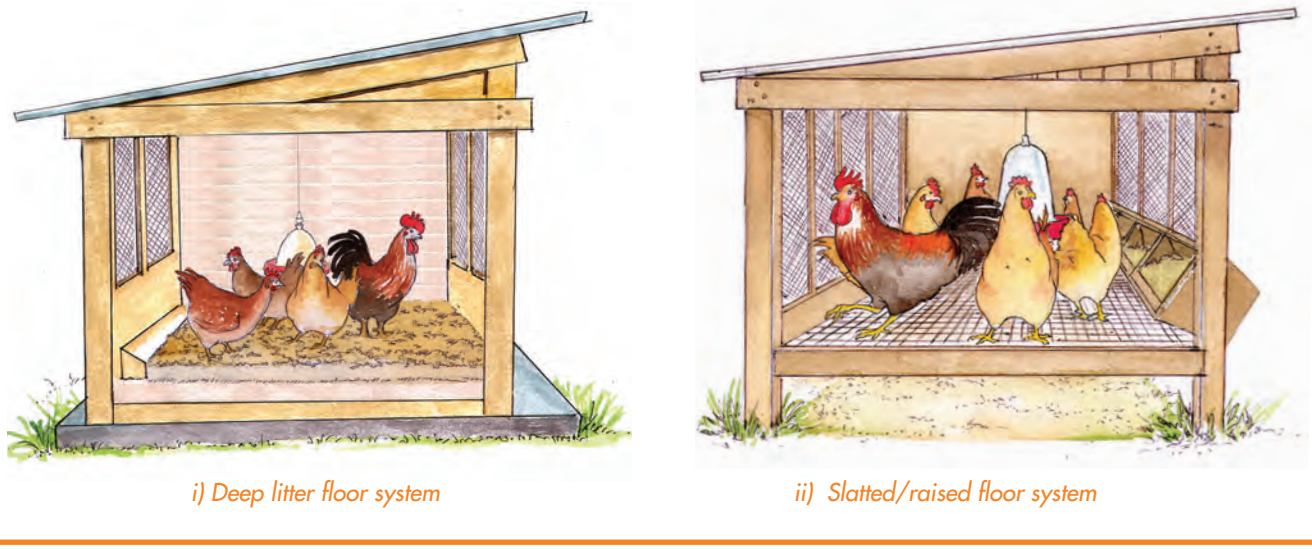
To protect against build-up of disease causing agents and parasites the house must be accessible and easy to clean.

Use slatted or raised floors to remove droppings and avoid predators. Remove any sharp edged objects from the house to prevent possible injury to the birds and humans.

Housing Density (for adult birds)

Production System	Floor type	Flocking density	
Intensive	Slatted (Raised)	6-8 birds per m^2	2 birds per sq. ft.
	Deep-Litter	4-5 birds per m^2	1 bird per sq. ft.

NOTE: *This spacing will cater for mature chicken and equipments.*



i) Deep litter floor system

ii) Slatted/raised floor system

Figure 22: Types of floor systems

Importance of Perches

Perches are important for chicken to roost on at night and during daytime. It also reduces boredom which can lead to vices like pecking and fighting. Diseases and parasites may attack poultry when left to rest on the floor (in contact with litter). Each one-meter perch may roost five adult birds.

Perches are best made from rounded sticks which are not too big or too small. They should be treated with used engine oil or kerosene to keep away parasites. Perches should match the size of the birds' feet.

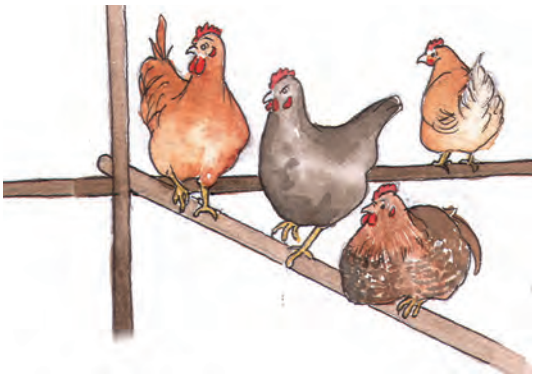


Figure 23: Birds resting on perches.

Nests

Laying nests ease egg collection and help avoid dirty and cracked eggs. Avoid building nests on the ground or outside chicken houses as this will expose the eggs to predators and thieves. Removing eggs continuously from the nests is important to stop hens from going broody.

Nests should be placed inside the chicken house and preferably above the ground. There are two types of nests:

- Battery and communal nests where more than one hen lays at the same time.
- Individual nests where one hen lays at a time.

Provide one laying nest for every 5 hens. Brooding nests are individual nests and should be placed in quiet and dark places where they are easily removed. Once the hen is broody it may be necessary to move her to an isolated place to avoid other hens disturbing her or going broody as well. Simple nests can be made out of clay, calabashes or baskets made of local fibres, cardboard or wooden boxes. Nests should have the correct measurement for the hen to feel comfortable. An individual nest box measures 45 x 45 x 45 cm (upper diameter x height x lower diameter).

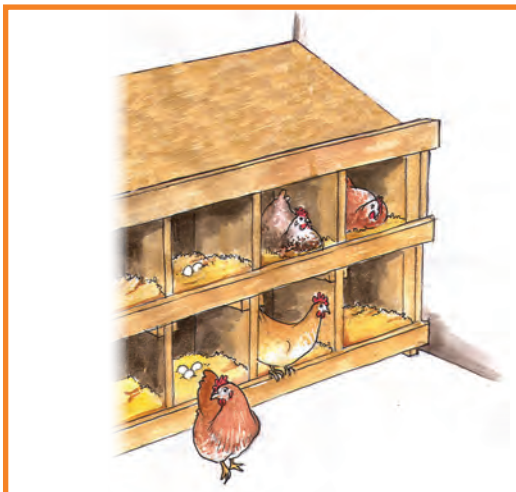
Individual nests can be prepared using the following steps:

a. Ensure the pot or basket is clean and dry;

b. Fill the pot or basket with sand mixed with ashes up to 1/3 full;

c. Place clean, soft nesting litter material (hay or straw or wood shaving) on top up to 2/3 full.

Nesting material should be changed when dirty to avoid contaminated and dirty eggs. Ensure that the nest is 1/3 full with litter material to make the hen feel secure. If necessary "dummy eggs" (e.g. stone eggs), can be placed in the nests to train or attract hens into using the laying nests.



i) Battery nests

ii) Individual nest

Fig. 24: Types of nests

External parasites reduce hatchability, since brooding hens spend too much time and energy leaving the nest, cleaning and scratching her body hence leaving the eggs cold. One can use ashes, tobacco leaves or other anti-parasitic substances with the nesting material to keep out most external parasites.

Chicken Runs

Chicken runs are a fenced open air space of 25 m^2 or more where poultry are kept and protected against predators and thieves. Runs are also used for feeding, watering, for daily flock observation and collection of eggs. The walls are 2 meters high and can be made of clay or woven mat or chicken wire. A chicken run is relatively costly but provides security to the poultry. Allow adult birds to scavenge outside the run during daytime to reduce feeding costs.

Fig. 25: Chicken run

TOPIC 10.

FEEDING INDIGENOUS CHICKEN

Feeding is important so as to increase the production of meat and eggs from chicken. Lack of feed or water will reduce resistance to diseases and parasites, and subsequently increase flock mortality (deaths).

Indigenous chicken will starve during certain periods of the year (e.g. drought, planting season when in confinement) when left to scavenge without supplementary feeding.

Egg production and growth are limited by access to feed, water and genetic potential. Local birds convert feed to eggs under fluctuating environmental conditions despite their low production potential compared to genetically improved breeds. Egg production and growth of indigenous chicken maybe improved by giving supplementary feeds. Improved breeds also perform well under rural conditions when given a steady supply of feeds. Under an intensive system, indigenous chicken may not be profitable due to high cost of feeds, however better returns will be attained if the feeding is supplemented alongside the scavenging. A cost-benefit analysis will help in judging the costs involved before choosing the quantity and type of feed. Feeds and feeding will vary between free range, semi-intensive and intensive systems of poultry production due to profitability.

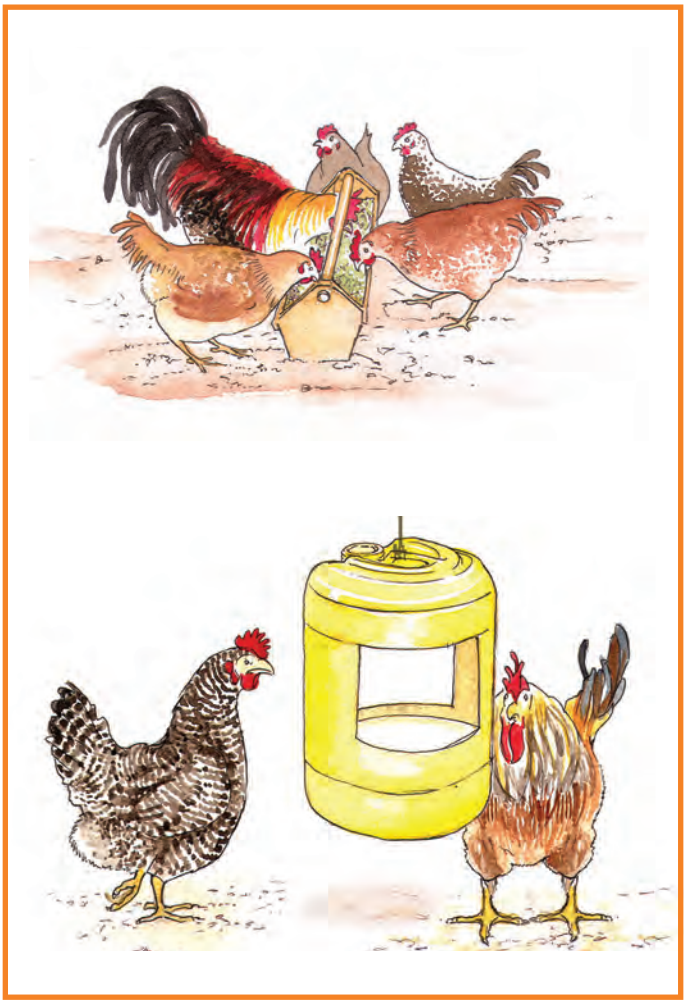


Fig. 26: Chicken feeding and drinking from a feeding trough and drinker. *(Feed and drink should be located inside the chiken run).*

What to Feed?

The composition and availability of feeds will vary, depending on the season, locality and production system. Poultry, as other animals need feed containing energy and protein, as well as vitamins, minerals and water. The need for feed will change, depending on the age and status *{chicks, growers (pullets), egg layer, broody hen}* of the bird.

The cheapest – and also often the best – way to supplement the diet of your poultry is to use local resources.

However, many vitamins and nutrients are destroyed if stored too long or under sub-optimal conditions, e.g. high humidity and heat. Knowledge of feed quality and sources of different feed types is important for feed safety.

If your production is based on improved breeds or hybrids for egg production, different types of commercial diets may be offered. These are divided into three distinct categories, with decreasing amount of protein as follows;

a) Chick mash (or starter diet): high in protein; offered from day old up to 8 weeks;

b) A growers' diet/mash: medium in protein; offered from 9 weeks up to when they start dropping eggs;

c) A layers' diet/mash: medium in protein; offered to hens from when they start laying.

When buying commercial feeds, calculate whether it is profitable based on the market price for eggs or meat/live birds. If the product price is lower than the price of feed consumed by the birds it is not economical to offer commercial feeds. Indigenous chicks may be offered commercial diets profitably from day old to six weeks of age, for optimal performance.

Scavenging

Scavenging for feed is a major characteristic of traditional/free range/extensive poultry production systems. Birds are free to forage and they usually manage to get a reasonably balanced diet. Nevertheless, their diet is restricted in quality and quantity to what they manage to find.

Fig.27: Chicken scavenging.

Forage diets comprises of household waste, crop by-products and a range of food from the farm, fields and kitchen waste. It varies from one area to another, with season, with the size and wealth of the household, and with the area that the chickens have to roam (population density)

In a traditional/free range or semi-intensive poultry rearing system, pullets and mature birds ought to be given enough time and space for scavenging in their surroundings daily. The best time for scavenging is during early morning and late afternoon when there are plenty of insects and less heat.

Chicks below six weeks of age should be confined. Supplementary feeds should be offered in the morning and evening when the birds come back for the night. Access to clean water should be provided at all times.

Types of Feeds

a) Energy feeds

As a rule 75% of a quality poultry diet is made up of energy feeds. These are the most important feeds for maintenance requirements (e.g. body temperature, vital functions, exercise).

Examples of energy feeds are cereals like maize and its by-products (bran), sorghum, wheat and its by-products (bran), rice and its by-products (bran, polishing), cassava root meal, yams and sweet potatoes. Roots and tubers should be soaked in water for 60 minutes or cooked before drying to remove harmful substances and the proportion in the diet in general kept below 10%. Fat is also a good source of energy particularly, in hot climates as the heat produced during metabolism is less than that from traditional energy feeds, e.g. cereals. Sources of fat are animal fats and oil seed cake meals. Such oils and fats should only be given in small amounts, i.e. less than 10% of the total diet.

Fig. 28: Energy foods.

NOTE: *Some harmful substances (anti-nutrients) are present in protein- rich plants such as beans. As such their proportions in chicken diets should be low, based on the type and processing prior to feeding. Cooking will reduce the anti-nutritional factors in beans, sweet potatoes and cassava.*

b) Protein

Protein is needed for growth and optimal health status. Normally no more than 20% of a poultry diet is made up of protein-rich feeds mainly due to cost. Protein sources may originate from animals or plants. Examples of protein-rich local feeds include; termites, insects, worms, meat scraps, fish scraps, fresh-water shrimps, fish meal, meat meal, bone meal, blood meal, soya bean meal, peas, beans, oil cakes from; ground nuts, cotton seeds, palm kernels, and coconuts.

Fig. 29: Protein foods.

c) Minerals

Minerals are important for bone formation, eggshell formation and for optimal health status. The most important minerals are calcium and phosphorous. To produce strong egg shells, laying hens need free access to calcium (limestone or crushed shells). Mature birds are usually able to balance their mineral intake according to their requirements. When phosphorous rich feeds are added to the diet, they should be balanced with calcium rich feeds, since high levels of one mineral will cause deficiency of the other. Sources of minerals include: bone meal, limestone and burned eggshells.

> ***NOTE:*** *The standard ratio for calcium and phosphorous is 2:1.*

The use of bone meal or eggshells is a good way of balancing calcium and phosphorus levels in the diet. Eggshells should always be scorched or cooked before re-use in diets to remove contaminants.

Fig. 30: Mineral foods.

d) Vitamins

Scavenging birds get vitamins from eating green grass, vegetables, fresh cow dung and through sunlight. Vitamins A, B2, and D3 are important because many problems arise when birds are deficient of these. Sunlight and green grass or green fodder normally provide Vitamin A and D, whereas Vitamin B may come from fresh cow dung. Vitamin B may also be added by giving multivitamins.

Additional vitamins are given in very small quantities and purchased from agro-vet stores or feed stockists. Supplementary vitamins are usually not required when birds are left to scavenge. Confined or intensively managed birds always need additional vitamins added into their feeds.

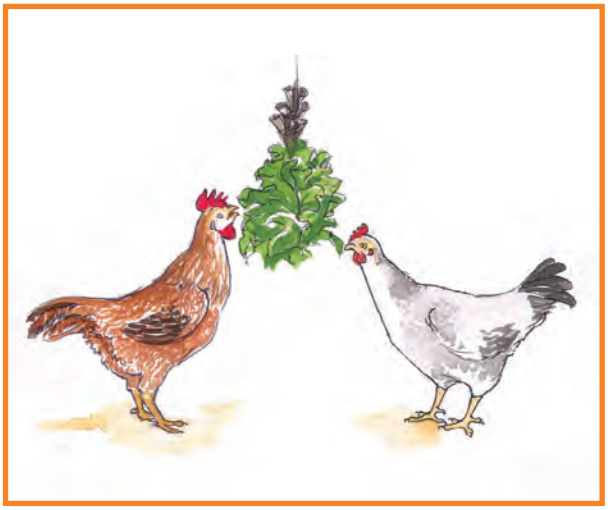


Figure 31: Vitamin foods (Vegetables).

Simple Feed Mixing

It is advisable to make a semi-balanced diet for the small chicks from 0-6 weeks of age. Locally available ingredients should be dried in the shade (the sun may destroy important vitamins) and grounded in a mortar before mixing. Locally available containers such as plastic tins or matchboxes may be used for easy quantification of the different ingredients. Grams or percentages should be transferred into local quantities for field practice. Large ready-mixed quantities should only be stored, if adequate storage capacities are assured.

In general mixed feeds should not be stored for more than a month to avoid contamination from mould, bacteria or rodents and quality deterioration. Above 8 weeks of age, poultry may be fed in a cafeteria system saving time and energy on mixing feeds.

Ingredient Quantity

1. Crushed maize/sorghum or millet 1 kg tin
2. Wheat by-products/sorghum or millet bran 1 kg tin
3. Sunflower/sesame/groundnut cake 2 match boxes
4. Bone meal/salt mix 1 match boxes
5. Blood or fish meal 2 match boxes
6. Sesbania/leucaena leaves 2 match boxes

Termites or maggots may also be added during the first 8 weeks. Depending on the types of crops grown in the locality; cereals and oil cakes may be substituted. Alternatively a commercial chick starter ration can be used from day old to 8 weeks of age. In this way you will ensure that the chicks have the daily requirements during the most vulnerable weeks.

Simple Techniques for Growing Maggots and Termites

Maggots and termites are a cheap source of protein in semi-intensive poultry production systems. However, they are a supplement to other feeds. Maggots or termites should be offered to young chicks since they require quality protein sources for optimal growth.

Maggots may be grown by a simple technique whereby, blood, offal and cow dung are mixed in a large open pot. The pot is filled with 1/3 water. Flies will lay their eggs in the mixture and maggots hatch and feed on the mixture. The pot is left open during daytime and closed during the night. After 5-10 days *(depending on temperature)* the maggots will be ready to pupate. Collect the maggots by gently pouring water into the pot. The maggots will float and you can then wash them and feed them directly to the birds. Remember to place the pot away from public places, as the smell at times may be offensive.

Take a pot with a short neck and a capacity of at least 10 litres. Fill it up with cow dung and straw and sprinkle a little water. Set the pot upside down with the opening on sandy soil.

After one day and one night, the pot will be full of termites and you may empty the living contents in front of the hen house in the morning.

How Much to Feed?

A major economic advantage of the free-range or semi-intensive production systems over the intensive systems is the ability of poultry to scavenge for feed from their surroundings. Scavenging resources will change over the seasons based on climate, geography and production systems in the area.
Depending on the season, the chicken may find nearly all their needs from their surroundings *(e.g. during harvest)* or nothing *(during dry season).*

Age (wks)	Intake/bird/day (g dry weight)
1	12-15
2	15-21
3	21-35
4-6	35-50
7-8	55-60
16-27	68-80
28	100

Table 6: Amount of feed at different ages ofl ocal poultry

Limit the quantity of feed offered to the birds daily to at least 30% - 50% of their full daily intake. Allow a maximum of 30-40 g/bird/day from week 4-6 and gradually reducing the supplementary feeding. At day old to 4 weeks young chicks will receive feed according to their needs. As the birds grow, they will gradually get a smaller portion of what they need, until they only get between 1/3 and half of their needs as adults.

Economic benefits are calculated from the break-even point (where cost of production is equal to revenue generated) from the sale of eggs and live birds relative to the cost of disease control, housing, labour and feeds.

To ensure sustained egg and meat production, offer feeds on a continuous basis rather than large quantities during the harvest season and none during the dry season. Reduce the flock size when feed costs are high rather than reducing the amount of feed given to each bird.

How to Feed?

It is important to use simple local measures to administer feeds. The table below shows calculated daily feed requirements based on a flock of 1 cock, 4 hens and 15 three week old chicks.

Flock	Intake/bird/day	Total/day
1 cock	35 g	35 g
4 hens	4 x 35 g	140 g
15 chicks	15 x 25 g	375 g
	Total:	***550 g***

Table 7: Simple calculation for daily feed requirements

Feed Mixing and Formulation

Mixing and formulation of poultry feeds may be based on simple assumptions about the nutritional requirements of the birds and the content of the feedstuffs or it may be calculated by use of computers and Least Cost Formulation Programmes.

It is important to realize that the nutritional requirements of the birds may be met in many ways by offering a large variety of feed ingredients. Feed ingredients to be included in the ration in each seasons, will be based on availability, quality and price.

Cafeteria System

Adult birds are able to mix their own feed according to their needs. The best way to feed semi-intensively managed birds above 8 weeks of age is a cafeteria system, whereby various types of feeds are offered separately.

In the cafeteria system, there should be at least one feeding compartment for:

a) **Energy rich feeds**, e.g. maize, millet, sorghum.

b) **Protein rich feeds**, e.g. beans, peas, oil cakes, fish, meat, bone meal, maggots, termites.

c) **Mineral rich feeds**, e.g. bone meal, burned eggshells.

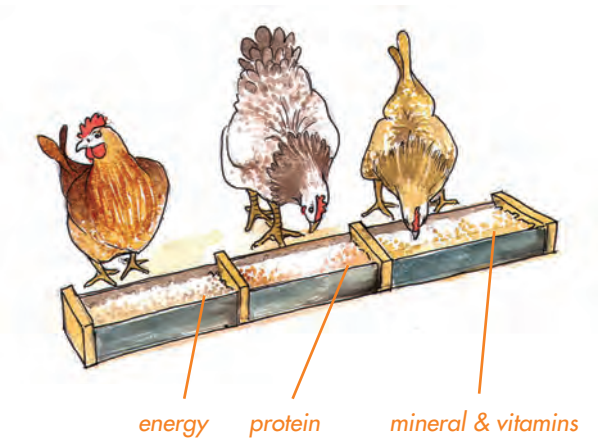


Figure 32: Chicken on a cafeteria system of feeding.

An additional compartment for oil rich feeds may be added, e.g. animal-based fat, oil cake meals, or fish oil. By giving adult birds feeds in compartments, observe their feeding behaviour and avoid feeding unnecessary amounts and types of feed. For example, during harvest seasons you may find that they birds feed less on energy feeds in the evenings because there is plenty of cereal in the environment. You may also try out alternative feeds that the birds do not find tasteful. The cafeteria system is a good way of learning about your birds´ behaviour and taste.

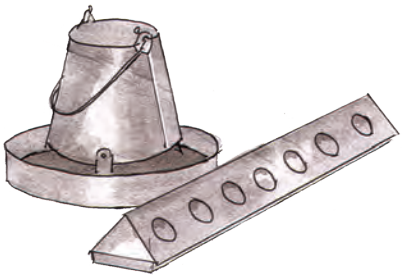
Common Feedstuff Problems Include

- Fish meal can give a fishy taste to meat and eggs. May contain excessive amounts of salt.
- Cassava tubers contain cyanide, which is toxic, and the tubers must be sliced and dried in the sun before feeding.
- Oil seed cakes can contain excessive amounts of oil and fibre, which lower digestibility of the feed.
- Beans and peas contain a number of anti-nutritional components and should be dried in the sun or cooked for a short period *(chick pea and pigeon pea are exceptions and can be fed raw after crushing)*.

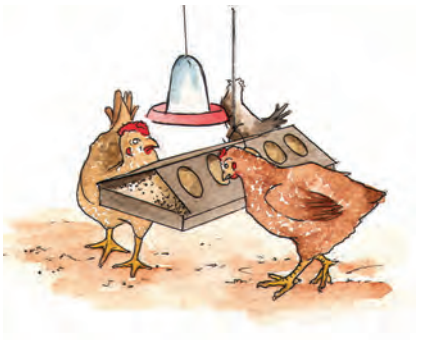
Feeders and Drinkers

Feeders and drinkers are similar across the production systems. Feeders and drinkers should always be kept clean to prevent the spread of diseases. They should be big enough for all birds of the same age to feed at the same time. A one metre trough is big enough for 20 adult birds to eat and for 40 birds to drink.

Feeders and drinkers may easily be produced out of local materials.



i) Simple drinker made of an old tin can and a plate.



iii) Commercial drinker/feeder in plastic or metal.

ii) Feeders and drinkers may also be made locally of wood, clay, plastic or metal.

Fig 33: Different drinkers and feeders

Ensure that feeders minimize feed wastage. Feed wastage can be minimized when feeders are not filled to the top. Fill the feeders half full and check them regularly for refills.

Commercial feeders and drinkers may also be bought at the market, either in metal or plastic. However they are often expensive and normally not any better than locally produced feeders or drinkers.

TOPIC 11.

POULTRY SELECTION AND BREEDING

Introduction

Selection of healthy and sound-looking chicken in the villages or markets is important, if you want to assure a healthy flock with high productivity. Judging a day old chick, a full-grown cock or a laying hen, requires different skills. The features to look for become even more complicated, when dealing with different breeds with distinct looks, behaviour and purpose, i.e. egg laying or meat producing.

Chicken Selection

It is important to look for different features in chicks, growers, hens and cocks. Select or buy new chicken early in the day, as stress from lack of water, feed and rest, will make most animals look rather sick and drowsy.

Breeds and Selection

a) Chicks

A soft belly and a clean, dry navel are important features of a healthy, newly hatched chick. The following are the key features of a healthy chick:

- Well developed body length and depth
- Shiny, dry, thick and coloured down feathers
- Soft belly
- Clean, dry navel and clean feathers around the vent
- Thick shanks with spaced and straight toes
- Big clear eyes
- Lively behaviour

Chicks

b) Growers/Pullets:

Features of a healthy grower;

- should appear healthy and lively
- feathering shiny and normal *(depends on the breed)*
- large size for the age
- eyes clear and shiny
- clean, dry beaks and nostrils
- clean feathers around the vent
- straight legs and toes

Growers/Pullets

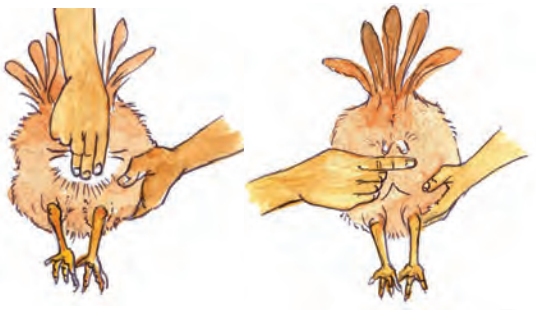
c) Laying birds

Features of a healthy good egg-layer;

- should appear healthy and lively
- feathering normal for the breed
- A red comb (more coloured when in lay
- eyes clear and shiny
- clean, dry beaks and nostrils
- clean feathers around the vent
- straight legs and toes, with no signs of scaly legs
- Legs less coloured in lay
- The breast bone should not be too sharp
- A big broad bottom *(laying status can be checked, see illustration)*

Layers

In small flocks, it is relatively easy to check whether the hens are laying or not. Check with your hand the distance between the pubic bones will be equivalent to three fingers, when the hen is in lay. Only one finger may pass between the pubic bones, when the hen is not in lay.

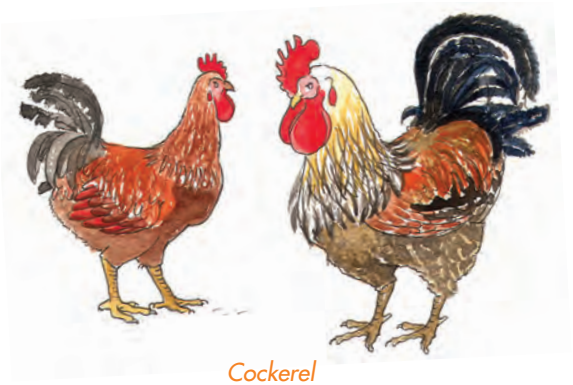


Using the comb, a laying hen will have a long shiny comb, whereas a hen not laying will have a small shrivelled comb (holding this hen you will find that the one with a long comb is heavier than the other one). Such hens, which are not laying, should be selected and fed differently from the rest of the flock so as to attain the laying weight.

d) Cocks:

Features of a healthy and good cock;

- alert and protective nature
- shiny and normal feathering for the breed
- clear and shiny eyes
- clean, dry beaks and nostrils
- clean feathers around the vent
- straight legs and toes with no signs of scaly legs
- large size relative to the hens



Cockerel

Breeding

A breed is a group of chicken with a characteristic body form and feather contour. These unique characteristics are inherited from one generation to the next. Features such as the comb, colour of ear lobes and shank colours and length are usually determined by breed. In every breed, different varieties can occur usually determined by plumage colour. Thus a white and a black hen may just be different varieties of the same breed.

It may be an advantage to keep records on the growth and productivity of each bird in order to select birds according to features such as egg production, growth (meat production) and broody behaviour. Keeping records may help you select the best layers or the best mother to protect the chicks. If new birds are bought on the market it is important to isolate the new birds in separate baskets for the first two weeks. This will enable you to discover possible diseases or disorders in the new birds. If they show signs of any kind of illness you should dispose them. When you have succeeded in improving your productivity and survival of your local poultry through improved management, housing, feeding, chick protection etc, you may want to further increase productivity by introducing better breeds.

Different types of chicken breeds

Frizzled Feathers, Naked-Neck, Dwarf and the Normal type are commonly found in the warm regions. Naked- Neck genes are found in almost every village, and are believed to be a natural adaptation to avoid heat stress. Frizzled feathers may look ill at a first glance, but is also common in most village based systems. In some parts of the country, Frizzled Feathers are higher priced in the markets than normally feathered poultry. Dwarf poultry show standard colours and plumage, but tend to be 2/3 of the normal size for poultry, mostly because of the short shanks.

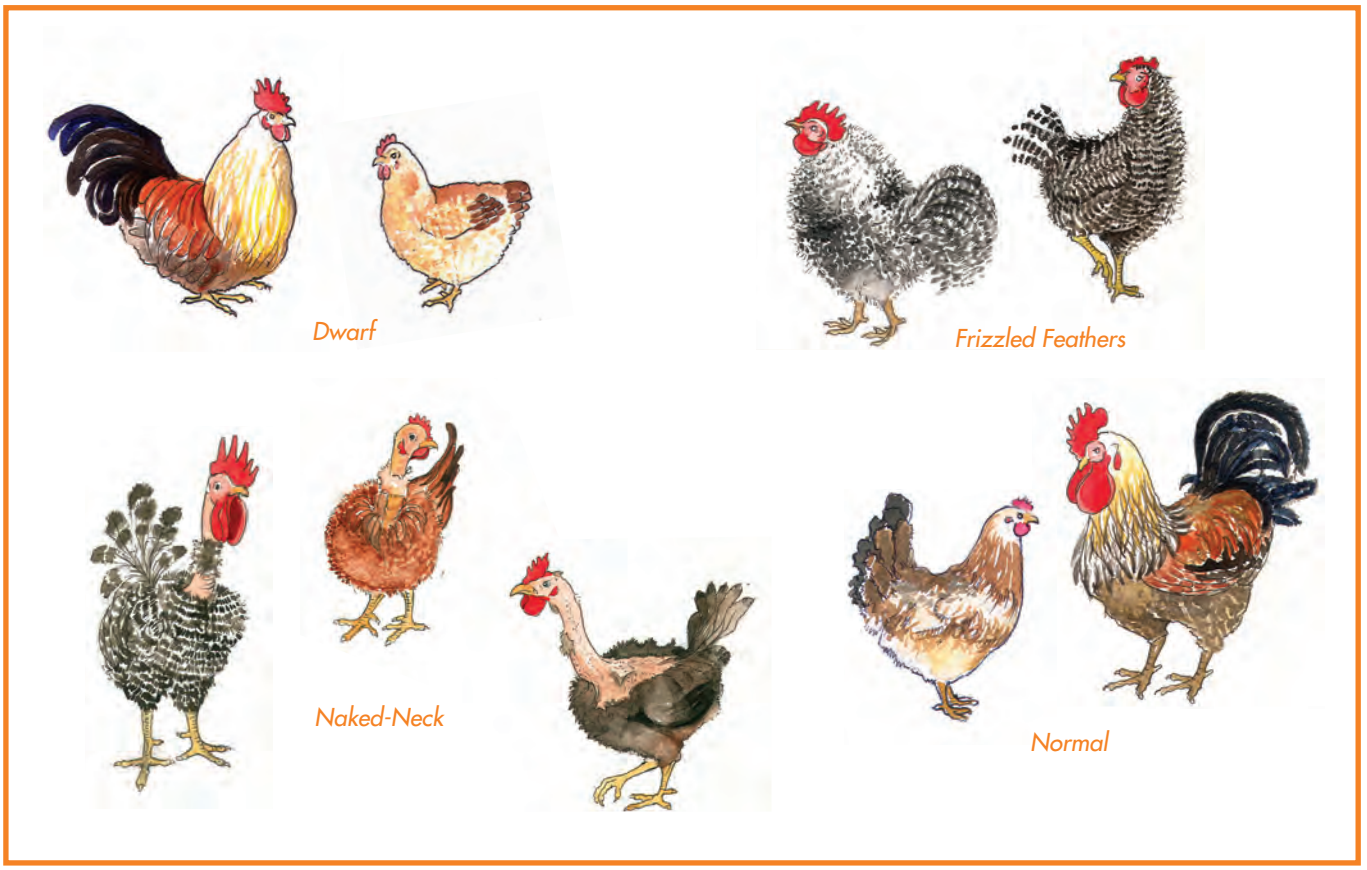


Fig. 35: Different breeds of indigenous chicken.

Chicken in commercial systems are usually kept for two distinct purposes, that is either egg or meat production. A high productivity in either egg or meat production is a result of specialised breeding programs. The dual purpose breed is also a result of breeding programs, and may produce more eggs as well as more meat than traditional birds. It is important to select birds, which are suited for a particular production system, and which are suited for the conditions under which they are kept, e.g. free-range or confinement.

Features of Specialized Birds

Features of birds specialized in egg production, meat production or both (dual purpose) are;

1. Laying hens are *"boat-shaped"* with a long straight back.
2. Meat producers (broilers) are long-legged, in a more upright position and wings in high position on the body.
3. A dual-purpose breed is a form in between the layers and broilers. Local breeds often have the form of a dual-purpose breed, although much less heavy in body form and size.

The commercial sector has developed highly specialized hybrids *(crosses of several breeds)* of which layers can produce 300 eggs per year and broilers can reach 2 kg in 6 weeks. To obtain this high production, the hybrids have very specific requirements in management, feeding, disease management and production costs are high. They are therefore not normally suited for free-range and improved free-range systems.

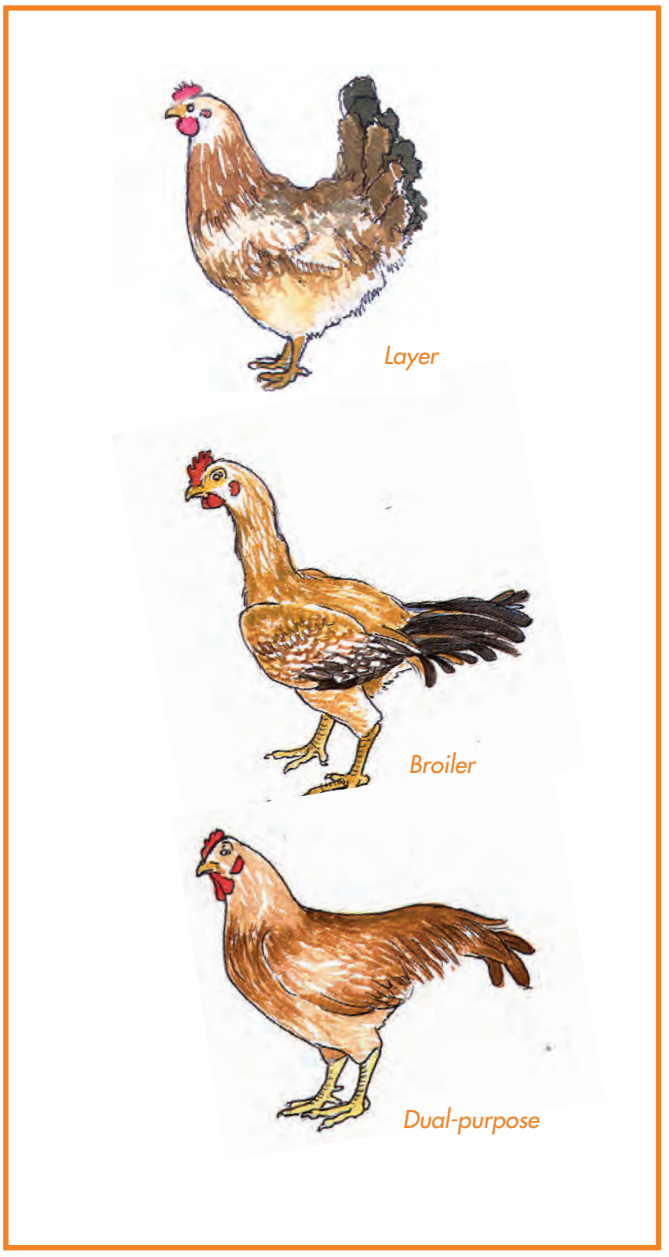


Fig. 36: Typical breeds producing eggs, meat and dual purpose.

Cross-breeding

To increase production from local chickens, crossbreeding with other breeds can be practiced. It is however, important to consult professional breeders or breeding companies, who may recommend suitable and available breeds to increase egg production, growth or both. It is important to be aware that the offspring will obtain different qualities depending on whether the cock or the hen of the new breed is used. This is because some qualities are sex-linked and thus it is important to consult a breeder.
Note: If a cross-breed is introduced, it is crucial that management, feeding and health protection schemes are improved.

Cockerel Exchange Programs

In many countries, a common attempt to increase production from local chickens has been to *establish cockerel exchange schemes*. The idea was to improve the productivity of local birds by mating them with improved cocks.

Disadvantages of the cockerel exchange scheme:

- the introduced breeds may not adapt to the local climatic conditions,
- inadequate feeding and management practices and thus many of them may not achieve their potential,
- if reproduction succeeds, the first generation of these cocks often show a slight increase in production, but if no strict breeding schemes are maintained, the effect will be lost after a few generations
- loss of broodiness,
- reduced scavenging capacity,
- reduced survival,
- diseases such as Newcastle Disease, Gumboro, Fowl Typhoid etc, may be introduced to new areas result in high mortality among local birds.

For all these reasons it is very important that selection of breeding birds takes place in the existing environment. Simple cockerel exchange programmes are as such not recommended.

TOPIC 12.

RECORD KEEPING

Management of poultry requires detailed records on a daily or weekly basis. It is important to spend some time each day observing your flock carefully.

Keeping of records is a useful management practice for farmers, service providers and business people in order to identify problems and optimize profitability of the enterprise. In this way early signs of disease, malnutrition, or other problems may be detected and the necessary action taken.

Important parameters to record on a daily, weekly or monthly basis include:

Production records:

- flock size,
- mortality *(clinical signs and/or suggested cause)* - flock statistics
- general laying ability/ percentage lay *(number of eggs per clutch)*
- number of clutches per year
- number of chicks hatched
- number of chicks reared
- age of chicks/chicken
- vaccination and other treatments applied *(when and with what).*

Income records:

- number of chickens and eggs sold
- number of chickens and eggs consumed at household level
- number of chickens and eggs given to or from the flock
- Other sales e.g. empty bags, manure

Expenditure records:

- Feed - types, cost, brand, consumption
- Vaccines - types, cost, batch number
- Drugs
- Disinfectants

Fig. 37. Recording in a ledger.

Fig. 38. A farmer selling chicken and eggs at the market

Types of Record Sheets

POULTRY REARING AND PRODUCTION RECORD SHEET

HOUSE No. ..... Breed..... No. Placed ..... Date Placed ..... MONTH .....

Date	Age	Feed		Mortality	Culls	Closing Stock		Sales		Comments
		Type	Kg			Eggs	Birds	Eggs	Birds	

POULTRY MEDICATION AND VACCINATION RECORD SHEET

HOUSE No. ..... Breed..... No. Placed ..... Date Placed ..... MONTH .....

Date	Type of Medication/ Vaccination	Dosage/Route	Group Treated	Number of Birds	Age (Weeks)	Done By	Comments Signs in Flock

POULTRY MORTALITY AND CULLING RECORD CARD

HOUSE No. ..... Breed..... No. Placed ..... Date Placed ..... MONTH .....

Date	Age (Weeks)	Dead		Culled	TOTAL	Done By	Comments

POULTRY FFED STORE RECORD CARD

MONTH ..... FEED TYPE..... BAGS IN STOCK ..... Date Placed ..... MONTH .....

Date	Delivered Feed Bags	Used Bags	Feed Balance	Comments

TOPIC 13.

MARKETING OF PRODUCTS

Introduction

It is important to know your market requirements, investment costs, running costs, and expected revenue for the different products before starting any production activity. These include Whole birds (for meat etc), Eggs, Parts (Gizzards, Drumsticks, Chicken wings, Chicken breasts) manure etc.

A detailed market study including a cost and benefit analysis should be carried out before choosing the production system. Start with a production based on local breeds, local feeds and local demands before proceeding into a more sophisticated production system with improved breeds whose products require a stable market.

In general the economic outcome as well as the necessary investments and risk involved in the production, will vary from one system to the other e.g. A free range production system will have relatively low risks compare to an intensively managed systems *(higher risk)*.

Commercialization

Live birds and fertile eggs are sold in local markets while hybrid table eggs are more often found in peri-urban and urban areas or along traffic corridors, where confined production systems can be managed. In local markets, live birds are sold at highly variable prices depending on factors such as demand (high during festivals), size and weight, plumage and colour. Cocks are usually highly priced at most markets compared to hens. In certain regions e.g. Western Kenya indigenous chicken are also highly priced compared to exotic breeds irrespective of size.

Likewise eggs from indigenous chicken are often more valued than table eggs from exotic hens, despite their smaller size. The taste and texture of meat and eggs from indigenous chicken are a major reason for the higher prices of local products.

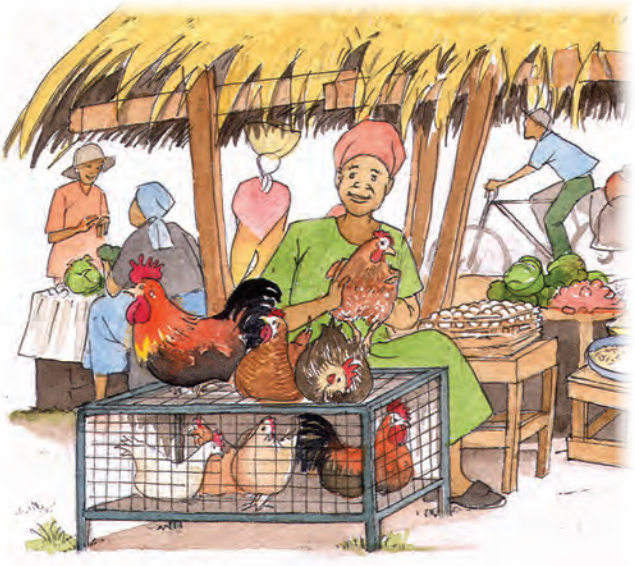


Fig. 39: Selling of chicken and eggs in the market.

Birds for Sale

Cockerels in a flock should be sold as soon as they attain the correct weight for the market. At the age of 6 months and a weight of approximately 1.5 kg, cocks are usually big enough for sale in prime markets. Retain a breeding cock for every 10-15 hens in the flock. Breeding cocks should be sold when mating is inefficient *(low fertility/hatchability)* or to stop inbreeding. Breeding cocks should be kept for 12-18 months. Care should be taken not to return live birds from the market back to the farm due to disease. Old hens which are out of lay should also be sold. It is best to restrain birds for sale in the night or attract them with feed then hold them using a piece of metal wire bent at the end.

Eggs for Sale

Eggs should be collected and sold while fresh, particularly when cooling is not possible. Collect eggs from the laying boxes at least once, but rather two times a day, and store them in a dark, cool place. Eggs should normally not be cleaned. When the eggs are dirty, clean them with a dry sponge or cloth and sell them immediately. Cleaning eggs with water often destroys the shells and the natural protection against infection.

Pack eggs in boxes, egg trays or other suitable containers to avoid breakage. If profitable, grade your eggs according to size. Always keep records of your production and sale.

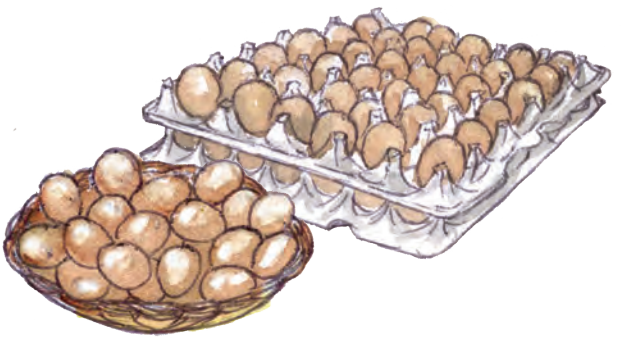


Fig. 39: Selling of chicken and eggs in the market.

Economic Analysis and Simple Risk Assessment

Before starting any poultry production enterprise, calculate if it is economically feasible, thereby making the right decisions regarding the production system and the necessary interventions.

Revenue or Income

Revenue or income is all the money earned in relation to the poultry enterprise such as:

- Income from sale of live birds, e.g. growers, cockerels or spent hens;
- Income from sale of eggs;
- Value of eggs or poultry eaten or given away.

Value the standing stock, e.g. the production flock which is the foundation of future income. Poultry manure also represents a value when used on the farm or sold for other activities. Manure reduces the cost of buying fertilizer and improves crop production.

Expenditure or Costs

These are costs involved in relation to the poultry enterprise:

- Material for baskets, shelters or poultry houses;
- Starting up flock e.g. Growers, hens or cocks;
- Fertile eggs for incubation;
- Day old chicks;
- Supplementary feed, vitamins or minerals;
- Vaccines and other medication;
- Labour and technical advice.

When the birds are offered crops *(cereals or forage)* that would otherwise be sold, this also represents a value and should be included in the calculation. Money acquired through loans, the repayment and interest on loans is also an expense that has to be included among the inputs. In a free range system where outputs are usually low, the inputs are also low. This means that expenses for buildings and other equipment are kept at a minimum. Small basket or shelters may be built using locally available materials without incurring high costs.

TOPIC 14.

CHICKEN PROCESSING

Proper slaughter practices ensure wholesome poultry products. Hygienic slaughter of poultry enhances access to premium markets. These practices facilitate better slaughter waste management, which reduces the spread of diseases.

Transportation of poultry using cages minimises heat stress, which may cause death. Cleaning and disinfection of trucks and equipment, helps to prevent disease transmission from one farm to another.

Pre-slaughter

Birds should be transported to the slaughter place in appropriate cages made from plastic or wire. At the slaughter place birds should be held in the holding area, awaiting inspection by the veterinarian. It is after inspection that healthy birds are presented for slaughter.

Slaughter

Slaughtering can be performed manually or by a slaughter machine. Slaughtered birds should be bled for at least two minutes to ensure a total bleed out. They are then dipped into hot water (scalding) to loosen feathers for plucking to take place.

Birds for subsequent freezing/chilling should be scalded at 60 - 65°C.

NOTE: *Sick birds should not be slaughtered for consumption.*

To avoid cross-contamination of carcasses during the scalding process, de-feathered birds should be rinsed under running water.

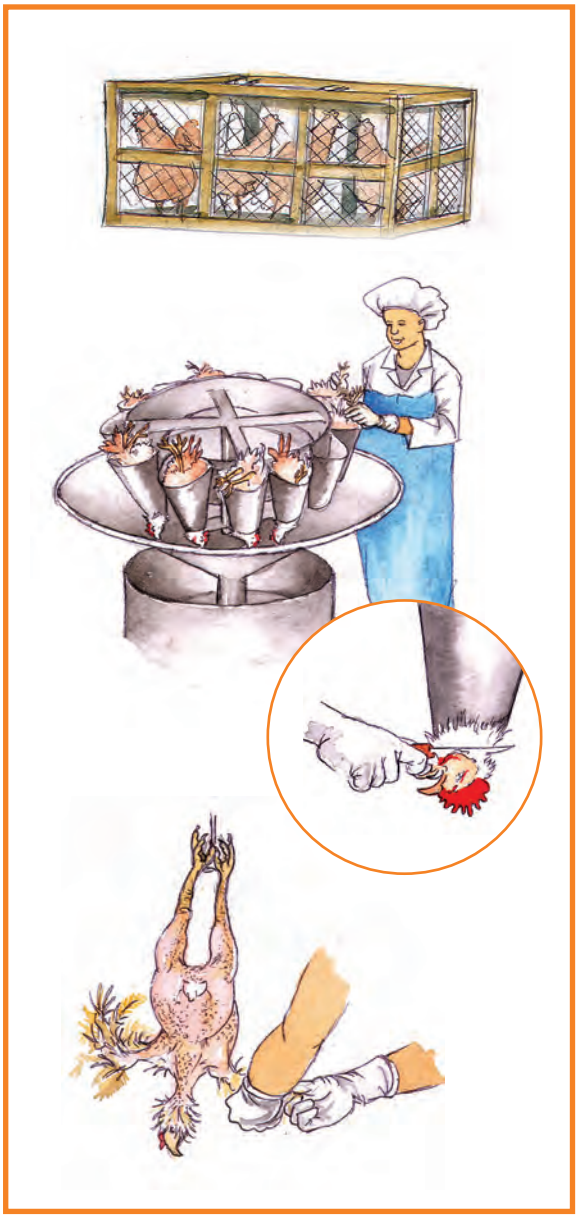


Fig. 40: Chicken processing

Evisceration

In this process the head, feet and internal organs are removed. The open bird and the organs are then presented for inspection by a trained individual. Birds that are unfit for human consumption should be disposed off hygienically.

Certified carcasses should be rinsed under clean running water and cooled as quickly as possible to 4°C or below. It is important to ensure that, the carcass is packed using approved materials.

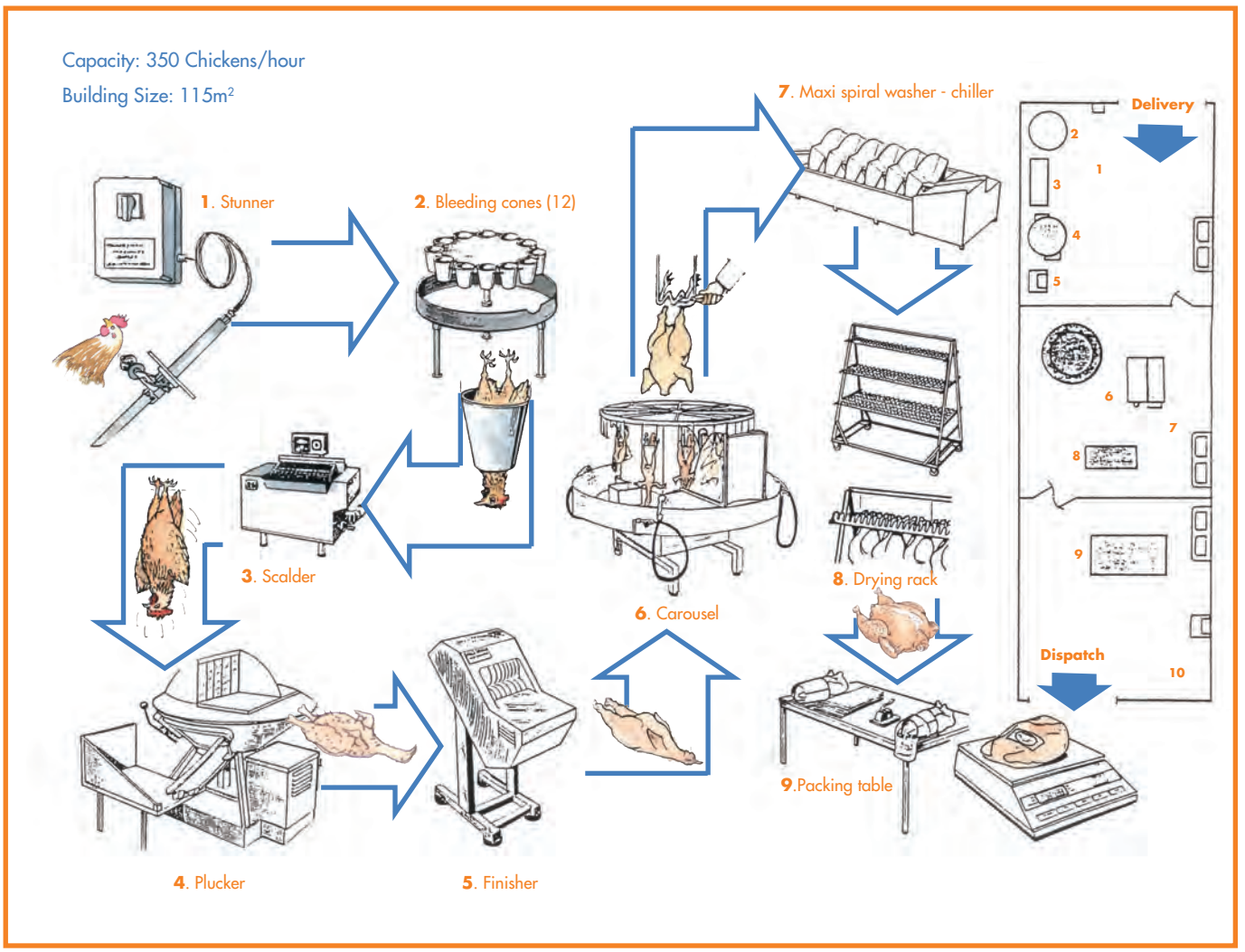


Fig. 41: Small scale poultry processing plant

SPADE POULTRY TRAINING MANUAL REVIEW

PARTICIPANTS LIST:

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	Kakamega	6	Dr. Chris Kadenge	M	DVO
NYANZA	Gem	7	Dr. Millan Argwings	M	DVO
		8	Lawi O. Wamani	M	DLPO
	Kisumu West	9	Dr. Asoka Itur	M	DVO
		10	Peter O. Oduko	M	DLPO
	Rarieda	11	Dr. Mark Otieno	M	DVO
		12	Maurice Rangoma	M	DLPO
	Homabay	13	John C. Biwott	M	for DVO
		14	George Genga	M	DLPO
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