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Implementation of poultry production activities: A review

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Abstract

Poultry Production system is the way in which animals are kept and managed for specific purpose. Free-range poultry farming allows chickens to roam freely for a period of the day, although they are usually confined in sheds at night to protect them from predators or kept indoors if the weather is particularly bad. Backyarding is actually a separate method of poultry culture by which chickens and cows are raised together. Chickens have the unique ability to adapt to a wide range of conditions, more than most species of Livestock. Even with their adaptability, each breed is best suited for one type of environment more than another. The provision of clean, cool drinking water is the single most important consideration for any egg laying operation.

Keywords: Broiler, Layer, Poultry, Production

Introduction

Poultry Production system is the way in which animals are kept and managed for specific purpose. In poultry production, it is broadly categorized as: free-range, backyard, and Intensive.

Free-Range Systems: Free-range poultry farming allows chickens to roam freely for a period of the day, although they are usually confined in sheds at night to protect them from predators or kept indoors if the weather is particularly bad. Under free-range conditions, the birds are not confined and can scavenge for food over a wide area. Rudimentary shelters may be provided, and these may or may not be used. The birds may roost outside, usually in trees, and nest in the bush. The flock contains birds of different species and varying ages. In this system birds are left on the field to scavenge their feed on farm ranges. The system is adopted when the land is adequate.

Backyard: While often confused with free-range farming, yarding is actually a separate method of poultry culture by which chickens and cows are raised together. The distinction is that free-range poultry are either totally unfenced, or the fence is so distant that it has little influence on their freedom of movement. Poultry are housed at night but allowed free-range during the day. They are usually fed a handful of grain in the morning and evening to supplement scavenging.

Intensive Systems: These systems are used by medium to large-scale commercial enterprises, and are also used at the household level. Birds are fully confined either in houses or cages. Capital outlay is higher and the birds are totally dependent on their owners for all their requirements; production however is higher. There are three types of intensive systems:

Deep litter system: birds are fully confined (with floor space allowance of 3 to 4 birds/m^2 within a house, but can move around freely. The floor is covered with a deep litter (5 to 10cm deep layer) of grain husks (maize or rice), straw, wood shavings or a similarly absorbent (but non-toxic) material. The fully enclosed system protects the birds from thieves and predators

and is suitable for specially selected commercial breeds of egg or meat-producing poultry (layers, breeder flocks and broilers).

Slatted floor system: wire or wooden slatted floors are used instead of deep litter, which allow stocking rates to be increased to five birds/m^2 of floor space. Birds have reduced contact with faeces and are allowed some freedom of movement.

Battery cage system: this is usually used for laying birds, which are kept throughout their productive life in cages. There is a high initial capital investment, and the system is mostly confined to large-scale commercial egg layer operations. This is the most intensive type of poultry production system. In this system each hen is confined to a small cage. The day-to-day management operations like feeding, watering, egg collection, etc. are easy. The important advantage is the saving of floor space per bird.

The objective of the study of this paper is:

❖ To identify and select poultry breeds for production

Identify and select poultry breeds for production

Common poultry breeds

There are hundreds of chicken breeds in existence. Domesticated for thousands of years, distinguishable breeds of chicken have been present since the combined factors of geographical isolation and selection for desired characteristics created regional types with distinct physical and behavioral traits passed on to their offspring. The physical traits used to distinguish chicken breeds are size, plumage color, comb type, skin color, number of toes, amount of feathering, egg color, and place of origin. They are also roughly divided by primary use, whether for eggs, meat, or ornamental purposes, and with some considered to be dual-purpose.

Leghorn Chickens

Color and Appearance: Most Leghorn chickens have single combs but there are several color varieties that have rose combs. Recognized colours are white, red, black tailed red, light brown, dark brown, black, blue, buff, columbian, buff columbian, barred, exchequer and silver.

Origin of Leghorn Chickens: The Leghorn breed was developed in Livorno, Italy.

Size of Leghorn Chickens: Leghorns mature into smallish chooks, weighing from 3 lbs (1.4kg) to 4 lbs (1.8kg).
Temperament of Leghorn Chickens: Leghorns are nervous types of chickens around humans and can fly, making them less popular as a homestead breed.

Uses of the Leghorn Chickens: Leghorns are fantastic egg producers, laying around 280 white eggs a year. They are the world's top breed behind commercial egg producing lines.

New Hampshire Chickens

Color and Appearance: The mature birds are a rich chestnut red, of a lighter and more even shade than the Rhode Island Reds.

Origin of New Hampshire Chickens: The New Hampshire originated in the state of New Hampshire in the United States.

Size of New Hampshire Chickens: Roosters weigh in at around 8.5 lb (3.9 kg), whereas hens are lighter at 6.5 lb (2.9 kg).

Temperament of New Hampshire Chickens: New Hampshire's are competitive and aggressive.
Uses of the New Hampshire Chickens; while it is a fair producer of large brown eggs, the New Hampshire was developed more for meat production than egg production. Medium heavy in weight, it matures early and dresses a nice, plump carcass as either a broiler or a roaster. The hens are prone to go broody and make good mothers.

Rhode Island Red Chickens

Color and Appearance: These chooks normally have hard rust colored feathers, but may be darker or almost black.

Origin of Rhode Island Red Chickens: The Rhode Island Red are types of chickens originally bred using an infusion of Malay chicken bloodlines in Adamsville, Rhode Island in the USA.

Size: Rhode Island Reds are large: roosters weigh in at around 8.5 lb (3.8 kg), the hens 6.5 lb (3 kg).

Temperament of Rhode Island Red Chickens: They are generally good pets to keep. However the roosters, and sometimes hens, can be quite aggressive.

Uses of the Rhode Island Red: They are a tough utility bird, raised for meat and eggs. Indeed they are among the best laying types of chickens. With good feeding their egg production is excellent, being from 250 to 300 large, light brown eggs a year. They are moderately early maturing. Rhode Island Reds are also used for creating many modern hybrid types of chickens. However, their large comb makes them susceptible to frost bite.

Deciding Criteria for selection poultry breeds and selecting appropriate breeds

Chickens have the unique ability to adapt to a wide range of conditions, more than most species of Livestock. Even with their adaptability, each breed is best suited for one type of environment more than another. Criteria for selecting poultry breed s, Carcass Quality and Other Uses Feather Color, Temperature, Tolerance, Disposition, When you crowd birds, like is the case in a small coop or moveable pen, aggressive tendencies result in more injuries, infections, broken eggs, and even dead chickens, so consider this before you put aggressive breeds in with overly docile ones, Considering the space you may have your birds in, disposition is key to keeping birds healthy, Size Matters, Egg Color and Laying Ability, A good laying record and Precocity.

The average age at which pullets began to lay eggs was traditionally between 18-21 weeks. In recent years, this has gradually been reduced so that hybrids start lying much earlier. The amount and intensity of artificial light also has a bearing on precocity and if too much is given the pullets can start to lay before they have finished growing. From the point of view of birds destined for free-range conditions, this is not a good idea. They need to be well grown before egg laying starts otherwise they will not be able to cope with the demands of outside conditions. A good pullet for free-range would therefore be one with a precocity of around 18 weeks.

Criteria for selecting Egg type poultry breeds

Intensity: This refers to the number of eggs laid over a given period, such as a month, without skipping a day. The greater the degree of intensity the better the hen. Again, scrupulous recording is required.

Persistency: This is the ability to lay over a long period of time in the first season of lay. The longer the period the greater the persistence and the better the hen for selection purposes.

Lack of broodiness: Hens which are always going broody and sitting tight on the nest, wanting to hatch out a clutch of eggs, are not going to be laying as well. This is an undesirable characteristic for the egg producer, although it may be welcome by those who want a broody hen to incubate and brood some eggs.

Moulting: This is a natural process of losing old feathers and replacing them with new ones. All birds moult, but the time and duration are to some degree inherited. The pattern can be a useful indication as to whether a hen is a good layer or not. As a general rule, a hen that moults early is a poorer layer than one who moults later. It is not quite that simple however, for an early moulter that goes through the moult quickly, is better than one whose moult lasts a long time.

Vent and abdomen: The abdomen of a hen enlarges when she starts lying and the vent becomes more moist and rounded. A bird that is a poor layer will tend to have a smaller, more shriveled vent. The pelvic bones also gradually move further apart. This can be measured quite easily by picking up a hen and seeing how many fingers will fit in between the bones. At first, it will be two fingers wide, but as the laying period continues, it measures three or even four fingers wide. When viewed from above, a good layer will be considerably narrower at the front than the back.

Plan for poultry house construction and facilities

Requirements for poultry house construction.

The basic requirements for poultry housing are: protection from weather, protection from predators, enough space, adequate ventilation, a clean environment and access to dust bathing facilities.

Environment

The climate in a chicken house has a great influence on the health and production level of the birds. Especially young and highly productive birds are sensitive in this respect.

Proper housing should meet the following environmental requirements. Moderate temperature:- Hens need a moderate temperature of 50-60 ^{o}F, Adequate ventilation:- The proper ventilation of poultry house is necessary for the purpose of removing excessive moisture and providing fresh air, Dryness: - Dry condition inside a poultry house is always an ideal condition. The proper degree of dryness in a house is obtained by a proper system of ventilation. Dampness gives rise to disease condition, Insulation:- Insulation of walls and roofs of a poultry house serves the following purpose, Light:-Day light in the house is desirable for the comfort of the house and Sanitation.

Ventilation: air flow

Ventilation is an important factor in housing. A building with open sides is ideal, otherwise cross-ventilation at bird-level should be allowed for in the form of floor level inlets, open in a direction to allow the prevailing wind to blow across the width of the building.

Heat stress is a significant constraint to successful production and can lead to death. Although birds can withstand several degrees below freezing, they do not tolerate temperatures over 40 °C. Poultry become heat stressed and irritable, and may begin to peck at one another. When new pinfeathers are growing (especially on young stock), blood is easily drawn, which can lead to cannibalism. The effects of heat stress are: a progressive reduction in feed intake as ambient temperature rises; an increase in water consumption in an attempt to lower temperature; a progressive reduction in growth rate; and Disturbances in reproduction (lower egg weight, smaller chicks, reduced sperm concentration and an increased level of abnormal sperm in cocks).

Light: duration and intensity

A well-lit house is essential. A dark house leads to lethargic, inactive, unproductive birds. Light is important for feeding, as poultry identify food by sight. This is especially important for intensively managed day-old chicks, which need very bright 24-hour lighting for their first week of life. Light is also an important factor in sexual maturity. An increasing light proportion in the day, as naturally occurs from mid-winter to mid-summer, will accelerate sexual maturity in growing pullets, bringing them to lay sooner. If hens are already laying, the increasing light proportion will increase egg production.

Protection: shelter sheds and buildings

Many factors influence the type and choice of housing to protect poultry from the effects of weather and predators. These include the local climate, the available space, the size of the flock and the management system. In extensive systems, birds must be protected from disease and predators but also be able to forage.

Site selection for poultry house construction

For efficient profitable and pleasant operation the following consideration should be taken in to account in selecting site to build poultry house.

Topography (physical feature of the land): Should be label or gentle slope that requires less site preparation and reduce the cost of construction. Houses should also be suited to take advantage of topographical features which will favor the movement

Drainage and soil: poultry houses should be placed on a sloping hillside rather than a hill top or in the bottom of a valley that provides good water drainage. Fertile and well drained soil preferably sandy loam rather than a heavy clay soil grows good vegetation.

Exposure: records of local wind speed and direction helps us to choose the best orientation of the house. Depending up on prevailing wind in a given locality, it should face the direction that permits' greatest amount of light in the house and it should be located against the prevailing wind to provide proper ventilation and at the same time avoid necessary exposure to wind. The house should be readily accessible to water supply, electricity and good transportation.

Space requirement for different poultry classes

Space: density of birds per unit area

This is the most important basic principle in housing, as the space available determines the number and type of poultry that can be kept. The recommended floor and perching space for the three main types of chicken is shown in the next table.

Table 1: Requirement of chickens for floor and perch space

Chicken types	Floor Space(birds/m^2)	Floor Space $ft^{2/}$bird)	Space Perch per bird)
Layer	3	3.6	25 cm
Dual Purpose	4	2.7	20 cm
Meat	4-5	2.2-2.7	15-20 cm

Hen groups are comfortable at a stock density of three to four birds per square meter. If more space is allowed, a greater variety of behavior can be expressed. Less space creates stressed social behavior, allowing disease vulnerability and cannibalism and leaving weaker birds deprived of feed or perch space.

Designing farm layout and chicken house

Poultry housing systems

Generally four systems of poultry housing followed among the poultry keepers. The type of housing adopted depends to a large extent on the amount of ground and the capital available.

Types of poultry housing: Free – range or extensive system, Semi - intensive system, Folding unit system, Intensive system (Battery system and Deep litter system).

Free-range system:

Overnight shelter which is roomy, clean and airy should be provided under free-range systems. Houses may be either fixed or mobile. If space permits, a mobile chicken house may be appropriate, and to increase egg production, mobile folds or field units for laying birds can be provided. These mobile units can be rotated on the range. Although housing is cheaper and there is less need for balanced rations, the birds are exposed to the sun and prone to parasite infestation. The stocking density on pasture should be calculated according to the soil type and pasture management system. A night shelter for up to 20 free-range chickens can be attached to any existing structure, such as the farmer's outhouse, kitchen or dwelling. In a deep litter system, there should be a density of at most three to four birds per square metre. In regions where it rains heavily, the floor should be raised with a generous roof overhang, particularly over the entrance. The raised floor can be a solid platform of earth or a raised bamboo platform. The raised bamboo platform has the advantage of providing ventilation under the poultry, which helps cool them in hot weather and keeps them out of flood water in the monsoons.

Semi-intensive system:

Where the amount of free space available is limited this system is adopted, but it is necessary to allow the birds 20-30 square yards per bird of outside run. Wherever possible this space should be divided giving a run on either side of the house of 10-15 square yards per bird, thus enabling the birds to move onto fresh ground.

Folding-unit system:

This system of housing is an innovation of recent years. In portable folding unit's birds being confined to one small run, the position is changed each day, giving them fresh ground and the birds find a considerable proportion of food from the herbage are healthier and harder. For the farmer the beneficial effect of scratching and manuring on the land is another side effect.

The most convenient folding unit to handle is that which is made for 25 hens. A floor space of 1 square foot should be allowed for each bird in the house, and 3 square feet in the run, so that a total floor space to the whole unit is 4 square feet per bird, as with the intensive system.

A suitable measurement for a folding house to take 25 birds is 5 feet wide and 20 feet long, the house being 5' x 5', one-third of the run. The part nearest the house is covered in and the remaining 10' open with wire netting sides and top.

Its Disadvantages are; the food and water must be carried out to the birds and eggs brought back and there is some extra labour involved in the regular moving of the fold units.

Intensive System:

This system is usually adopted where land is limited and expensive. In this system the birds are confined to the house entirely, with no access to land outside. This has only been made possible by admitting the direct rays of the sun on to the floor of the house so that part of the windows are removable, or either fold or slide down to permit the ultraviolet rays to reach the birds. Under the intensive system, Battery (cage system) and Deep litter methods are most common.

Battery system; This is the most intensive type of poultry production and is useful to those with only a small quantity of floor space at their disposal. In the battery system each hen is confined to a cage just large enough to permit very limited movement and allow her to stand and sit comfortably. The usual floor space is 14 x 16 inches and the height, 17 inches. Advantages: Remarkably successful in the tropical countries, It requires a minimum expenditure of energy from the bird as they spend all time in the shade and It lessens the load of excess body heat and The performance of each bird can be noted and culling easily carried out.

Deep litter system: In this system the poultry birds are kept in large pens up to 250 birds each, on floor covered with litters like straw, saw dust or leaves up to depth of 8-12 inches. Deep litter resembles to dry compost. In other words, we can define deep litter, as the accumulation of the material used for litter with poultry manure until it reaches a depth of 8 to 12 inches.

Advantages of Deep Litter System: Birds and eggs are safety as enclosed in deep litter intensive pen, which has strong wire netting or expanded metal, Built-up deep litter also supplies some of the food requirements of the birds. They obtain "Animal Protein Factor" from deep litter, The level of coccidiosis and worm infestation is much lower with poultry kept on good deep litter than with birds (or chicken) in bare yards. Well managed deep litter kept in dry condition with no wet spots around waterier has a sterilizing action, With correct conditions observed with well managed litter there is no need to clean a pen out for a whole year; the only attention is the regular stirring and adding of some material as needed, Generally 35 laying birds can produce in one year about 1 tone of deep litter fertilizer. The level of nitrogen in fresh manure is about 1%, but on well built-up deep litter it may be around 3% nitrogen (nearly 20% protein). It also contains about 2% phosphorus and 2% potash. Its value is about 3 times that of cattle manure and It is a valuable insulating agent, the litter maintains its own constant temperature, so birds burrow into it when the air temperature is high and thereby cool themselves. Conversely, they can warm themselves in the same way when the weather is very cool.

Basic Rules for deep litter system are; Do not have too many birds in the pen – one bird for every 3 ½ to 4 and preferably 5 square feet of floor space, Provide sufficient ventilation to enable the litter to keep in correct condition, Keep the litter dry. This is probably the master work in a deep litter system. If the litter gets soaked by leaking from roofs or from water vessels, it upsets the whole process and would have to start over again. All probable precautions should be taken to maintain the litters completely dry. Stir the litter regularly. Turning the litter (just like digging in a garden) at least once weekly is very important in maintaining a correct build-up of deep litter.

Feeding, watering, lighting, and other facilities

Feeder

A good feeder should be: durable enough to withstand frequent cleaning; stable enough not to be knocked over; of the correct height and depth; bird proof (such that birds cannot get into it or roost in it); and Equipped with a lip to prevent birds from spooning feed out onto the floor with their beaks.

Feeder space is measured as the linear distance of lip available to the birds. This is either the circumference of a round tube-feeder tray or twice the length of a trough if the birds feed from both sides. If troughs are used, at least 10 cm of feeding space should be accessible to each bird. When circular feeders are used, there should be at least 4 cm feeding space per bird.

Drinker systems

The provision of clean, cool drinking water is the single most important consideration for any egg laying operation. Laying fowl require clean, uncontaminated drinking water that is neither too hot nor too cold. If water supply and/or consumption is interrupted for any reason (equipment failure, contamination, overheating) there will be a subsequent drop in egg production until the problem is resolved. This situation is exacerbated during extremely hot conditions, when water consumption can double from 250ml up to 500 ml.

For most small scale producers, simple troughs or other receptacles are satisfactory, provided that they are cleaned regularly. There are also many commercially available drinker systems that assist in ensuring a constant supply of clean water.

For larger producers, the most effective and reliable drinker system is the "nipple" system; the standard drinker system of the commercial industry worldwide, providing water to literally billions of chickens, laying hens, broilers, turkeys and other poultry species. This system provides drinking water to the bird when they activate a captive "nipple", releasing a flow of water directly into the bird's beak.

Undertake routine poultry management activities

Lighting

There are two ways to try to raise the production of chickens by using artificial lighting.

If the housing is lit in the cooler hours before sunrise or after sunset, the chickens are able to eat more or if the day length is increased by using artificial lighting, laying hens are encouraged to lay more eggs.

Day length must not be increased until just before young chicks start laying. Otherwise, it can lead to premature laying maturity. It is best to start raising the chicks when the days are getting shorter. If you need to start the growing period when the days are getting longer, try to artificially ensure a constant day length. Just before the laying period starts, lengthen the days by one hour a week until you have 14 hours of light per day. After production rates have reached a maximum, lengthen the amount of light per day by one hour a week until there are 16 hours of light.

Culling

Culling is used to immediately remove unproductive hens and sick chickens from the population during the production period. This in Small-scale chicken production increases the production efficiency because you do not waste feed on unhealthy or unproductive chickens. You can already start culling during the growing period.

Feeding and watering managements

Vitamin requirements: vitamins are often involved in enzyme systems.fat soluble vitamins include vitamin A, D, E and k. water soluble vitamins include vitamin B(thiamin, riboflavin, biotin, niacin, panthothenic acid ,folacin etc)and vitamin C (ascorbic acid) an imbalance of vitamin leads to serious disorders.

Mineral requirements: the function of the mineral element in the animal's body is numerous. In the absence of certain mineral elements the various organs and tissues of the animal organism are unable to perform their functions.

Ca and p are the minerals required by birds in larger amounts.

Feed additives: include antibiotics, growth promoters, and egg yolk coloring materials. they aid in maintaining the normal health of birds and increased feed efficiency. are mixed with poultry rations in minute quantities

Debeaking

Cannibalism can be prevented by de beaking 1/3-1/2of the beak of chickens. Chicks are debeaked at the age of 6-10 days but it is possible up to the age of 18 weeks. In layers debeaking causes stress, reduces feed intake and affects egg production.

Cannibalism is caused by un satisfactory diets, overcrowding, overheating and bright light

Management of poultry disease:

Poultry health and disease: health is the condition in which all the organ systems and body structures are working in full harmony. Disease is deviation from normal health.

Disease is always a big risk to poultry man.

Stress: the tendency to develop disease on exposure to infections is increased under conditions of stress. Stress can arise from any of number of internal and external factors.

Internal factors: includes Heredity: some birds have natural, hereditary protection against certain disease, Age: some disease occurs at certain age e.g. coccidiosis occur at young age, Immunity: some birds have more immunity to more disease .

External factors:- Stocking density of birds: overcrowding leads to social problems, Feed: properly fed birds are more resistant to disease than poorly fed

ones, Water: provision of insufficient or impure water affects productivity of birds, Climate: a sudden change in temperature, humidity, air composition makes chicks susceptible to disease, Light changes: sudden change in length of exposure to light affects metabolism and can make birds more susceptible to disease.

Poultry disease prevention and control

The preventative measures include good hygiene measures, effective nutrition, good housing and vaccination.

Handling an outbreak of disease:- an effective programme of disease prevention and control methods is important in todays intensive poultry operation which includes the following; Bring only healthy birds to the farm, Sanitary precautions should be followed, Provide a balanced ration and clean and adequate supply of fresh water to the birds all the time, Try to avoid stressful conditions, Regularly vaccinate the birds, Check temperature, humidity, light and ventilation of the houses regularly, Keep the birds separated according to their age, Control vermin, keep all birds showing abnormalities in isolation pens, Dispose dead birds properly. Burn or bury all dead birds, If a disease problem develops, obtain an early, reliable diagnosis and apply the best treatment and Always start with the healthy birds.

Biosecurity and Disease Management

Bio security, which literally means safety of living things, is a programme designed to prevent the exposure of birds to disease causing organisms by reducing introduction and spread of pathogens into and between the farms. Therefore, it is better to wait a little longer before introducing new flock than to hurry and risk infection of new flock.

Formulate Ration for Different Classes of Poultry

Referring nutrient requirement for chicken from standard nutrient requirement table

Poultry convert feed into food products quickly, efficiently, and with relatively low environmental impact compared with other livestock. The high rate of productivity of poultry results in relatively high nutrient needs. Poultry require the presence of at least 38 dietary nutrients in appropriate concentrations and balance. The nutrient requirement figures published in Nutrient Requirements of Poultry (National Research Council, 1994) are the most recent available and should be viewed as minimal nutrient needs for poultry. They are derived from experimentally determined levels after an extensive review of the published data. Criteria used to determine the requirement for a given nutrient include growth, feed efficiency, egg production, prevention of deficiency symptoms, and quality of poultry product. These requirements assume the nutrients are in a highly bioavailable form, and they do not include a margin of safety. Consequently, adjustments should be made based on bioavailability of nutrients in various feedstuffs. A margin of safety should be added based on the length of time the diet will be stored before feeding, changes in rates of feed intake due to environmental temperature or dietary energy content, genetic strain, husbandry conditions (especially the level of sanitation), and the presence of stressors (such as diseases or mycotoxins).

Nutrient requirements of leghorn-type chickens as percentages or as milligrams or units per kilogram of diet

Energy base kcal ME per kilogram diet*	Growing 0-6 wks 2,900	Growing 6 to 14 weeks 2,900	Growing 14 to 20 weeks 2,900	Laying 2,900	Laying, daily intake per hen**	Breeding 2,900
Protein (%)	18	15	12	14.5	16,000 mg	14.5
Arginine (%)	1.00	0.83	0.67	0.68	750 mg	0.68
Glycine and serine (%)	0.70	0.58	0.47	0.50	550 mg	0.50
Histidine (%)	0.26	0.22	0.17	0.16	180 mg	0.16
Isoleucine (%)	0.60	0.50	0.40	0.50	550 mg	0.50
Leucine (%)	1.00	0.83	0.67	0.73	800 mg	0.73

Lysine (%)	0.85	0.60	0.45	0.64	700 mg	0.64
Methionine+cystine	0.60	0.50	0.40	0.55	600 mg	0.55
Methionine (%)	0.30	0.25	0.20	0.32	350 mg	0.32
Phenylalanine+tyrosine	1.00	0.83	0.67	0.80	880 mg	0.80
Phenylalanine (%)	0.54	0.45	0.36	0.40	440 mg	0.40
Threonine (%)	0.68	0.57	0.37	0.45	500 mg	0.45
Tryptophan (%)	0.17	0.14	0.11	0.14	150 mg	0.14
Valine (%)	0.62	0.52	0.41	0.55	600 mg	0.55
Linoleic acid ((%)	1.00	1.00	1.00	1.00	1,100 mg	1.00
Calcium (percent)	0.80	0.70	0.60	3.40	3,750 mg	3.40
Phosphorus, available	0.40	0.35	0.30	0.32	350 mg	0.32
Potassium (percent)	0.40	0.30	0.25	0.15	165 mg	0.15
Sodium (percent)	0.15	0.15	0.15	0.15	165 mg	0.15
Chlorine (percent)	0.15	0.12	0.12	0.15	165mg	0.15
Magnesium (mg)	600	500	400	500	55 mg	500
Manganese (mg)	60	30	30	30	3.30 mg	60
Zinc (mg)	40	35	35	50	5.50 mg	65
Iron (mg)	80	60	60	50	5.50 mg	60
Copper (mg)	8	6	6	6	0.88 mg	8
Iodine (mg)	0.35	0.35	0.35	0.30	0.03 mg	0.30
Selenium (mg)	0.15	0.10	0.10	0.10	0.01 mg	0.10
Vitamin A (IU)	1,500	1,500	1,500	4,000	440 mg	4,000
Vitamin D (ICU)	200	200	200	500	55 mg	500
Vitamin E (IU)	10	5	5	5	0.55 mg	10
Vitamin K (mg)	0.50	0.50	0.50	0.50	0.055 mg	0.50
Riboflavin (mg)	3.60	1.80	1.80	2.20	0.242 mg	3.80
Pantothenic acid (mg)	10.0	10.0	10.0	2.20	0.242 mg	10.0
Niacin (mg)	27.0	11.0	11.0	10.0	1.10 mg	10.0
Vitamin B_{12} (mg)	0.009	0.003	0.003	0.004	0.00044mg	0.004
Choline (mg)	1,300	900	500	?	?	?
Biotin (mg)	0.15	0.10	0.10	0.10	0.011 mg	0.15
Folacin (mg)	0.55	0.25	0.25	0.25	0.0275 mg	0.35
Thiamin (mg)	1.8	1.3	1.3	0.80	0.088 mg	0.80
Pyridoxine (mg)	3.0	3.0	3.0	3.0	0.33 mg	4.50

Food stuffs commonly used in poultry diets in the tropics

Poultry rations represent approximately 60% of cost of producing table poultry or table eggs. Saving in the use of poultry food can therefore make a major contribution to the economics of production; it is important that the cheapest suitable food stuffs are used in the correct ratio in poultry diets. It is also important to know what food stuffs are available and how they should be used in poultry diets. Food stuffs used in poultry diets can be classified in to five broad classes; Cereals and cereal by products; Plant proteins; Animal proteins; other energy foods and Mineral supplements

Energy Sources

Grains; Corn is the most important & widely used. Also, milo, wheat, barley, and oats are being used, but, perhaps, inferior to corn in the relative value.

Grain by-products; Including various milling by-products (e.g., corn gluten & bran, and wheat processing by-products), brewery by-products, etc.

Molasses; Used as a source of energy but have an adverse laxative effect, thus should be limited to not more than 2% of the diet.

Vegetable & animal fats; Used as energy sources, but also reduce feed dustiness, increase palatability, and improve texture and appearance of the feed.

Protein/Amino Acid Sources

Plant sources;

Soybean meal; Most widely used because of its ability to provide indispensable amino acids; high in digestibility and low in toxic or undesirable substances.

Cottonseed meal; Generally not used for layer diets because of: a) gossypol, which can cause a mottling and greenish cast to egg yolks, and b) cyclopropenoic fatty acids, which can impart a pink color to egg whites. May be used to replace up to 50% of the soybean meal in grower poultry diets.

Linseed meal - Can use a limited amount but may depress growth and cause diarrhea. Should not exceed 3 to 5% of the poultry diet.

Alfalfa meal and corn gluten meal - Used extensively, both for their high content of carotenoids. Both should be limited to not more than 10%.

Animal sources

Fish meals - Often used at 2 to 5% of the diet, but high in fat & tend to create a fishy flavor in meat and eggs when used in larger amounts.

Meat products (animal by-products, poultry meal, blood meal, hydrolyzed poultry feather) - Often economically priced, thus may replace an equal amount of soybean meal protein up to about 10% of the diet. Excellent sources of Ca & P.

Mineral Sources

Caicium; Common supplements are ground limestone, crushed oyster shells or oyster shell flour, bone meal, and dicalcium phosphate.

Phosphorous; Common supplements are bone meal, dicalcium phosphate, deflourinated rock phosphate, monosodium phosphate, and rock phosphate.

Salt; common to add 0.1 to 0.5%. Too much salt will result in increased water consumption and wet droppings.

Vitamin Sources

Unlike in the past, a wide variety of feedstuffs are not included in poultry diets for their Vitamin content.

Vitamin premixes are commonly used to satisfy the vitamin needs

Types of poultry ration

Chickens differ markedly in their growth rate, egg production and feed conversion efficiency. Broilers are fast growing and are efficient in converting feed in to meat they need both high energy and high protein feeds. Layers are slow growing and are efficient in converting feed in to eggs rather than meat. They need low energy and protein. Fast growth and early maturity is not desired in layers .adlibitum feeding of layer chicks and pullets for early maturity resulted in lower egg production, decreased in size of eggs, prolapsed vent and more mortality. So feeding layer chicks and pullets should be aimed at maintaining a normal and sustainable growth up to the point of lay

Broiler feeds (rations)

There are three different types of rations in broiler feeding

Broiler starter ration: is a ration that is fed to chicks aged 0-21 days or up to 4 weeks. it is high in protein 22% cp. It is comparatively lower in energy= 3100 kclME/kg of ration but it should not be greater than 2800kclME/kg of the diet.

Broiler grower ration: more or less similar to the starter ration

Finisher ration: is fed to chickens starting from 25 or 41 days of age depending on the feeding programme .it is high in energy(3200KCLME/kg) but low in cp(19-20%) compared to starter and grower ration

Layer feeds (ration): there are three types of rations for egg producing type of chickens

Layer starter ration: is fed to layer chicks up to 8 wks of age .it contains 20% cp and 2800KclME/kg. an individual chick requires 1.5-2.5 kg feed from the age of 0-8 wks (25-42)gm/day. It contains higher protein and energy than grower and layer ratios

Layer grower ration: is fed to pullets 9-20 wks. it contains 18% cp and 2700KclME/kg. restricted feeding should be practiced either by decreasing the quantity of the feed or skipping feeding for a day. bird requires 6-10kg during the growing period or 60-100gm daily.

Layer ration: is fed to egg laying chickens. Laying chickens should be fed adlibitum of layer ration. Restricted feeding affects production and initiates moulting. It contains 16% cp, 2700kclME/kg of feed and 3% ca just before the point of lay, ca content of the feed should be increased to 6% because pullets start to deposit ca in their bones.

Infectious diseases and their causes

Disease can occur in poultry of all ages and breeds. When birds look sick and/or behave strangely there are many possible causes. A healthy chicken is active, has bright eyes and scavenges for food. Unhealthy or sick birds are often less active, with dull eyes and ruffled feathers. Sometimes you may observe abnormal breathing (coughing, swollen eyes), abnormal digestion (watery or bloody diarrhea, dirty feathers) or locomotion disorders (paralysis/limping). Small-scale chicken production sometimes you may notice that hens are laying fewer or abnormal eggs. Some diseases can cause high mortality rates. Infections are caused by germs. These microbes act as pathogens,which means that they Cause disease:

Viruses causing; Newcastle Disease, bird flu or avian influenza, fowl pox and Gumboro disease.

Bacteria causing; fowl cholera, typhoid and pullorum disease.

Fungi causing; Aspergillosis or brooder pneumonia.

Of all the microbes, only a few parasites are visible to the naked eye. All other germs can only be seen with special microscopes. Fungi or moulds can produce toxic substances called mycotoxins. If birds eat feed with mycotoxins, their resistance may be lowered. Feed should therefore be stored properly to avoid fungal growth. Parasites also cause disease or growth retardation: internally (roundworms, tapeworms and coccidiosis) or externally (fleas, ticks, lice).

Disease prevention

Diseases in chicken can often be prevented by: Providing clean water, good food, housing and care, applying hygiene and biosecurity measures and vaccinating against viral diseases present in the area

Disease treatment

Viral diseases *cannot* be cured with any medicines. For bacterial and parasitic diseases, there are medicines such as antibiotics, coccidiostats, de-worming drugs, herbs etc. Ectoparasites can be treated by applying oil, kerosene or pesticides. The right diagnosis is important, so you can choose the right treatment. When chickens are treated with medicines, residues of the drugs can be present in meat and/or eggs for some time.

Perform hatchery operations

Indentifying Types and parts of incubators

Incubator; is a box that holds and rotates eggs while maintaining appropriate temperature, humidity and oxygen levels.Identifying Types and parts of incubators.

The force air incubators have a fan and are large in size. These incubators are good for hatching a large number of chicken eggs. These incubators have automatic turners that help turn eggs during incubation.

The still-air incubators are small and do not have a fan. You can hatch smaller number of chicken eggs in this incubator.

Method of incubation

Fertilized eggs should be incubated using the broody hen(natural incubation)or artificial incubation or artificial incubator for 21 days for the production of chicks . It is by natural incubation that most chickens of the indigenous breeds are produced. However the results are usually poor and this method cannot serve large scale commercial poultry production. These artificial incubators have the capacity of incubating up to 100,000 eggs can be used. The working principle of an incubator is similar to the body of hen

Artificial incubator

Every incubator has egg trays, temperature regulator, device for adding moisture to the air of the egg chamber (humidifier), a ventilating device and reliable thermo meter. Incubators of large capacity have automatic egg turners. The two units of artificial incubator are: A setting compartment or the processing unit- for the first 18 days of incubation period and A

hatching compartment (unit) - after the 18th days (for the last 3 days)where eggs hatch into chicks. Many incubators contain both compartments except the large capacity incubators.

Types of artificial incubator- there are several different makes of incubator which differ in design, size, kind of fuel used, method of heating the eggs, method of ventilating the egg chamber and method of providing humidity, so that it is impossible to classify them in any system. There are two principal types of incubators based on their size; The smaller cabinet type of incubator –is low capacity incubator (400-20000 eggs per setting) containing both compartments. Most of the incubators that are available in Ethiopia are of this type. Large walk in mammoth incubator – is high capacity incubator (>50,000 eggs per setting) it is usually owned by large companies in such type of incubators both compartments are not found on the same incubator.

Factors essential for incubation of eggs

Temperature- The eggs need to be kept at **37.5c^0** at all times; just one degree higher or lower for a few hours can terminate the embryo. Temperature is the most critical factor for successful development of embryos and hatching of chicks.

Humidity: 40 to 50 percent humidity must be maintained for the first 18 days; 65 to 75 percent humidity is needed for the final days before hatching. Low RH for the first 18th day results in excessive loss of water from eggs that hatch into smaller and hard chicks. High RH prevents sufficient evaporation as the result of which large and completely wet chicks are produced. It also delays hatching and reduces hatchability

Ventilation – Egg shells are porous, allowing oxygen to enter and carbon dioxide to exit; incubators need to have holes or vents that allow fresh air to circulate so the fetuses can breathe. Is to maintain the O_2 and CO_2 content of an atmosphere in the egg incubating chamber at 21% and 0.5% respectively.

Position and turning of eggs:- eggs are arranged on setting trays with position large end up. This is done to allow more eggs to be incubated at one setting and to increase chick quality and hatchability. Placing the eggs with the small end up results in a decrease in chick quality and hatchability (10%). Turning of the eggs frequently prevents the adhering of the embryos to the shell

Perform hatchery operation

Now a day's most commercial poultry farms obtain day old chicks from hatcheries. But farms to which a hatchery unit is added can produce their own day old chicks. Whatever the cause knowledge of the basic working principles and practices of incubator and incubating eggs is of paramount importance in hatchery management and operation.

Operation of an incubator

Artificial incubation has several steps:

Step 1: preparation of the incubator

A. Sanitation and fumigation- this includes the cleaning and disinfection of the incubator parts. Remove the different parts such as the egg trays and carriers racks. Fumigate with 50ml of 40% formaldehydes with 25-30gm potassium permanganate

B. Regulate the incubator. Check the temperature, humidity and the light make trial run for 24 hours then adjust it

Step 2: select the eggs.

The following factors should be considered in selecting hatching egg. Select eggs that are neither too small nor too big. Select medium sized eggs, Eggs with poor shell texture should not be selected. poor shell quality indicates ca deficiency which is associated with poor hatchability, Do not select cracked eggs, Highly soiled eggs should not be selected, Do not select eggs that are kept for long time usually for more than 10 days. If the area is hot eggs kept more than 3 days should not be selected, If the egg has been stored in cold storage it should be left at room temperature for 4 hours to stabilize.

Step 3 setting: placing the eggs in the incubator

Place the eggs with large end upon the egg tray then Put the tray on the incubator

Step 4 regulate the incubator

Adjust the temperature, Adjust the humidity, Adjust the ventilation, Eggs should be turned 4-6 times daily starting the 3rd day of incubation

Step 5 testing the egg or candling

Incubated eggs should be tested (candling) on the 7th day and 14th day; If the egg is perfectly transparent, like anew laid egg , it is infertile; If dark body is seen in the center of an egg , it is fertile and contains an embryo; All infertile eggs should be sorted out and disposed

Step 6 transferring the egg to the hatching unit (compartment)

An incubator has two compartments

Incubating compartment- compartment where hatching eggs are set for the first 18 days

Hatching compartment – compartment where hatching eggs are placed starting 19th day On the 19th day hatching eggs are transferred from incubating trays to hatching trays

Step 7 cares during hatching

Chicks start to come out starting the 21th day; The chicks hatched should remain in the incubator without feed for 18- 24 hours; After drying off and flushed out the temperature should be gradually decreased to 98-95 degree Fahrenheit for hardening of the chicks before transferring them to the brooder.

Selecting egg, cleaning and setting in incubators

Eggs sold in the local stores are not fertile eggs and cannot hatch. Fertile eggs are those eggs in which ovum have been fertilized by male sperms. You can get fertilized eggs from hatcheries or poultry farms. When selecting an egg, keep the following instructions in mind:

Select medium-sized eggs as large eggs hatch poorly and small eggs produce small chicks.

Avoid eggs with cracks and thin shells Select clean eggs for hatching as cleaning or wiping dirty eggs removes their protective coating on the shell. This makes the eggs prone to diseases

Selection of Hatching Eggs

Most producers set as many eggs as their breeders produce. If incubator space is the limiting factor, it is more profitable to select the better quality eggs for incubating. A few tips to follow when selecting hatching eggs are:

Select eggs from breeders that are; well developed, mature and healthy; compatible with their mates and produce a high percentage of fertile eggs; are not disturbed much during the mating season; fed a complete breeder diet; and Not directly related brother, sister, mother, father, etc.

Avoid excessively large or small eggs. Large eggs hatch poorly and small eggs produce small chicks.
Avoid eggs with cracked or thin shells. These eggs have difficulty retaining moisture needed for proper chick development. Penetration of disease organisms increase in cracked eggs.

Do not incubate eggs that are excessively mis-shapen.

Keep only clean eggs for hatching. Do not wash dirty eggs or wipe eggs clean with a damp cloth. This removes the egg's protective coating and exposes it to entry of disease organisms. The washing and rubbing action also serves to force disease organisms through the pores of the shell.

Egg Care and Storage

Many times a producer carefully attends to the incubation process but disregards the care of the eggs before they are placed in the incubator. Even before incubation starts the embryo is developing and needs proper care. Hatching eggs suffer from reduced hatchability if the eggs are not cared for properly.

When the required amount of eggs for setting have been collected, cleaned, candled and sorted then as a group they should be bought up to room temperature for 24 hours before placing in the incubator to minimize the shock caused through a sudden change of temperature.

Performing routine incubator management

Fumigation of Incubators

The killing of bacterial organisms by formaldehyde gas is based on the concentrations of the gas, exposure time, temperature, and humidity of the incubator. The chemicals potassium permanganate and formalin (which is 40% formaldehyde gas) have proven to be the most effective method of destroying bacterial organisms in the hatchery.

Concentration

The recommended concentration for effective fumigation is 53 mL of formalin added to 36 g of potassium permanganates per cubic meter of space to be fumigated, or 1 1/2 mL of formalin added to 1g of potassium permanganate per cubic foot of space to be fumigated.

Caution: Never add the permanganates to the formalin. Heat is generated when the two chemicals are combined, and care should be taken. Formaldehyde gas is generated quickly. Do not allow the fumes to get into the eyes. Personnel should use a respirator or wear a mask to avoid unnecessary exposure.

Time

It is not recommended to fumigate setters with hatching eggs in them, but if such treatment becomes necessary, embryos between 24 and 96 hours of age should not be exposed to the above concentration of formaldehyde.

Fumigation Procedure

Make sure the temperature and humidity of the incubators are at normal operating conditions.

Measure the inside volume of the machine in cubic feet or cubic metres (length x width x height).

Close the ventilators, but leave the fans on.

Weigh the required amount of potassium permanganate into a wide enamelware or earthenware vessel large enough to accommodate the boiling and splattering action experienced when the formalin is added. Place the vessel and the permanganate in the area to be fumigated; then add the formalin.

Close the door immediately and leave closed for 20 minutes.

After 20 minutes, open the ventilators.

Open the doors of the machine for five minutes, leaving the fan on to allow more of the formaldehyde gas to escape, or neutralize it with a 25% solution of ammonium hydroxide equal to one-half the amount of formalin used. The hydroxide should be thrown directly on the floor of the machine and the doors closed. The formaldehyde gas will quickly be neutralized.

Temperature management

During the warm-up period, the temperature should be adjusted to hold a constant 101°F for still air, 99°-100°F for forced air. To obtain reliable readings, the bulb of the thermometer should be at the same height as the tops of the eggs and away from the source of heat.

Humidity management

The relative humidity of the air within an incubator should be about 60 percent. During the last 3 days (the hatching period) the relative humidity should be nearer 65-70 percent. (Too much moisture in the incubator prevents normal evaporation and a result in a decreased hatch, but excessive moisture is seldom a problem in small incubators.) Too little moisture results in excessive evaporation, causing chicks to stick to the shell, remain in the pipped shells, and sometimes hatch crippled.

Ventilation management

The best hatching results are obtained with normal atmospheric air, which usually contains 20-21 percent oxygen. Ventilation is very important during the incubation process. While the embryo is developing, oxygen enters the egg through the shell and carbon dioxide escapes in the same manner. As the chicks hatch, they require an increased supply of fresh oxygen. As embryos grow, the air vent openings are gradually opened to satisfy increased embryonic oxygen demand. Care must be taken to maintain humidity during the hatching period. Unobstructed ventilation holes, both above and below the eggs, are essential for proper air exchange

Turning eggs

Turning is essential during the first 14 days of incubation and should be continued until 3 days prior to the eggs expected hatch day. If hand turning, always turn the eggs an uneven number of times a day, so the eggs do not spent two nights in a row in the same position. If not turned to a fresh position frequently during the early stages, the developing embryo touches the shell membrane and sticks to it causing abnormal growth. Turning the egg aids these movements within the egg, and mimics what a mother hen would do naturally.

Incubating Chicken Eggs

Mark the chicken eggs with a small 'x' using a permanent marker before you put in incubator. This will be helpful when turning the eggs around during incubation.

In a forced air incubator, adjust the temperature to 100 °F. The temperature should be set at 102 °F, in a still-air incubator. Set the humidity levels at 58-60% for the first 18 days. During the time of hatching, that is, between 18 to 21 days, raise the humidity level to 65%-70%. This is to prevent the loss of moisture in eggs. If you are using a still-air incubator turn the eggs around 2 to 3 times a day for 18 days after incubating. Do not attempt to turn the eggs after the 18th day as you may injure the chick.

Candling eggs periodically

Fertility and Candling

Fertility is rarely 100%. When the flock is of good producing age and the right proportion of males to hens are penned together, it can be assumed that a fair amount of eggs will be fertile. Fertility may vary from 55% to 95% with season, condition and type of birds. A good average expectancy may be that 50% to 75% of the eggs will hatch.

Fertility of eggs cannot be determined before incubating them. After 2 to 3 days, white shelled eggs may be candled to see if embryos have developed. Cracked or damaged eggs do not hatch and often develop odors and should be removed when detected.

Egg Candling

Candling is the term used for shining a light through an eggshell to see what's happening inside. The reason to candle to see whether the embryo is developing or not; those that are not developing should be removed from the incubator on day 14 (or sooner if they begin to smell bad). There are many reasons an egg could fail to develop or begin developing and stop.

How to candle

When candling an egg, a light is held up to the wide end of the egg (the air cell end) in order to illuminate the shell's contents. The darker the eggshell, the brighter the light required to get a good look at what's going on inside.

Terminologies

Poultry :- birds that are raised by humans for meat, egg, feather production purpose for human **Mash**: a blend of several feed ingredients, ground to a small size but *not* too a powder

Pellets: small kernels of compressed mash, causing birds to eat the whole blend, not pick and choose

Crumbles: pellets broken up into smaller pieces

Starter: a blend of feed for chicks and growing birds, usually in the form of mash; approximately the same as "Grower"; can be replaced with "adult" food as soon as chicks go for it, somewhere between 4 and 8 weeks of age

Grower: approximately the same as "Starter"

Layer feed : blend for chickens that are laying eggs, having extra calcium and protein added

Broiler feed: blend for chickens that are growing as fast as possible, in order to be harvested for meat as early as possible

Pullets: female chickens in their first year of lay, or prior to their first moult; female baby chicks

Hens: female chickens in their second year of lay, or after their first moult

Cockerels: male baby chicks; male young domestic fo wl

Broilers: chickens raised to be eaten

Layers: chickens raised to be egg-layers

Layer-Broiler: chickens raised to be both egg-layers and to be eaten

Conclusion and Recommendations

Poultry Production system is the way in which animals are kept and managed for specific purpose. There are hundreds of chicken breeds in existence. The physical traits used to distinguish chicken breeds are size, plumage color, comb type, skin color, number of toes, amount of feathering, egg color, and place of origin. They are also roughly divided by primary use, whether for eggs, meat, or ornamental purposes, and with some considered to be dual-purpose. Feeder space is measured as the linear distance of lip available to the birds. This is either the circumference of a round tube-feeder tray or twice the length of a trough if the birds feed from both sides. Disease can occur in poultry of all ages and breeds. When birds look sick and/or behave strangely there are many possible causes. A healthy chicken is active, has bright eyes and scavenges for food. Unhealthy or sick birds are often less active, with dull eyes and ruffled feathers. Sometimes you may observe abnormal breathing (coughing, swollen eyes), abnormal digestion (watery or bloody diarrhea, dirty feathers) or locomotion disorders (paralysis/limping). Small-scale chicken production sometimes you may notice that hens are laying fewer or abnormal eggs. Some diseases can cause high mortality rates. Infections are caused by germs. These microbes act as pathogens, which mean that they Cause disease:

The following recommendations are forwarded;

- The poultry farm should be cleaned every time.
- Adequate ventilation and water should be provided.
- Sick poultry should be separated and culled.

References

Abera Melese, 2000. Comparative Studies on performance and physiological responses of Ethiopian indigenous chicken. DVM Thesis.

Alemu Yami and Tadele Dessie. 2014. The status of poultry research and development research Debra Zeit Agricultura Research Center.

Ceneteral Stastic Authority (CSA), 2014. Agricultural Sample Survey, Addis Abebe Ethiopia.

EARO (Ethiopia Agricultural Research Organization), 2000. Summary of livesock research strategy .

Fish Moges, Abera Melese, and Tadele Dessie. 2010. Assessment of village chicken production system and evalution of the productive and reproductive performance of local chicken in Bure District, North West Ethiopia.

Halima Hassen and Neser F.W.C. 2007. Village based indigenous chicken production system in North West Ethiopia.Tropical Animal Health and Production.

Tadele Dessie.,T.Milion, Alemu Yami and K.J.Peters,2003. Village chicken production system in Ethiopia: use pattern and performance evaluation and chicken products and socio economic function of chicken. Livestock Research for Rural Development **15**(1).

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