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Review

Review on Health Care Management Practices in Poultry

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Abstract

Poultry occupies a unique position in terms of its contribution to the provision of high quality protein food and sources of income. There is a tremendous growth of poultry farming in the last six decades and it creates income generation in urban and per urban area. Village poultry production based mainly on a scavenging system is of enormous socio-economic significance, in terms of contribution to family nutrition and household food security throughout the developing world. Health management is a system of preventive medicine that considers the whole animal, and the total influences including social, with respect to relationships with others in the flock, psychological and environmental factors that affect health including nutrition, housing, sanitation, vaccination, biosecurity and so on. The aim of this seminar paper is to high light the poultry health care management practices which include, feed, housing, sanitation, bio-security and vaccination. Poultry feed provides the bird with fats, carbohydrates, proteins, minerals vitamins and water. Poultry housing should be weather-proof to provide protection from the elements (cold, rain, wind, and the hot sun) and provide warmth, especially during brooding. Cleaning and disinfection involve the physical and chemical removal (usually using detergent and water) of contaminating debris, and the reduction or elimination of pathogenic organisms in or on materials, so that these no longer present a health hazard. Evaluating the biosecurity of ongoing operations is important in developing effective programs to prevent the introduction of disease into a complex or to limit subsequent dissemination among farms. Vaccination is a measure that may be applied wherever a high risk of introduction and further spread of a contagious poultry disease has been identified. Therefore, for good productivity and profitability, it is recommended that there should be a day-to-day husbandry and strong chicken health care management practices.

Key words: Biosecurity; Health care Management; Poultry; Sanitation; Vaccination.

Introduction

Poultry occupies a unique position in terms of its contribution to the provision of high quality protein food to rural smallholder farming families in Africa [1] and urban dwellers. The role of poultry in the rural economy of Ethiopian farmers is immense where they are an important source of high quality animal protein and of easily disposable income for farmers. In addition to these, the spiritual benefit of sacrifice of indigenous chicken types has also an important place in the cultural, social and religious functions of the Ethiopian society [2].

There is a tremendous growth of poultry farming in the last six decades and it creates income generation in urban and per urban areas [3]. In village systems, farmers keep poultry for diverse objectives. They are raised for purposes of hatching, sale, and home consumption, sacrifices (e.g. healing ceremonies) and gifts [4]. Village poultry production based mainly on a scavenging system is of enormous socio-economic significance, in terms of contribution to family nutrition and household food security throughout the developing world [5]. The existence of a local market offering good sale opportunities and adequate transport facilities are obvious prerequisites for family poultry development [6].

Although rural communities operate in vastly different agro-ecological, cultural and socio-economic contexts, the role of poultry as a source of income, nutrition and as set-building capital is a common theme that transcends cultural and geographical space. The low-input nature of village poultry, particularly about its semi-scavenging feed system, allows it to be replicated with minimal resource requirements [7].Despite the enormous benefits of poultry at rural, peri-urban and urban settings, diseases and poor health situations aggravated by lack of proper health care management practices of the poultry are significantly affecting its productivity and profitability. In most developing countries rural poultry play significant roles of improving the nutritional status, income, food security and livelihood of many smallholders [8].

Health care management is a system of preventive medicine that takes into account the whole animal, and the total influences including social, with respect to relationships with others in the flock, psychological and environmental factors that affect health including nutrition, housing, sanitation, vaccination, biosecurity and so on [9].The aim of health care management is to provide the conditions that ensure optimum performance of the birds [10]. Prevention of disease in commercial poultry operations requires the application of a coordinated program of bio-security, vaccination and hygiene [11].

Poultry health care management is the emerging issue along with bio-security measure [3]. Biosecurity measures can be instituted by ensuring poultry feeds are free of pathogens [12]. Vaccination should be emphasized, for the prevention of the introduction and spread of a contagious disease in any given country/area/compartment [13]. No poultry producer would consider a disease prevention programmed to be complete without a comprehensive plan for cleaning and disinfection, which would be inadequate without a rigid set of principles, and good husbandry and management practices. One of the important requirements to facilitate hygiene and sanitation is adoption of the 'all-in/all-out' method (i.e. all the birds within a single establishment should be of the same age group), together with the restriction of each enterprise to a single type or species of bird [14]. Therefore, the objective of this review is to high light the health care management practices in poultry.

Proper Feeding

Family poultry production in Africa survives by scavenging and generally, no supplements provided except that sometimes, household waste fed to the birds and other circumstances the diet supplemented with grain [15]. Similarly, in Ethiopia the chicken production is characterized by keeping under free range system with some amount of supplementary feeds like frushika, maize, sorghum, food leftover and the major feed sources are believed to be insect worms, seed and plant materials .However, the availability of the supplementary feeds was reported during the dry season (November to March) following the grain harvest while the grains/grain by-products were in short supply leading to feed scarcity during the rainy reason.

Modern broiler, breeder and egg-production flocks require balanced diets consisting of essential nutrients to achieve optimal reproductive efficiency, feed conversion, live ability, and immune response [16]. Poultry feed provides the bird with fats, carbohydrates, proteins, minerals vitamins and water. The proper amount of these nutrients needed in diets depend on breed, age, and production stage of the bird. Starter rations are high in protein-an expensive feed ingredient. However, grower and finisher rations can be lower in protein since older birds require less [17].

Water

The body of a bird is made up of 70% water and eggs are approximately 65% water. Poultry must have a continuous supply of clean fresh water so that nutrients can be absorbed and toxic materials removed from the body. This is especially vital for young chicks. A lack of water will reduce feed intake, seriously retarding growth and impairing egg production. This is particularly true in hot climates, where deprivation can rapidly lead to death. Water is also essential for birds to control their body temperatures in hot weather. Birds need a lot more water at high temperatures than at low temperatures, and lack of water quickly leads to death by overheating [18].

Carbohydrates

Carbohydrates are sources of energy, needed for normal body maintenance and activity. They are provided by cereals such as wheat, barley, maize, oats and sorghum. The energy values of poultry feeds are expressed in Metabolizable Energy (ME), i.e. the gross energy in the feed minus the energy in the droppings [19].The effect of fiber (25-30g/kg) on immunity is associated with the fermentation of soluble fibers in the hindgut. Short chain fatty acids (SCFA) are produced following fermentation and may protect GIT from pathogen colonization [20].

Generally, feeds in tropical areas show somewhat lower energy levels than in temperate zones, partly because tropical feed ingredients are often richer in fiber content (25-30g/kg) and thus, lower in energy, and partly because the energy level of the diet can be slightly lower under warm conditions [21]. Most poultry will compensate for low energy density by consuming a greater quantity of feed. Under conditions of feed restriction or extreme competition, mature birds will lose weight and hens will show a decline in both egg size and egg numbers. Male breeders will become infertile. Growth rate of immature stock will be depressed [22].

The effect of restricting energy intake will be exacerbated by low environmental temperature or improper management of brooding and ventilation systems during the early growth phase. Flocks deprived of energy will show increased susceptibility to infection [22].

Protein

Protein is needed for growth, replacement of old cells and production of eggs. Protein sources include by-products which come from the processing of oil-bearing seeds, such as soya beans, sesame seed, cotton seed, rape seed and sunflower seed. Protein quality is mainly a matter of amino acid composition [23]. Lysine (2.5-3.5g/kgg/kg) is one of the most important amino acids, but for poultry the sulphur containing amino acids methionine and cysteine (10.5-13.5g/kg) are also important. Low protein intake will depress growth rate, feed conversion efficiency, immune response and reproductive efficiency [17].

Fats

Fats are also sources of energy, and are needed for body maintenance and storage. They are very high in energy; therefore, added fats are usually used only in high-energy broiler (meat chicken) feeds so we should provide fat sources like seeds [24]. Suboptimal levels of essential fatty acids including linoleic and linoleic acid will depress egg size in high-producing hens [25].Under conditions of elevated temperature, essential fatty acid deficiency will result in degeneration of the liver and possibly rupture of the capsule, with hemorrhage into the body cavity (Fatty liver syndrome) [18].

Vitamins

Vitamins are needed only in very small amounts, but are essential to chemical processes taking place in the chicken body. Examples are vitamin A (required for normal growth) and vitamin D (needed to prevent rickets) [22].A deficiency in vitamin A (avitaminosis A) will leads to poor growth and feathering in Chicks and in advanced cases, ataxia (inability to stand), xerophthalmia ("dry eye") and chronic purulent conjunctivitis (accumulation of yellow cases material beneath the eyelids) [28]. Laying hens subjected to avitaminosis A will show deterioration in internal egg quality, a high prevalence of blood spots and fertility and hatchability of breeders will be adversely affected. Since vitamin A is concerned with the integrity of respiratory and gastrointestinal mucosa, flocks subjected to a vitaminosis A will show a high prevalence of Escherichia coli and other bacterial infections and will be more severely affected by end parasites and coccidiosis [28]. A deficiency in vitamin D3 will leads to rickets in immature flocks. Affected birds aged 4 to 7 weeks show a disinclination to walk. Affected flocks show a gradual decrease in egg production and a marked deterioration in shell quality [11].

Minerals

Adequate supply of minerals includes not only the well-known calcium (Ca), phosphorus (P) and but also other minerals, such as magnesium (Mg), potassium (K) and sodium (Na), which should be given in rather large amounts, but also the so called trace elements, such as manganese (Mn), iron (Fe), zinc(Zn), copper (Cu), cobalt (Co), iodine (I) and selenium (Se) [29]. Ca and P are very important for egg laying birds, since Ca is the main constituent of the egg shell, which almost completely consists of calcium carbonate (CaCO3) [30]. These minerals are needed for egg shell formation. Generally, a 1% Ca diet can be fed to pullets until they start to produce egg, but then the Ca level must be increased quickly, just prior to, or at least at, laying maturity [28].The absolute amount of required Ca depends mainly on the level of production. Therefore, the requirement is greatest at peak production and should then gradually decrease. Failure to add supplementary salt to poultry diets composed of maize and soybean meal will result in depressed growth rate and decreased egg production [31]. The diets for laying hen and broiler hen are states as follows (table 1and table 2) [32].

Proper Housing

Poultry housing should be weather-proof to provide protection from the elements (cold, rain, wind, and hot sun) and provide warmth, especially during brooding. Housing should also provide good ventilation, as well as protection from predators [33].

Temperature

The body temperature of an adult chicken is 105-107°F (40.6 to 41.7°C). The thermo neutral zone is 65-75°F (18-24°C) [34].which allows chickens to maintain their body temperature. If the temperature is above this zone, heat must be lost in some way. Chickens have no sweat glands. Since eating increases body temperature, chickens reduce their feed intake during hot weather, and therefore, gains will be less. Chickens begin panting at 85°F (29.4°C) to help dissipate heat, and drink more to avoid dehydration. Proper ventilation will also help regulate house temperature. Each house should have a thermometer to display the current temperature as well as the high and low temperatures in a daily period, and producers should pay attention to weather forecasts [35].

Ventilation

Ventilation brings fresh air into a poultry house and removes heat, moisture, and gases. Ventilation designs may be natural or mechanical. Natural ventilation makes use of the movement of air (warm air rises and cold air falls) and wind currents. A roof at least six feet tall will allow sufficient height differential for cool air to enter through low air inlets and warm air to escape through high vents. There is less control in natural ventilation than mechanical [36]. The reasons for ventilating during winter and summer are different. During warm months, the purpose is to remove heat and control the temperature in the house, and, therefore, large amounts of air are moved. During cold months, the ventilation system must remove moisture and gases, especially ammonia, while conserving heat. This is tricky because producers tend to keep houses closed up tight to conserve heat [37]. It is done by controlling air inlets and is possible because warm air holds more moisture than cold air does. Therefore, during cold weather producers can bring small amounts of air into the house with high moisture in the air, allow the fresh air to heat to room temperature, and when this air leaves, it takes moisture out of the house [35].

In mechanical ventilation, positive and negative pressure systems use fans to direct air into the house (positive) or exhaust air from the house (negative) [35]. A ventilation system for poultry provides desired amount of fresh air, without drafts, to all parts of the shelter, maintains temperatures within desired limits, maintains relative humidity within desired limits, and maintains ammonia levels below specified levels [38].Ventilation rates are designed to balance sensible heat (dry heat) gains and losses, as well as latent heat (moisture) gains and losses [39].

Lighting

Poultry are very sensitive to light. Light not only allows them to be active and find their food, but it also stimulates their brains for seasonal reproduction [40]. Birds need adark period for good health. They only produce melatonin hormone important in immune function—during dark periods [41]. Welfare programs usually require at least four to six hours of dark daily. Dark periods can be especially helpful for fast-growing broilers in the first weeks of life to slow growth, build frame, and reduce leg disorders (chicks, however, need 24 hours of light the first three days to ensure that they learn to find food and water). Growers need 15 hours light per day; Layers need 17 hours light per day [37]. In contrast, the conventional poultry industry uses long light periods to encourage feed consumption and weight gain by fast-growing broilers, because birds do not eat in the dark. When birds have a dark period, they are more active during the light period than birds that have continuous light [35]. Poultry have seasonal and daily biological rhythms, both of which are mediated by light, particularly day length [42].For day length to exert its controlling effect, there needs to be a dark phase (night) when light levels should be less than 0.5lux. Day length and light intensity during the breeder bird's life have an important role in development of the reproductive system. The difference in day lengths and light intensities between the rearing and the laying phases is the principal factor responsible for controlling and stimulating ovarian and testicular development [37].

Approximate Age	Type of Diet	Energy	Protein	Calcium	Phosphorus
0 – 8 weeks	Starter	2850 kcal/kg	18%	1.00%	0.50%
9 – 17 weeks	Grower	2850 kcal/kg	16%	0.90%	0.45%
17 + weeks	Laying Hen	2850 kcal/kg	17%	3.50%	0.45%

Table 1: Laying Hen Diets

Approximate Age	Type of Diet	Energy	Protein	Calcium	Phosphorus
0 – 3 weeks	Starter	3000 kcal/kg	22%	0.95%	0.47%
4 – 5 weeks	Grower	3100 kcal/kg	20%	0.90%	0.45%
6 - 7 weeks	Finisher	3200 kcal/kg	18%	0.85%	0.42%

Table 2: Broiler Diets

Litter

Litter management is very important in most poultry production systems. Litter is used to cover the floor and used as medium for the bids to get proper resting. Litter dilutes manure and absorbs moisture, provides cushioning and insulation for the birds, and captures nutrients for spreading where desired outside. Litter is also a medium for birds to scratch and is important for welfare. Litter is normally spread two to four inches deep and maintained at 20 to 30 percent moisture. But, on the contrary, poorly managed litter serve as excellent source of infection for chickens [35].

Floor space

Floor space to be allocated per bird is determined by the following factors. These are: weight of the bird, type of housing (open sided or environment control) and climate conditions. Floor space requirement for commercial broilers should be 1 to 1.2 square feet per bird (open house) and 0.4 to o.6 square feet per bird (environmental controlled house) [43].

Sanitation

The aim of sanitation and disinfection is to reduce or kill microbial populations which present a threat to the health of flocks. All removable equipment and fittings should be dismantled and removed from the building [44].Cleaning and disinfection involve the physical and chemical removal (usually using detergent and water) of contaminating debris, and the reduction or elimination of pathogenic organisms in or on materials, so that these no longer present a health hazard. Wet cleaning is performed systematically, from the back to the front of the building, and from the top downwards, moving carefully from one short side of the house towards the other [45].

For the disinfection of buildings, it is advisable to use 4% formalin end solution (commercial formalin 37.5% solution diluted 1:8 in water) with propylene glycol. The propylene glycol is essential to enable the formaldehyde to penetrate pores, cracks and spaces between metal plates where joints are riveted or welded together. Formaldehyde gas used on dirt floors is effective only on the surface, as fumigation is unable to affect pathogens at a depth of more than 2 centimeter [46]. The contact time of disinfectants has been increased several folds with the advent of foaming techniques. Foam takes a lot longer to dry and, consequently, the antimicrobial activity of the disinfectant is greatly increased [47]. Hygiene and disinfection must be placed high on the list of priorities for control of infection following a disease outbreak [48].

Bio-security is a set of practices that limit the spread of disease-causing organisms. Evaluating the bio-security of ongoing operations is important in developing effective programs to prevent the introduction of disease into a complex or to limit subsequent dissemination among farms [49].A successful bio-security program presumes an understanding of the principles of epidemiology and economics and requires teamwork to maximize benefits. Bio-security programs require a structured approach involving the following sequence: planning and evaluation of programs, locating resources and training of personnel, implementing including erection of facilities, and control involving review of results and analytical procedures [50].

Biosecurity

The bio-security of the village poultry production system is very poor, as scavenging birds live together with people and other species of livestock. Poultry movement and droppings are very difficult to control and chickens freely roam in the household compound. There is no practice (or even viable means) of isolating sick birds from the household flocks and dead birds are left for either domestic or wild predators. Chickens and eggs are sold on open markets along with other food items. The current live bird marketing system represents a significant and potential hazard to both buyers and sellers, yet implementation of biosecurity and hygienic practices in such a system is generally difficult. The Newcastle Disease experience and the attitude of communities to handling sick birds (which are often sold) shows that marketing systems play a considerable role in the dissemination of disease over wide geographical areas in a relatively short period of time. The first recorded case of Newcastle disease was in 1970 on a poultry farm near Asmara, Eritrea, from where it spread all over Ethiopia within a short period of time. In summary, it is very difficult to apply health and bio-security measures on full day scavenging birds in small flock sizes [40].

Levels of Bio-security

Conceptual biosecurity

The primary level represents the basis of all programs to prevent disease. Conceptual bio-security includes selecting the location of a complex or operation in a specific area to separate different types of poultry, reduce bio-density, and avoid contact with free-living birds [51].Sitting of farms in relation to public roads and service facilities such as hatcheries, feed mills, and processing plants has a profound impact on the effectiveness of a program to maintain optimal standards of production. Decisions concerning conceptual bio-security influence all subsequent activities relating to prevention and

control of disease. Generally, defects in conceptual bio-security cannot be changed in response to the emergence of new diseases which may result in severe losses or even failure of an enterprise [11].

Structural biosecurity

The second level of bio-security includes considerations such as the layout of farms, erection of fences and construction of drainage, all weather roads, and equipment's for decontamination; bulk feed installations, change rooms, exclusion of rodents and wild birds, and the interior finishes in houses. Water supply free of pathogenic bacteria and chlorinated to a level of 2 parts per million. Structural bio-security can be enhanced in the intermediate term with appropriate capital investment [52].

Remedial action may often be too late to respond to the emergence of a new disease or an epornitic of a catastrophic infection such as highly pathogenic avian influenza [52].

Operational biosecurity

The third level comprises routine manage mental procedures intended to prevent introduction and spread of infection within a complex or enterprise. These activities can be modified at short notice to respond to disease emergencies. Constant review of procedures, participation by all levels of management and labor and appropriate monitoring of the health status and immunity of flocks contributes to effective operational bio-security (Figure 1) [11].

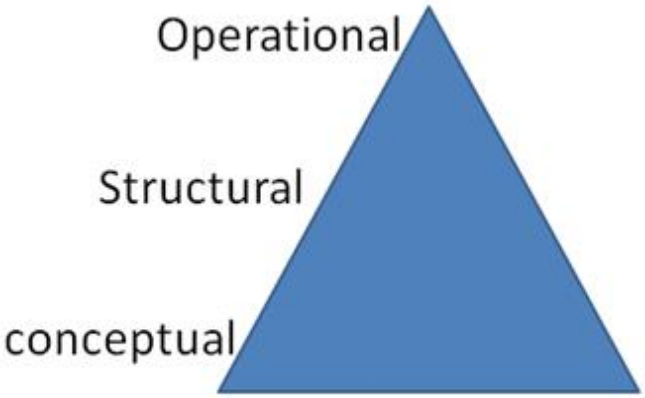

Figure 1: Hierarchy of Biosecurity

Disease Control Measures

Diseases were one of the major bottlenecks for village chicken productions in the studied areas. Newcastle disease was most widely distributed among the village chicken in Ethiopia. This was reported in several previous studies which employed different diagnostic methods such as virus isolation, sero-epidemiological investigations and molecular methods to confirm the presence of the disease in Ethiopian village chicken productions [51].

In this study survey, almost 56 to 71% of the visited farms were affected by this disease at least once on the (Figure1). The disease occurred in all agro-climatic zones during the period studied, particularly affecting chicken in highlands (71.3%). Farmers did not know how to differentiate the disease affecting their chicken in 17.9%of the cases. They knew only symptoms shown by affected chicken. The symptoms most commonly observed in affected village chicken were bloody diarrhea, nasal discharge, sneezing, torticollis and deaths within few days. Only 18.7% of the visited households contacted veterinarians when their chickens were sick [53].

According to study reported by from northwest Ethiopia that most (72.43 %) farmers do not properly examine their chicken and provide no health management services. Also another study reported from rift valley of Oromia, that 44% of farmers in the study area usually treat sick chickens using traditional medicine whereas others (41%) do nothing. Only 11% of the farmers consult veterinarians when their chickens get sick; this is as a result of veterinary service insufficiency. They use garlic, different kind of green leaves, lemon, local alcohol, paper powder, butter, etc as drenching, nasal application and smoking. The response to treatment vary considerably where 45% fully recovered, 33% partially recovered and22% no response to traditional treatment [54].

To save their chicken during disease outbreak village poultry producer take different kind of measures like: use traditional

medicine (33%), consult veterinarian (11.4%), call traditional healers (10.4%), sell the survived ones (4.5%). The wide use of traditional medicine was due to its low cost, local availability and easiness of application. Large flock sizes were obtained with those farmers that gave traditional medicine to their chickens.

This indicates that traditional medicines do work and have the potential to improve the health status of village flocks. Hence, there is a need for research to determine their chemical properties, concentrations and mode of application [55-56]. (Figure 2)

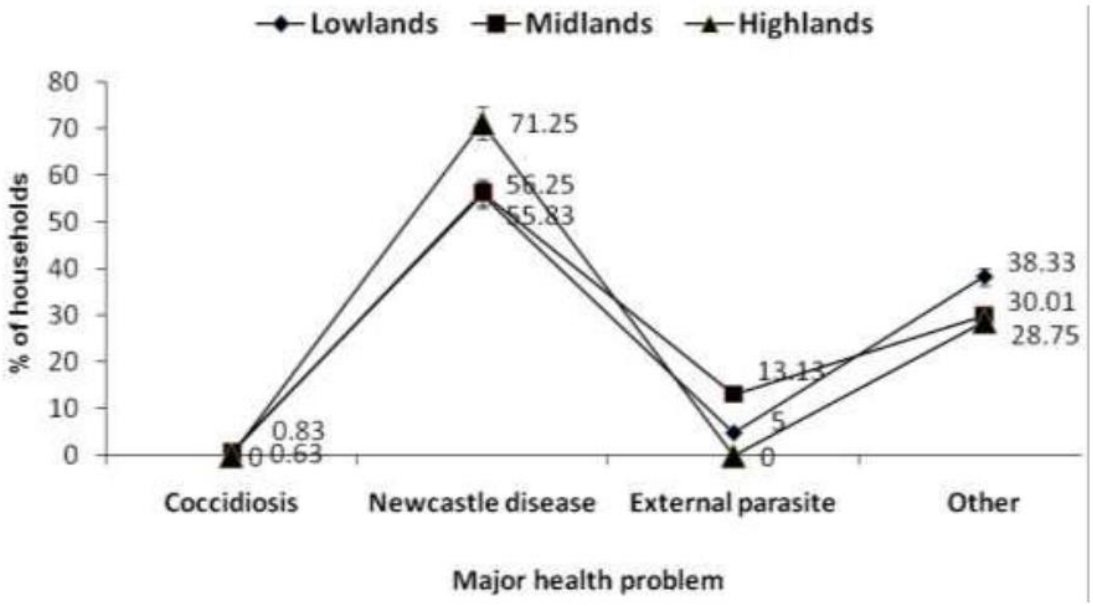

Figure 2: Major poultry health problems in lowlands, midlands and highlands of Ethiopia

Vaccination

Vaccines are used to prevent or reduce problems that can occur when a poultry flock is exposed to field disease organisms. Vaccination has been considered the most effective means of controlling ND and has been used successfully throughout the world since the 1940s.Vaccine quality is commonly blamed when a disease occurs; however, there are usually other factors responsible such as lack of a cold chain. A comprehensive investigation is often called for to identify the causes and to resolve the problem. In Ethiopia, two types of vaccines which have been used. These are: conventionally used vaccines which comprise: Hitchener B1(HB1) and LaSota live freeze dried vaccines produced in 500 and 100 dose vials, produced by NVI, Debrezeit, Ethiopia and thermo stable vaccine. The thermo stable vaccine NDV I 2 is also live freeze dried, produced in 500 dose vials. This is a non-pathogenic heat resistant vaccine, transportable without freeze and given orally with feed grain without catching birds [41].

Village chicken vaccination particularly against NCD is more important than other management interventions; benefit-cost calculations done for the Tigray region of Ethiopia indicated that ND vaccination was more economically beneficial than the provision of daytime housing, supplementary feeding, cross breeding and control of broodiness [42]. In village production study in different parts of Ethiopia, no vaccination practice against poultry diseases was reported by [57, 58].

The finding of [59] also indicated that the level of awareness about availability of vaccines for local chicken is low and the farmers do not have any experience of getting their chicken vaccinated against diseases. This is due to the fact that the farmers have no information about disease control and vaccination because of poor extension package of poultry production.

Vaccination is a measure that may be applied wherever a high risk of introduction and further spread of a contagious poultry disease has been identified. The scientific basis for the use of this strategy is the generation of a level of protective immunity in the target population that can be boosted in case of immediate risk or evidence of introduction of a field virus. The use of vaccination in the absence of any outbreak of disease, together with the application of effective bio-security measures, could maximize poultry protection whenever a risk

of exposure exists. Vaccination is generally carried out for the prevention of poultry diseases that have a clear impact on the industry [49].

Herd Immunity

Protection against the clinical form of the disease is effective at an individual level, whereas the reduction of both susceptibility and infectivity also benefits the entire poultry population in the vaccinated flock/area. The positive effect on a vaccinated population, known as 'herd immunity' may be defined as the reduced probability of an individual (bird or flock) becoming infected whenever it is part of a vaccinated population [60].

Availability of Different Types of Vaccines

Vaccines used in poultry production are classically described as live or inactivated. The availability of different types of vaccines could be one of the major limits to the implementation of effective vaccination programs. Different types of poultry production (or bird species) or diverse levels of risk require the application of more than one type of vaccine to obtain a high and long-lasting immunological response [61].

Administration of Vaccines

Various methods of administration can be applied as required by different types of poultry operations (at the hatchery or farm); those are: subcutaneous injection, intramuscular injection, eye drop, aerosol administration and drinking water administration [62]. (Table 3) [11].

Age	Vaccine or Operation	Route of Administration
1 day	Marek's disease HVT & SB 1 combination **Salmonella typhimurium (mutant)* ND HB-1 *ND oil emulsion	Subcutaneous, hatchery Drinking water or Eye drop Aerosol Subcutaneous
5 days	*IBD oil emulsion *IBD mild strain	Subcutaneous Eye drop
10 days	IBD intermediate strain	Drinking water
14 days	**Salmonella typhimurium (mutant)*	Drinking water
20 days	IB-HI20	Drinking water
24 days	ND	Drinking water or Aerosol spray
30 days	IBD intermediate strain	Drinking water
6 wks	*Avian influenza emulsion	Intramuscular
7 wks	Avian pox and AE	Wing web stab
10 wks	ILT	Drinking water
12 wks	ND - IB combination	Drinking water

16 wks	Transfer Multivalent inactivated EDS, ND IB	Subcutaneous
30 wks	ND - IB combination (and at 12 wk intervals thereafter) If required: Fowl typhoid at 7 wks or: Coryza at 7 wks and 14 wks	Drinking water or Aerosol spray Intramuscular Intramuscular

*if required in area of operation.

Table 3: Comprehensive vaccination program for commercial egg production flocks

Factors Influencing Vaccine Efficacy

Several factors can jeopardize the optimal immunization of vaccinated poultry. These negative factors, classifying them into three main categories: those linked to the vaccine itself (Virus serotype), those regarding vaccine delivery (Route), and those endogenous to the bird (Maternal immunity). Management conditions are also relevant and should be considered the fourth factor (Hygienic practices) [63].

Vaccine factors

Veterinary vaccines whether attenuated (live) or non-infectious (killed) from the different manufacturers can vary in their potency, efficacy and duration of immunity. Attenuated vaccines tend to induce stronger and long-lasting immunity than non-infectious vaccine. Non-infectious vaccines include killed, toxoid; subunit and DNA vaccines are safer and more stable than attenuated vaccines [64].

Maternal immunity (antibody)

Maternal antibodies (MABs) are transferred from the serum of the hen via the yolk to the chick. Passively acquired maternal antibody may protect progeny against post-hatch exposure to certain pathogens for up to 2 weeks. Circulating antibodies derived from the hen increase from day 1 to day 3 as yolk is absorbed [65]. A waning in titer occurs over the succeeding 1-3 weeks, according to a decay rate characteristic for the antibody [66].High maternal antibody is reflected in uniform and proportionally elevated antibody levels (titers) in progeny. Low and variable immunity in parent flocks is associated with early susceptibility of chicks. High levels of maternal immunity often inactivate mild attenuated vaccine virus administered to chicks. This interference phenomenon is important in timing the first “priming” dose of vaccine which stimulates immunity against IBD, IB and ND. The dilemma facing poultry health professionals in developing vaccination programs for chicks is to specify the age of administration relative to the level of maternal immunity. If the initial vaccine is administered too early in relation to the decline in maternal antibody, the chick will not be protected. If the initial vaccination is delayed, field challenge of susceptible birds will occur [11].Maternal antibodies can interfere with the ability of vaccines to induce immunity.

This is particularly true for live virus vaccines that contain relatively small amounts of infectious agents and may be readily neutralized by maternal antibody [67].

Routes of administration

Vaccines are developed to be given by a certain route, intranasal, subcutaneous or intramuscular. If a vaccine is administrated by a route different from the route for which it was developed, it may not be effective and could cause considerable harm. Careful training is needed to ensure vaccine are injected the appropriate depth and appropriate site [68].

Management factors

Vaccines should be stored at the appropriate temperature recommended by the manufacturer. This is especially true for live vaccines which might be inactivated at higher temperatures. Each vaccine has an expiry date printed on the vial which should strictly adhere. Vaccines should be reconstituted with the diluents with which they are supplied and once reconstituted, they should be used immediately [64].

Conclusion and Recommendations

Poultry occupies a unique position in terms of its contribution to the provision of high quality protein food and sources of income. Humans, contaminated equipment have, newly introduced birds, wild birds, rodents and stresses are some of the main sources of poultry diseases. Sick chickens do not produce, and profits will be lost due to costs of medicines and chicken mortalities. If the sources of disease are identified and managed properly, the number of outbreaks is greatly reduced. So, for good productivity and profitability; there should be proper health care management practices in place, i.e. good housing, nutrition and health care for our chickens, and observe them daily for any abnormalities and disease symptoms. Some diseases can spread rapidly through a poultry flock so sick-looking birds should be housed separately and given extra care.

- Based on the above conclusion, the following recommendations are forwarded.
- Poultry should get balanced diet/nutrition dietary supply to keep them healthy and productive.
- Keep strict bio-security measures and proper sanitation of personnel and equipment's working or used in the poultry farm.
- Practice "all in-all out" policy of poultry movement in the farm.
- Reduce stressing factors (inconvenient temperature, light, ventilation, space, etc.) through good management practices.
- Provide footbaths at the entry of each shed and at the entrance of poultry farm.
- Regular poultry vaccination strategies should be implemented to prevent prevailing endemic and or newly emerging infectious diseases.

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