POULTRY PRODUCTION

Level III

Learning Guide -62

Unit of Competence: - Maintain Health and Welfare of Poultry

Module Title: - Maintaining Health and Welfare of Poultry

LG Code: AGR PLP3 M16 0120 LO1LG- 62

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LO 1: Monitor poultry health and welfare

Instruction Sheet	Learning Guide # 62

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Maintaining bio security protocols and quarantine procedures at all times to prevent the entry of disease.
- Taking regular checks to assess poultry health and welfare
- Recognizing and reporting symptoms of ill health.
- Identifying cull birds using criteria established by the enterprise
- Recording flock/herd health status in accordance with organization procedures

This guide will also assist you to attain the learning outcome stated in the cover page.
Specifically, upon completion of this Learning Guide, **you will be able to –**

- Maintain bio security protocols and quarantine procedures at all times to prevent the entry of disease.
- Take regular checks to assess poultry health and welfare
- Recognise and report symptoms of ill health, common diseases, parasite infestations, or physical abnormalities.
- Identify cull birds using criteria established by the enterprise or industry quality assurance program.
- Record flock/herd health status in accordance with organisation procedures.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1, - 5”.
4. Accomplish the “Self-check 1 - 5” **in page -3, 6, 24,27 and 29** respectively.

Information Sheet-1	Maintaining bio security protocols and quarantine.

1.1. Introduction

Biosecurity is defined as an overall program that uses a combination of physical barriers and directed actions in a specific way that should prevent the introduction of, or limit the spread of infectious disease.

Biosecurity has two components: bioexclusion, to preclude the introduction of disease to the farm; and biocontainment, to prevent the spread of disease within the farm and to other farms.

Basic Concepts of Biosecurity at The Farm Level

Biosecurity has three main components namely isolation, traffic control and sanitation.

- **Isolation**

  Refers to the confinement of animals within a controlled environment. A fence keeps the birds in, but it also keeps other animals out. Isolation also applies to the practice of separating birds by age group. In large poultry operations, all-in/all-out management system allow simultaneous depopulation of facilities between flocks and allow time for periodic clean-up and disinfection to break the cycle of disease.
- **Traffic Control-** Includes both the traffic onto the farm and the traffic patterns within the farm
- **Sanitation-** addresses the disinfection of materials, people and equipment entering the farm and the cleanliness of the personnel on the farm.

Quarantine- Restricts the movement of birds to prevent potential spread of disease

Isolation- Separates birds that are sick with a contagious disease from animals that are not sick. Separates new birds that are being introduced to a flock

Purpose of isolate/quarantine new birds

- ✓ Prevent the spread of disease between new birds and current flock
- ✓ Birds can harbor and transmit disease while appearing healthy
- ✓ Birds that appear healthy when leaving a location may pick up infectious disease en route
- ✓ Isolation gives owners and veterinarians time to observe new birds for signs of disease
- ✓ Newly added birds have time to recover and acclimate to a new environment after movement

Time of isolate/quarantine

- ✓ Immediately upon arrival of any bird from another location (off-site)
- ✓ Prevent movement of birds on/off property during an outbreak of Newcastle disease, avian influenza, or other contagious diseases

Step 1: Set up an isolation/quarantine area

- ☞ Set up a separate quarantine area more than 10 meters (approx. 33 feet) from other birds
- ☞ Only use equipment designated for this area (e.g. water dishes, food, cleaning equipment, cages)
- ☞ Set up disinfectant stations; change clothes and shoes before entry and exit from the area (see Cleaning and Disinfecting handout)

Step 2: Bird care

- ☞ Have all birds enter and leave quarantine at the same time
- ☞ Examine quarantined birds and feces for signs of disease on a daily basis
- ☞ Keep a daily log of birds and note down if any unusual symptoms are seen
- ☞ Make sure to visit these birds as a last step after caring for other birds that are not in your designated quarantine area
- ☞ Acclimate birds to your bird management routine (e.g. vaccination, feeding, etc.)

Step 3: Length of time in isolation/quarantine area

- ☞ 30 days free of illness
- ☞ 90 days if birds come from different sources
- ☞ Thoroughly clean and disinfect the area after birds are removed

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define biosecurity. (1pt)
2. What is the difference between isolation and quarantine? (2pts)
3. Describe the time duration for quarantine. (2ps)

Note: **Satisfactory rating – 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Taking regular checks to assess poultry health and welfare

2. Introduction

Daily inspection of poultry by trained staff, in good lighting conditions, and independently of any automatic surveillance equipment, is the best method to prevent serious outbreaks of disease. Inspections will enable you to detect early signs of disease simply by noting changes in the behaviour and condition of individual hens.

The early signs of ill health may include changes in food and water intake, in preening, in 'chatter' and in activity. There may also be a drop in egg production and changes in egg quality such as shell defects.

All animals, including farmed poultry, must be looked after in ways that meet their welfare needs - ensuring they do not experience any unnecessary suffering.

The first week, in particular the very first day of life, is crucial to ensure a good production cycle. When the one day old chicks arrive at the farm, they have had a stressful time and they have already utilized the biggest part of their reserves. Make sure that your poultry house is totally ready to receive the little chicks:

Ensure a **safe and stable environment** through an effective cleaning and disinfection during the sanitary stop. A one-day old chick has not yet established a strong gut flora and they will pick up all kinds of microorganisms from the environment.

Provide immediately access to the drinkers and feeders. One day old chicks have to drink and eat as fast as possible to restock their reserves and to become a strong broiler chick. Guarantee enough feed on the chick paper so they can find food easily the first days.

Make sure that there is **a good climate in the poultry house**. Check regularly the temperature and ventilation and ensure dry litter.

2.1. Follow-up your flock regularly.

To detect early problems, it is very important to follow-up your flock on daily base. In this way, you will be able to intervene at the right moment and to limit the damage in your poultry house. It is strongly recommended to do twice or at least once a day a check-up of your flock by going around in the building:

- **Take out death birds** as quickly as possible to avoid disease transmission. Death birds are often an important source of infection for the rest of the flock...

- Look closely to your animals and **inspect also their droppings** on abnormalities.
- **Check the bird distribution in general within the house** to see if the temperature is right. If the temperature is too low, all birds will stick very closely together. Normally, with an optimal temperature, they are distributed in little groups of 20-30 animals. When the temperature is too high, they won't flock together and they will often go and search for colder places next to the walls of the building.
- **Check also the bird distribution around the drinkers and feeders** to find out if there are any problems such as blockages of the nipples or feeding pans.
- **Adapt the height of the drinking lines every day** because the birds are growing fast. To ensure an optimal water intake they must be able to easily reach the drinking water.
- **Identify causes of death** and ask your veterinarian to do some autopsies if necessary to detect any disease.
- Set up together with your veterinarian **an effective vaccination program**, adapted to your farm.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List the work you carry out during Follow-up your flock regularly. (5pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Recognizing and reporting symptoms of ill health.

3.1. Recognizing healthy and sick birds

A very important skill for all poultry stock persons to have is the ability to differentiate between healthy and sick birds. It is normal when a flock is diseased to find healthy birds and those with varying degrees of illness. Therefore, it is necessary to be able to tell as early as possible when some of the birds in the pen are sick.

While the manager may be able to identify some diseases from available evidence, it is unlikely that they will be able to identify all. However, the sooner a disease is noticed in the flock, the sooner appropriate action can be taken. This may include initiation of a medication program, send specimens to the laboratory for examination and diagnosis, and/or to call in expert advice. Early action not only gives the manager a chance to cure the condition but it may help prevent it spreading to other stock.

A healthy bird will:

- ✓ Be active and alert.
- ✓ Be normal size/weight for the strain, age and sex.
- ✓ Have no lameness or paralysis.
- ✓ Have no injuries.
- ✓ Have no deformities.
- ✓ Have no discharges from the nostrils or eyes.
- ✓ Have no stained feathers around the vent.
- ✓ Have no swellings.
- ✓ Generally, have good plumage related to the whether in a moult or in lay.

A sick bird will show some or all of the following signs:

- ✓ Isolation – sick animals usually seek a quiet place out of the way of others.
- ✓ Hunched stance – sick birds often have a hunched stance with ruffled feathers and eyes partially closed.
- ✓ Diarrhea – usually evidenced by stained feathers in the vent region.
- ✓ Paralysis – of the leg(s), wing(s) or neck.
- ✓ Sneezing and/or coughing; there may be nasal discharge.
- ✓ Blood in the faeces.
- ✓ Swellings – of the joints.
- ✓ Injuries.
- ✓ Loss of weight – this may be pronounced if the condition is a chronic one e.g. Marek's Disease.

- ✓ Unexpected changes to the food and water consumption – often the first signs of illness.
- ✓ Slower growth or a drop in egg production.

It is normal to find a continuous low level of mortality and a small number of unthrifty birds in the poultry flock. Even though this does occur, attempts should be made to reduce even this “normal” mortality. Normal levels will be in the vicinity of 4% to 40 days for meat chickens, less than 5% to point of lay for layer and breeder replacements and less than 1% per 28 days for layers and breeders.

3.2. Major diseases of poultry in Ethiopia

There are different diseases which can affect chicken. These diseases are of bacterial, viral, fungal and parasitical origin.

1. Viral infections

☞ **Newcastle disease**

Newcastle disease is a viral disease that can spread rapidly through a flock. It is the first disease which is suspected

during any disease outbreak in Ethiopia. Several different strains of virus exist and are circulating in Ethiopia, ranging from mild strains to ones which can cause 100% mortality in an unprotected flock.

Symptoms: the mild form of the virus generally causes respiratory symptoms (nasal discharge, coughing), and low mortality; but the severe one generally causes high mortality, with respiratory and nervous system problems including twisting of the head (torticollis; Figure 12), green diarrhea and swollen heads.

Figure 1: Torticollis (twisting of head) due to Newcastle disease.

Diagnosis: Mainly by serology (hemagglutination inhibition or HAI test).

Transmission: Infected birds shed virus in the feces, which is probably the main mode of transmission between birds in a scavenging environment. Virus can also be transmitted directly between birds through the air and in discharge from the nostrils, if birds are in close contact, such as in an intensive farm. The disease can also be transmitted from wild birds, chicken carcasses, and materials, such as feed, water, footwear, clothing, equipment and litter.

Prevention/control: prevention of Newcastle disease is best achieved through a vaccination program that is tailored for the local conditions and disease status.

Vaccination, coupled with good hygiene and husbandry practice, is the best way to prevent and stop the spread of **Newcastle disease.**

☞ **Infectious bursal disease (IBD) or Gumboro**

Cause: IBD is an immunosuppressive disease caused by a Birna virus 1. Virus strains can be divided in classical and variant strains. The virus is very stable and is difficult to eradicate from an infected farm. The disease is considered endemic in most part of Ethiopia.

Transmission: IBD virus is very infectious and spreads easily from bird to bird via droppings. Infected clothing and equipment may also act as a mean of transmission within and between farms.

Clinical signs: IBD infection may result in a chronic or acute form of disease. In both cases the infection targets the Bursa of Fabricius leading to the loss of B lymphocytes which are the cells that produce antibody. The main effect of IBD is that birds become immunosuppressed and susceptible to many other infections as they produce little antibody

and of course, will respond poorly to vaccination. Infection in young birds of less than three weeks old typically leads to chronic infection. Acute IBD occurs in birds around 3–6 weeks of age and causes both immunosuppressive and a disseminated infection with damage throughout the body. Affected birds are listless and depressed, become pale and often huddle together. Usually, entry of IBD to a previously unaffected farm may result in a mortality rate of about 5 to 10% (but it may be as high as 60% depending on the pathogenicity of the strain involved). In subsequent infections on the same farm, mortality is lower and eventually, with successive attacks, there is no mortality noted.

Diagnosis: both serology (ELISA) and molecular methods can diagnose infection in a flock.

Treatment and control: No treatment is available for IBD. Vaccination of parent breeders and/or young chicks is the best means of control and is widely applied on most commercial farms in Ethiopia. The induction of a high maternal immunity in the progeny of vaccinated breeders, together with the vaccination of the offspring is the most effective approach to successful IBD control. Application of control in village production systems is not currently practical in Ethiopia

☞ **Marek's disease**

Marek's disease is caused by a herpesvirus that can lead to a range of pathologies. Classical Marek's disease affects the nervous system leading to paralysis typically leading to birds with a 'hurdle jumper' appearance. Infection may also lead to eye infection. Classical Marek's is most likely to be seen in low intensity production environments. In commercial production, the neoplastic or tumor-forming disease is more prevalent. This is caused by more virulent variants that have evaded older vaccines. Infection leads to transformation of lymphocytes in the blood causing them to become cancerous. This leads to lymphoma or cancer of the blood system which is usually fatal. Marek's disease virus may also persist or become latent within the chicken where it can persist for life or re-emerge to cause lymphoma. The virulent form of Marek's disease virus is easily transmitted in feather dust in commercial production leading to spread throughout flocks.

Symptoms: Gray eyes and blindness, lameness, paralysis, unthriftiness.

Transmission: The Marek's disease virus can spread via feather dander, dust, feces and saliva. Herpesviruses are robust and can persist for several months in poultry houses. Infected birds carry virus in blood for life and remain a source of infection for other birds. In intensive commercial production, the virus is easily spread by feather dander and dust as birds are kept in close proximity to each other in enclosed housing.

Diagnosis: Both the paralytic and lymphoma-forms of the disease can normally be diagnosed based on their clinical signs. Serology (ELISA) and molecular methods, such as PCR, can be used to detect carrier birds.

Prevention/Control: There is no treatment for Marek's disease. Preventive strategies include vaccination at hatchery. Affected birds should be culled to prevent transmission to other birds. A range of mainly live attenuated vaccines are usually delivered via spray in commercial hatcheries. In the USA DNA-based and live vaccines for Marek's disease virus are delivered to the developing embryo in ovo. Vaccination is important for commercial production but is of less value in village systems.

Figure 2: The paralysis in Marek's disease is caused by lesions of the affected nerves. The picture shows classical Marek's 'hurdle jumper' paralysis in a village chicken in Horro region 2012.

Figure 2. Dead poultry b/se of Marek's

☞ **Fowl pox**

Fowl pox is slowly spreading viral disease affecting chickens. It is endemic in poultry in Ethiopia. The disease is mainly observed in commercial farms and among exotic chickens kept under a scavenging system.

Symptoms: Fowl pox causes raised scab-like lesions on un-feathered areas (head, mouth, legs, vent), reduced production and, in the case of the wet form of the disease, high mortality rates high due to lesions in the mouth and windpipe. These lesions in the mouth and windpipe cause impaired feed intake, increase susceptibility to secondary
bacterial infections and, ultimately, death.

Transmission: Air-borne transmission of the Fowl pox virus can occur via dust or dander. The air-borne virus can enter the blood stream through the eye, skin wounds or the respiratory tract. Another possible route of transmission is via the bite of insects (including mosquitoes and other biting insects).

Prevention/Control: There is no treatment for Fowl pox. Preventive and control strategies include reducing the local insect population, reducing skin trauma from fighting, and vaccination in endemic areas. Supportive care and appropriate antibiotic therapy may provide protection from secondary bacterial complications.

☞ **Avian influenza**

Avian influenza (AI) is a Type A influenza virus. Influenza is an Orthomyxovirus with an RNA genome that allows it to change, or evolve, rapidly. Influenza viruses can be carried by many birds but particularly waterfowl such as ducks.

AI can be found as a High Pathogenicity (HPAI) or Low Pathogenicity (LPAI) variant. AI can be transmitted to humans (zoonotic infection).

Symptoms: AI presents as a similar disease to Newcastle disease. Birds may have respiratory distress, diarrheoa, swollen head, torcolitis and, in HPAI variants, high mortality.

Transmission: The infection is transmitted via feces and other secretions (such as respiratory secretions) between birds in a flock. Transmission into flocks can be from introduction of infected chickens, or from wild birds or other animals such as rodents.

Diagnosis: Serology. PCR or by growing the virus in embryonated eggs.

Prevention/Control: There is no treatment for AI and vaccination is extremely difficult due its variability. Affected birds should be culled and incinerated or buried along with any bedding or litter. Prevention of contact between wild birds and chickens reduces the likelihood of transmission into a flock. New birds brought into a flock should be held in quarantine to prevent potential introduction of AI.

2. Bacterial diseases

☞ Infectious Coryza

Coryza is caused by the bacterium Hemophilus paragallinarum. It is a common problem in some parts of Ethiopia.

Symptoms: Signs of coryza include swelling of the head and wattles, nasal discharge, rattles, egg production drop and diarrhea.

Transmission: Coryza is transmitted from bird to bird through direct contact, and via contaminated feed and water. Birds which have recovered from the disease remain carriers.

Prevention/Control: Careful attention to sanitation and biosecurity is the only option for prevention and control in Ethiopia. Measures such as avoiding mixing of flocks and the use of an appropriate antibiotic may be helpful. However, birds tend to relapse once medication is withdrawn. Vaccines are not available.

☞ Escherichia coli

Escherichia coli (E. coli) is a bacterium that can act as a cause of both primary and secondary bacterial disease. It is a common inhabitant of intestinal tract of birds and mammals, but some variants can cause disease in largely healthy birds whereas others can lead to secondary, or opportunistic, infections following a viral infection. The disease is not specific to a particular body system and may affect a range of organs and systems. The disease mainly occurs among immunocompromized birds, such as those with an underlying viral infection, and young chicks, but it can also affect other age groups and chickens with good health status.

Symptoms: E. coli infection can result in non-specific signs including ‘sick bird syndrome’, mortality, diarrhea, respiratory signs and lameness. In young birds, it may cause a systemic infection throughout the body (colibacilosis), or it may specifically target the air sacs (air sacultis) or the heart and liver with

fibrinous lesions. It may also infect the reproductive tract of mature hens leading to 'egg peritonitis'.

Transmission: E. coli is an environmental pathogen spread by contaminated air, water, feed, and litter and from birdto bird via feces.

Prevention/control: Prevention and control requires attention to strict sanitation in the hatchery and on the farm. This requires thorough and proper implementation of bio-security and hygienic measures.

Figure 3: Air saculitis (A), perihepatitis (B) and pericarditis (C) caused by *E. coli*

☞ **Avian salmonellosis**

Cause: Avian Salmonellosis is caused by the Gram-negative bacterium Salmonella enterica. Salmonellosis in the chicken takes two main forms. The first are two severe systemic or typhoidal diseases; Pullorum disease caused by Salmonella Pullorum and fowl typhoid caused by Salmonella Gallinarum which can result in high mortality in birds of all ages. The second form is infection by variants such as Salmonella Typhimurium or Enteritidis. These can cause severe disease in chicks, but can persist without disease in older birds. This latter type of Salmonella can cause disease in humans and can be transmitted from chickens to people by feces or poorly cooked meat and eggs.

Transmission: Pullorum can be transmitted vertically by infected (carrier) breeder hens through their eggs. Chicks that hatch from such infected eggs will have typical pullorum disease (white diarrhoea) and high mortality. Infected chicks can also infect other chicks via droppings.

Fowl typhoid is typically a disease of adult chickens, with high mortality and morbidity. It is transmitted horizontally through infected droppings, dead bird carcasses and infected clothing, shoes, utensils and other fomites used on the farm.

Other forms of Salmonella are mainly transmitted via infected droppings.

Clinical signs: In chicks, Pullorum causes a typical white diarrhoea and high mortality. Infected (carrier) adult breeders do not show clinical signs of the disease but may have internal lesions in the ovary (misshaped, dark coloured follicles).

In adult chickens, fowl typhoid causes listlessness and sulfur (yellow) coloured diarrhoea. Affected birds have generalized infection with swollen livers, spleens and kidneys, with haemorrhages in these tissues. Mortality is usually 25–60%.

Treatment and control: Treatment of pullorum disease is supportive only and will not lead to cure. Treatment is undesirable from a standpoint of eradication. It is far more practical to control the disease by elimination of infected carrier breeder hens. Blood testing of breeder chickens by the serum plate or tube agglutination test with suitable S.

Pullorum antigen will detect infected carrier birds which can then be culled. If effectively implemented, such control measures will stop the incidence of egg-transmitted pullorum disease. If hatching eggs from pullorum-free breeders are kept free from contamination from infected eggs (from infected breeders) or from contaminated equipment, Pullorum-free flocks can be developed.

The best control method for fowl typhoid is eradication of infected birds. Breeder flocks should be blood tested and typhoid carriers eliminated. Such ‘test and cull’ approaches have been successful in largely eliminating the disease in North America and western Europe.

Vaccination for Salmonella is largely practiced in developed poultry industries to reduce the risk of foodborne zoonotic infection. However, vaccination may be employed for fowl typhoid (with cross protection for Pullorum disease). The live attenuated 9R vaccine was developed 60 years ago but is still effective and has previously been used in Ethiopia.

Figure 4: Fowl typhoid (*Salmonella* Gallinarum) in a commercial layer farm.

Infection results in high morbidity and mortality. On postmortem examination birds have hepatosplenomegaly (enlargement of spleen and liver) with white spot/mottled lesions. Here there are also lesions in the ovary leading to misshaped developing eggs (University of Liverpool).

☞ **Mycoplasma**

Cause: Four species of Mycoplasma may cause disease in chickens but Mycoplasma synoviae (MS) and Mycoplasma gallisepticum (MG) are the most important.

Symptoms: Avian mycoplasmosis may result in a range of symptoms though most frequently present as respiratory disease. MG infection typically leads to chronic respiratory disease whereas MS lead to a more acute disease. Both can lead to co-infection with E. coli which, in turn, leads to airsaculitis and a range of signs as previously described. MS can lead to infection and inflammation of joints in the legs and wings which can lead to a creamy exudate within the joints and extending into tendons. In some cases, 'breast blisters' can be formed on the breast/stern bone area of the chicken.

Transmission: Vertical transmission (via the egg) from MS-infected breeder hens is the major mode of transmission of MS. Horizontal transmission from bird to bird and by infected equipment, clothing, shoes, egg boxes and other fomites occurs with both MS and MG. Both can also be transmitted via dust in commercial production.

Diagnosis: Serological tests including agglutination or ELISA, or via molecular detection via PCR.

Prevention/control: Mycoplasma infections can be treated with antibiotics with variable degrees of success (for example: tetracycline, erythromycin, tylosin, tiamulin) but prevention and eradication of MS and MG following testing is more effective. Some vaccines are produced but their efficacy is limited and are used infrequently.

Figure 5: Colisepticaemia in a broiler chicken exacerbated by infection with Mycoplasma gallisepticum. Note: pericarditis, perihepatitis and airsacculitis

☞ **Fowl cholera**

Cause: Fowl cholera is caused by the non-motile Gram-negative bacterium Pasteurella multocida.

Transmission: Transmission of fowl cholera is mainly from bird to bird by water or feed contamination. Vermin (rats and mice) also appear to play a role in contamination of water and feed with P. multocida.

Clinical signs: Acute fowl cholera is a rapid septicaemic disease of high morbidity and mortality. Birds will frequently show inflammation of the spleen and liver accompanied by lesions and, at latter stages, diffuse hyperaemia, haemorrhage and inflammation. The acute disease can easily be mistaken for fowl typhoid.

In chronic forms of P. multocida infection the affected birds are frequently depressed and have decreased appetite.

Chronic fowl cholera does not cause high mortality, although there will be an increase in deaths. A swollen face including the comb and wattle is a common feature of chronic fowl cholera.

Diagnosis: Both bacterial culture and PCR can detect P. multocida but further typing is needed as only avian-specific variants cause Fowl cholera, whilst strains associated with sheep and cattle rarely cause disease in avian species and vice versa.

Treatment and control: Treatment with appropriate antibiotics can be successful in halting mortality and restoring egg production but chronic carrier birds may remain in flocks of chickens after treatment meaning disease often reappears when treatment stops. As such antimicrobial therapy is often ineffective. As with Salmonella, removal of carrier birds from flocks and prevention of bird-to-bird spread is essential. Rodent control is also very important to prevent reintroduction of the infection. Vaccines, including killed bacterial vaccines or bacteria, are often effective as part of control strategies.

Figure 6: Swelling of facial area and green diarrhea due to chronic fowl cholera**.**

3. Parastic diseases

☞ **Coccidiosis/Eimeria**

Eimeria spp. are protozoan parasites of poultry which affect all breeds and age groups that cause coccidiosis. There are seven species of Eimeria known to infect chickens; the pathogenicity of these varies considerably, with some causing disease and affecting production, and others being largely asymptomatic. All Eimeria species are widely distributed in Ethiopia and may affect poultry production. The presence of Eimeria oocysts in the feces of chicken does not necessarily mean that infection is the direct cause of illness, but does show the flock is infected. Chickens infected with Eimeria but not showing clinical disease may have decreased productivity and be more susceptible to other infections. The severity of lesions with Eimeria species may depend on several factors, including the age of affect birds, the infective dose of the parasite and the presence of concurrent disease.

Clinical signs: Disease can be divided into three groups based on the disease caused:

- ✓ Severe: E. brunetti. E. necatrix and E. tenella
- ✓ Moderate: E. acervulina, E. maxima
- ✓ Mild: E. mitis, E. praecox

Clinical signs:

- ✓ Infection can lead to diarrhoea or dysentery, reduced food and water intake, weight loss and visibly depressed birds.
- ✓ Coccidiosis can be life-threatening to birds as infection can lead to bloody dysentery in severe cases.
- ✓ Milder disease leads to general poor health including susceptibility to other infections and reduced productivity.

Transmission: Coccidia are transmitted via the fecal-oral route. Coccidial oocysts (eggs) are present in infected feces or the environment where feces is present (e.g. litter) and can be spread in blowing dust, boots, clothing, equipment. Birds

ingest the eggs in feed, water, litter or soil and become infected. The eggs can survive up to four years in the environment.

Diagnosis: Diagnosis is usually via detection of oocysts in feces by microscopy.

Prevention/control: Control should include the improvement of housing conditions, good litter management, avoiding wet litter conditions and overcrowding. If indicated, coccidiostats (ionophoric antimicrobials) may be incorporated into the feed. Care must be taken that meat or eggs from recently treated birds do not enter the food supply chain as residues of these drugs can remain and can affect human health. Vaccines may be used but they are not always effective for all species and are expensive.

Figure 7: Bloody diarrhoea, a frequent feature of coccidiosis caused by Eimeria tenella, Eimeria necatrix and Eimeria brunetti.

Figure 7: Bloody diarrhoea

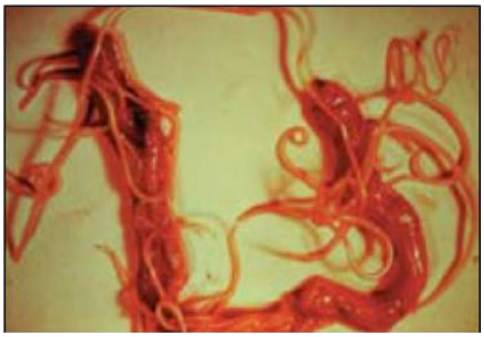
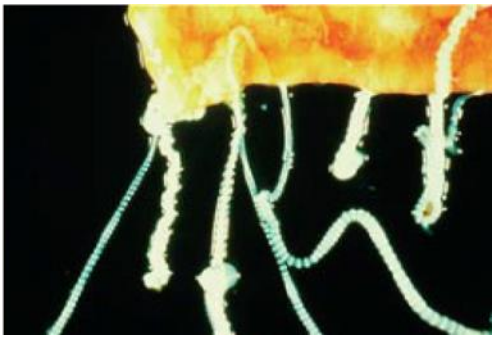
Endo and ectoparasites

There are various worms (endoparasites) and external parasites (ectoparasites) which affect chickens, the most common and important of which are described here.

Endoparasites

A number of worm species can be found in the gastrointestinal tract of chickens. Clinically important species include large roundworms, such as Ascaridia galli (Figure 8 A) which can measure 5–10cm in length, the caecal worm, Heterakis gallinarum, and multiple Capillaria species. Tapeworms (Figure 8 B), such as Raillietina species and Davainea proglottina found in the small intestine can also cause severe clinical disease.

Figure 8: A) Large ascarid roundworm found primarily in the small intestine. B) Tapeworm species in the small intestine.

The gapeworm, Syngamus trachea, can be found in the trachea and lungs of infested birds, with high burdens causing breathing difficulty (breathing with open beak) and cyanosis.

Clinical signs: The clinical signs associated with heavy intestinal worm burden are non-specific, but include loss of weight, appetite, condition and productivity, and in some cases diarrhea with or without passage of worms or worm segments.

Transmission: Worm eggs shed in the feces are directly picked up by chickens in contaminated feed or water, or with certain worm species, require an intermediate host, such as an earthworm or beetle, which can be readily eaten by the chicken when scavenging. Worm eggs can survive in temperate conditions in the environment for many months.

Diagnosis: Diagnosis is by clinical signs, the visible presence of worms and the identification of worm eggs in feces by microscopy.

Prevention/control: Strict sanitation is important for reducing the burden of worm eggs in the environment and the risk of re-infestation. Chicken housing and roosting areas, including nests should be regularly cleaned, in particular with the removal of soiled litter and feces. Food and water bowls should be cleaned daily. Alongside these important hygiene measures, birds can be treated with a suitable anthelmintic according to manufacturer's instructions and under the advice of a veterinary or poultry specialist.

☞ **Ectoparasites**

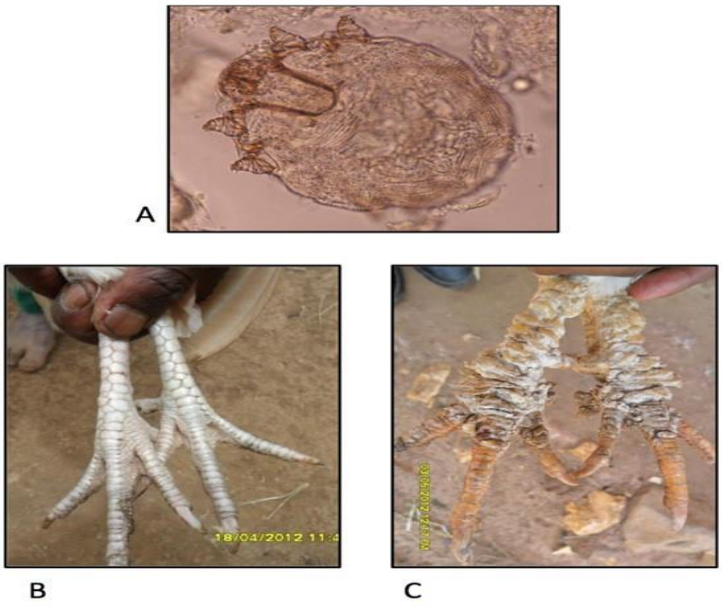
Infestation with external parasites is a common problem in village flocks. Clinical disease is often associated with heavy infestation with one or more species of ectoparasite, leading to poor health and reduced productivity. In severe cases, particularly affecting chicks and young birds, heavy ectoparasite burdens can lead to bird losses.

Scaly leg mites

Scaly leg mites (Cnemidocoptes mutans) are common microscopic parasites that burrow and live within the skin of the birds' feet and legs (Figure 9 A). Heavy infestation will cause raised scales, crusting and distortion of the skin (Figure 9C), which in severe cases can lead to malformation, lameness and secondary infection of

affected tissue. Scaly leg mites are transmitted by direct contact with infected birds.

Figure 9: A: Female scaly leg mite (Cnemidocoptes mutans) under light microscopy (400x) B) Normal appearance of legs and feet in an unaffected bird C) Severe crusting and malformation caused by chronic infestation with scaly leg mite.



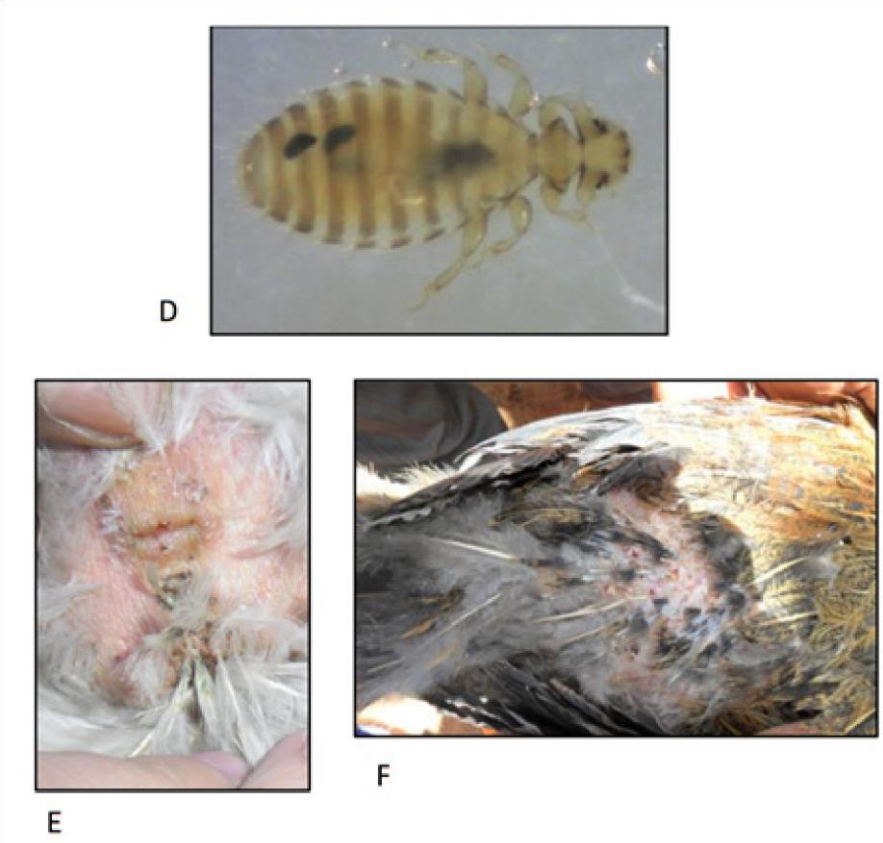
Scaly leg mite is difficult to treat. Treatment involves a combination of softening the scales, via gentle regular washing, together with application of treatment to suffocate or kill the mites, such as Vaseline, paraffin or mineral oil, or an insecticide. Any insecticide treatment must be used in accordance with the advice of a veterinary or poultry specialist and with adherence to any recommended meat and egg withdrawal periods. Any selected treatment may take several months to be effective.

☞ **Lice**

Chewing lice are small, rapidly moving, yellow/brown parasites, often visible to the naked eye, which can be found over the entire skin and feathers of the bird (Figure 10E). Lice will feed on feathers and skin, and will draw and feed on blood reached through their chewing action. All species spend their entire life on the bird, laying clusters of eggs which are visible on feathers. Species commonly found include Menacanthus stramineus, Menacanthus cornutus, Menopon gallinae, Goniodes gigas and Goniocotes gallinae.

Lice are transmitted mainly through direct contact between birds, though heavy infestations and overcrowding can lead to transmission via shared infested bedding and roosts.

Figure 10: D) The yellow body louse *Menacanthus cornutus* on light microscopy (100x). E) clusters of lice seen infesting the vent area of a hen. F) feather and skin damage typical of lice infestation.



Heavy infestation with certain species, such as Menopon gallinae, the wing louse, and several species of Menacanthus body lice (Figure 10 D) and can cause irritation, reduced productivity and occasionally anemia. Infested birds may appear restless, preening and scratching excessively, resulting in visible damage to feathers and skin (Figure 10 F) Birds may tolerate mild or moderate louse infestation without apparent disease. However, this burden could contribute to reduced productivity in the event of concurrent disease, or act as a source of infection for more susceptible birds, such as young chicks.

Strict sanitation, avoiding overcrowded housing, providing dust or ash baths for the birds can help to treat lice, as will keeping roosting areas, nests, bedding and litter clean. Insecticidal treatments and powders licensed for the treatment of mites can be used under the guidance of a veterinary or poultry specialist.

☞ **Skin mites**

There are a number of species of skin mite that infest chicken. Mites are generally very small, just visible to the naked eye, and fast moving on the skin of the bird. Species that can cause significant disease include Ornithonyssus sylviarum, Ornithonyssus bursa, which spend their entire life on the bird, and Dermanyssus gallinae, the red poultry mite, which lives in the housing environment and largely feeds on birds at night. All species are bloodsucking, and heavy infestation can lead to irritation, loss of condition,

poor productivity, and paleness of the skin, comb and wattles due to blood loss.

Insecticidal treatments designed for the housing environment can be used in accordance with the manufacturers' instructions. Such treatments should be repeated after one week, to ensure that newly-hatched mites are also killed.

Smoke can be used to fumigate roosts, nests and shelters regularly.

☞ Ticks

Ticks are blood-sucking parasites that can be found on the skin, particularly areas with little or no feather cover, such as the face and under wings. Although small, all life stages are typically visible on the bird, and are usually a blue-brown colour.

Infested animals may lose condition and show reduced productivity. The skin, comb and wattles may become pale due to blood loss, and red spots may be seen on the skin where the ticks have fed. Birds may seem restless and irritated when roosting, as this is a time when the ticks will typically feed.

Important species include the fowl tick Argas persicus, a soft, brown tick which may live for up to four years without a blood meal. Adult ticks will usually blood feed at night, preferring to live in cracks and crevices in housing during the day. Nymph stages will feed continuously for a period of 2–7 days on the bird. Fowl ticks can also act as vectors for important blood parasites such as Borrelia anserina and Aegyptianella pullorum.

Poultry can also act as a transient host for nymph stages of ticks of mammalian species, such as Amblyomma variegatum, typically seen on cattle.

Treatment of the environment is important in tick control. Removing the bark from any timber used to construct poultry shelters and covering structures and perches with agricultural lime can help. Insecticidal treatments designed for the housing environment can be used in accordance with the manufacturers' instructions.

☞ Fleas

The stick-tight or stick-fast flea (Echidnophaga gallinacea) is commonly found in warm tropical and sub-tropical climates. These small brown-black parasites are visible in clusters firmly attached to the skin, typically around the eyes, on the face, comb and wattles (Figure 11). Adult fleas feed on blood and stay firmly attached to the bird, while eggs and nymphs remain in the surrounding environment.

Figure 11: Heavy infestation with the stick-tight flea, E. gallinacea. Clusters of fleas can be seen attached to the featherless skin around the eyes, wattle and face.

Infested birds may be irritated and scratch at sites where fleas are attached. The skin, comb and wattles may be pale due to blood loss, and red, crusted lesions are found where fleas have previously attached. Large clusters of fleas around the eyes and nostrils may affect sight and ability to breathe. A heavy flea burden may be sufficient to kill young chicks and debilitated birds.

Birds can be treated by regular direct application of Vaseline, paraffin or petroleum jelly onto the areas where fleas are attached. Note that dead fleas may remain attached for days or weeks following treatment. Attempts to remove the firmly attached fleas without treatment is painful to the bird and could cause further damage. Hence, this should be avoided.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write three for each virial, bacterial and parasite disease of poultry. (9pts)
2. Justify how you differentiate ill health chicken from health one. (4pts)

Note: **Satisfactory rating - 13 points** **Unsatisfactory - below 13points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-4	Identifying cull birds using criteria established by the enterprise

Culling hens refers to the identification and removal of the non-laying or low producing hens from a laying flock. Unless the birds are diseased, they are suitable for marketing or home cooking.

Culling. Culling is the removal of undesirable (sick and/or unproductive) birds, from the flock. There are **two methods** of culling:

Mass culling, when the entire flock is removed and replaced at the end of the laying cycle.

Selective culling, when the farmer removes individual unproductive or sick birds.

Four Reasons to Cull

1. Culling removes the risk of your other chickens catching a disease from the sick or injured one.
2. Culling increases food and water space for the productive chickens.
3. Culling increases the flock's overall egg-per-hen ratio or per-bird average growth rate.
4. Finally, culling inferior chickens increases the living space for the producing chickens.

Culling: Year-round culling of unproductive stock will fetch better profit. Culling is based on physical characters, which reflect the physiological changes related to egg production.

☞ **Culling for better returns**

Birds which do not perform well are culled to optimize profits. Culling is practiced on the basis of outward appearance of available records. Stunted growth and physical deformity do not pose any problem. Culling for poor production or non-production requires handling of all the stocks in the laying pen. Since culling may be a source of annoyance to the flock thereby causing a drop in production it should be practiced in the night.

☞ **Culling from outward Appearance**

The appearance of a bird though not an index of its laying ability gives an idea about its health and vigour. The main characteristic for distinguishing a layer from a non-layer is given below.

Table 1. criteria for culling

Character	Laying hen	Non-laying hen
Comb and wattle	Full, red, waxy, warm and velvet like	dry, hard cold, coarse and shrunken with white scabs
Beak	Stocky, well curved, worn -out and less yellow	Very long, thin and sharp pointed, yellow
Eyes	Bright and alert	Dull and sleepy
Ear lobes	Full, waxy and velvet like	Shrunken, wrinkled and coarse
Pelvic bones	Usually spread apart more than 2 fingers, thin and pliable	practically close together thick and stiff
Abdomen	Large, spread 3 to 5 fingers, soft and less of fat	Small usually less than 2 fingers, hard and more of fat
Vent	Full, large and moist	Small, dry and puckered

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define culling(1pt)
2. What are types of culling? (2pts)
3. Write reason of culling. (4pts)

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5	Recording flock/herd health status in accordance with organization procedures.

To keep records is simply to collect relevant information that can help you to take good decisions and to keep track of activities, production and important events on a farm. Records can be about any performance of the animals, economic development, or any activity of the farmer or veterinarian. It is important to keep record keeping simple, and to keep records systematic.

Daily inspection of poultry by trained staff is the best method to prevent serious outbreaks of disease. Inspections will enable you to detect early signs of disease simply by noting changes in the behaviour and condition of individual hens.

The early signs of ill health may include changes in food and water intake, in preening, in 'chatter' and in activity. There may also be a drop in egg production and changes in egg quality such as shell defects.

Disease and treatment records are necessary to keep track of the disease events in which each chicken is involved during its lifetime. It provides information about the health status of each individual animal and the whole flock, and it can help ensuring important vaccinations given at the right time.

On basis of the disease and treatment records, success of interventions both for prevention and treatment can also be evaluated. After treatment with dewormers, acaricides and antibiotics and other medicines, milk, eggs and meat cannot be eaten by humans for some time. The records are essential for keeping track of this, e.g. when this withdrawal time is over. In organic animal husbandry, the withdrawal time is normally longer than the ordinary withdrawal time (double, or three times)

Health records Health records are needed to do the required vaccinations at the right time and to prevent disasters like foot and moth epidemic. They also provide information about the health status of each individual animal and the whole heard. Only with the breeding and health records can a good and wise decision be made.

- ✓ Vaccination
- ✓ Spraying
- ✓ Treatment
- ✓ De-worming
- ✓ Postmortem

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What the use of record keeping? (2pts)

Note: **Satisfactory rating - 2 points** **Unsatisfactory - below 2 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

List of Reference Materials

1. MCA, 1995.Health and Welfare, Principles of Health and Welfare: Book 1, NSW Agriculture,
2. https://www.asean.org/storage/images/archive/AMAF%2033%20Biosecurity%20Manual_.
3. https://ucanr.edu/sites/poultry/files/301024
4. Dr.Acharya, Handbook of Animal Husbandry
5. De Gussem M., van Middelkoop K., van Mullem K. and van ‘t Veer E., 2013. Broiler signals, a practical guide to broiler focused management. Roodbont Publishers B.V., Zutphen, The Netherlands.

POULTRY PRODUCTION

NTQF Level III

Learning Guide -63

Unit of Competence: - Maintain Health and Welfare of Poultry

Module Title: - Maintaining Health and Welfare of Poultry

LG Code: AGR PLP3 M160120 LO1LG- 63

TTLM Code: AGR PLP3 TTLM0120 v1

LO2- Provide an Optimal Environment for Poultry

Instruction Sheet	Learning Guide # 63

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Monitoring bird housing conditions to ensure that protection from external factors
- Identifying the welfare code of practice and farm welfare Quality Assurance (QA) procedures.
- Monitoring, maintaining and operating temperature control equipment and humidity
- Installing equipment and housing in accordance with established organization quality.
- Reporting welfare of poultry continually monitored and non-compliance with *animal* welfare codes.
- Recording relevant formation of stock welfare and health

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Monitor bird housing conditions to ensure that protection is provided from external factors identified by the welfare code.
- Monitor, maintain and operate temperature and humidity control equipment.
- Install equipment and housing
- Monitored welfare of poultry continually and report non-compliance with ***animal*** welfare codes.
- Record relevant information about welfare and health of stock

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, - 5”.
4. Accomplish the “Self-check 1 - 4” **in page -2, 4, 18,21 and 23** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 in **page -23.**
6. Do the “LAP test” **in page – 26** (if you are ready).

Information Sheet 1	Monitoring housing conditions to ensure that protection from external factors

When new accommodation for chicken is planned, a suitable site should be selected taking into consideration the risks from outside environmental factors such as noise, light, vibration, flooding, atmospheric pollution, predators and disease risks.

Monitoring the house maintenance, buildings and equipment for poultry should be such that they:

- ✓ Allow the fulfillment of essential biological needs and the maintenance of good health;
- ✓ Facilitate good management of the hens and ease of routine inspection of all areas;
- ✓ Allow for easy maintenance of good conditions of hygiene and air quality;
- ✓ Provide shelter from adverse weather conditions;
- ✓ Limit the risk of disease, disorders manifested by behavioral changes, traumatic injuries to the hens, injuries caused by hens to each other and, as far as possible, contamination of the hens by droppings;
- ✓ Exclude predators, rodents, and wild animals and minimize insects;
- ✓ Allow for the prevention and treatment of infestations of internal and external parasites;
- ✓ Incorporate damp-proof membranes to prevent insulation breakdown and measures to prevent easy access by vermin to the insulation material; and
- ✓ provide sufficient suitable lighting to enable normal behavior.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what are the you inspect during monitoring of poultry houses? (5pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2	Monitoring, maintaining and operating temperature and humidity control equipment

Daily monitoring of the temperature and relative humidity (RH) levels within the house and observing bird behavior allows the stockman to make regular adjustments to the house environment to ensure the birds are comfortable. Maintaining the correct environmental conditions in the broiler house is essential for optimum bird performance and welfare throughout a flock's life.

Ventilation, heating, lighting, feeding, drinker lines and all other equipment or electrical installation should be designed, sited and installed so as to avoid risk of injuring the birds. All electrical installations at mains voltage should be inaccessible to the birds and properly earthed.

Air circulation, dust levels, temperature, relative air humidity and gas concentrations must be kept within limits which are not harmful to the animals.

Environmental factors (temperature, humidity, ammonia, carbon dioxide, dust, bacteria and fungi) can directly impact on bird welfare, feed conversion, egg production (numbers, weight, shell quality), disease and mortality. The following table shows recommended values for some environmental parameters:

Table 1. Environmental parameters for poultry house.

House temperature	17 - 25°C (adult layers) depending on system of production
Humidity	40 - 60% (up to 70 - 75% for short periods)
Light intensity	At least 10 lux (except nest boxes <1 lux)
Ammonia concentration	< 20 ppm
Carbon dioxide	< 3000 ppm

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. write recommended values for the following environmental parameters
   a. Humidity ----------(1pt)
   b. Light intensity ----------(1pt)
   c. Ammonia concentration----------(1pt)
   d. Carbon dioxide----------(1pt)

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 3	Installing equipment and 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.

Litter is normally spread two to four inches deep and maintained at 20 to 30 percent moisture. Birds have a concentrated form of waste called uric acid, which makes it possible to keep a lot of birds on litter, but moisture can build up. If litter feels damp to the back of the hand, it is probably at least 30 percent moisture.

Some equipment and material installed in poultry house are: -

- **Electrical brooder**

Figure 1. Electrical brooder

- It is also thermostatically controlled heating system that spread required amount of heat uniformly above large area, this avoid crowding of chicks under brooder directly.
- One electrical brooder can be used for 300 to 400 chicks.

- **Infra-red bulbs**

Figure 2. Infra-red bulbs

- It is a self-reflecting bulb and hence no need of reflector over the bulbs.

- 150- and 250-watt bulbs are available to provide sufficient heat to 150 and 250 chicks, respectively.

☞ **Reflectors/ Hovers**

Figure 3. Reflectors/ Hovers

- These reflectors are called Hovers.
- These are reflectors of heat and light.

☞ **Flat type hover**

These hovers are flat provided with heating element, heating mechanism and pilot lamp and in some cases, thermometer are also there in order to record the temperature.
Generally, they are mounted with stands on all four corners, instead of hanging from the roof.

☞ **Canopy type hover**

These reflectors are in concave shape consisting of ordinary electrical bulb, thermostat mechanism and in some cases thermometer.

☞ **Brooder guard / chick guard**

Figure. 4. **Brooder guard**

✓ These are thin sheets of metal, hard board, or bamboo mat of 1 to 1.5 feet height and varying in lengths.

- ✓ They are used to restrict the movement of chicks, so that the chicks will be kept closer to the brooders and prevent them from chilling.
- ✓ They are used to prevent chicks from straying too far away from heat supply until they learn the source of heat.
- ✓ We have to provide brooder guard with a diameter of 5 feet, height of the brooder should not exceed 1.5 feet.
- ✓ For this purpose, we can use materials like cardboard sheet, GI sheet, wire mesh, and mat etc. depending upon the season of brooding.
- ✓ During summer season, brooding is done for 5-6 days. In winter season it is 2-3 weeks.

☞ **Electrical heaters (heating rods or coils)**

Figure 5. Electrical brooding heaters

- This type of brooder is provided with heating elements and pilot lamps and in some cases, thermometer is provided to record the temperature.
- They used to have a reflecting device over the heating rods or coils.
- The temperature can be adjusted depending on the requirement.

☞ **Feeding equipments**

- Feeders are equipment used to feed the birds, by placing feed in them.
- They may be conventional, semi-automatic of various designs and shapes and made up of either metal or plastic.
- Different feeding equipment are,

1. Automatic feeder

Figure 6. **Automatic Feeder**

- In case of automatic feeder, the feed is supplied to the entire length of the poultry house by specially designed feed troughs with auger type or chain type devices to move the feed from the feed bins to the other end.
- These are operated with electricity and the height of the feeder can be adjusted depending upon the age of the birds.

2. Linear feeder

Figure 7. Linear Feeder

- Different sizes of linear feeder with guards are available.
- Provision is also made to adjust the height of the feeder.
- Linear feeders are usually made of Galvanized Iron. However, it can as well be made out of any locally available material like wood, bamboo, etc.
- Provisions for stability and adjustment in height at which the feeder stands have to be made in its design.
    - Birds can stand on either side of the linear feeder.
    - Total feeder space available = 2* length.

- No of linear feeders = (2*Length of the feeder) ÷ Feeder space with all measurements in cm.

3. Circular feeder

Figure 8. Circular Feeder

- These are semi-automatic feeders and can hold 5 to 7 kg feed in its cone at a time.
- The feed is slowly delivered to the bottom by gravity.
- It can also be attached with feed grills to prevent wastage.
- These are made of high plastic and usually suspended from roof/ roof-truss or from separate pipeline for the purpose.
- These are also called as ‘hanging feeders.
- These feeders are available in different capacity and when completely full, the feed will suffice 4 to 7 days, depending upon the age and number feeding on them.
- The height at which the feed is available can be easily adjusted by simple clamp mechanism.
- Plastic feeders will be brightly colored (red or blue, generally) and hence are expected to attract layers, especially chicks to feed.
- No. of hanging feeders = 1.3* (Circumference ÷ Feeder space) with all measurements in cm.
- 30% more birds can be accommodated in a hanging feeder when compared to that in linear feeder.

4. Shell grit box

Figure 9. shell grit box

- It is used to provide shell grit to the layer birds as a supplemental source of calcium.

☞ **Water equipments**

1. Water softeners and filters

- Water with high total dissolved solids will cause deposits on the humidity controls, spray nozzles, jets and valve seats.
- Therefore, filter systems and water softeners are necessary to reduce the TDS content of the water used for hatchery operations.

2. Water heaters

Figure 10. Water heaters

- Hot water will be necessary for operating most hatchery tray washers and for general clean up.
- A large capacity boiler is generally used to provide hot water.

☞ **Watering equipments**

- Waterers or drinkers are used to provide water to the birds.

- Waterers are available in different sizes, design and shape.

1. Pan and Jar type

Figure 11. Pan and Jar type

- This type of waterer is circular in nature, having two compartments i.e. jar for filling water and pan for delivering water.

2. Linear waterer / Channel type waterers

- This type waterer is usually attached with cages for providing continuous water supply.
- One end of channel type waterer is designed as funnel shape to receive water from a tap and the other end has the provision for draining the excess water.

3. Water basin made of plastic / wood/GI with grill

Figure 12. Water basin made of plastic

- Basins of different diameters are available (10”, 12”, 14” and 16” diameter).
- A separate grill is available to prevent the entry of birds inside the water.

4. Bell type automatic waterer

Figure 13. Bell type automatic waterer

- These are made of high-impact plastic in a bell shape usually suspended from separate pipeline for the purpose.
- This type of waterers has control over the water flow and maintains the required water level always.
- There will be a continuous flow of water so as to ensure water available for the birds throughout the day.
- Height at which the water is available can be easily adjusted by simple clamp mechanism and rate of flow water is adjustable by a valve (spring-mounted). Plastic drinkers will be brightly colored (red,blue) and hence are expected to attract layers, especially chicks to water.
- No. of bell-drinkers=1.3*(circumference÷ Drinker space)

5. Nipple drinker

Figure 14. Nipple drinker

- It can be used both in deep-litter and in cage system.
- When used in deep-litter system, it is attached with cup under the nipple to prevent wetting of litter material.
- These drinkers look like a nipple and water drops comes out when they are pressed.
- They can be used for all types and classes of birds, but most commonly used in laying cages.
- One nipple drinkers in each cage housing 3 layers is sufficient.

6. Manual drinker

Figure 15. Manual drinker

- In case of chicks during first week of brooding, manual drinkers are popularly used.
- They also referred as “fountain drinkers” because water comes out of the holes like that in case of a fountain.

- The main advantage of manual drinkers is the ease of giving vitamins and other probiotics/medicines/vaccines through water.
- Manual drinkers with stand made of high-impact plastic in bright colors (red or blue) are available.
- Arrangement of drinkers at an equal distance of 0.6m between any two feeders and feeder and a drinker

☞ **Miscellaneous equipments**

1. Beak trimmer

Figure 16. Beak trimmer

- It is an electrical device used to cut a portion of beak in order to prevent cannibalism among birds.
- The equipment will be mounted on to a stand of convenient height (0.60 to 0.75) with a peddle connected to the top of the unit with a chain/ strong thread so that upon pressing the peddle with the foot of the operator, the hot blade slides down cutting the beak placed over a small platform in the equipment.
- The equipment is also provided with a thermostat to regulate temperature.

2. Nest boxes

Figure 17. Nest boxes

- These are used to get clean eggs and to avoid floor eggs in layer or breeder houses.
- These may be individual, communal or trap nest.
- Different types of weighing balances are available to weigh birds or feed for record and marketing purposes.

4. Perches / Roost

Figure 18. Perches Roost

- This is a wooden device usually kept at a height of about 3-5’ from the floor in order to help the bird to stand over it.

5. Sprinkler

Figure19. Sprinkler

- This is particularly important in hot weather areas.
- Commercial irrigation sprinklers can be used to cool not only the surroundings of the farm buildings but also the roof of the farm.
- But under hot-humid conditions, sprinklers are used only to cool the roof during afternoon hours only.

6. Sprayer

Figure 20. Sprayer

- Several types of sprayers are available in the market.
- But that which is hand-operated and can be carried on the back while in use is most ideal for a poultry farm.
- The desired disinfectant or sanitizer can be mixed and loaded on to the tank and sprayed.

7. Flame-gun (Blow-lamp)

Figure 21. Flame-gun

- It is very useful equipment and it generally works on kerosene (or gas).
- It is used to flame metal frames to rid the building from external parasites and/ or their eggs/ larva etc.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write at least five equipment with their function which should be installed in poultry house. (10pts)

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 4	Reporting welfare of poultry continually monitored and non-compliance with animal welfare

The term **“animal welfare”** is denotes the desire to prevent unnecessary animal suffering (that is, whilst not categorically opposed to the use of animals, wanting to ensure a good quality of life and humane death)

The welfare of poultry is considered within a framework that was developed by the Farm Animal Welfare Committee (FAWC) and known as the ‘Five Freedoms’.

The Five Freedoms are:

1. Freedom from Hunger and Thirst by ready access to fresh water and a diet to maintain full health and vigour;
2. Freedom from Discomfort by providing an appropriate environment including shelter and a comfortable resting area;
3. Freedom from Pain, Injury or Disease by prevention or rapid diagnosis and treatment;
4. Freedom to Express Normal Behaviour by providing sufcient space, proper facilities and company of the animals’ own kind;
5. Freedom from Fear and Distress by ensuring conditions and treatment to avoid mental suffering.

Table 2. Elements included in the concept of animal welfare

Physical health	• Absence of disease and injury • Adequate feeding • Physical comfort • Thermal comfort
Emotions	• Absence of negative emotions such as pain, fear and distress (and, at least in some species, boredom) • Presence of positive emotions
Behavior	• Possibility to express behaviors important in themselves • Possibility to express behaviors that have positive effects on the health or the emotional state of the animal

Continually monitored of poultry welfare

- ✓ Managing the transition from rearing to laying house by matching conditions as far as possible. This is a high-risk period for stress and the onset of feather pecking behaviour and the transition should be kept as smooth as possible.
- ✓ Allowing the pullets immediate access to good quality, friable litter;
- ✓ Giving the pullets in the laying unit early access to the range;
- ✓ Encouraging use of the range by providing shelters near the house; increasing the amount and variety of vegetation; cograzing with compatible non-avian species; and providing foraging opportunities and appropriate outside drinkers.
- ✓ Actively managing the range by keeping the area around the popholes clean and well drained, controlling predators and rotating pasture;
- ✓ Maintaining good, deep, friable litter throughout the laying period to promote foraging and dustbathing activities;
- ✓ Providing additional opportunities for foraging and dustbathing, such as straw or hay bales (entire to allow birds to pull them apart) or in hanging nets; a range of peckingobjects and dustbathing boxes;
- ✓ Minimising diet changes – where possible, mix old and new diets through any transition period. Avoid changing from high protein to low protein diets. Mash increases eating time compared to pellets and keeps the birds occupied;
- ✓ Increasing insoluble fbre in diet – within the main diet or as an added forage, such as whole oats, wheat, corn, alfalfa, maize/ barley/pea, silage or carrots. However, ensure that methods of additional forage provision do not attract rodents;
- ✓ Managing health and hygiene and maintaining effective disease control
- ✓ Reducing stress in the flock by developing good human-animal relationships, carrying out regular inspections and avoiding large contrasts in light, noise and temperature;
- ✓ Inspecting birds more regularly than usual following any unusual or sudden change in management that is likely to increase stress levels, in order to detect any injurious pecking at the earliest opportunity, enabling steps to be taken to treat or cull injured birds;
- ✓ Consider introducing additional perching opportunities in the vertical space in the building. Providing additional resting/ roosting options, appropriate for that shed, can allow submissive birds to avoid situations in which they might otherwise be pecked; and
- ✓ Consider the provision of “verandas” or “winter gardens” as practical methods of reducing stocking densities. The natural lighting and extra space, as well as opportunities for further enrichment points, all help maintain bird welfare.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define welfare. (1pt)
2. List five freedom of animal. (5pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5	Recording relevant formation of stock welfare and health

Recording during flock inspection should include an assessment of body condition, any growth variation within the flock, respiration, mortality, condition of plumage, indications of head or vent pecking, condition of droppings, eyes, skin, beak, legs, feet and claws, and, where appropriate, combs and wattles.

Attention should be paid to the presence of external parasites, feed and water consumption and egg production level. The healthy individual hen should vocalize and perform activities appropriate to its age, breed or type, it should have clear bright eyes, good posture, clean healthy skin, good feather condition and coverage, well-formed legs and feet, effective walking and active feeding and drinking behavior.

Inspections should be made at every level of multi-tier and enriched cage systems. In order to ensure a thorough inspection, the owner/ keeper should pass close enough to every bird to encourage them to move, taking care not to frighten them with sudden, unaccustomed movement, noise or changes in light levels. This will enable the identification of any individual that is sick, injured or weak for appropriate action to be taken by the owner/keeper.

Individual examination should occur where inspection suggests animal health or welfare is compromised and may require prompt intervention, including humane culling.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is relevant formation you recording during inspecting of stock welfare and health? (5pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet-1	Procedure for monitoring temperature and RH

Equipment

1. Hand held temperature / humidity meter.
2. Manual hygrometers.
3. Electronic temperature and RH sensors, these are linked to the automatic control computer.
4. Mercury minimum and maximum thermometers.

Step 1. Take 1 thermometer and 1 hygrometer and place at the center of the house beside the electronic sensors. Two additional thermometers should be placed half way between the center and the end walls of the house. They should be located where the birds cannot touch them and are not in the direct line of any heat sources. Calibrate the electronic sensors before the birds are placed.

Step 2. 1 manual thermometer and 1 hygrometer must be outside of the house in a shaded area away from direct sunlight to establish climatic conditions.

Step 3. All sensors should be checked at the same time every day as part of the daily routine. Minimum and maximum readings should be recorded. The manual thermometers should be reset. Hand held temperature and humidity meters can be used to provide instant temperature and humidity measurements. They are a quick and reliable method of providing additional checks inside and outside the house.

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LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1 hour.

Task 1. Check temperature and RH of poultry house.

POULTRY PRODUCTION

NTQF Level III

Learning Guide -64

Unit of Competence: - Maintain Health and Welfare of Poultry

Module Title: - Maintaining Health and Welfare of Poultry

LG Code: AGR PLP3 M160120 LO1LG- 64

TTLM Code: AGR PLP3 TTLM0120 v1

LO-3. Administer vaccines or alternative therapies

Instruction Sheet	Learning Guide # 64

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Storing and labeling Vaccines, veterinary chemicals.
- Storing to maintain maximum efficacy of Killed and live vaccines
- Carrying out routine prevention procedures for disease
- Measuring quantities of medicines accurately for administration
- Carrying out vaccination or medication under instruction
- Recording administration or medicines

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Store and label vaccines, veterinary chemicals, or other therapeutic medicines
- Store killed and live vaccines or other compounds to maintain maximum efficacy
- Carry out routine prevention procedures for disease or parasite infestation
- Measure accurately quantities of medicines for administration
- Carried out Vaccination or medication under instruction
- Record administration or medicines.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1, - 6”.
4. Accomplish the “Self-check 1 - 6” in page -4, 5, 10,14,24 and 26 respectively.

Information Sheet 1	Storing and labeling Vaccines and veterinary chemicals.

Drug: means any substance or mixture of substances used in the diagnosis, treatment, mitigation or prevention of a disease in man or animal.

Label- means any written, pictorial or other descriptive material (including cartons, vials, leaflets), affixed to or contained in or on the packaging, which gives information about the veterinary medicine that is to be marketed or sold.

The label information on the product is specifically authorized to provide essential information for its safe and effective use. This includes warnings for the user and animal owner so it must not be obscured by any additional labelling or amendments made to the packaging.

The following guidelines are recommended for arrangement of drugs on shelves:

- ✓ Shelves should be made of steel or treated wood
- ✓ Shelves should be strong and robust

Health institutions and drug retail outlets can use one or a combination of the following commonly used methods of drug arrangement:

- ✓ Alphabetical order by generic name
- ✓ Pharmacotherapeutic category
- ✓ Dosage forms

In arranging drugs, the following points should be considered:

- ✓ Each dosage form of drug is arranged in separate and distinct areas
- ✓ Sufficient empty space should demarcate one drug or dosage form from another
- ✓ Put drugs in dry place protected from direct sun light and heat

Table 3. Terms that relate to storage temperature

No	Terms used	Applications
1	Store frozen (-20^{0} C (40 ^{F}))	For products, such as certain vaccines, need to be transported within a cold chain.
2	Store at 2^{0C} – 8^{0} C (36^{0} -46^{0F})	For products which are very heat sensitive but must not be frozen. This temperature is appropriate of storing vaccines for a short period of time
3	Keep cool	For products labeled to be kept between 8^{0} -15^{0} C (45^{0}-59^{0F}).
4	Store at room temperature	For products labeled to be kept between 15^{0} -25^{0} C (59^{0} - 77^{0} F).
5	Store at ambient temperature	Store at the surrounding temperature. It means “room temperature” or normal storage conditions, i.e. storage in a dry, clean, well-ventilated area room temperature between 15^{0} -25^{0} C (59^{0}-77^{0F}) or up to 30^{0} C, depending on climatic conditions

For all vaccines:

- Vaccine should arrive with cool packs in a well-insulated box
- If vaccine arrives hot, call manufacturer or distributor.
- Storage temperature = 35-45º F (2-8º C).
- Avoid freezing, extreme heating and intense light.

For Live Vaccines:

- Transport to farm in cooler with ice packs to keep temperature constant.
- Mix with diluent (reconstitute) just before application

For Inactivated Vaccines:

- Remove 24 hours prior to vaccinating so that the product can warm to room temperature.
- Also, can use warm water bath–do not exceed 100º F for more than 5 hours.
- Do not leave bottles in direct sunlight during transport to farm.
- Gently agitate bottles thoroughly prior to use.

Inactivated vaccines are especially susceptible to temperature extremes or poor handling.

These products are typically in an oil emulsion and mishandling these products can result in disruption of the emulsion – known as a broken emulsion.

- To test the product to see if the emulsion is broken – shake the bottle vigorously for 2 minutes. Let bottle rest for 5 minutes. If separation persists, do not use that bottle of the vaccine and contact the manufacturer.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what are the points should be considered in arranging drugs? (2pts).
2. Define drugs. (1pt)
3. What is the recommended temperature to store vaccine? (2pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2	Storing to maintain maximum efficacy of Killed and live vaccines

Storage areas should be designed or adapted to ensure good storage conditions. In particular, they should be clean and dry and maintained within acceptable temperature limits. Where special storage conditions are required on the label (e.g. temperature, relative humidity), these should be provided, checked, monitored and recorded. Materials and pharmaceutical products should be stored off the floor and suitably spaced to permit cleaning and inspection. Pallets should be kept in a good state of cleanliness and repair.

Storage requirements

- **Documentation**: written instructions and records
  - ✓ Written instructions and records should be available which document all activities in the storage areas including the handling of expired stock.
  - ✓ Permanent information, written or electronic, should exist for each stored material or product indicating recommended storage conditions, any precautions to be observed and retest dates.
  - ✓ Records should be kept for each delivery.
- **Labelling and containers**
  - ✓ All materials and vaccine products should be stored in containers which do not adversely affect the quality of the materials or products concerned, and which offer adequate protection from external influences.
  - ✓ All containers should be clearly labelled with at least the name of the material, the batch number, the expiry date or retest date, the specified storage conditions and reference to the pharmacopoeia, where applicable.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are storage requirements of drugs? (3pts).

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 3	Carrying out routine prevention procedures for disease

3.1. General hygienic measure

It is very important to keep the chance of infection by contacts with sources of infections to a minimum. Germs can be spread via animals and via people. Infection is also possible through contact with infected objects such as crates or cars. All kinds of diseases can be transferred by birds, vermin, insects and other parasites. Remember that feed and dirty drinking water can also carry germs.

The following measures are important to prevent disease.

- Keep the chickens housed instead of letting them roam around freely.
- Do not locate the farm near other farms; keep it at least 100 m away.
- Only allow visitors that have been disinfected thoroughly near the chickens.
- Clean drinkers and feeders regularly.
- Clean the housing after getting rid of the old, non-laying hens.
- Remove all installations from the housing.
- Soak off all the dirt and clean it well.
- Clean the chicken house well with lots of water and let it dry completely.
- Disinfect the empty housing with disinfectant.
- Control rodents (mice and rats) and flies.
- Remove dead birds immediately from the chicken house.
- Renew the litter regularly. Get rid of old litter immediately.

When disease has broken out in your area, it is especially important to carry out these measures well.

If you want to place new, bought stock (for example cocks) with your own home-bred birds, it is a good idea to keep the new birds separate for some time. If a contagious disease appears, the chance of infection will be less than if you immediately place the new birds with the old stock.

A. Sanitation program for poultry raisers

- Do not expose your flock to birds from other flocks.
- Buy chicks from known sources.
- Buy chicks from pullorum-clean flocks.
- Keep young chicks away from older birds.
- Burn or bury dead birds.
- Allow no contaminated equipment to be brought on your premises.
- Keep visitors away from your poultry houses or ranges.

- Keep chickens that have left the premises from getting back into the flock.
- Dispose of sick chickens.
- Should disease appear, seek authoritative advice promptly.
- Use preventative and control medications with extreme caution.
- Treat droppings as potential disease spreaders.
- Try to eliminate rats, lice, and other pests.
- Handle vaccines properly. Follow the manufacturer's directions.
- Keep different species of fowl segregated.
- Do not sell birds known to be diseased.
- Clean poultry buildings carefully and thoroughly.
- Enforce a strict program of sanitation and quarantine

B. Other health management practices

- ✓ Buy poultry replacement stock from a reliable, diseases-free source.
- ✓ If possible, keep birds of only one age on the farm. Use an all-in, all-out program. (Bring all the birds onto the farm at one time and remove them all at one time.)
- ✓ Keep pests and flying birds out of the poultry house.
- ✓ Provide the proper ventilation in the poultry house.
- ✓ Control rats and mice.
- ✓ Feed balanced rations to prevent nutritional diseases. Keep feeders and waterers clean.
- ✓ The workers engaged in poultry farm should change their clothes, footwear and head gear at or before entry into the poultry farm.
- ✓ The poultry farm should be fenced.
- ✓ Visit of outsiders should be restricted as far as possible. In case they visit they should change the footwear and clothes, or be disinfected, before visiting the farm.

C. Vaccination

Vaccination (or immunization) is the process of administrating an antigen or vaccine to the birds to develop protective resistance or immunity against a specific infectious disease.

D. Controlling disease outbreak

- ✓ The poultry flock should be checked daily for signs of disease.
- ✓ A sudden drop in feed and water consumption is often a sign of health problems.

- ✓ Watch the birds to see how they are eating and drinking.
- ✓ If more than 1% of the flock is sick, a disease is probably present.
- ✓ Death rate is another sign of disease.
- ✓ During the first three weeks, the normal death rate for chicks is about 2%.
- ✓ After three weeks of age, the death rate should not be more than 1% per month.
- ✓ A sudden increase in the death rate is an indication of disease.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the measures important to prevent poultry disease? (5pts).
2. How we control disease outbreak? (3pts).
3. Describe the activities done in sanitation program for poultry raisers. (4pts)

Note: **Satisfactory rating - 12 points** **Unsatisfactory - below 12 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 4	Measuring quantities of medicines accurately for administration

If your bird is ill, your veterinarian may prescribe medication. Occasionally, medications can be provided in food or water or others. However, unless you can provide the medication inside something that can be swallowed in one gulp (for example, inside a small piece or fruit or vegetable), or your bird will accept hand feeding, controlling dosages and administration times in food or water is not very precise. Your bird may not consume enough of the medication because it does not like the taste or it simply is not hungry.

In many cases, your veterinarian will instruct you to provide medication using an eye dropper or needle-less syringe. It is important to follow your veterinarian's instructions as closely as possible regarding the amount of medication and how often it must be given. Your bird may not be very cooperative, but it is important to administer the medication with as little fuss as possible to avoid stressing the sick bird further. If you are uncertain how to give the medication, ask your veterinarian or veterinary technician to demonstrate the technique before you leave the office.

Be sure that you understand all of the instructions given by your veterinarian, including the correct dosage, the number of times you need to give the medication each day, and how long the treatment should continue. Here under some examples on dose calculation are described.

☞ **Amoxicillin SP**

This treatment applies to the following species:

Chickens: The recommended dosage is 10-20 mg AMOXICILLIN SP, to provide 8-16 mg amoxicillin trihydrate, per kg body weight per day, for a period of 3-5 consecutive days. The higher dosage is advised when treating severe infections. To calculate the amount of AMOXICILLIN SP required per day, the following formula may be used:

$$\text{grams AMOXICILLIN SP/day} = \frac{\text{Number of birds} \times \text{average liveweight (kg)}}{\text{50 (for 20 mg/kg) or 100 (for 10 mg/kg)}}$$

Tank Method: Ensure there is no access to unmedicated water while medicated water is being offered. Any unused medicated water should be discarded immediately after the treatment period. Make a stock solution, by scattering the calculated amount of AMOXICILLIN SP onto the surface of 5-10 litres of water and stir until completely dissolved. Dilute this stock solution by stirring into a tank of

water sufficient to provide the volume of medicated drinking water that will be consumed in approximately two hours. The normal water supply should be resumed after this time.

Water Proportioner Method: To calculate the amount of AMOXICILLIN SP required to medicate the total daily drinking water intake, the following is a guide:
Birds 0-4 weeks of age: 6 - 12 g AMOXICILLIN SP/100 litres of water
Birds older than 4 weeks: 10 - 20 g AMOXICILLIN SP/100 litres of water

Make a stock solution, by scattering the calculated amount of AMOXICILLIN SP onto the surface of 5 - 10 litres of water and stir until completely dissolved. Dilute this stock solution by using a water proportioner calibrated to deliver medicated drinking water containing the appropriate concentration of AMOXICILLIN SP, sufficient to provide the volume of medicated drinking water that will be consumed in approximately two hours. The normal water supply should be resumed after this time.
Use the following formula to calculate the volume of diluent required to dilute the number

of doses of the vaccine per vial and the eye-dropper in use:

Volume of diluent (mL) = No. of doses of vaccine per vial divided by No. of drops formed per mL

Example 1: How much diluent should be added to a vial containing 250 doses of ND vaccine given that 1 mL of water in the eye-dropper yielded 50 drops?

Volume of diluent (mL) = 250 doses per vial divided by 50 drops per mL = 5 mL per vial

Example 2: How much diluent should be added to a vial containing 100 doses of ND vaccine given that 1 mL of water in the eye-dropper yielded 37 drops?

Volume of diluent (mL) = 100 doses per vial divided by 37 drops per mL = 2.7 mL per vial.

- *Ascaridia galli* and *Heterakis gallinarum*: 1 mg fenbendazole per kg body weight per day (equivalent to 0.005 ml Panacur AquaSol) for 5 consecutive days.
- *Capillaria* spp.: 2 mg fenbendazole per kg body weight per day (equivalent to 0.01 ml Panacur AquaSol) for 5 consecutive days.

Dose calculation:

The required daily amount of product is calculated from the total estimated body weight (kg) of the entire group of chickens to be treated. Please use the following formula:

Treatment of *Ascaridia galli* and *Heterakis gallinarum:*

Total estimated body weight (kg) of chickens to be treated x 0.005 ml
= ml product/day

Treatment of *Capillaria* spp.

Total estimated body weight (kg) of chickens to be treated x 0.01 ml
= ml product/day

Examples: **Panacur AquaSol Dosage Calculation Schedule for chickens**

Total bodyweight of chickens to be treated	**Amount of product per day for 1 mg FBZ/kg (ml/day)**	**Total amount of product (ml/for 5 days)**
40,000 kg	200 ml	1,000 ml
		(5 x 200 ml)
160,000 kg	800 ml	4,000 ml
		(5 x 800 ml)
Total bodyweight of chickens to be treated	**Amount of product per day for 2 mg FBZ/kg (ml/day)**	**Total amount of product (ml/for 5 days)**
40,000 kg	400 ml	2,000 ml
		(5 x 400 ml)
160,000 kg	1600 ml	8,000 ml
		(5 x 1600 ml)

Follow the instructions in the order described below to prepare the medicated water. Use a sufficiently accurate measuring device, which should be properly cleaned after use.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the formula to calculate the amount of **AMOXICILLIN SP** required per day. (3pts).
2. Depending on question no. 1. How much diluent should be added to a vial containing 250 doses of ND vaccine given that 1 mL of water in the eye-dropper yielded 50 drops? (3pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5	Carrying out vaccination or medication under instruction

5.1. Introduction

Vaccination and drug administration are parts of the poultry medications. Vaccines are applied to chickens to build their immune system against an impending disease. One of the best ways to control poultry disease is through vaccination. In poultry production, either: broiler production, turkey or layers production; vaccination program should be included in the chicken medicine chart.

Vaccines are different from drugs; vaccines are used for prevention while drugs are used for treatment. Vaccination is periodic; drug can be administered at any particular time, provided the chicken is unhealthy. Vaccines are commonly administered when the chickens are healthy; it is to complement and build resistance against any deleterious diseases that may want to distort the healthy living of the bird in future. Once your chicken shows symptoms of diseases; apply drug and not vaccines.

The use of drug and vaccine as part of medications in poultry production require adequate care and attention. Like humans, we can be treated in various ways: drugs, injection, etc. This also applies to livestock. There are means of drug and vaccine administration; it is called **ROUTE OF ADMINISTRATION**. This cleared states how a drug or vaccine should be administered to ensure its efficiency. The route of administration is normally demoted with abbreviations on the label of the drug. These abbreviations are:

I/V: This means INTRAVENOUS, it means the drug must be given to the animal through the vein. It is used for early or acute emergence of an infection or disease.

I/M: This means INTRAMUSCULAR, it means the drug or vaccine must be given to the animal through the muscle. This is common in all livestock.

S/C: This means SUBCUTANEOUS, it means the drug must be given to the animal through the skin. It is common in poultry and farm animal too. Example is the Fowl pox vaccine for chicks.

TOPICAL: This means the drug must be applied through rubbing on the skin of the animal. It is common in farm animal to treat skin infection.

ORAL: This means the drugs must be given to the animal through drinking water or mixing with feed. This is the most common route in poultry production.

LA: This means LONG-ACTING; it means the drugs will stay longer in the animal system.

Withdrawal period of vaccine is about 3 weeks; this implies that, within the three weeks medication, the by-products of the chickens should not be consumed but discarded. Withdrawal period for vaccination and deworming should be strictly followed to avoid health issues.

If a veterinary medicine has been used in or on an animal, you must wait a minimum amount of time before it is used for food. This is to make sure the medicine won't pose a health risk to consumers.

Veterinary medicines registered for use in or on animals must have the withholding period printed on the label. We calculate withholding periods from residue data provided during registration of a veterinary medicine.

5.2. Vaccination

- **Live vaccine:**

Live vaccine consists of live micro agents. Live vaccines are viruses or bacteria weakened under controlled laboratory conditions into a safe virus/bacteria strain that can infect the chicken immunity and stimulate immunity without causing severe disease. Live vaccines stimulate the complete immune system including local, cellular and humoral immunity. Protection following vaccination is relatively rapid (few days to a week) depending on properties of particular virus/bacteria. Protection for most of live vaccines does not last for a full breeder cycle and needs regular revaccination.

Live vaccine can be administered by mass applications such as **drinking water, spray or aerosol.** Most poultry vaccines are a live virus type. They can be given at a younger age than killed vaccine.

- **Killed or inactivated vaccine:**

Killed or inactivated vaccines contain pathogens that have been chemically inactivated with or without a suitable adjuvant so that they will produce immunity, but are unable to cause or transmit the disease

Inactivated vaccines do not stimulate complete immune system like live vaccine. They do not induce local immunity and only limited cellular immunity but there is a very strong humoral response (circulating antibodies) and takes up to 6 weeks for this protection to develop. A killed virus product is dependent on the number

of antigenic units (virus particles) present in the vaccine dose to stimulate antibody production. Inactivated vaccine must be administered by injection to each individual bird at the prescribed dose rate is laborious.

Development of competent vaccines is one of the factors for emergence of poultry industry.

5.2.1. Methods of Vaccination

There are seven methods of vaccination which are used and are mentioned over here in detail. The reconstitution of vaccine is of prime importance. Users must apply all the steps of the reconstitution while using the live freeze-dried vaccines.

- **Intraocular (Eye Drop) or Nasal Instillation method**

This method of administration by Eye drop/ Nasal instillation should be preferably used for small dose packs as it is necessary to consume reconstituted vaccine immediately. If this method is to be used for higher dose packs it is advisable to use more vaccinators so as to utilise reconstituted vaccine immediately. Hold the chick with one eye turned up. Take the vaccine product in sterile prescribed vaccine-dropper and instill one drop in eye or nostril. Ensure that the vaccine drop is completely absorbed in the nostril or in the eye. In Nasal Instillation method the vaccine drop is inhaled by the chick on momentary pressing of the beak. Intraocular method of vaccination gives better immune response. Use prescribed droppers as provided by Ventri.

Figure 1. Eye drop vaccination

☞ **Beak Dipping Method**

Reconstituted vaccine should be mixed with requisite amount of chilled water (normally mixed with suitable amount of skimmed milk powder) in china-clay / glass bowl.

Secure the chicks and dip the beak upto the nostrils. Chicks quite often will respond with a jerky movement of the forehead. Complete the vaccination within one hour. maintain the cold chain throughout the vaccination.

☞ **Subcutaneous Injection Method**

This method is specially used for inactivated vaccines and Marek's disease vaccine, live Suncutaneous injection is often placed in the lower half, back of the neck. although field contamination due to unhygienic vaccine handling can result in extreme reactions at the site of injection, this region is not valuable part of carcass.

Figure 2. Subcutaneous Injection

☞ **Intramuscular Injection Method**

Intramuscular injection of inactivated vaccines and of live vaccine like ND R2B & Fowl Pox, can be placed in several locations including the breast, thigh and wing. These types of vaccines have been commonly injected into the breast muscle of chickens, because intramuscular injection into the breast is an easy and accurate way to apply the vaccine.

For subcutaneous and intramuscular vaccination method use 20G1/2 inch needle with a short bevel. Change needle after every batch of 100 birds for hygienic vaccination in order to reduce the post vaccinal reactions.

☞ **Wing Web Prick Method**

This method is used only for Pigeon pox vaccine. an applicator instrument is called “lancet” is used for this method of vaccination. the metal tips of lancet are dipped into reconstituted vaccine and pierced through the part of wing having the least number of blood vessels.

Figure 3. **Wing Web**

Mass vaccination:

☞ Drinking Water Vaccination

The Oral vaccination of the birds through drinking water is the most practical method of vaccination in flocks of large size. Drinking water vaccination can be used for vaccinating birds with certain vaccines against Newcastle Disease (N.D.), I.B.D. (Gumboro Disease) and Infectious Bronchitis (I.B.). Quality ice @ 1kg per 10 ltr of water and skim milk powder @ 6 g per ltr water (Vacc-sure tablet can be used.) Always place the requisite number of waterers per batch of birds for having the better charging of vaccines to the flock.

Figure 4. Drinking Water Vaccination

☞ **Vaccination by Dosing Pump**

A dosing pump is a device, which allows constant, progressive and predetermined release of "stock Solution" into the drinking water of birds. The rate of incorporation is adjustable and classically varies from 2 % to 5 %. (for example, a rate of 2 % means: 2 ltr of "Stock solution" released per 100 ltr of drinking water passing through pump). An important factor in vaccination by dosing pump is estimation of the volume of the "Stock-solution" and timing of work. Here the validation is important, wherein counter-check the released volume.

☞ **Spray Vaccination**

The reconstituted chilled vaccine in the bottle us poured aseptically in chilled skim milk powder – water mixture.

Use 2.5 grams of skim milk powder per liter of distilled water. Clean mineral water which is of next choice if distilled water is not available. Use 300-500 ml of clean distilled water (skim milk powder – water moisture) for every 1000 bird's doses of the primary vaccine or 500- 1000 ml for repeat vaccinations. Various types of pumps for spraying of vaccine are available in foreign/developed countries for use in such vaccinations.

However requisite spray pump available in the market can be used for spraying of the reconstituted vaccine described above. The droplet size of vaccine water sprayed through such pumps should be in the range of 150- & 175-micron size. This is of course to avoid stress on the air sacs and further leading ti precipitation of mycoplasma existing in dormant form. Hence consult with the experts.

Spraying of the vaccine is recommended at flow rate of about 300-400 ml per minute, keeping the distance of about 30 cm above the chicks. The birds can be vaccinated on day of arrival in the chick-boxes itself for desirable "take" of vaccination to avoid handling stress.

However, upto 6th day, priming is also possible using this method while keeping the chicks in their chick guards and raising the brooding "Baskets" with bulbs at more height for 15-30 minutes till "vaccination" is completed. Since brooding method is used in your farm is not suitable for the spray vaccination as described above then religiously use eye drop or nasal or drinking water method for vaccination.

Incase if CRD is noted in particular areas then the spray vaccination should be avoided as opined by technical experts.

The vaccinator must put the aprons, mask, gumboots and goggles to protect themselves from transmission of any virus particles into system.

☞ **Drinking water Method of Vaccination**

It is very common method used by all the poultry farmers. Most if the booster or repeat vaccination are done by drinking water. The number of drinkers is very important and should be places to make it available to all the chicks / birds so that every bird can get access to the vaccinated water on the day of vaccine. Many times, the water vaccination is done through nipple drinkers or channel drinkers in such cases the requisite pipeline should be thoroughly cleaned by pipeline cleaners. This pipeline cleaning should be done regularly but it should always be done three days prior to drinking water vaccination, to avoid any kind of detrimental effects of cleansing agent on vaccine virus.

Table 4. vaccination schedule.

No	Age	Disease	Route
	1 day	Turkey Coryza (Rhinotracheitis)	-live Bordetella vaccine given intranasally
	14 days	Turkey Coryza	live culture vaccine via drinking water
	21 days	Newcastle Disease -	live B1 or PMV3 via drinking water
	28 days -	Hemmorhagic Enteritis	live culture vaccine via drinking water
	6 wks	Fowl Cholera -	live culture vaccine via drinking water or killed vaccine by intramuscular injection
	8 wks	Newcastle Disease -	live virus vaccine via drinking water
	10 wks	Fowl Cholera -	2nd FC vaccination: live or killed vaccine (last dose for hens)
	12 wks -	Newcastle Disease	live vaccine via drinking water
	14 wks -	Fowl Cholera	live culture vaccine (last dose for toms)

In hot weather, keep water from birds for 1 hr prior to vaccination; increase to 2 hrs in cold weather

• Scrub waterers thoroughly with brush, removing all dirt, droppings, and slime. Make sure everything is clean before mixing and administering vaccine.

☞ **Default withholding periods for veterinary medicines**

In some cases, where no residue data is provided for a product, default withholding periods are used.

The following default withholding periods are applied to registration of veterinary medicines without residue data. These are conservative withholding periods based on all residue data provided to MPI.

These don't apply to sustained release formulations because a withholding period must be after release into the animal, not after the medicine is given to the animal.

Birds, including chickens

- ✓ Meat: 63 days
- ✓ Eggs: 10 days

5.4. Medication

The administration of therapeutic agents to treat various infectious diseases or conditions:

- ✓ Worms = anthelmintics (dewormers)
- ✓ Bacteria = antibiotics*
- ✓ Coccidia = coccidiostats
- ✓ Fungi = antifungals
- ✓ Lice and mites = insecticides/acaricides
- ✓ Vitamin/Mineral deficiencies = Vit/Min supplements

Table 5. Common Diseases and Medications

Disease	**Medication**	**Dose**
Mycoplasmosis	Tylosin*	2 gms/gal of water for 2-3 days
	(Tylan)	withdrawal: chickens: 1 day; turkeys: 5 days
	Erythromycin*	0.5 gm/gal of water for 5 days
	(Gallimycin)	withdrawal: 1 day
Bacterial infections	Oxytetracycline* *(Terramycin)*	1 gm/gal. of water withdrawal: 5 days
	Chlortetracycline*	Chlortetracycline* -*same as for oxytetracycline (Aureomycin)*
	*Sulfamethazine**	*2 tablespoons (1 fl oz) per gallon (Sulmet 12.5%) of drinking water for 6 days withdrawal: 10 days*
	*Sulfaquinoxaline** -	*same as for sulfamethazine*
Coccidiosis	Amprolium *(Amprol)*	Prevention: 0.0125% in feed continuously until 8 weeks of age Treatment: 1/3 oz. powder/gal. water for 10-14 days
Roundworms	Piperazine *(Wazine)*	50mg/lb body weight for 1 day Broilers: 4 wks; repeat at 6 wks of age Pullets: 5 wks; repeat at 30-day intervals until 21 wks of age
Other worms	Fenbendazole *(Safeguard)* *(Panacur)*	1 oz *Safeguard or Panacur* per 15-20 lb feed for 1 day or 1.2 oz/100 lb of feed for 3 days. Dissolve the fenbendazole product in one cup of water. Mix this solution well into the feed and give to the birds as their only feed source.
	Tetramisole	20 mg. per bird per day (1 gm. powder (Tramisol) per gallon water for 1-2 days).
Lice and Mites	Carbaryl *(Sevin)*	-apply 5% dust to vent and feathers or place the bird into a garbage bag containing the medicated powder with the birds' head out and rotate/shake the bag to completely cover the bird with powder -repeat every 2 weeks -withdrawal: 7 days

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the routes of medication for poultry? (5pts)
2. Describe the default withholding periods for veterinary medicines for eggs and meat? (2pts)
3. Describe the difference of live vaccine and killed vaccine? (2pts)
4. List the vaccination schedule for common poultry disease. (5pts)

Note: **Satisfactory rating - 14 points** **Unsatisfactory - below 14 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 6	Record administration or medicines

A farm worker / A farmer is required to keep a record of all animal remedies coming on to the farm, as well as a record of all animal remedies administered or unused/out of date veterinary medicines which are returned.

☞ **Administration/Outgoing details**

- ✓ Date of Administration,
- ✓ Authorized name and quantity of the animal remedy administered,
- ✓ Identity of animal to which the animal remedy was administered including ID No. if appropriate,
- ✓ Date of expiry of a withdrawal period,
- ✓ Name of person who administered the animal remedy,
- ✓ Name of prescribing veterinary practitioner (if applicable),
- ✓ Quantities of unused or expired animal remedies which were returned.

Self-Check -6	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are administration/outgoing details the farm worker records? (5pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

POULTRY PRODUCTION

NTQF Level III

Learning Guide -65

Unit of Competence: - Maintain Health and Welfare of Poultry

Module Title: - Maintaining Health and Welfare of Poultry

LG Code: AGR PLP3 M160120 LO1LG- 65

TTLM Code: AGR PLP3 TTLM 0120v1

LO-4. Collect samples for analysis

Instruction Sheet	Learning Guide # 65

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Taking and preparing swabs from surfaces and work areas on a regular basis for laboratory testing.
- labelling and preparing Swabs and samples clearly and accurately for dispatch to the laboratory.

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- Take swabs from surfaces and work areas on a regular basis and prepare for laboratory testing.
- Prepare swabs and samples and label clearly and accurately for dispatch to the laboratory
- **Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, - 2”.
4. Accomplish the “Self-check 1 - 2” in page 6 and 10 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 in page -11.
6. Do the “LAP test” in page – 13 (if you are ready).

Information Sheet 1	Taking and preparing swabs from surfaces and work areas

Diagnostic samples are used to determine health status or identify specific pathogens in pullet, layer and breeder flocks.

Routine samples include

- ✓ whole blood
- ✓ serum
- ✓ formalin-fixed tissue and swabs: tracheal, choanal, oropharyngeal, cloacal, organs and joints.

☞ **Equipment required for collection of samples**

(1). Sterile forceps, scissors, and scalpels.

(2). Sterile swabs

(3). Vials for containing transport medium for collection of samples for isolation or identification

(4). Bottles for collection of faeces, blood, and other samples that do not require transport medium

(5). Bottles containing formalin saline for tissues to be examined histologically.

(6). Blood collection equipment- without additive for serum, and with anticoagulant for isolation

(7). Notebook and equipment for labeling specimens

(8). Swabs and transport medium for bacteriological investigation

(9). Cool box (Thermos flask)

(10). Heavy duty plastic bags for postmortem material.

This information is vital to the flock veterinarian and diagnostician to make a meaningful interpretation of serological or diagnostic results and provide recommendations to improve flock health and/or production.

☞ **Summary of Guidelines for Proper Serum Collection**

- ✓ Select normal representative birds (10 to 20 sera samples), unless working up a diagnosis.
- ✓ Collect 2.0 to 3.0 mL of blood from each bird.
- ✓ Samples collected with a needle are cleaner than with a scalpel.
- ✓ Do not damage samples by forcing the blood sample back through the needle into the clot tube.
- ✓ Ensure blood runs down the side of the clot tube and position the tubes nearly flat until the clot is formed.
- ✓ Leave blood in the clot tube for 10 to 12 hours at about 80°F (27°C).

- ✓ Do not shake, roughly handle or freeze the blood while the clot is forming or hemolysis will occur.
- ✓ Remove clot gently, or pour off serum.
- ✓ Do not mail samples without frst removing the clot.
- ✓ Keep the serum samples cool and send immediately to the laboratory on wet ice or cold pack.

☞ **Equipment Used for Blood Collection**

Disposable, sterile 3 or 5 cc syringes are used, depending on the size of the sample to be obtained. The size of needle depends on the anatomical site used for blood collection.

Table 6.site and needle length for blood sample collection

Blood Collection Site	**Needle Length**	**Needle Gauge**
Wing vein	0.5–1.0 inch (1.25–2.54 cm)	20–22 gauge
Cardiac puncture	1.5 inch (3.81 cm)	18–20 gauge

☞ **Collection of Swabs**

Cotton or dacron tipped swabs are an effective, non-invasive method for sampling for Mycoplasmas, bacteria, and many viruses (examples: infectious bronchitis, avian influenza, infectious laryngotracheitis, Newcastle). Samples for PCR, virus isolation, bacterial isolation or other tests can be obtained from swabbing the oral/ choanal cleft, trachea, cloaca, affected joints, and organs.

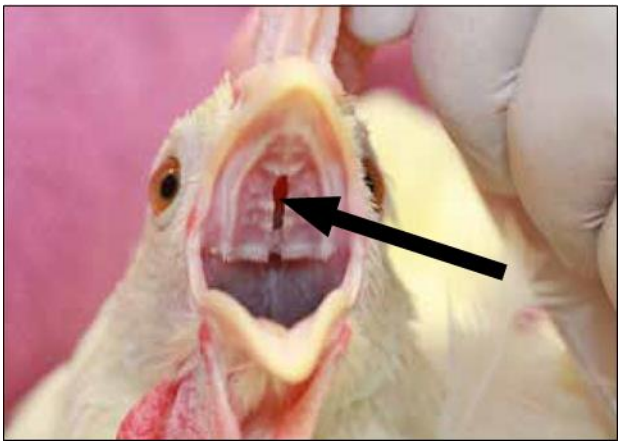

Figure 1. The swab is inserted gently through the glottis into the trachea.

Figure 2. Proper technique for restraining the bird while collecting oropharyngeal swabs.

Figure 3. Be sure to insert swab into the choanal cleft when collecting oropharyngeal swabs.

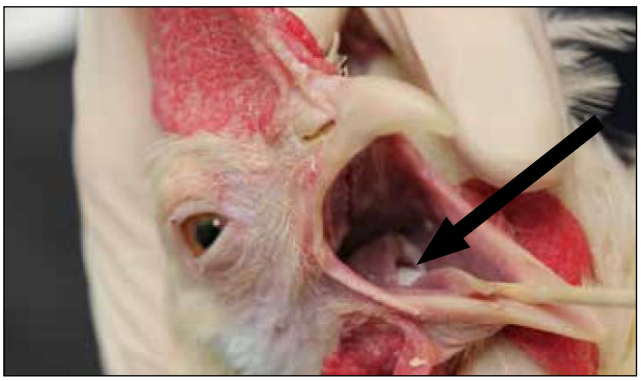

Figure 4. *The swab is inserted gently through the glottis into the trachea.*

Figure 5. *Remove feathers and clean the skin with an alcohol pad before cutting into the joint of a euthanized bird.*

Figure 6. *Swab the synovial surface of the affected joint.*

Figure 7. *Expose the cloaca and insert the swab gently into the cloaca and rotate the swab over the mucosal surface.*

Table 1. site where taking swab

Pathogen(s)	Sample Pooling for PCR	Media Used	Location
Avian Influenza	pool of 11 swabs in 5.5mL media pool 5 swabs in 3mL media	BHI (Brain heart infusion)	Tracheal, orорharyngeal
Newcastle Disease	pool of 5 swabs in 5.5mL media	BHI	Tracheal, oropharyngeal
Mycoplasma gallisepticum/synoviae	pool of 5 swabs per PCR reaction	Dry or BHI media	Tracheal, oropharyngeal
Bacteria and/or Viruses	only pool tissues from a single bird; pool by organ system (respiratory, enteric, reproductive)	media provided in the culturette tube	Affected organs

☞ **Histopathology**

Histology refers to the evaluation of cells and tissues using a microscope. As a follow-up to the post-mortem exam, histology can be a valuable tool in assessing flock health.

Collect specimens for histopathology as soon as possible after death to avoid deterioration of tissues. Do not collect samples from birds that have been previously frozen. The freeze and thaw processes can disrupt cellular features, leading to poor quality slides.

Samples should be collected using a scalpel or razor blade that is sharp and sterile (Figure 5). Avoid using scissors, as they can crush tissue and destroy microscopic details.

An individual sample should be no larger than $1cm^3$ (1x1x1 cm) to allow for adequate penetration of the tissue with fixative.

The selection of samples depends on observations made during the examination. Tumors and other masses, focal discolorations, and organs that are enlarged, atrophied, or otherwise abnormal should be sampled. When a particular disease is suspected based on flock history, tissues associated with that disease may be collected, even if they appear normal (see Table 1). A cross section of all parts of the affected organ being sampled should be harvested whenever possible. Tissue cut from the margin of the lesion, collecting both affected and normal tissues, is preferred. Whenever possible, collect healthy-appearing tissue of the same for comparison.

Table 7. some diseases of concern and the special samples that should be taken

Disease of Concern	Samples Needed
Gumboro (IBD)	✓ Bursa of Fabricius, ✓ Thymus
Infectious Laryngotracheitis	✓ Trachea Larynx ✓ Conjunctiva
Marek's Disease	✓ Sciatic Nerve ✓ Brain ✓ Eye ✓ Tumors
Wet pox	✓ Trachea ✓ Larynx
Enteritis (coccidia, focal duodenal necrosis)	✓ Portions of the gastrointestinal tract affected

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List equipment used for collecting samples. (5pts)
2. Describe some diseases of concern and the special samples that should be taken(5pts)

Note: **Satisfactory rating - 10points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2	**labelling and preparing Swabs and samples clearly and accurately for dispatch to the laboratory.**

Sample Preservation

Samples should be promptly submerged in a solution of 10% neutral buffered formalin for preservation. The volume of formalin solution in a single container should be at least 10 times the volume of all tissues. Samples must be fully immersed in the solution to be adequately saturated by fixative to prevent deterioration.

Lung tissue and other air-containing tissues may be wrapped gently in absorbent cotton to aide immersion. Gently open the lumen of trachea and intestine samples to release trapped air.

After 48 hours in formalin, the tissues are adequately fixed. If necessary, for shipping, the formalin can be decanted at this point. Decanted samples should be shipped immediately to minimize the risk of damage to the sample from drying.

If samples may be subject to sub-freezing temperatures during shipping, already fixed samples can be decanted, and re-submerged in an "alcoholic formalin." This will protect against freeze-thaw damage to tissues. For a simple alcoholic formalin mix, combine and pre-mix 6.5 parts pure ethyl alcohol, 2.5 parts distilled water, and 1 part 37% formalin.

The formalin-fixed samples can be kept in sealable plastic bags (e.g. Whirl-Pak® bags), or remain in a securely sealed jar with formalin.

If the samples are to be mailed to the laboratory, double-bag the sample to prevent leakage. Remember that formalin is a poison and exposure to the liquid or vapor is harmful to humans.

Figure 8. *Immediately place the tissue into 10% neutral buffered formalin for preservation.*

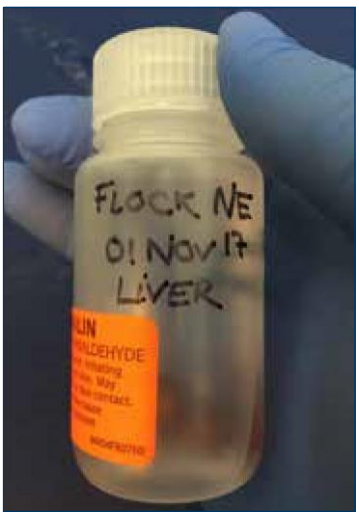

Figure 9. *After 48 hours in formalin, tissues are adequately preserved*

Figure 10. ***Whirl****-Pak® type bags are sealable, leak-resistant, and can be used for storing and transporting samples.*

Information to Be Sent with Sample

Information and case history should always accompany the samples to the laboratory, and ideally should be placed in a plastic envelope. The information should include the following points:

- ✓ Name and address of owner/occupier where disease occurred, with telephone and fax numbers,
- ✓ Disease suspected,
- ✓ Samples submitted and tests required (transport medium used),
- ✓ Different species on the farm and number, age and sex of each affected animal,
- ✓ Length of time on the farm; if recent arrival, where from,
- ✓ Date of first cases and of subsequent cases or losses,
- ✓ Description of the spread of infection in the herd or flock,
- ✓ Number of animals' dead, the number showing clinical signs, and their age, sex and breed,
- ✓ The clinical signs and their duration including the condition of mouth, eyes and feet, and milk or egg production data,
- ✓ Type and standard of husbandry, including the type of feed available, possible contact with poison or poisonous plants,
- ✓ A list of description of the samples submitted for examination, and post-mortem findings,
- ✓ Any medication already applied to the animals, and when given,

- ✓ Any vaccination already given, and when given,
- ✓ Name and address of sender, with telephone and fax number, and date of submission.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List the information sent with samples. (5pts)
2. How we preserved samples? (2pts)

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet-1	Procedure for Collecting A Blood Sample

Wing (brachial) vein method using a needle

The brachial vein of the wing is an acceptable site for blood collection for birds 4 weeks and older. In younger birds, this vein is too small for efficient blood collection.

STEP 1

Figure 11. ***Hold bird by both legs.***

STEP 2

Figure 12.a ***Place legs under elbow of nondominant hand.***

STEP 3

Fig. 12.b. Free both hands to gain access to underside of wing.

Figure13. Remove feathers to better view the brachial vein.

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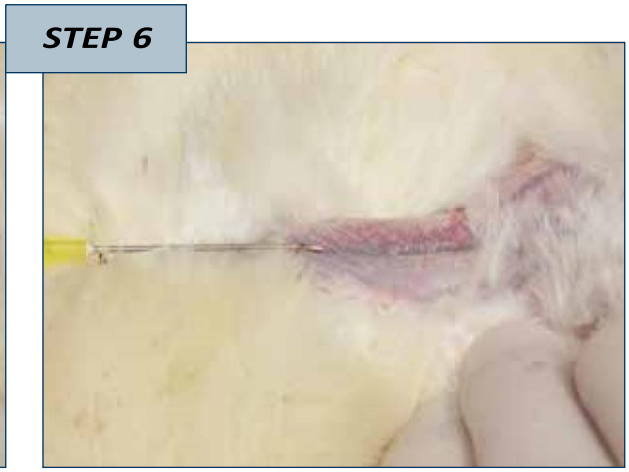
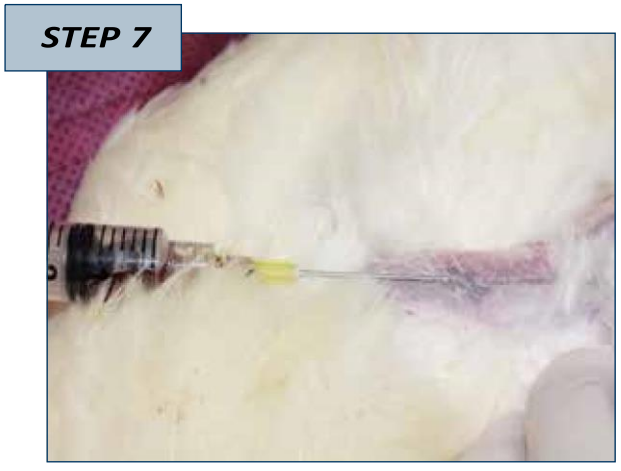


Figure 14. Visualize the brachial vein. Figure 15. Orient needle in alignment with vein, bevel pointed up, with tip of needle pointed toward wing tip.



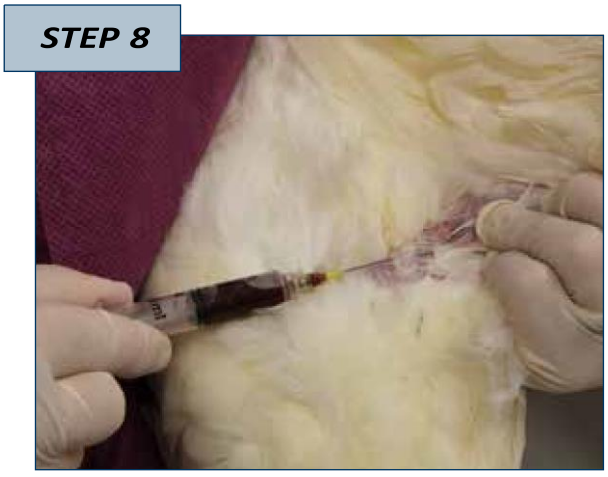


Figure 17.

Figure 16. Needle should be inserted first under the skin and then into the vein mid-way between elbow and shoulder joints.

Figure 17. If needle is within the brachial vein, blood will fill syringe with minimal pull on syringe plunger. Pulling back on plunger with too much force will create high negative pressure, causing the vein to collapse and stopping the flow of blood into the needle.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 25min.

Task 1. Collect blood sample from wing (brachial) vein using a needle.

REFERENCE

1. Bermudez, Alex J. and Bruce Stewart-Brown. 2013. Chapter 1: Principles of Disease Prevention: Diagnosis and Control, “Disease Prevention and Diagnosis”. Diseases of Poultry. 13th edition. Ames: Wiley-Blackwell,

2. USDA-APHIS. 2016. United States Veterinary Permit for Importation and Transportation of Controlled Materials and Organisms and Vectors. U.S. Department of Agriculture.

POULTRY PRODUCTION

NTQF Level III

Learning Guide -66

Unit of Competence: - Maintain Health and Welfare of Poultry

Module Title: - Maintaining Health and Welfare of Poultry

LG Code: AGR PLP3 M160120 LO1LG- 66

TTLM Code: AGR PLP3 TTLM0120 v1

LO- 5. Remove non-viable poultry

Instruction Sheet	Learning Guide # 66

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Undertaking culling and removal according to organizational procedures
- Treating or culling sick poultry by neck dislocation or gassing safely with industry standards of health and hygiene.
- Providing post-mortem assistance where necessary.

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to –**

- undertake culling and removal according to organizational procedures and industry quality assurance program.
- Treat or culled sick poultry by neck dislocation or gassing safely
- Provide post-mortem assistance where necessary.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, - 3”.
4. Accomplish the “Self-check 1 - 3” in page -2, 5 and 7 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 and 2 in page 8 and 9 respectively.
6. Do the “LAP test” in page – 17 (if you are ready).

Information Sheet 1	**Undertaking culling and removal according to organizational procedures.**

Birds that have been identified as sick or injured must be monitored at least twice daily, or at a frequency appropriate to their conditions. If not showing signs of recovery, birds must be euthanized in accordance with the on-farm euthanasia plan

Euthanasia is a critical part of an effective on-farm animal welfare program. Proper euthanasia, done at the right time, reduces suffering due to disease, pain from injury and distress from ill thrift. The decision to euthanize is subjective, and depends on farm management practices and experience. Sick or injured birds must be treated or euthanized without delay if they:

- ✓ Are unlikely to recover
- ✓ Fail to respond to treatment and convalescent protocols
- ✓ Have chronic, severe or debilitating pain and distress
- ✓ Are unable to access feed and water
- ✓ Show emaciation or lack of body condition

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the points we consider for Sick or injured birds to be treated or euthanized without delay? (5pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

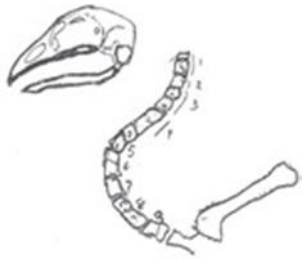
Information Sheet 2	Treating or culling sick poultry by neck dislocation or gassing safely

Proper handling and restraint minimize stress on the bird, and reduce or eliminate the chance of an ineffective procedure. Proper restraint is crucial during any physical method of euthanasia, and will reduce the chance of injury to the personnel euthanizing the bird.

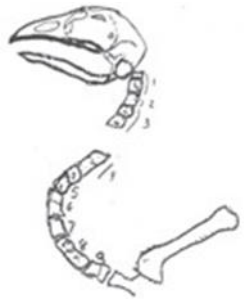
Alternative grip: hold head by placing the thumb and index finger around the neck, at the base of the head. Some users feel that this alternative grip lets them put more traction on the neck. This is an acceptable grip, provided the head of the bird can be flexed towards its back sufficiently

☞ **cervical dislocation**

When performed properly, this technique results in a dislocation of the skull from the frst vertebrae. This results in the spinal cord separating from the brainstem. It is damage to the brainstem that results in rapid unconsciousness, and humane death.



If performed incorrectly, there will be boney structures still attached to the skull. This means that the brainstem will not be damaged, and the time to unconsciousness is extended. This is usually the result of the “wind-milling” method, and is unacceptable.



There is no perfect method of euthanasia for poultry, and research continues on improving methods of euthanasia. Every method has its strengths and weaknesses, and decisions for the best method must be made on a farm-by-farm basis. The following guidelines may help in evaluating the applicability of each method on any individual farm.

Table 1. method of Euthanasia

Method of Euthanasia	Considerations	
Manual Cervical Dislocation	Effective only in smaller birds. Operator strength and technique determine effective weight limits for this technique.	
Non-Penetrating Captive Bolt	Not practical for chicks or young poults. Elaborate equipment and maintenance protocols required.	
Penetrating Captive Bolt	Not practical for chicks or young poults. Elaborate equipment and maintenance protocols required.	
CO2	Elaborate equipment and maintenance protocols required. CO2 causes distress to birds if not applied properly. Necessary exposure time can be variable.	
Decapitation	Properly maintained equipment is effective for all classes of poultry. There are concerns for biosecurity due to blood loss.	
Blunt Force Trauma	High level of control and repeatability of the procedure are crucial.	
Mechanical Cervical Dislocation	The device must dislocate the neck vertebrae, not cause crushing of the bones of the neck, and be comparable to manual cervical dislocation with respect to time to loss of consci	

www.poultryindustrycouncil.ca.

- **using gas**

The use of mixtures of the gases carbon dioxide, oxygen and nitrogen for stunning or killing poultry

- **Method 1: 40% CO2, 30% O2, 30% N2** with an exposure time of 2 minutes. The effects of exposing chickens to this gas mixture for two minutes
- **Method 2: 40% CO2, 30% O2, 30% N2** for 1 minute followed by 80% CO2, 10% O2, 10% N2 for 2 minutes In this method, birds on a conveyer are exposed to the initial gas mixture for 1 minute to stun them, followed by 80% CO2 for a further 2 minutes to kill them.

Figure 1. culling birds by gas

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Describe culling poultry using gasses. (3pts)
2. What is cervical dislocation means? (3pts)
3. List types of euthanasia. (4pts)

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 3	Providing post-mortem assistance

Introduction

Perform the post mortem on freshly killed or fresh, dead birds, before autolysis (decomposition) compromises histopathological examination. Formalin fixative kills putrefactive bacteria and fungi and inactivates the enzymes of autolysis halting any further tissue degeneration.

- ✓ Describe all lesions with brief notes on (or attached to) the submission form according to the basic parameters of size, colour, consistency, location and distribution.
- ✓ Consider submitting digital photographic images of lesions observed.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the purpose or use carryout postmortem? (5pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet-1	Procedure of manual cervical dislocation

Step 1. Use for chicks, poults, chickens and turkeys of appropriate size that operators can easily dislocate

Step 2. Hold bird above hocks for good control of body and to decrease the chance of causing injury.

Large birds (i.e. breeders or growing turkeys) may be restrained by the wings, if they are too large to be held by the legs during cervical dislocation.

Step 3. Hold head by placing first two fingers on either side of the neck, against the bony outcroppings of the skull near the ears. This grip allows for control of the head, while still enabling the user to put solid traction on the neck.

Operation Sheet-2	Procedure of carry out post mortem.

Step 1. For post mortem examination on the farm utilize a stable flat surface set at a suitable height in a well-lit but shaded position. Have a basic instrument set to hand (scissors, plane forceps, shears) with water, soap and disinfectant to clean up afterwards and disposal bags for the carcass material.

Post Mortem Procedure

Figure 2

Figure 3

Examine birds externally for evidence of trauma, soiling of feathers, vent damage, skin lesions, eye lesions, external parasites, foot pad lesions and joint swelling.

Examine the oral cavity and conjunctiva and apply pressure to the infraorbital sinus for evidence of nasal discharge.

Step 2. Place the bird on its back with the head away from you. Incise the skin at the thigh-body wall junction, dislocate the coxo-femoral joints (the bird will now lie flat on its back).and make a small incision through the skin between the caudal end of the breast bone and the cloaca. Pull the breast skin away from you towards the neck and examine the subcutaneous tissue and breast musculature (Figures 2 + 3).

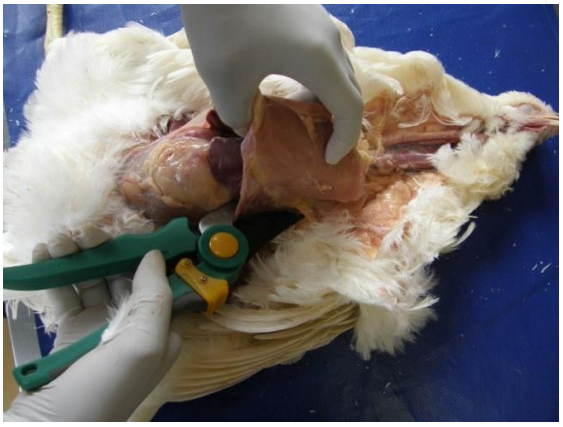


Figure 4 a

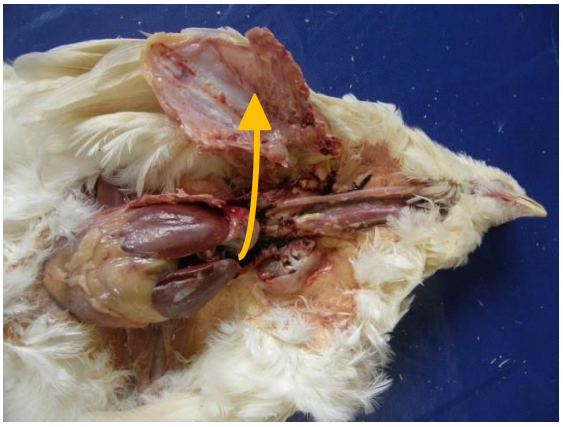


Figure 4 b

Step 3. Push strong scissors/shears through the incision and incise the right side (bird's left) coelomic (abdominal) wall, thoracic cage and coracoid bone. Repeat on the bird's right side. Reflect the breast to your left or remove completely taking care not to damage the underlying terminal trachea/tracheal bifurcation (Figure 4a).

- ✓ The liver, lungs, heart, trachea and airsacs can now be viewed (Figure 4b).

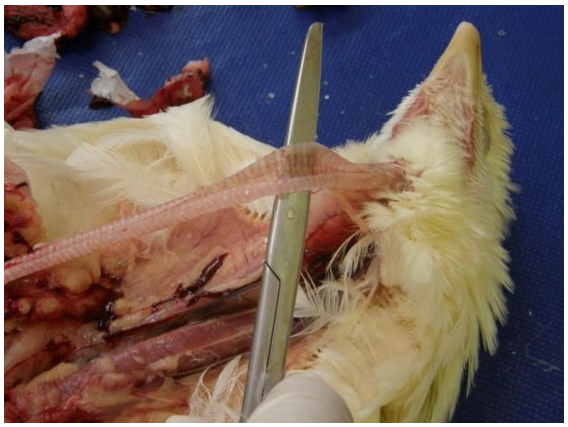
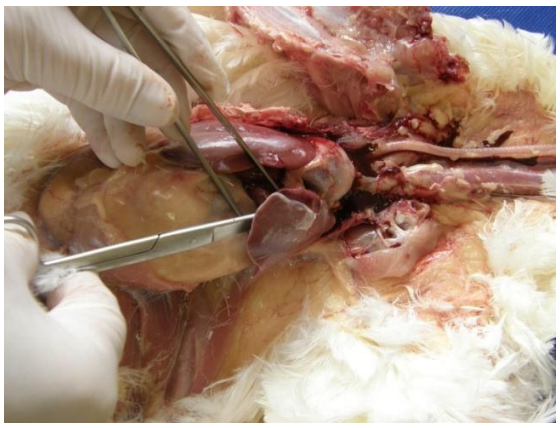


Figure 5

Figure 6

Step. 4. A longitudinal section of the trachea from the syrinx (tracheal bifurcation) to the larynx will allow careful examination of the mucosa - with collection of samples by swabbing (for bacterial culture or for PCR) to evaluate for important respiratory pathogens such as avian influenza, Newcastle disease, infectious bronchitis virus, infectious laryngotracheitis virus, Turkey rhinotracheitis virus, *Mycoplasma gallisepticum*, *Avibacterium paragallinarum* (Figures 5 + 6).



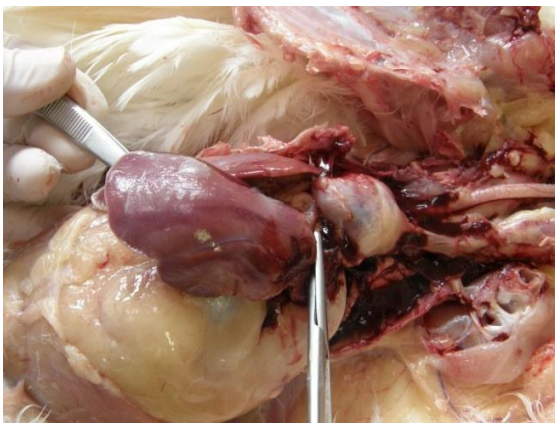
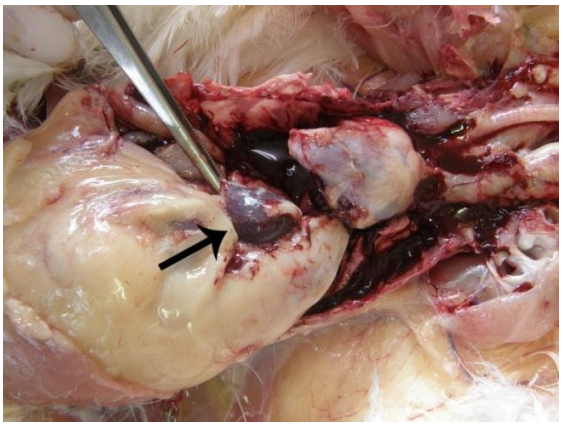


Figure 6 **Figure 7**

Step. 5. Carefully undermine and remove the bird's left and right liver lobes and gall bladder (Figures 6 and 7). Rupture of the gallbladder results in release of bile into the coelomic cavity and bile has potent antibacterial properties which can significantly interfere with bacterial culture results.



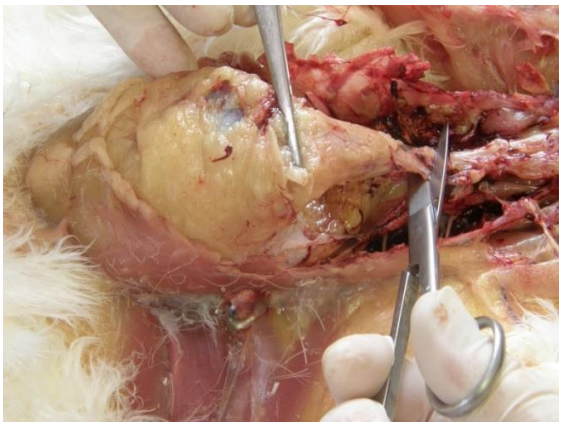


Figure 8 **Figure 9**

The underlying spleen is now visible (Figure 8 arrow). Heart is removed and examined.

Step .6. The GIT is excised between the oesophagus and the proventriculus and gently pulled towards you (Figure 9). Excision of the doudenohepatic ligament may be necessary.

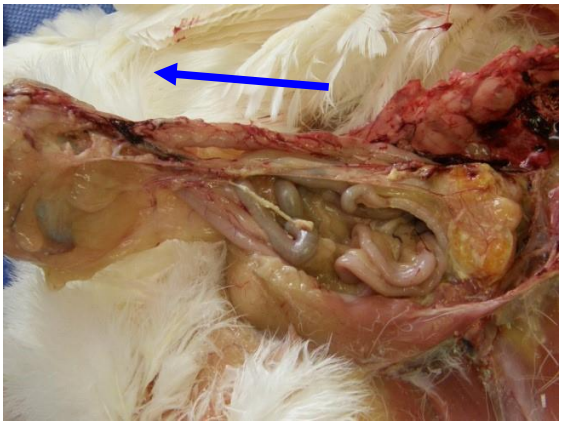


Figure 10 a **Figure 10b**

The GIT is gently extended and laid out on the left of the bird for further detailed examination (Figures **10 a and b**).

Helminths (roundworms) and (tapeworms) may be found especially in the proximal part of the small intestine (from gizzard to first 30 cm or so of the intestine). Caecal worms may be seen in the caeca.

The whole intestine (including caecae) should be opened and the mucosal wall examined for any evidence of coccidia.

Step. 7. Examination of the thoracic and abdominal air sacs and kidneys (see annotated image below) is now possible (Figure 11).

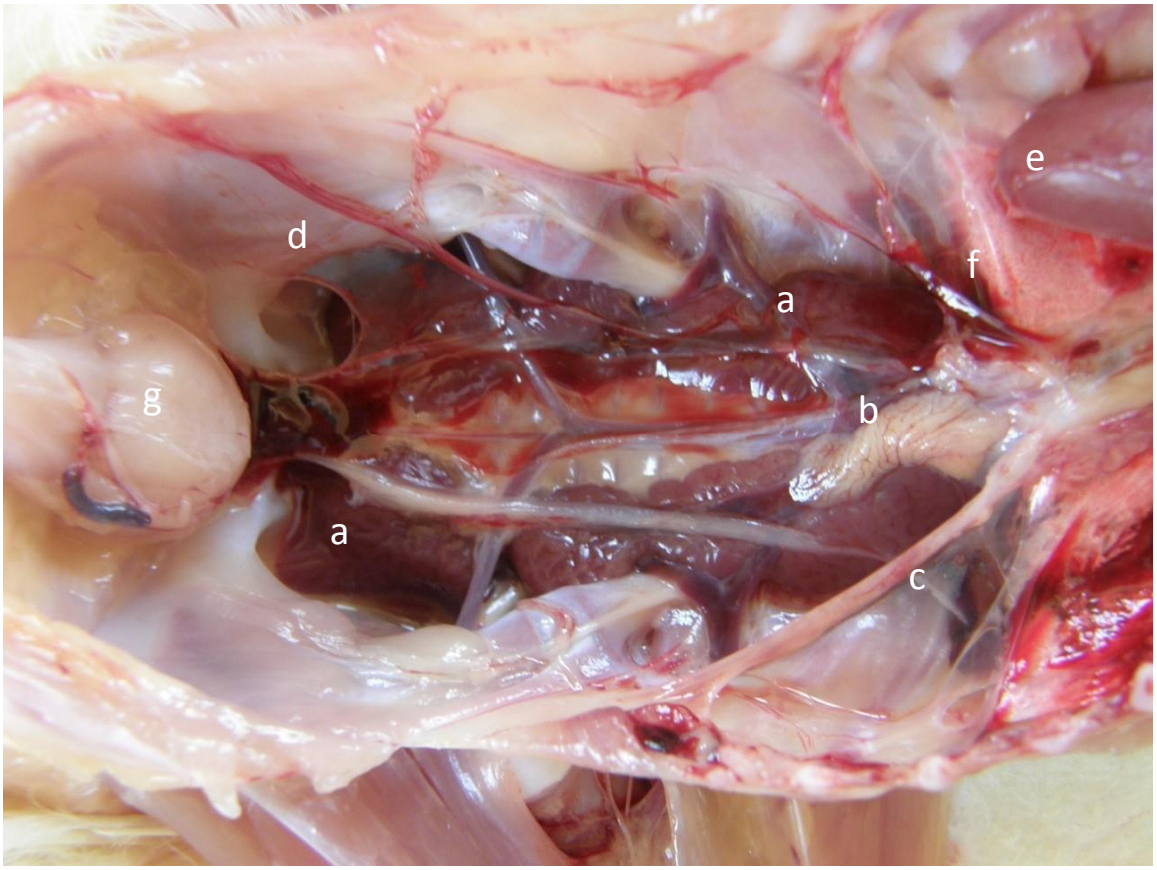


Figure 11. Lobulated Kidneys a, Immature ovary b, Thoracic airsac c, Abdominal airsac d, Heart e, Lung f and bursa g.
Gonads / Reproductive Tract.

Step. 8. Examine the development and condition of the oviduct, ovary, ovarian follicles or testes with respect to age of the bird (Figure 12 a and b).

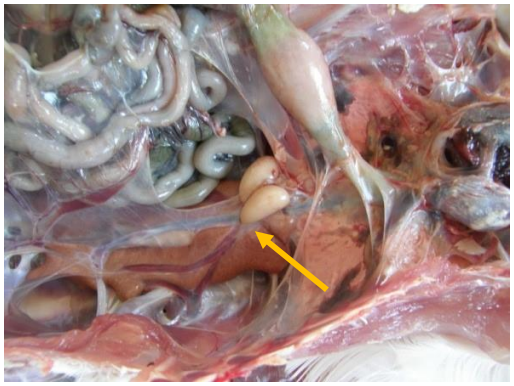


Figure 12. a. Normal mature ovary and succession of follicles

Figure 12.b. Immature testes.

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☞ **Proventriculus/Gizzard.**

Step. 9. The proventriculus, gizzard and intestine are now opened for examination of their internal surfaces. Closely examine the mucosal surface of the proventriculus for evidence of linear hemorrhages (Newcastle disease, avian influenza, infectious bursal disease) at the junction of the oesophagus and proventriculus plus proventriculus and gizzard – stars (Figure 13).

Examine the surface of the gizzard for both colour and the presence of erosions.

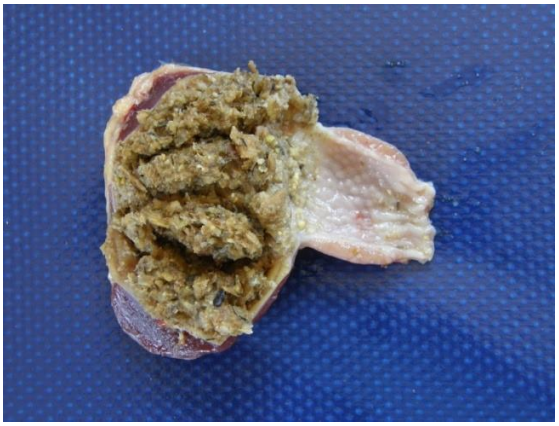

Figure 13. Proventriculus and gizzard

Figure 14. Normal gizzard content

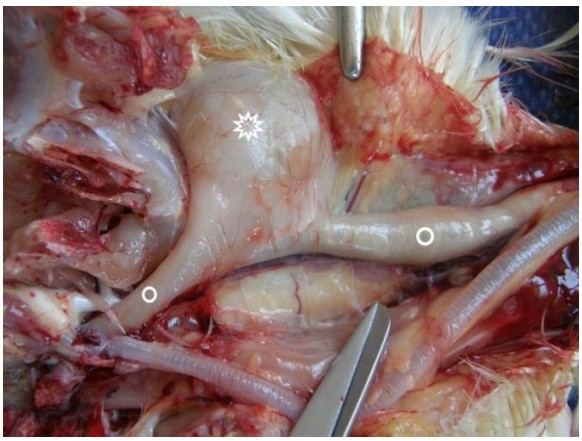

Figure 16. Crop (asterix) and oesophagus (circle). **Figure 17. Opened crop and oesophagus**

Step. 10. The crop and oesophagus are opened for examination of their mucosal surfaces (Figure 16 and 17).

- **Brain.**

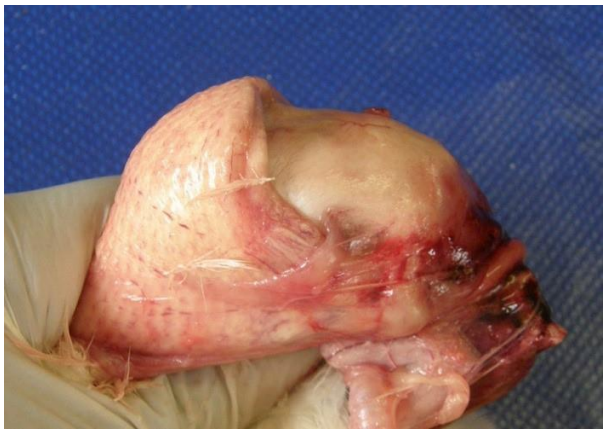

Figure 18 **Figure 19**

Step. 11. Remove the head at the atlanto-occipital joint, peel the skin towards the beak to expose the skull (Figure 18).

Incise the skull from the occipital foramen forward in two tangential cuts to both orbits where the incisions join (Figure 19).

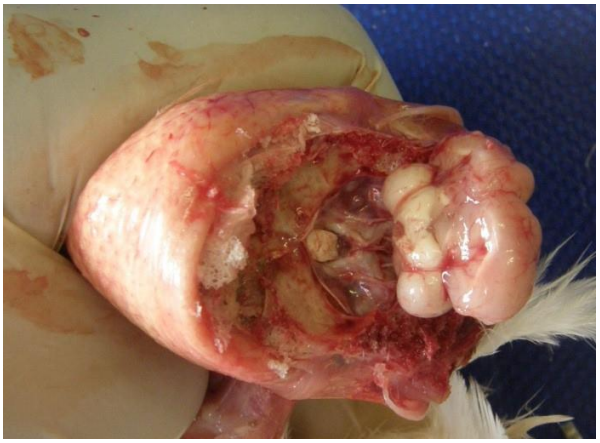

Figure 20 **Figure 21**

Remove the excised cranium to expose the brain (Figure 20).

Gently undermine the brain from the anterior region levering gently upwards and place whole brain into a formalin bottle (Figure 21).

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 2hrs .

Task 1. Carry out manual cervical dislocation

Task 2. Cary out post mortem examination

REFERENCES.

1. Abdul-Aziz T, Fletcher O.J. & Barnes H.J. 2016. *Avian Histopathology*. 4th edition. American Association of Avian Pathologists, Florida.
2. Dinev I. 2010. *Diseases of Poultry: A Color Atlas*. 2nd edition. CEVA Sante Animal, Bulgaria.
3. Horner R.F. & Last R.D. 2012. *VDX Poultry Health and Food Safety Manual*. Vetlink, Pretoria.
4. Saif Y.M. 2008. *Diseases of Poultry*. 12th Edition. Blackwell Publishing, Iowa.
5. https://ec.europa.eu/food/sites/food/files/safety/docs/sci-com_scah_out08_en.pdf.

POULTRY PRODUCTION

NTQF Level III

Learning Guide -67

Unit of Competence: - Maintain Health and Welfare of Poultry

Module Title: - Maintaining Health and Welfare of Poultry

LG Code: AGR PLP3 M160120 LO1LG- 67

TTLM Code: AGR PLP3 TTLM 0120v1

LO- 6. Keep and maintain record

Instruction Sheet	Learning Guide # 67

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Reporting disease information to the unit manager
- keeping and maintaining all records clear and accurate

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Report disease information to the unit manager
- Keep and maintain all records clear and accurate

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1 - 2”.
4. Accomplish the “Self-check 1 - 2” in page -3 and 6 respectively.

Information Sheet 1	Reporting disease information to the unit manager

Report serious or unusual symptoms or behaviour in your livestock or birds to one of the following:

- ✓ unit manager
- ✓ your private veterinarian
- ✓ nearest animal health adviser or government veterinarian officer.

Report any suspicions of disease immediately. We will determine whether a significant or notifiable disease is occurring.

Symptoms that could be notifiable, serious, or unusual disease

Report any of the following symptoms in birds:

- ✓ a large number of sick or dead animals
- ✓ fast spread of disease through a herd or flock
- ✓ animals that are lame, drooling, or salivating excessively
- ✓ ulcers, erosions, or blisters around the feet, muzzle, udder, and the mouth
- ✓ unusual nervous behavior
- ✓ **discharge, including:**
  - diarrhoea, especially if there is blood in it
  - excessive nasal discharge
- ✓ birds with dullness, swollen heads, or respiratory distress
- ✓ production drop in egg production in birds
- ✓ an increase in thin-shelled eggs in birds
- ✓ sudden illness with rapid deterioration or death in horses
- ✓ any unusual or unfamiliar disease symptoms in animals or birds.

Method of reporting

- ☞ Electronic Communicable Disease Reporting
- ☞ Printable Communicable Disease Report

Give the following information when reporting

- ✓ what pest or disease is suspected.
- ✓ the name of the owner or farm manager
- ✓ property details including: telephone number
- ✓ the livestock species
- ✓ number of animals on the property, including wild animals

- ✓ the type of animals being affected
- ✓ a description of clinical signs of the illness
- ✓ the date symptoms were first noticed
- ✓ approximate number of sick or dead animals

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. write the types of reporting. (2pts)
2. list the information we included when reporting the disease information. (3pts)

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 8points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 2	keeping and maintaining all records clear and accurate

Management of poultry requires detailed records on a daily or weekly basis. It is important to spend some time each day observing your flock carefully. In this way early signs of disease, malnutrition, or other problems may be detected and the necessary action taken.

Use this form to record poultry flock management (for birds that are managed consistently and uniformly as a group), as applicable: preventative health care practices, administration of vaccinations and medications, physical alterations, location, reproduction, sale, and culling/mortality.

Table 1. Record keeping format

Flock ID/Location:		
Hatch Date:	**Number Purchased:**	**Date of Purchase/Delivery:**
Source:		
LAYERS		
Date Egg Laying Began:		
MEAT/LIVE BIRDS		
Date of Sale:	**Buyer:**	**Sold as Organic?** ☐ Yes ☐ No
PHYSICAL ALTERATIONS (caponization, beak trimming, spur removal, etc.)		
Date(s)	**Procedure(s)**	

VACCINATIONS AND VETERINARY BIOLOGICS		
Date(s)	**By Whom** (hatchery or farm)	**Material(s) Administered**

MEDICATIONS/REMEDIES/SUPPLEMENTS		
Date(s) Administered	**Product(s)** (including parasiticides)	**Reason for Use**
CULLING/MORTALITY INCIDENTS		

Date(s)	# of Birds	Explanation

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Construct record keeping format. (3pts).

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Reference

1. Dinev I. 2010. *Diseases of Poultry: A Color Atlas*. 2nd edition. CEVA Sante Animal, Bulgaria.
2. Horner R.F. & Last R.D. 2012. *VDX Poultry Health and Food Safety Manual*. Vetlink, Pretoria.

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