# POULTRY PRODUCTION

## NTQF Level - III

# Learning Guide -25

**Unit of Competence: - Maintain and operate poultry production machinery and equipment**

**Module Title: - Maintaining and operating poultry production machinery and equipment**

**LG Code:** **AGR PLP3 M07 LO1-LG-25**

**TTLM Code:** **AGR PLP3 TTLM 0120v1**

## LO1: Identify machinery and equipment requirements for the property

| Instruction Sheet | Learning Guide #25 |
|---|---|

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

- identifying machinery and equipment requirements
- evaluating alternative options to machinery ownership
- identifying and addressing storage and housing requirements for machinery and equipment
- monitoring and assessing machinery innovations
- maintaining inventory of machinery and equipment

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: –**

- identify machinery and equipment requirements
- evaluate alternative options to machinery ownership
- identify and address storage and housing requirements for machinery and equipment
- monitor and assess machinery innovations
- maintain inventory of machinery and equipment

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 7.
3. Read the information written in the “Information Sheets 1, 2, 3, 4 and 5 in page 3, 28, 33, 38 and 41 respectively”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1,2, 3, 4 and 5 ” in page 27, 32, 37, 40 and 44 respectively
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answers only after you finished answering all Self-checks).
6. If you earned a satisfactory evaluation proceed to “next Information Sheets”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #25.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

| Information Sheet-1 | Identifying machinery and equipment requirements |
|---|---|

## 1.1. Introduction to Machinery and equipment

Machine and equipment in livestock farm are refers to structures, devices in houses or shelter use to simplify activities in the farm. Since the term livestock is very broad field, machine and equipment are different in type, size and shape with application style. Poultry machine and equipment are refers to structures other than houses or shelter used. The size and design of all equipment may differ, that is, not all self-feeder. Yet there are similar regardless of kind, the design or size. Poultry equipment is all equipment that is used at all poultry farms. Poultry machine are the machine give service in and around poultry farm. That are feed miller machine, transporting machine as well as electrical and non-electrical used in every activity the enterprise

**Machinery and equipment** includes pollution control equipment installed and used in a qualifying operation to prevent air pollution, water pollution, or contamination that might otherwise result from the operation.

**Machinery** is a collective term for machines and their parts. A machine is considered to be any apparatus that has interrelated parts and is used to perform work.

A **machine** is a device with a specific mechanism in it to perform a specific tasks or tasks with certain mechanical advantage or simply it is a device that gives mechanical advantage which facilitate the doing of work. In other words a machine is an assembly of parts that are made up of solid bodies but include in some cases fluid bodies or electricity in conductors and that transmit force, motion and energy one to another in some predetermined manner and to some desired end (as hoisting a load, or maintaining an electric current). E.g. Incubator, de-beaker, etc.

**Agricultural machinery** is any kind of machinery used on a farm to help the farming process.

**Equipment** is the necessary items for a particular purpose. Or a tangible property other than land and building that is used in the operations of a business.

**Plant** is a general name for machinery, equipment, appliance, implement or tool and any component or fitting or accessory of these. It can include things as diverse as presses in a foundry, underground drill jumbos in mining and photocopiers in an office.

**Operator:** a person who operate any machine

**Operation:** the process of operating different machineries

**Important of agricultural machinery and equipment**

- help farmers produce the goods that consumers want and need
- to provide efficient enough the food, clothing, and shelter that we need
- Hundreds of years ago, the population was made up of primarily farmers and ranchers, now; a very small percent of the population is responsible for producing the food and fibre used today.
- Because of the high technology with machinery and equipment, in some countries one farmer produces enough food to feed over 100 people.
- reduce the amount of hard labour needed for farmers to do their work
- Jobs are easier and take less time when machinery and equipment are used
- help farmers produce larger amounts of higher quality livestock and grain products

## 1.2. Identifying machinery and equipment

Considering animal production, there are different farms or production enterprises. Each enterprise requires different types of machinery and equipment with in specific requirements. Machinery and equipment for poultry production are different in their specification, size, number/amount, with respect to the scale of farms. Therefore, we should identify the right requirement of machinery and equipment for running enterprises. Machinery and equipment can be used to help producers care for and manage their livestock.

Examples: Automated feeding and watering systems, incubators, egg Candler, de-beaker and many other types of machinery and equipment can be used by the producer to improve efficiency and quality of products.

Machinery and equipment requirements should be identified for the enterprises being conducted. Machinery and equipment may include all vehicles and attachments, stationary and mobile plant used by the enterprise. For each individual farm, you need to specify considerations that best meets the requirements on the particular farm.

- ✓ You need to consider how many of each equipment's or machines, whether they are local or imported and at what extent of cost.
- ✓ You need to know actual and intended production levels as well as lifespan.
- ✓ Labor cost, qualifications and availability will decide level of automation or mechanization.

- ✓ Technical matters like existing buildings, access to electric power, water quality and availability and access roads will influence plant specifications.
- ✓ Financing and operation costs also have to be considered.
- ✓ In many countries, there also are laws and regulations that have to be considered.
- ✓ Finally, it has to have a capacity giving strong turbulence in the cleaning water during the cleaning process.

There are huge amount of equipment and machinery used for giving service at each poultry house in a given farm. For instance in brooder house there separate equipment and machine like brooder, brooder guard, chick feeder, chick waterier etc. in laying house the equipment used are egg trays, cages, brooding box, feeder, waterer etc. as well as in growing house it may use similar equipment.

In general the list of required plant machinery and equipment in poultry production are listed as follows;

### 1.2.1. Drinker

**Drinkers Designs**: There is countless design of poultry drinkers all of which are variation of some basic geometry or design. Design varies from open clay pot (used by home keeper) to microprocessor controlled/monitored drinkers.

A general classification is as follows;

**A. Open water surface** - Open bowls like clay pot, plastic bowls Figure 1 with anti-roost and Drinking trough

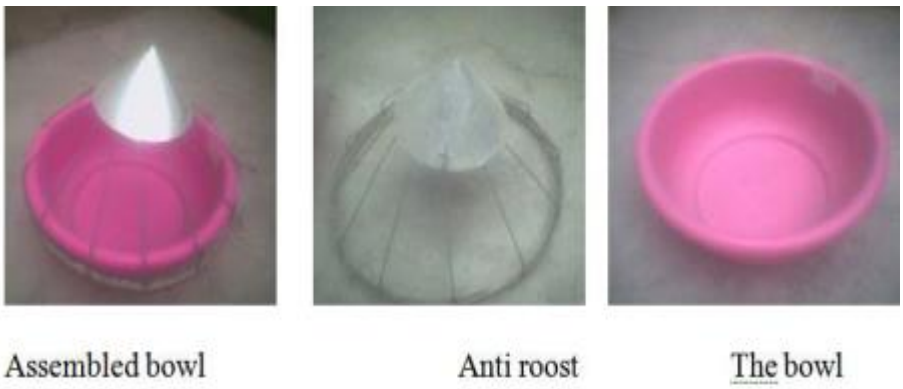



Fig 1: Open Bowl Drinker

**B. Gravity Drinkers** - Examples are shown in figure 2 (plastic drinkers). The problem with this design is that there is always contamination and is also labour intensive - cleaning and refilling.

Also when the water is almost empty, unrestrained drinkers are often toppled by the exercising birds. Plain Jar (often glass) turn over a bigger cover is a common improvised design for brooding.

Fig 2: Plastic Bucket Drinker

**C. Drinker with valve** - Nipple Drinkers - ensures clean water always (of cause if source and pipe are clean). Reduce flow rate and blockages are major problems with this type of drinker. There is also the problem of litter wetness because of dripping. Adapters are used for the starting phase of chicks.

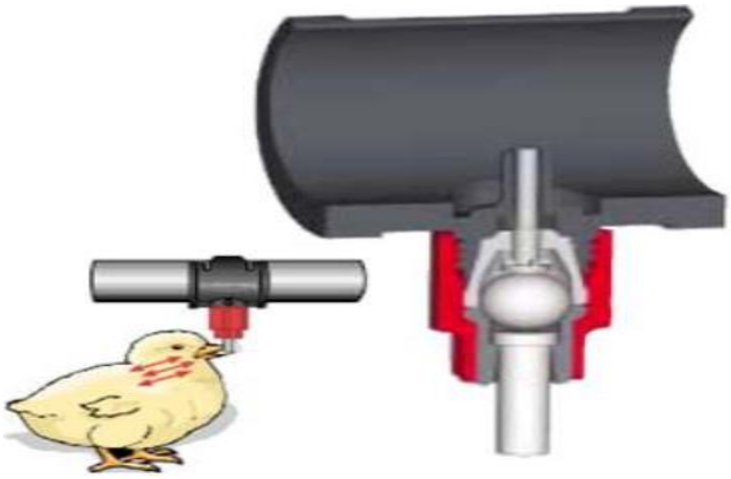


Fig 3. Nipple drinker

**D.** Mini drinker – Figure 4 (a)

**E.** Catch cup - Figure 4 (b). This is used for both chicks and grown up birds to minimize wasted water especially in high-flow system.

**F.** Button end - Figure 4 (c). This have large nipple end to catch beads of water. The water bead will attract the chicks to the nipple.

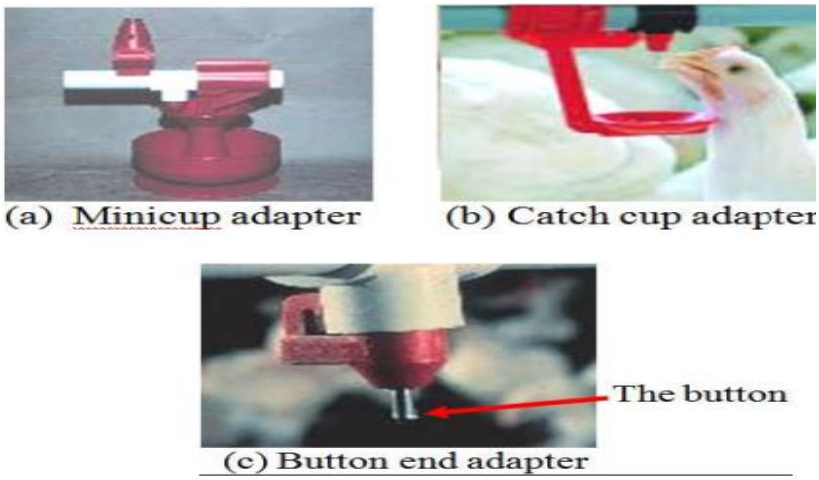



Fig 4. Nipple drinker Adaptor

## G. Automatic drinker


Fig 5. Automatic drinker

### 1.2.2.1. Water and Poultry Health

High quality water is very essential for the wellbeing of poultry. Contaminated water can result in outbreak of diseases such as Salmonella, Fowl Cholera, Fowl Typhoid, Aspergillosis. Poor hygiene and presence of contaminants such as faeces, damp litter (mouldy litter) aids the outbreak of these diseases as the birds pick the contaminants from water.

### 1.2.2.2. Drinkers Materials and Poultry Health

Drinkers are mostly made from plastic and stainless steel material because of their inert nature. The plastic are often UV stabilized to make them last longer. The materials that the drinker is made of can also contribute to the wellbeing of the birds. For instance, if the drinker is made of Iron, the presence of Iron (Fe) can lead to rusting of the drinker; also iron may form solid particulate such as iron oxide, which can block pipes and orifice e.g. the nozzle openings in Nipple drinkers.

Iron bacteria are more likely to thrive in water with high iron concentrations leading to serious poultry disease such as E.coli and Salmonella Species. The presence of solids particulates such as iron (Fe), Manganese (Mn), and nitrates (NO3) do not affect broiler health, because, these solids are not directly linked to poultry health issues, but their effect on the drinking equipment (like blockages) could negatively affect their performance due to poor digestion and poor feed conversion because of reduced water intake.

### 1.2.2. Automatic Feeding system

Auger elevator can transfer the feeding food to the silo and then transfer the feeding food to the hopper of the automatic feeding machine, and then the automatic feeding machine will spread feeding food into the feeding through.


Fig 6. Automatic feeding system

### 1.2.3. Incubator

Incubation equipment is a type of bionic device that provides suitable environmental conditions for embryonic development. It is a main production tool in modern poultry industry. It is now divided into two mainstream models: the single-stage and the multi-stage, which can incubate breeding eggs of the common poultry and the special poultry. They are applied in the medium/small individual hatchery and large modern intensive enterprise. An incubator is a device simulating avian incubation by keeping eggs warm and in the correct humidity, and if needed to turn them, to hatch them.


Fig 7. Incubators

### 1.2.4. Poultry Cage

The cage system of rearing birds has been considered as a super intensive system providing floor area of 450-525 sq.cm per bird. In cage the birds are kept in one, two or three per cage, arranged in single or double or triple rows. Battery cages are a housing system used for various animal production methods, but primarily for egg-laying hens.

The name arises from the arrangement of rows and columns of identical cages connected together, in a unit.

Fig 8. Poultry cage

**Advantages cage system**

- Greater number of birds is reared per unit of area
- Facilitates correct maintenance of records
- Helps in identifying poor producers and prompt culling
- Control of vices of poultry cannibalism and egg eating
- It helps in production of clean eggs
- Removal of stress factors
- Easy control of parasitic disease like coccidiosis and worm infestation
- Prompt steps to control feed wastage

- Egg production of caged layer was reported to be more than those kept in deep litter system.
- Feed efficiency and egg weight were better in caged birds than the laying flock under deep litter system.

**Disadvantages of cage system**

- Difficulties in ensuring proper ventilation to birds especially in summer season and under very high dense conditions.
- Incidence of leg problem, cage layer fatigue, fatty liver syndrome, flies and obnoxious gases in the house will be on increases
- Hysteriosis of chicks

**Accessory:**

a. Cage wire mesh

Top mesh, bottom mesh, back mesh, partition mesh, and door.

Surface treatment: galvanized

b. Frame,

Warranty more than 20 years,

Galvanization surface treatment

c. Feeding through

Material: White PVC

Good quality can bear the weight of two people.

d. Feeder connector

Used for connecting two feeding through, and cover the end of the feeding through.

e. Water tank

Adopt new pure native PE raw material, strong toughness & resistance to fall off, anti-aging.

f. Filter

Installed at the inlet end of the water piper to ensure that chicken can drink clean water

g. water pressure regulator

Adjust the water pressure to ensure that every chicken can drink water easily.

h. Water pipe

Used for connecting water tank or water pressure regulator supply water to nipple drinker for chicken drinking.

High temperature, not easy to deformation

i. “T", "L”, "I “connector

"I “connector connect two pipes; “T" connect three pipes; "L” connector for water pipe turning.

j. Nipple drinker:

Material: stainless steel ball and ABS plastic;

Long life span, no leaking

k. Fittings and tools

Screw: used for assembling the frame and cages;

Pliers and clip: used for assembling the wire mesh to cage;

### 1.2.5. Feed mill and mixer

**Feed Machinery -** The applications of feed pellets have greatly developed recent decades' years. They are easy to transport, more tasty for animals. After well processed, the feed pellets are clean and convenient for poultry. The high quality feeding stuff cuber can make strong pellets with slippery surface. The pellets feed mill for animal feed such as poultry and etc has wider application in agricultural field. Nowadays, intensive management of animal feeding industries can save cost and realize maximum benefit. With the developing of intensive management of animal feedstuff, there is a big market for feed pellets mill.

Fig 9. Vertical type of hammer mill type

Fig 10 . poultry feed mixer and grinder machine

Fig 11 . Horizontal feed mixer

Fig 12. Dry powder feed mixer

### 1.2.6. Beak trimmer/ de-beaker

Most commonly used equipment is the electrical beak trimmer. The equipment will be mounted on to a stand of convenient height (0.6 to 0.75m) with peddle connected to the top of the unit a chain (strong threat) so that up on pressing the peddle with the foot of the operator, the hot blade sides down cutting the beak placed over a small plat form in the equipment .the equipment also provided with a thermostat to regulate temperature.

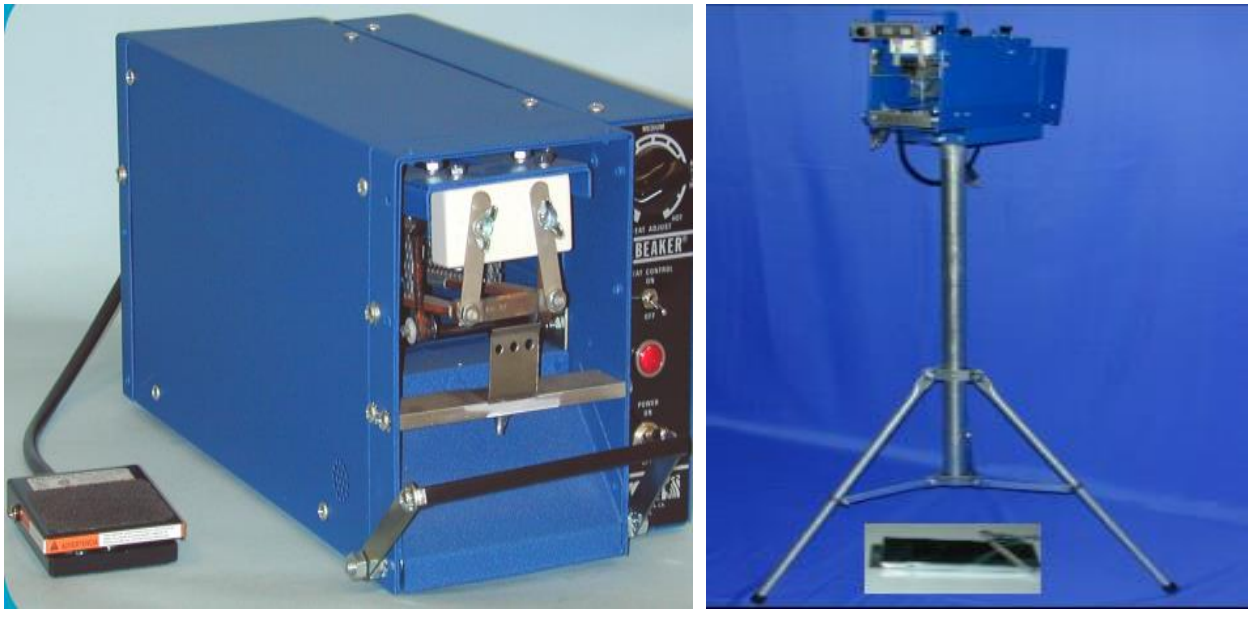



Fig 13. De-beaker

### 1.2.7. Automatic egg collection and transfer system

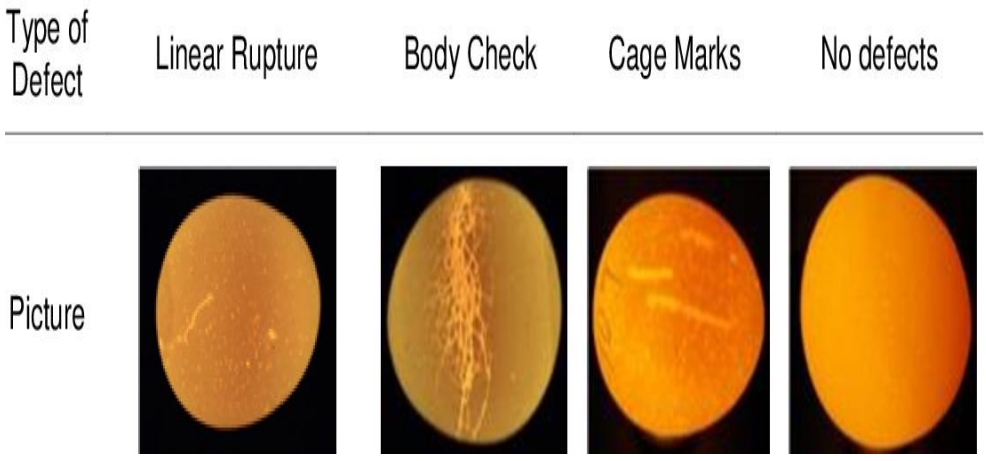
The belt will transfer the eggs to the collection machine automatically, then, the transfer system will transfer the eggs to the center package place.

Fig 14. Automatic egg collection and transfer system

### 1.2.8. Egg candling machine

The egg candling machine is used in a chicken hatchery. It helps in checking incubating eggs to confirm if embryos are developing as well as helps you differentiate the normal eggs from the rotten, dead-in-shell, or infertile ones. Egg candling machine is used to test eggs while they are incubating in order to determine whether they are viable or not. A viable egg is an egg that was fertilized and is able to develop an embryo.

- The egg candling machine is used in a chicken hatchery.
- It helps you differentiate the normal eggs from the rotten, dead-in-shell, or infertile ones.
- The machine works by illuminating the interior of the chicken eggs to help you see exactly what is happening inside the shell.
- Inspection system for the reliable detection of cracks in hatching eggs prior to setting.
- Suitable for manual operation.



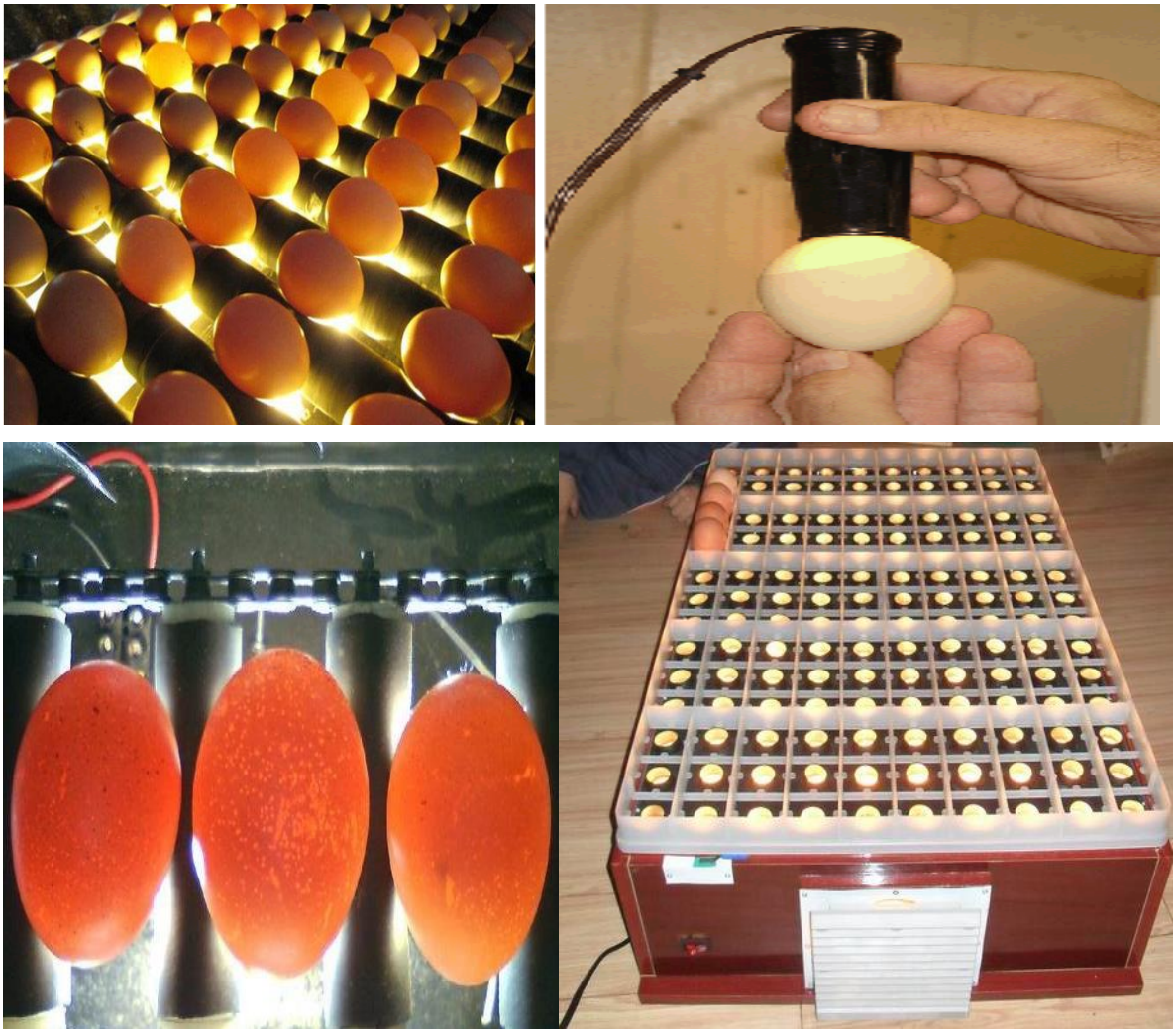


Fig 15. Egg candling machine

### 1.2.9. Brooder

A brooder is the place where you move your chicks to after incubation. Here they will spend a lot of time being fed, watered, and loved on and of course, being kept safe and warm. As you can see, the incubator was a brooder for maybe a couple of days, but it is not ideal for long term brooding.

**Different equipment used for brooding;**

- Charcoal stove / kerosene stove
- Gas brooder
- Electrical brooder
- Infra-red bulbs
- Reflectors/ Hovers
- Brooder guard / chick guard

Fig 16. Electrical brooder

Fig 17. Brooder box

Fig 18. Brooder guard

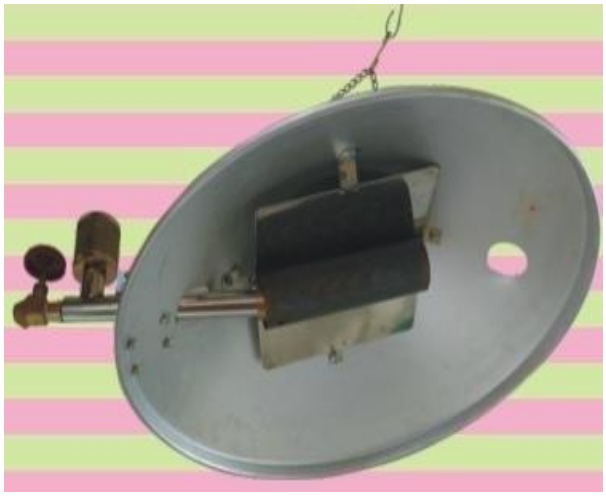


Fig 19. Gas brooder


Fig 20. Reflector/ hovers

Fig 21. Charcoal stove

Fig 22. Infra-red bulbs

Fig 23. Kerosene stove

### 1.2.10. Manure handling/cleaning system

The scrapers will take the manure to then end of the chicken house automatically.

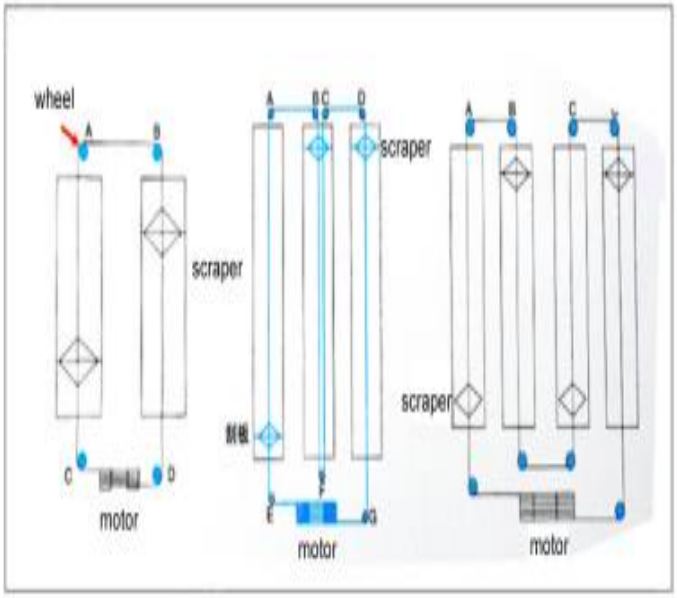



Fig 24. Manure cleaning system

### 1.2.11. Environment controlling system

The environment controlling system will keep the temperature and the humidity of the chicken house in the Suitable range.

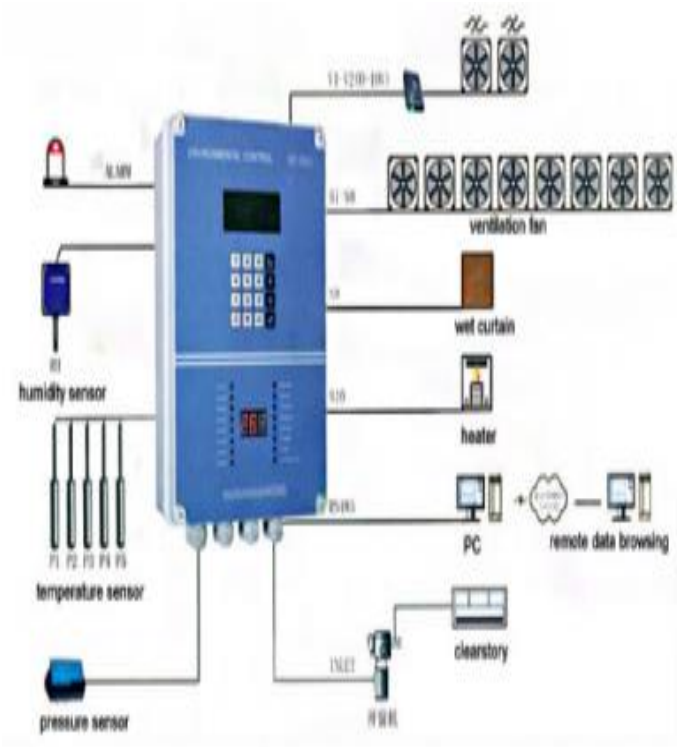



Fig 25. Environment controlling sysytem

### 1.2.12. Compressor

A compressor is a mechanical device that increases the pressure of a gas by reducing its volume. An air compressor is a specific type of gas compressor. Compressors are similar to pumps: both increase the pressure on a fluid and both can transport the fluid through a pipe. As gases are compressible, the compressor also reduces the volume of a gas. Liquids are relatively incompressible; while some can be compressed, the main action of a pump is to pressurize and transport liquids.

An air compressor is a device that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air (i.e., compressed air). By one of several methods, an air compressor forces more and more air into a storage tank, increasing the pressure. When tank pressure reaches its engineered upper limit, the air compressor shuts off. The compressed air, then, is held in the tank until called into use. The energy contained in the compressed air can be used for a variety of applications, utilizing the kinetic energy of the air as it is released and the tank depressurizes. When tank pressure reaches its lower limit, the air compressor turns on again and re-pressurizes the tank. An air compressor must be differentiated from a pump because it works for any gas/air, while pumps work on a liquid.


Fig 26. Compressor

### 1.2.13. Water treatment set

Drinking water treatment plants treat large amounts of water from many households in one single spot and consequently most often require more operation and maintenance and the construction of a water distribution system.

Semi-centralized drinking water treatment plants are middle-scaled units e.g. on community level. These systems are most often designed to remove several types of contaminants from anthropogenic or natural origin: suspended and dissolved solids, ions (metals, fluorine, phosphates, nitrates), organic compounds (organic micro pollutants, natural organic matter), and microorganisms (bacteria, viruses).

**Advantages**

- Very efficient and reliable for purifying water
- Can be adapted to any kind of water
- Relatively low cost for drinking water production

**Disadvantages**

- Skilled labour, technical equipment, electricity and chemicals required to design and operate the plant
- Plant has to be continuously controlled and maintained
- High initial investment costs to build infrastructure


Fig 27. Water treatment set

### 1.2.14. Conveyer

A conveyer is a device for moving large amounts of a solid.

Fig 28. Conveyer

### 1.2.15. Feather removing equipment

One of the steps in bird processing before it reaches the end product for cooking is de-feathering of the bird. De-feathering involves removing feathers from the slaughtered birds.



Fig 29. De-feathering machine

### 1.2.16. Automotive weight scale

Weighing balance is the mandatory requirement for weighing feed, birds at market .now a days, balance with digital display to the nearest available at reasonable rate.





Fig 30. Different forms of weighing sacle

### 1.2.17. Egg filler flat/ egg tray

Fig 31. Egg tray

### 1.2.18. Engine

An engine or motor is a machine designed to convert one form of energy into mechanical energy. Heat engines, like the internal combustion engine, burn a fuel to create heat which is then used to do work. An engine or motor is a machine designed to convert one form of energy into mechanical energy. Heat engines, like the internal combustion engine, burn a fuel to create heat which is then used to do work. Electric motors convert electrical energy into mechanical motion, pneumatic motors use compressed air, and clockwork motors in wind-up toys use elastic energy.

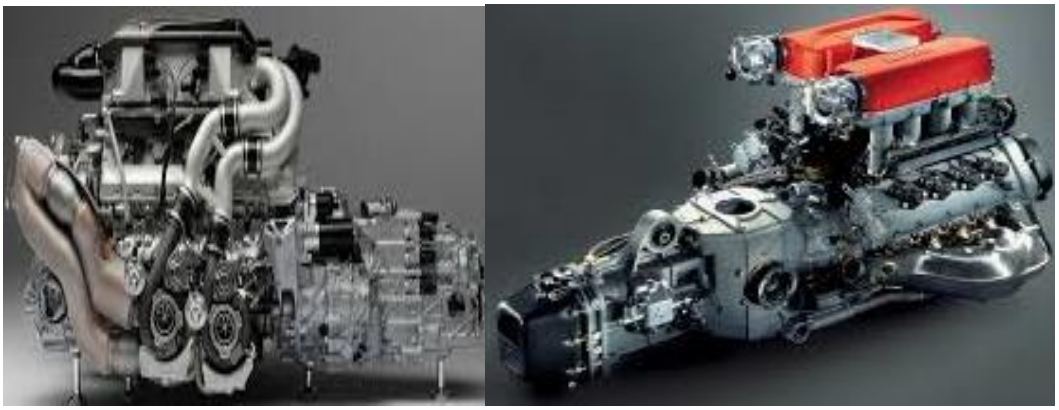


Fig 32. Engine

### 1.2.19. Pumps

A **pump** is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. **Pumps** can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity **pumps.** Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid. Pumps operate via many energy sources,

including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps.

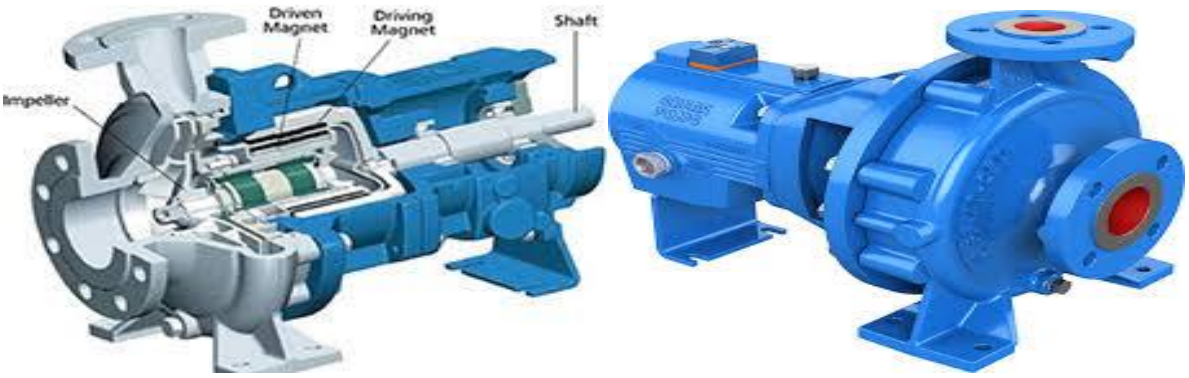



Fig 33. Pumps

### 1.2.20. Generators

Generator may refer to:

- Signal generator: electronic devices that generate repeating or non-repeating electronic signals
- Electric generator: a device that converts mechanical energy to electrical energy
- Generator (circuit theory): an element in an abstract circuit providing a source of electricity
- Engine-generator: an electric generator with its own engine
- Wearable generator: a hypothetical generator that can be worn on the human body
- Gas generator a device: often similar to a solid rocket or a liquid rocket that burns to produce large volumes of relatively cool gas.
- Motor–generator: a device for converting electrical power to another form


Fig 34. Generator

### 1.2.21. Emergency standby electric plants

When there is a failure in the local electrical supply, the incubators must have a secondary source of electricity. Therefore, a standby electrical generator located on site, generally within, or next to the hatchery building is imperative.The standby electrical generator should have the capacity to support the all essential services of the hatchery.

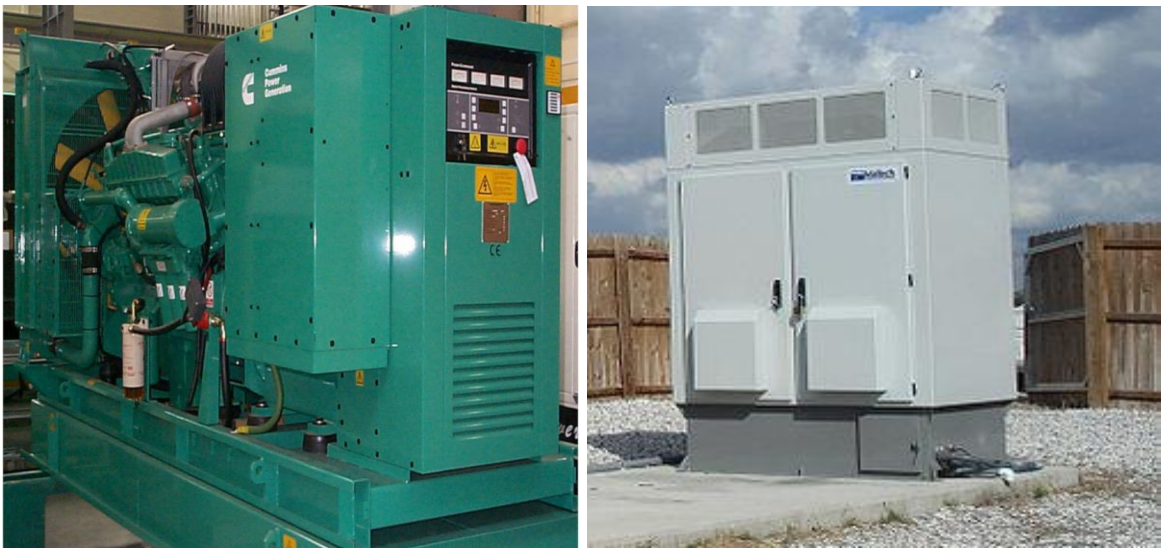


Fig 35. Emergency standby electric plants

### 1.2.22. Water heaters/boiler

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.


Fig 36. Boiler

### 1.2.23. 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.



Fig 37. Sprinkler

### 1.2.24. Autoclave

It is used to sterilize different poultry equipment and tools. Autoclave is a pressurized device designed to heat aqueous solutions above their boiling point at normal atmospheric pressure to achieve sterilization.



Fig 38. Autoclave

### 1.2.25. Cooling water tank


Fig 39. Cooling water tank

### 1.2.26. Vehicle

It is used for transporting poultry from one place to others for different purposes.

Fig 40.poultry carrying vehicle

| Self-Check -1 | Written Test |
|---|---|

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

1. List machinery and equipment that used for poultry farming (5pts)
2. Mention advantages of sprinkler in poultry farming (4pts)

***Note:*** **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____

| Information Sheet-2 | Evaluating Alternative options to machinery ownership |
|---|---|

## 2.1. Machinery ownership alternatives

Alternative options to machinery ownership should be evaluated for applicability. Alternative options may include:

- ✓ Use of shared machinery arrangements
- ✓ Contractors
- ✓ Membership of machinery syndicates
- ✓ Leasing or hiring
- ✓ Participation in machinery rings

Poultry equipment and machines are owned according to requisites of owner. The user can use this equipment's depends on their requisites. Whatever the source is, using the least cost and easily available and accessible to the targeted livestock farm is most recommended. For instance innovation of brooder called hay box brooder is solve problem behind cost and operation of equipment. So it can be made from locally available material as well as operate easily and owned by disabled person. Generally, material and equipment ownership can be evaluated by cost, availability, reliability, difficulty of operation. Farm machinery, especially tractors, can be expensive to purchase and a questionable use of capital, particularly if only used occasionally during the year as is the case on many small farms. The cost factor is one of the most compelling reasons to look at alternatives to outright ownership. This article will explore some of these alternatives and compare them to ownership. Owning all of your own farm machinery does have some advantages, provided it is in good, reliable working condition. Most advantages are associated with timeliness: having the machinery on hand to do the job when it is required. Owning poorly maintained, old, undersized or unreliable machinery may hold no advantage at all.

Alternatives to owning your own include:

### 2.1.1. Machinery sharing agreement

Machinery Sharing Agreement is one of your farm business choices. It is used in the farm business transfer process when the younger party "spins-off" or establishes a separate farming operation. Although each party has a separate farming operation, they share labor and machinery. This agreement is used when each party has a separate land base. They younger party may obtain a rented farm from land the older party previously rented or land that appeared on the rental market. Buying land may be an option in some situations.

Each party pays the production expenses, receives the income, and has final management control over his/her individual cropping operation. Livestock programs may be separate or mutually owned and operated. Each party owns individual items of machinery. However, the younger party usually does not have a complete line of machinery and the older party typically needs additional labor. When both parties combine labor and machinery, they can efficiently operate both farms. As an alternative, the two parties may own the machinery together. Information Files Joint Machinery Ownership and Farm Machinery Joint Ventures provide information on machinery co-ownership.

### 2.1.2. Contracting

Using contractors is very common on farms, with numerous professional contractors available for a wide range of small farming tasks.


Fig 41. Contracting

Advantages of using a contractor include:

Contractors usually have better quality and larger machinery, which gets the job done faster. Contract rates for normal farming jobs are standardized. Contracting is a tax deduction for business purposes. Machinery is owned, operated and maintained by the contractor (while in most cases the farmer supplies the fuel). Hiring farm machinery can save the cost of wages as your own time will be spent on the machine. The main criticism for hiring contractors is the failure to get to the job done on time. A reasonable negotiation with your contractor well in advance is a good idea. When you find a reliable, quality contractor, stick with them and build a relationship. Paying their bill promptly will certainly assist here. Small farming jobs will usually be less attractive to contractors, particularly if travel is involved, so it can be useful to pool work with your neighbours to make the job larger and more enticing.

### 2.1.3. Hiring

Compared to using a contractor, hiring farm machinery can save the cost of wages as your own time will be spent on the machine. Remember that it will take you longer to do the job than a contractor, as they are skilled operators doing that job every day. Most regional towns have machinery hire companies, with transport to and from being the hirer's responsibility. Make sure prior to hiring that there is an agreement or contract in place detailing the cost of hire, replacement of parts, insurance and breakdown responsibility.

### 2.1.4. Hire purchase

Under a hire purchase agreement, ownership of the equipment is transferred to the farmer at the completion of payments. Similarly to leasing, the maintenance of the machine is also the responsibility of the farmer.

### 2.1.5. Leasing

When leasing farm machinery, ownership is retained by the finance lender. Periodic payments are made in the form of lease rentals, which are generally tax deductible. Lease terms vary, but 3-4 years is a common time frame with a residual value at the end of the term usually 30-50 percent of the purchase price. Responsibility for the sale of machinery at the end of the lease will depend on the lease agreement. There are three types of lease agreements: operating and finance lease and contract hire. Money tied up in machinery that gets little use, makes no financial sense.

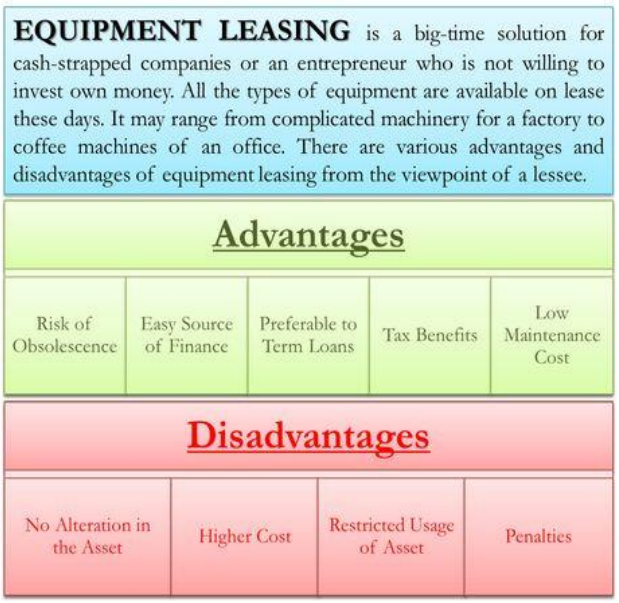



Fig 42. Leasing agreement

### 2.1.6. Share Farming

For absentee or small farmers who do not have the time or expertise to farm, share farming can be an option. Share farming usually involves the owner providing the land while the share farmer provides the inputs, labour and marketing. In share farming the land owner does not need to own any machinery as it is all supplied by the share farmer.

### 2.1.7. Syndication

A number of small farmers can form a syndicate and buy one piece of machinery, sharing it between many farms. The fixed cost of the farm equipment is spread over a number of farms, usually allowing a larger and better quality machine to be purchased. Disadvantages of a syndicate include: Members can all require the machine at the same time. Maintenance responsibilities can pose problems. Use and care between members can vary. Legal issues of ownership, taxation and problems related to selling the machine. Syndicates can work well for small farmers if a legal agreement is negotiated in advance and if members are charged contract rates for variations in usage.

### 2.1.8. Reciprocal borrowing

This arrangement is similar to a syndicate, however under this arrangement each farmer agrees to purchase and maintain a separate piece of machinery. Haymaking equipment is a good example where one farmer buys the mower, another buys the rake and a third the baler. Work on each farm can be done using a contract payment system so no one machinery owner is disadvantaged. This arrangement removes some of the ownership problems associated with a syndicate and may work well in small farming situations.

| Self-Check -2 | Written Test |
|---|---|

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

1. List ways/options of getting machinery (6pts)
2. Define syndication (5pts)
3. What is the difference between hiring and leasing (4pts)

***Note:*** **Satisfactory rating – 9 points** **Unsatisfactory - below 9 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

1. _____
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| Information Sheet-3 | Identifying and addressing storage and housing requirements for machinery and equipment |
|---|---|

### 3.1. Storage and housing for machinery and equipment

Storage system has to accommodate the inflow of inputs of materials and brought components from outside source and the in processing inventories. The systems efficiency may be compared and assessed in terms of unit cost (per volume or weight) of moving machine through storage sites or storage areas over a given period of times. It usually takes into accounts the elements of labor, space and equipment's need and cost. The design, size and location of store house must be integral parts of a wider system and management strategy.

Any storage system is compromise between the use of space and the use of time. There are three ways of storing

- Fixed location: found immediately without a complex system of recording can be considerable waste space
- Random location: space is better utilized but good and elaborate record have to be kept about where materials are
- Zoned location: where partial goods product grouped are randomly stored.

Materials are returned to store or disposed of according to supervisor instructions. Tools and equipment are cleaned, maintained and stored according to manufacturer specifications and supervisor instructions. Whenever we are going to our work area we have to take our equipment materials and tools safely. And also after completing our task we have to replace them to their place (store) safely without any damage on the equipment and ourselves by cleaning and maintaining if necessary. Have a definite place for tools and equipment, and keep them there when not in use. Don't leave hammers, pinch bars and similar tools where they may fall and hit someone, and don't leave saws, planes, grease guns, and the like on the floor where they could cause falls. Keep your buildings free of debris. It is very easy to let junk pile up and hard to find time to remove it; but in terms of safety, it is time well spent. Old boards, cans, glass, old machinery, fencing and wire can injure you or your stock. It may also be the source of a fire or may harbor rodents.

Many accidents can occur around buildings, pens, fences or equipment just from little things. Bolts or nails that stick out can cause a cut or tear; caterers and feeders with sharp edges

can cut; weak or poor quality parts can give way, causing injury. Be alert to these small hazards and fix them.

Other possible sources of injuries are loose boards, weak or poor quality rails or walkways, weak or broken ladders, and slippery floors. Watch for and repair things that are supposed to be bolted down but have worked loose.

Storage and housing requirements for machinery and equipment should be identified and addressed. Affordable farm machinery and equipment storage sheds and buildings are a large important investment and help to lower repair costs. It keeps your operation running smoothly, cut downtime and lower repair costs by investing in a practical machinery storage shed. Research shows that:

- ✓ Farmers who stored equipment inside got much more for trade-in than those who stored it outside.
- ✓ Keeping equipment inside means more savings from reduced down time (a period of time during which a machine is out of action). In fact, equipment stored outside had twice the down time than if it had been stored indoors.

Fig 43. Machinery shop / Machinery storage building

Fig 44. Machinery shed

Fig 45. Machinery storage building

For effective use of machine and equipment, there must enough in quantity and quality, safe storage of materials manufacturer specification and enterprise requirement.

Housing and storage of machinery and equipment should be:-

- Durable, dry, ventilated, water proof
- Easily manageable/to maintain, clean, arrange etc./
- Free of hazard threat//natural or manmade/
- Consider  climate condition of micro environment
- Access to different facilities
- Free of any biotic and abiotic intruders
- Free of rust facilitator conditions

Fig 46. Machinery storage with plenty of room for all large equipment

### 3.2. Precautions in Storage Buildings

There are numerous precautions that should be observed when storing machinery in the farm. Buildings where machinery and power tools are stored should be located far enough away from structures that house livestock and hay in case of fire. Fuel storage tanks should preferably be located below ground, and a minimum of 40 feet from the nearest structure. Fuel tanks should be adequately protected from being stuck by machinery. An approved 10 B: C fire extinguisher should be near all fuel pumps and tanks. Electric lines coming in to the building should be high enough to facilitate equipment passing underneath. Electrical systems in machine sheds should be sufficient for the power tool and equipment that will require the use of electric current. Machinery storage buildings should not be used to store debris. Doors on machine sheds should be wide enough for machinery safely passes through without being caught. Doors also need to pull or slide open and close freely in case of emergency. Exit should be clearly marked. Floor surface should be level and smooth, free from bumps and protruding rocks.

Buildings should have adequate ventilation for the starting or running of engine within the structure. All tools and accessory equipment should be kept picked up and stored in their proper place. E.g., air hoses, oil cans, spare tires, jacks.

Fig 47. Storage housing

| Self-Check -3 | Written Test |
|---|---|

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

1. List the three ways of storing machinery and equipment (3pts)
2. Mention criteria's of storage and housing for equipment (4pts)
3. What is the precaution in storage building (3pts)

***Note:*** **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

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| Information Sheet-4 | Monitoring and assessing machinery innovations |
|---|---|

### 4.1. Monitoring and assessing machinery innovations

Machinery innovations should be monitored and assessed for applicability in regard to relevancy and/or appropriateness. There are several reasons why people make their own machinery and equipment. They may want to reduce the cost of getting started in particular farms or they may simply enjoy working with their hands. In many cases, they want a special item that is not readily available or, if it is, the product is not suited to their needs. Before doing so, you should compare the labor and material costs of making a piece of equipment with the delivered price of the same item, from a machine supply company. The price of high-quality equipment used in commercial livestock machinery supplies may make it difficult for you to save money unless you produce a lower quality product from less expensive materials.

Every machines and equipment should be innovate and updated to fit the need of intended enterprises and calibrated in correct place. Applicability of machinery measured in terms of cost effectiveness, quality, and feasibility to the activities, simple calibration, longevity and the like.

There must be good sorting of machine & equipment in store as well as at field area. This help to identify the quantity and quality of machines & equipment, functional and un-functional ones.

This also true:

- Reduce capital lose/reduce cost
- Save time and labour
- Save place/storage area/
- encourage timely repairing & maintaining
- help to waste management
- help to know currently required machines and equipment/prioritizing

### 4.2. Agricultural innovation

Innovation in its modern meaning is a new idea, creative thoughts, and new imaginations in form of device or method. Innovation is often also viewed as the application of better solutions that meet new requirements, unarticulated needs, or existing market needs. Innovation in machinery is about working smart.

The process of translating an idea or invention into a good or service that creates value or for which customers will pay to be called an **innovation**, an idea must be replicable at an economical cost and must satisfy a specific need. Innovation involves deliberate application of information, imagination and initiative in deriving greater or different values from resources, and includes all processes by which new ideas are generated and converted into useful products. In business, innovation often results when ideas are applied by the company in order to further satisfy the needs and expectations of the customers.

Farmers who manage about 90 percent of the world's farms, produce over 80 percent of the world's food but, paradoxically, are often poor and food insecure themselves While efforts in the past centered on boosting agriculture to produce more food, today's focus is to tackle the root causes of hunger and malnutrition through transformative changes to our food system. The way we produce, process, distribute and consume food must become wholly sustainable and contribute to healthy and affordable diets. As the driving force to transform food systems, innovation is central to lifting family farmers out of poverty, tackling unemployment for youth and rural women, and helping the world to achieve food security and the Sustainable. Agricultural innovation is the process whereby individuals or organizations bring new or existing products, processes or ways of organization into use for the first time in a specific context in order to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability and thereby contribute to food security and nutrition, economic development or sustainable natural resource management.

| Self-Check -4 | Written Test |
|---|---|

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

1. Define Machinery innovation (2pts)
2. What are the differences between innovation and innovator? (4pts)

***Note:*** **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

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| Information Sheet-5 | Maintaining inventory of machinery and equipment |
|---|---|

## 5.1. Inventory of machinery and equipment

Inventory is continuous record of items held in stock is or stores. Bin card or store accounts are really perpetual inventory within the strict meaning of term. It may include further information as to:

a) Equipment(inward) ordered for stock, indicating from whom to be received, the data and quantity
b) Quantity on order at any time , but not then delivered
c) Goods (outward) ordered but not yet supplied
d) Equipment kept on hand

A complete inventory is a list of all physical and financial items owned by the business. It includes both personal property such as livestock, machinery, grain, stocks and bank balances and real property such as land and buildings.

Taking an inventory would be the first step in organizing a complete set of records. To be useful in a recording system, the inventory must be in Birr values. Therefore taking an inventory consists of two parts:

- The physical count
- Valuation

**The procedure for preparing an inventory**

I. An inventory book is maintained
II. Grouping of the Assets: As land , building , Livestock , Implements ,seeds, Manures , cattle feed, credit to be realized, growing crops, unused cultivation , Residual value, or unspent utility, cash in hand, bills checks etc.
III. Listing and Valuation of the assets by allowing depreciation. Market value if it is lower than book value and there is definite trend towards reduction.
IV. Listing and valuation of liabilities: Loans or debts payable, wages not paid, bills not paid.

**N.B:** (1) Always valuation must be on conservative side never over value.
(2) Inventory values are estimated
(3) Discretion is to be applied while valuing growing animals.

The primary basis for stores accounting cost. Cost for such purpose may be determined under assumption as to flow of cost. In order to determine the money value of materials on hand at any given point of time, the quantity of material must be known and value must be assigned to those quantities. The quantity may obtained by counting or measurement and value assigned to individual items must be based on one of the total money value of material. The record which usually kept in stores has two broad categories

- ✓ Quantities
- ✓ Total balancing

For this purpose, the following record and document are maintained;

- Bin card

**Bin Card**

Material Code:
Material Description:
Location:
Unit of Measurement:
Maximum Level:
Minimum Level:
Reorder Level:

| Date | Doc No. | Received from/Issued to | Receipt | Issue | Balance | Verification with SL Date & Verified by | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |


BIN CARD
UNITED STATES DEPARTMENT OF JUSTICE
Federal Bureau of Prisons
Article
Stock No. Unit Size
APPR | ALLOT | BA | CC | PMS | PROJ | SUB-OBJ
Date | Ref. | QUANTITIES: Received | Issued | On Hand

- Store ledger( this is priced)

**Stores Ledger**

Material Code:
Bin No.:
Material Description:
Location:
Maximum Qty:
Minimum Qty:
Ordering Qty:

| Date | Receipts | | | | Issues | | | | Balance | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | GR No | Qty | Rate | Amount | SR No | Qty | Rate | Amount | Qty | Rate | Amount |
| | | | | | | | | | | | |

- Store identification card
- Material received note
- Material question slip
- Materials transferred note

Inventory of machinery and equipment should be maintained as required by the enterprise. As a farmer, you use resources such as land, labor, machinery, equipment, buildings,

breeding stock, management and financial capital. You must count and assign a value to all these resources and maintain current inventories to know the foundation from which you operate. The resources include both assets and liabilities. Assets are all items you own whereas liabilities are resource what you owe. All the machinery and equipment can be counted and assigned a value more often, but most farmers find an end-of-year valuation most useful. Resources inventories are nor a flow concept, but a stock measurement. The inventory evaluation enables you to count and measure your resources at a particular point in time. It is only valid for that point in time, since resources always change, for example, a cow dies and assets are reduced.

Fig 48. Inventory of equipment

**Why inventory?** The most direct application is completing a balance sheet to determine your net worth. It was also useful for computing noncash expenses such as depreciation. Resources on the farm often are uses as collateral for a loan. Finally, with an up-to-date inventory of your farms resources, you can consider options for growth and diversification more carefully and efficiently. Given a certain mix of buildings and land should you consider expanding the farm from just crops to include livestock? Are you making maximum use of land, building, machinery and equipment? The farm business can be reviewed periodically by considering these types of questions.

| Self-Check -5 | Written Test |
|---|---|

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

1. Define Inventory (3pts)
2. What is the advantage of inventory? (2pts)
3. What is the difference between inventory and recording? (2pts)

***Note:*** **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

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# POULTRY PRODUCTION

## NTQF Level - III

# Learning Guide -26

**Unit of Competence: - Maintain and operate poultry production machinery and equipment**

**Module Title: - Maintaining and operating poultry production machinery and equipment**

**LG Code:** **AGR PLP3 M07 LO2-LG-26**

**TTLM Code:** **AGR PLP3 TTLM 0120v1**

## LO2: Select and manage the range of machinery services provided by off-farm suppliers

| Instruction Sheet | Learning Guide #26 |
|---|---|

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

- identifying services to be provided by off-property suppliers
- developing criteria to select and monitor the provision of services
- recording and monitoring agreements and transactions

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: –**

- identify services to be provided by off-property suppliers
- develop criteria to select and monitor the provision of services
- record and monitor agreements and transactions

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 7.
3. Read the information written in the “Information Sheets 1, 2 and 3 in page 3, 8 and 13 respectively”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1,2 and 3 ” in page 7, 12 and 17 respectively
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answers only after you finished answering all Self-checks).
6. If you earned a satisfactory evaluation proceed to “next Information Sheets”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #26.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

| Information Sheet-1 | Identifying Services to be provided by off-property suppliers |
|---|---|

## 1.1. Services provided by off-property suppliers

Service to be provided by off-property suppliers is depending up on machine and equipment being served in poultry production farm. **Off-property** denoting the retailing of branded goods at a discount.

This may include:

- ✓ Repair and overhaul services
- ✓ Contracted machinery operations
- ✓ Parts suppliers

Those services are given in farm enterprise for repairing broken machine, properly accommodating equipment and machine at recommended site in each poultry house, and when technician unable to operate newly bought machine because they don't have skill on operating as well as on establishing that at specific site.

## 1.2. Manage your suppliers

Finding a reliable and competitively-priced supplier is vital to the success of your business. However this may cause significant problems if they go out of business. Systems can be rented from an Application Service Provider however sure that ownership of intellectual property is clearly defined at the outset. A supplier is defined as the person or organization that provides a product or service to another business. Finding a reliable and competitively priced supplier is vital to the success of your business.

The terms that you negotiate with your supplier need to be based on:

- the way that you pay them – bank draft, commercial bill paid for by bank, foreign currency
- potential costs - administration, taxation, transport, general payments and transactions
- possible risks - late payment to supplier, or faulty, late or undelivered goods

**Ten Strategies for Managing Suppliers**

a. Understand the cost and value of the entire supply chain. Without a thorough understanding of all costs, from raw materials through the end product or service, and the value provided by each supplier in the process, a supplier cannot be evaluated.

b. Realize that supplier strategies go two ways. Most companies focus on what suppliers can do for them rather than on what they can do with the supplier to lower costs. A true partnership leverages the total production cost to both parties' advantage.
c. Accept accountability. Companies should plan sufficiently in order to request orders from suppliers with acceptable lead time and without multiple changes. If every order requires emergency handling, the relationship will never work.
d. Incorporate appropriate service levels and metrics into agreements. A relationship based on a handshake is far more likely to encounter problems than one in which expectations are clearly established and agreed upon.
e. Spend equal time aligning incentives and penalties. It is natural to worry about the worst case, such as if a shipment is not received and a plant grinds to a halt. Conversely, the extra value created when production and asset utilization is optimized should be the basis of improving the value proposition for both parties.
f. Share critical information as early as possible. Information is the grease that makes an integrated supply chain work. Waiting to share critical volume and timing information with suppliers can create lost business for the company or excess inventory and added costs for suppliers. Sharing information constantly, with appropriate security and confidentiality, is critical for successfully managing a supplier relationship.
g. Plan for everyday exceptions. Sometimes emergencies will occur, especially in complex, multiparty supply chains. Agree ahead of time how emergencies will be handled and analyze why they occur so that the number of emergencies is minimized.
h. Plan for major contingencies. Unavoidable events that stress the supply chain should be planned and practiced. Some industries, such as utilities, implement plans for natural disasters. Every supply chain strategy requires similar foresight and joint planning so that disruptive events can be managed smoothly.
i. Expect and reward honesty. As in personal relationships, the best supplier relationships require honesty when exceptions to normal operations occur. Companies should require immediate notification without penalty when critical supplier situations occur.
j. Make relationship meetings meaningful. Companies often hold formal quarterly meetings without appropriate representation in which the vast majority of time is spent on information best provided through other communication forums. Instead, relationship meetings should focus on critical issues, areas for supplier improvement and discussions on how the buying organization can improve the relationship.

## 1.3. Service level agreements

Service level agreements (SLAs) are agreements or contracts with suppliers that define the service they must provide and the level of service to be delivered, and which also set out responsibilities and priorities.

SLAs themselves are contractual obligations and are often built into a contract - in the form of one or more clauses or as an entire section. SLAs can be used in any supplier contract where a business' ability to meet its customer requirements is dependent on the supplier.
SLAs are complex documents that should be well defined and cannot be drawn up in an ad hoc fashion.

**Drawing up an SLA**

It is important that you are involved in drawing up the agreement together with the supplier.
Typical SLAs set out:

- the service being provided
- the standards of service
- the timetable for delivery
- respective responsibilities of supplier and customer
- provisions for legal and regulatory compliance
- mechanisms for monitoring and reporting of service
- payment terms
- how disputes will be resolved
- confidentiality and non-disclosure provisions
- termination conditions

If suppliers fail to meet agreed levels of service, SLAs usually provide for compensation, commonly in the form of rebates on monthly service charges. When drawing up your SLA with your supplier, highlight the most critical components of the deal so you can apply the strictest penalties to these. Build periodic performance reviews into the SLA. Service level agreements require constant discussion and updating. If the needs of your business change, you may require different performance criteria. Likewise improvements in technology should be taken into account when reviewing your SLA.

**Review your suppliers' performance**

It is a good idea to review your suppliers' performance at regular intervals. If you have a service level agreement (SLA) this will help you to assess the business/supplier relationship in the most objective way possible. If not, even at this stage it may be worth using an SLA to define the terms and level of service you require from your supplier. The review process is particularly important as it will prevent existing suppliers becoming complacent.

Asking the following essential questions will help you ensure you are getting the best possible deal:

- **Price** - are you getting the best price? Does your supplier offer bulk discounts or other favorable terms?
- **Quality** - are you satisfied with the quality of your supplies?
- **Innovation** - do your suppliers regularly inform you of new products and services that might help improve your business?
- **Delivery** - are your suppliers punctual? Do the supplies arrive in good condition?
- **Account management** - do your suppliers respond quickly to any orders or queries that you place with them?
- **SLAs** - are your suppliers living up to their end of the agreement?

If, after the review process, you find that your suppliers are not living up to certain aspects of your agreement the SLA will usually provide for compensation, commonly in the form of rebates on monthly service charges.

| Self-Check -1 | Written Test |
|---|---|

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

1. Define service level agreements (5pts)
2. List the best criteria's to select suppliers (4pts)

***Note:*** **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

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**2.** _____

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| Information Sheet-2 | Developing Criteria to select and monitor the provision of services |
|---|---|

## 2.1. Selecting the supplier for provision service

Poultry equipment and machines are selected according to requisites of owner. The user can use this equipment's depends on their requisites. These are

- Utility use: -is usefulness, practical and efficiency of equipment and machine
  Ease of construction
- Durability:-receive hard and heavy use. Thus it should strongly and durable build.
- Dependable:-if it is function without getting out of order
- Low annual cost and up keep:-like poultry house, poultry equipment must be paid out of profit. Therefore, it has a low annual cost and keeps up.
- Movable:-should be movable so that it may be shifted from one location to another.
- Accessibility:-stationary or less portable equipment like nests should be accessible
- Save feed:-properly constructed equipment's can save feed.
- Labor reduces:-are modern machinery and equipment.

## 2.2. Factor/ Criteria in selecting supplier

Supplier is expected to provide and basis for selection is function, quantity, service, and price for selection. Considering these there are several factors in selecting supplier or there are common supplier selection criteria;

- Manufacturing capability
- Reliability
- After sale service
- Supplier location or Delivery
- Cultural Fit – including values or Social Responsibility
- Cost – covering price, Total Cost of Opportunity
- Value – value for money and value generation opportunities
- Experience in the market and current references
- Flexibility
- Response to change – in orders and products
- Quality – covering product and service quality and quality history
- Convenience/Simplicity

- Risk
- Agility

Outsourcing offers wide range of benefits to organization such as cost reduction, better access to superior quality, flexible in responding to market change, opportunity to focus on core competences and facilitate the development of product diversification. Facility management outsourcing can be an excellent way for large organizations to drive down operating costs, give more focus on the core mission and improve their competitive position.

Criteria are attributes that a buying organization values in its arrangements with suppliers. Depending on the situation, you may use them as-is, use more or fewer, or use a different combination of eight. Often, sourcing team members will want some criteria to be treated as constraints unbreakable rules in the supplier selection process. Examples of constraints include: there can only be one supplier, we must select the low bidder, delivery must be within six weeks, etc. Your job as leader of the sourcing team is to determine whether the proposed constraint is a truly warranted constraint or simply an important criterion.

You can do so by asking questions like "If we had to choose between (a) having the best quality for all items by using two suppliers and (b) having the best quality for only half the items by using one supplier, would we still insist on using one supplier?" or "If we could save 34% by accepting a seven week lead time instead, would we choose to save the money or would we still need to insist on the six week lead time?" The fewer constraints, the more flexibility the team has in its decision-making. After agreeing on the constraints and criteria, the sourcing team must agree on a hierarchy - an order of these attributes from most important to least important, with constraints preceding criteria. In most cases, supplier offerings will differ and there will be tradeoffs involving the criteria: you may get a better price from one supplier (cost) but that supplier insists on contract terms less favorable to you (risk).

### 2.3. Monitoring and evaluation of service provision

Monitoring and evaluation of service provision is essential for analyzing, and if possible improving, the effectiveness of servicing regimes. As a minimum, the servicing company should:

- Establish 'critical limits' - to measure the effectiveness and quality of the services provided to farmers
- Establish appropriate record-keeping and documentation systems
- Make regular visits to monitor progress and assess impact
- Establish corrective actions

- Evaluate, with the farmers, all the achievements made and lessons learnt, and apply any lessons learnt to existing and new arrangements.

The productivity of input use can be enhanced through the supply of high quality inputs that are appropriate to farmers' needs and circumstances. Efficient and effective use of the inputs provided will increase the chances of sufficient production to pay off the loan. Appropriate use of inputs can be ensured through frequent monitoring of smallholders. This can be facilitated by farmer groups.

Monitoring and evaluation is an essential component of any adaptation planning and should not be neglected. Trigger indicators and performance indicators can be monitored and the results used to determine when actions should be implemented and to track the success of the adaptation plan. Effective monitoring and evaluation underpin the planning cycle.

Monitoring and evaluation (M&E) is critical to ensure the long-term success of climate adaptation initiatives, plans and actions. It can help to demonstrate accountability to stakeholders and communities.

Monitoring, evaluation and review design is critical to ensure that information is used to inform decision-making, make appropriate adjustments, and report to stakeholders and decision makers. Without a clear link between monitoring and decision-making, there is a risk that monitoring activities and resources will be seen as a drain on resources and discontinued. Trigger points can be identified and monitored and, when reached, can stimulate the implementation of the next action in a sequence. In identifying trigger levels for response, it is important to consider the time required for the decision to be made and implemented. This should include acknowledging the time that may require for effective stakeholder engagement, or for any detailed investigation, design and development of actions that may be required. Evaluation helps you to learn from what you have planned and what has been done. It helps with considering what changes need to be made to your planning approach, your plan and associated activities to get adaptation outcomes. Your monitoring program should include a variety of measurements which enable you to report to your organization and stakeholders about your activities.

Monitoring should include outputs, immediate and short-term outcomes, and longer term outcomes. Stakeholder feedback is essential. People or groups who have an interest in the plan, or who are responsible for delivering various actions, must be made aware of any changes that affect them.

Importantly, consideration must be given to how the plan is being amended so that the planning cycle can be continued. Monitoring, evaluation and review is not the end of the adaptation planning cycle, it is a new beginning!!

### 2.4. Smallholders need from machinery suppliers

**a. Technical efficacy**

- Good performance under farmer conditions
- Known response under different agro-ecological conditions

**b. Reliable quality**

- The quality of machine and other inputs is not obvious until production so quality assurance at the time of supply is particularly important;
- Quality is hard to guarantee so rigorous machinery selection and testing programs must be maintained
- Efficient machine delivery systems are essential.

**c. Availability**

- Timeliness
- Availability at a location convenient to the farmers
- Supply of seed varieties specific to market requirements

**d. Pricing**

- Farmer willingness to buy machine is dependent on the market value of the machinery
- Low output compound farmer reluctance to use purchased inputs

**e. Packaging**

- Required unit size
- Provides adequate protection and quality assurance
- Provides appropriate technical information

| Self-Check -2 | Written Test |
|---|---|

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

1. What are criteria's that required in selection of suppliers? (8pts)
2. What smallholders need from machinery suppliers? (5pts)

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

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

1. _____
   _____
   _____
2. _____
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   _____
   _____

| Information Sheet-3 | Recording and monitoring Agreements and transactions |
|---|---|

### 3.1. Recording agreements and transactions

Agreements may include those that cover the conditions for use and operation of shared equipment, and agreements negotiated with contractors and other service providers. Renter agrees to use equipment in a safe and careful manner, in accordance with the Owner`s Manuals provided. Renter agrees to pay the cost of repairing the equipment if damage to the equipment or its parts occurs due to an external cause due to any negligence or any factor under the control of the Renter. Renter agrees to replace any equipment not returned to farm. Renter will transport the equipment by use of an appropriately sized vehicle. It is the responsibility of the Renter to secure load, transport equipment, and to return the equipment to the location designated by owner unless other arrangements are made on this Agreement**.** Failure to return the equipment or deliver it to the designated location shall result in a late or retrieval may have penalty according to agreement**.** Renter agrees to return the equipment in clean and usable condition according to cleaning checklist. The owner or farm shall not be liable for any personal injury or property damage occurring as a result of the use or transport of the equipment or any other loss or damage including but not limited to those resulting from;

- Loss caused by theft
- Accidental damage to persons or property from the operation or use of the equipment
- Damage or injury resulting from the conduct of the Borrower whether negligent or otherwise

### 3.2. Understanding Transaction

A transaction is an agreement between a buyer and a seller to exchange goods, services or financial instruments. In accounting, the events that affect the finances of a business must be recorded on the books, and an accounting transaction will be recorded differently if the company uses accrual accounting rather than cash accounting. Accrual accounting records transactions when revenues or expenses are realized or incurred, while cash accounting records transactions when the business actually spends or receives money. It may require a letter of intent or memorandum of understanding.

Transactions in terms of sales between buyers and sellers are relatively straightforward. Person A gives person B a certain amount of money for a good, service, or financial product.

Transactions can become more complex in the accounting world since businesses may sometimes make deals today which won't be settled until a future date, or they may have revenues or expenses that are known but not yet due. Third-party transactions can also occur. Whether a business records income and expense transactions using the accrual method of accounting or the cash method of accounting affects the company's financial and tax reporting.

### 3.3. Costs associated with the use of machinery

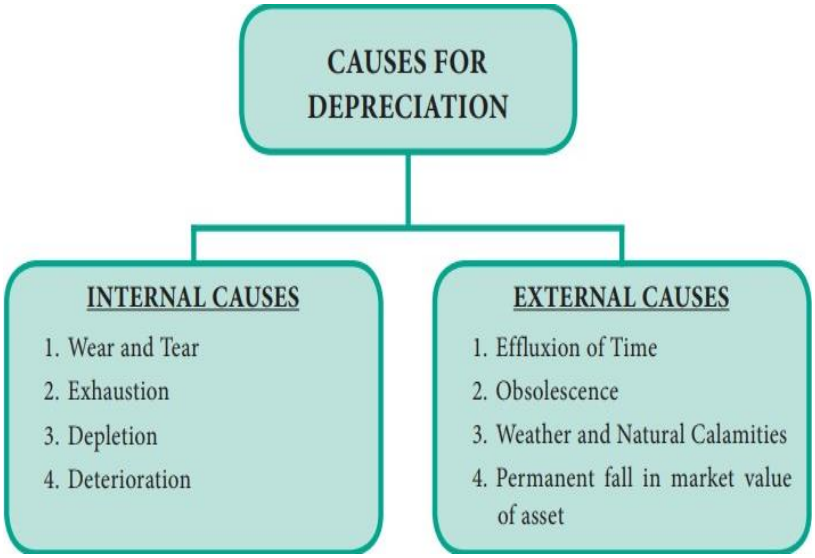
Costs associated with machinery use can be divided into four categories: machine costs, labour costs, fuel costs and overhead costs. Machine costs include depreciation, interest and repairs and maintenance. Machinery and equipment are major cost items in farm businesses. Larger machines, new technology, higher prices for parts and new machinery, and higher energy prices have all caused machinery and power costs to rise in recent years. However, good machinery managers can control machinery and power costs per acre. Making smart decisions about how to acquire machinery, when to trade, and how much capacity to invest in can reduce machinery costs as much as $50 per acre. All these decisions require accurate estimates of the costs of owning and operating farm machinery.

#### 3.3.1. Machinery Costs

Farm machinery costs can be divided into two categories: annual ownership costs, which occur regardless of machine use, and operating costs, which vary directly with the amount of machine use. The true value of these costs cannot be known until the machine is sold or worn out. But the costs can be **estimated** by making a few assumptions about machine life, annual use, and fuel and labor prices. This publication contains a worksheet that can be used to calculate costs for a particular machine or operation. **Ownership** costs (also called **fixed** costs) include depreciation, interest (opportunity cost), taxes, insurance, and housing and maintenance facilities.

#### 3.3.2. Depreciation

Depreciation is a cost resulting from wear, obsolescence, and age of a machine. The degree of mechanical wear may cause the value of a particular machine to be somewhat above or below the average value for similar machines when it is traded or sold. The introduction of new technology or a major design change may make an older machine suddenly obsolete, causing a sharp decline in its remaining value. But age and accumulated hours of use are usually the most important factors in determining the remaining value of a machine.




Before an estimate of annual depreciation can be calculated, an economic life for the machine and a salvage value at the end of the economic life need to be specified. The economic life of a machine is the number of years over which costs are to be estimated. It is often less than the machine's service life because most farmers trade a machine for a different one before it is completely worn out. A good rule of thumb is to use an economic life of 10 to 12 years for most farm machines and a 15-year life for tractors, unless you know you will trade sooner.

**Salvage value** is an estimate of the sale value of the machine at the end of its economic life. It is the amount you could expect to receive as a trade-in allowance, an estimate of the used market value if you expect to sell the machine outright, or zero if you plan to keep the machine until it is worn out.

### 3.3.3. Interest

If you borrow money to buy a machine, the lender will determine the interest rate to charge. But if you use your own capital, the rate to charge will depend on the opportunity cost for that capital elsewhere in your farm business. If only part of the money is borrowed, an average of the two rates should be used. For the example we will assume an average interest rate of 7 percent. Inflation reduces the real cost of investing capital in farm machinery, however, since loans can be repaid with cheaper dollars. The interest rate should be adjusted by subtracting the expected rate of inflation. For our example we will assume a 2 percent inflation rate, so the adjusted or "real" interest rate is 5 percent.

The joint costs of depreciation and interest can be calculated by using a capital recovery factor. Capital recovery is the number of dollars that would have to be set aside each year to just repay the value lost due to depreciation, and pay interest costs.

### 3.3.4. Implement Costs

Costs for implements or attachments that depend on tractor power are estimated in the same way as the example tractor, except that there is no fuel, lubrication, or labor costs involved.

### 3.3.5. Used Machinery

Costs for used machinery can be estimated by using the same procedure shown for new machinery. However, the fixed costs will usually be lower because the original cost of the machine will be lower. And repair costs will usually be higher because of the greater hours of accumulated use.

Therefore, the secret to successful used machinery economics is to balance higher hourly repair costs against lower hourly fixed costs. If you misjudge the condition of the machine such that your repair costs are higher than you anticipated, or if you pay too high a price for the machine so that your fixed costs are not as low as you anticipated, the total hourly costs of a used machine may be as high or higher than those of a new machine.

## 3.4. Negotiation and the development of agreement

Negotiations are a vehicle of communication and stakeholder management. As such, they can play a vital role in assisting policy-makers to obtain a better grasp of the complex issues, factors and human dynamics behind important policy issues. Growing linkages, interdependencies and the rapid pace of change in spheres affecting important agro-food issues including economics, trade, governance and regional and international relations, have created a greater need for skillful negotiators among agriculture policy-makers and experts.

Negotiation is a dialogue between two or more people or parties intended to reach a beneficial outcome over one or more issues where a conflict exists with respect to at least one of these issues. Negotiation is an interaction and process between entities that compromise to agree on matters of mutual interest, while optimizing their individual utilities. This beneficial outcome can be for all of the parties involved, or just for one or some of them. Negotiators need to understand negotiation process and other negotiators to increase their chances to close deals avoid conflicts, establishing relationship with other parties and gain profit.

| Self-Check -3 | Written Test |
|---|---|

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

1. Define Transaction (2pts)
2. What are machine costs? (3pts)
3. Define depreciation (2pts)
4. What is salvage value? (2pts)

***Note:*** **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

1. _____
   _____
2. _____
   _____
   _____
3. _____
   _____
   _____
4. _____
   _____
   _____

## References

Bouzas, Roberto (2003), 'MERCOSUR's Experience of Building Capacity for Trade Negotiations with the EU', forthcoming ECDPM Discussion Paper

Gonzales, Anthony Peter (2000), 'The Caribbean Community, the Regional Negotiating Machinery and Capacity Building for External Trade Relations in Small States', contribution to the DAC Workshop on Trade Capacity Development, 29 May.

# POULTRY PRODUCTION

## NTQF Level - III

# Learning Guide -27

**Unit of Competence: - Maintain and operate poultry production machinery and equipment**

**Module Title: - Maintaining and operating poultry production machinery and equipment**

**LG Code:** **AGR PLP3 M07 LO3-LG-27**

**TTLM Code:** **AGR PLP3 TTLM 0120v1**

## LO3: Manage machinery maintenance

| Instruction Sheet | Learning Guide #27 |
|---|---|

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

- determining maintenance requirements of machinery and equipment
- establishing systems for recording machinery use and maintenance
- monitoring machinery maintenance

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: –**

- determine maintenance requirements of machinery and equipment
- establish systems for recording machinery use and maintenance
- monitor machinery maintenance

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 7.
3. Read the information written in the “Information Sheets 1, 2 and 3 in page 3, 10 and 15 respectively”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1,2 and 3 ” in page 9, 14 and 17 respectively
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answers only after you finished answering all Self-checks).
6. If you earned a satisfactory evaluation proceed to “next Information Sheets”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #27.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

| Information Sheet-1 | Determining Maintenance requirements of machinery and equipment |
|---|---|

## 1.1. Maintenance of machinery and equipment

Machinery maintenance is the means by which mechanical assets in a facility are kept in working order. Machinery maintenance involves regular servicing of equipment, routine checks, repair work, and replacement of worn or nonfunctional parts. Machines to be maintained include both heavy duty industrial equipment and simple hand-operated machines. Maintenance of machinery is frequently handled reactively (e.g. after a breakdown) though it may also be done proactively, as with preventive and predictive maintenance. Preventive maintenance keeps assets in good repair through regular scheduled service; predictive maintenance relies on equipment monitoring to detect problems before they result in a breakdown.

Machinery maintenance involves regular servicing of equipment, routine checks, repair work, and replacement of worn or non-functional parts. Machines to be maintained include both heavy duty industrial equipment and simple hand-operated machines. Whenever every machinery and equipment used in poultry production enterprise, its maintenance should be kept for future sustained and durability. Repair costs occur because of routine maintenance, wear and tear, and accidents. Repair costs for a particular type of machine vary widely from one geographic region to another because of soil type, rocks, terrain, climate, and other conditions. Within a local area, repair costs vary from farm to farm because of different management policies and operator skill.

The best data for estimating repair costs are records of your own past repair expenses. Good records indicate whether a machine has had above or below average repair costs and when major overhauls may be needed. They will also provide information about your maintenance program and your mechanical ability. Without such data, though, repair costs must be estimated from average experience. The relationship between the sum of all maintenance costs of machine and the total hours of use during its lifetime based on historical repair data. The total accumulated repair costs are calculated as a percent of the current list price of the machine, since repair and maintenance costs usually change at about the same rate as new list prices.

These can be achieved through the following point.

- Be sure to keep owners' manuals for specific maintenance instructions
- Check if every machine and equipment is stalled in proper ways.
- Check whether all equipment locate at a site
- Monitoring if all wires are properly connected in electrical machine
- Turn off switch unless it is no way of service.
- Clean equipment before service
- Repair un functioned machine
- Sanitize and disinfect machine and equipment after services.

### 1.2. Prepare maintenance plan

- Maintenance requirements (wear, corrosion, design problems, equipment modification, incorrect use and accidents) for machinery and equipment must be identified from relevant information sources.
- Maintenance costs should be identified and quantified before starting maintenance activities.
- Develop Maintenance plan to promote and sustain performance and production systems in line with enterprise requirements.
- Establishes effective workplace communication strategies with regard to maintenance plan, environmental and Occupational Health and Safety (OHS) policies and enterprise requirements.
- Environmental impacts resulting from excessive noise and exhaust emissions, damage to native vegetation and animals, the unsafe use and disposal of maintenance debris (oil containers, chemical residues), and hazardous substances (fuel, oils). It may also include dust problems, soil disturbance and increased run-off flows from machinery use and unsafe cleaning and servicing activities.

Maintenance requirements for machinery and equipment should be identified form relevant information sources. Maintenance requirement includes:

- Wear
- Corrosion
- Design problems
- Equipment modifications
- Incorrect use

- Accidents
- Acts of nature

**Relevant information sources** in the process of identifying maintenance requirements for machinery and equipment may include:

- Operational diaries
- Staff comment and/or personal testing
- Observation of structures, machinery and equipment
- Manufacturers in-service updates
- Operator's manuals
- Property improvement groups
- Relevant government departments
- Other enterprise operators and service representatives

### 1.3. Implement maintenance plan

- Resource and supply requirements should be identified, secured and included in enterprise budgets and operational considerations.
- Communicate effectively the prepared maintenance schedules and procedures to staff and suppliers to minimise negative impacts on production and costs
- Implement and scheduled maintenance plan to minimize disruption to enterprise operations.
- Potential risks should be assessed with regard to staff and supply problems, and contingency plans prepared accordingly.
- Machinery and equipment have to be operated to manufacturers' specifications, OHS and enterprise requirements.

**Three types of machinery maintenance workers**

In most industrial settings, there are a few different types of personnel who are involved in the maintenance process.

**1. Machinery mechanics**

Among the duties of machinery mechanic is keeping industrial machinery fully operational by performing necessary maintenance. They maintain and repair various forms of equipment, including conveyor systems, packaging equipment, production machinery, and so forth. Machinery mechanics typically aren't involved in advanced diagnostics. If they perform any type of diagnostic work it's by visual inspection.

**2. Maintenance technicians**

A technician differs from a mechanic in that they focus more on the diagnostic side of maintenance. They examine equipment using computers and instrumentation to determine why it's malfunctioning, then prescribe a solution to the problem. They might perform the repairs themselves, or a mechanic might be assigned to the task.

**3. Millwrights**

Millwrights have a wider occupational focus than machinery mechanics. While they do repairs and perform maintenance work, they also install, assemble, dismantle, and move assets within the facility. Millwright is person who designs or builds grain mills or who maintains mill machinery.

### 1.4. Types of Maintenance

In the first case of maintenance, repair can be done after the breakdown occurs while in the second case maintenance is done on the basis of prediction or on the basis of periodical checking. Generally maintenance can be done in the following two ways:

#### 1.4.1. Break Down Maintenance

Breakdown maintenance is defined as a maintenance activity conducted on a machine which has ceased functioning owing to shear or crushing or buckling or elongation or swelling or any other form of failure of any critical component of the said machine in order to enable the same to function as before by resorting to necessary replacement(s) of the same and/ or more number of components by new ones or usable old ones and/ or re-conditioning of the same within the minimum time period considering scope of work, available facilities and skill.

**Breakdown of a machine can occur due to the following two reasons:**

(i) Due to unpredictable failure of components which cannot be prevented.
(ii) Due to gradual wear and tear of the parts, which can be eliminated to a large extent by regular inspections, known as preventive maintenance. From experience it can be decided that, when a part should be replaced, so that breakdown can be avoided. In breakdown maintenance, defects are rectified only when the machine cannot perform its function any longer & production department is compelled to call on the maintenance engineer for repairs. After repairing the defect, the maintenance engineers do not attend the machine again until another failure occurs. In this type of maintenance, repair shall have to be done on failure, thus it may disrupt the whole production, if it is performing an important work.

This method is expensive also due to increase of depreciation cost, payment to idle operators, overtime to the maintenance staff for doing the emergency repairs.

### 1.4.2. Preventive maintenance

Preventive Maintenance is defined as a maintenance activity conducted on a machine as per laid down schedule or frequency by making necessary or need-based replacement and/or reconditioning of component within the pre-fixed time period of the said work in order to reduce and avert breakdown. Preventive maintenance is sometimes termed as planned maintenance or scheduled maintenance or systematic plant maintenance etc. It is an extremely important function for the reduction of maintenance cost and to keep the good operational condition of equipment and hence increases the reliability.

Preventive maintenance aims to locate the sources of trouble and to remove them before the breakdown occurs. Thus it is based on the idea “prevention is better than cure”. Scheduled maintenance is always economical than unscheduled maintenance, as we all know that, “a stitch in time saves nine.” Best safeguard against costly breakdown is to inspect, lubricate and checkup the equipment as frequently as possible. To take full use of equipment and to maintain it in reliable condition, necessary measures should be taken to prevent overloading, dampness, negligence and misuse of machines.

**Preventive maintenance has following main objectives**

- To obtain maximum availability of the plant by avoiding breakdown and by reducing the shutdown periods to a minimum.
- To keep the machine in proper condition so as to maintain the quality of the product.
- By minimizing the wear and tear, preserve the value of the plant.
- To ensure for the safety of the workers.
- To keep the plant at the maximum production efficiency.
- To achieve all the above objectives with most economical combination.

**Procedure for Maintenance**

Daily maintenance is done by the operators themselves. Before starting the work of their shift, cleaning, oiling and greasing should be done by the operators.

For this purpose manufacturers used to issue maintenance instructions for their machines, which should strictly be followed. Preventive maintenance of the machine depends largely on the operators.

Hence, as far as possible, one operator be allotted for each machine, and when the same machine is used in more than one shift, one operator for each machine for each shift be allotted.

**This system has following advantages**

- An operator gets used to the sound and working of his machine and notices any change immediately, which helps in investigation and rectification of the defect then and there. If operators are changed frequently, immediate check-up and timely repair cannot be possible.
- It is easy to pin-point operators with bad operating habits. To remove these habits training can be arranged or disciplinary actions can be taken as the case may be.
- The machine will remain in good conditions.

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| Self-Check -1 | Written Test |
|---|---|

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

1. List advantages of machine maintenance (4pts)
2. Mention relevant information sources in the process of identifying maintenance requirements (4pts)
3. List down three types of machinery maintenance workers (3pts)

***Note:*** **Satisfactory rating - 11 points** **Unsatisfactory - below 11 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

**1.** _____

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**2.** _____

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**3.** _____

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| Information Sheet-2 | Establishing Systems for recording machinery use and maintenance |
|---|---|

## 2.1. Recording systems for machinery use

There are two general types of machinery records, the first is a cost record to permit the calculation of machinery costs for individual machines and the second is a record of scheduled repair and maintenance. Table is a machinery record form which emphasizes cost information but it also contains space for recording all repair and maintenance activities.

Entries on this form can be made daily or weekly for non-powered machines which receive little use during the year. For machines which require fuel and daily servicing and receive heavy use, each machine carries a form to record daily fuel and oil consumption and minor repairs.

## 2.2. Stages of equipment maintenance management

According to a consultancy study, it was found out that up to 60% of the production costs are likely to be affected by the efficiency of maintenance programs. This number depicts how critical repair projects are to the overall productivity of your business. If you lack a robust maintenance program, you will not only fall behind in achieving your targets but also incur extra overhead costs. The ideal solution is to implement computerized maintenance management software for your company. This software allows you to streamline equipment repair and service sessions to improve tool performance. Maintenance management involves 4 simple steps to help you carry out seamless maintenance routines:

- Generating a request
- Carrying out maintenance sessions
- Recording information
- Reporting the results

## 2.3. Maintain machinery and equipment to boost up efficiency

### a. Monitor tool custodianship through check-ins and checkouts

Every firm invests a large amount of capital in its equipment. High-quality tools and machines tend to break down less and function longer. But that doesn't mean you don't rigorously monitor their usage.

One way to do this is to track when and where your equipment is being used. This can be easily done through equipment maintenance record keeping by tagging all your tools. What this basically does is link your official inventory to online software. This software is a single access point of information for everyone in your workplace. Every time an employee checks out a machine for use, it is instantly updated in the system. When you know where your tools are, it becomes easier to record their usage history to forecast future trends and patterns.

**b. Enable depreciation management to maximize utility**

Equipment is sensitive to wear and tear after extensive use. The best way to make your tools and machines last long is to design rigorous maintenance workshops. This is only possible if you keep a tab on your assets for depreciation. An important part of equipment maintenance record keeping involves tracking machinery devaluation. Every tool has its functional lifespan after which it needs to be disposed of. If you monitor utilization in the correct manner you can even resale your assets for monetary returns. You can do all this through maintenance software. This software lets you maintain a database regarding repair sessions that enables you to run seamless work operations.

**c. Manage stock information via a single software**

It hardly ever happens that you buy all your equipment stock from a single vendor. Different departments require different tools and machines. To cater to your inventory needs, your company probably has a long list of vendors. To gain maximum economies of scale it is critical that you choose the best possible tools that fit your budget. This can only be achieved if you have a detailed service vendor management database.

As a part of equipment record keeping for your business, you can store all information related to tool purchases at one place. This includes, but is not limited to cost analysis and repair schedules. When you use cloud-based software to secure such data, you will be able to conveniently add numerous equipment items against their vendors for future reference as well. Having all the necessary records at one place allows your firm to maximize returns on tools and improve the overall lifecycle.

**d. Renew stock after equipment disposal**

The useful lifespan of equipment goes through a few stages, the last of one which requires disposal. If you regularly track depreciation for your tools, then you know well before the time when you would need a replacement.

As companies tend to have numerous different types of tools and machines in their inventory, it becomes difficult to track them all manually. For this reason, it is suggested that your company invests in a cloud-based system for equipment maintenance record keeping. When you do so, you will be able to configure your system to create new stock receipts at the time of disposal. This way whenever your tools break down and are near the end of their lifecycle, you can order new stock without delays.

### 2.4. Advantages of keeping an equipment maintenance record

For any equipment hire company, your fleet is the lifeblood of your business. Keeping equipment at optimum working condition minimizes the risk of having unscheduled downtime. If maintenance is needed, it's important to keep a comprehensive record whether scheduled or unscheduled to help you understand the importance of your equipment's upkeep works.

1. **Prevent expensive repair works from happening**

With constant use, your equipment is prone to wear and tear. Performing routine inspections allow you to see and repair small damages before they become a big problem. Documenting these inspections and small repairs help you keep track of all the maintenance work that your equipment has undertaken, ensuring that each machine is in tip-top shape before putting them to work.

2. **Helps you create specialized maintenance programs**

Equipment goes under different working conditions and they have different limitations as well. With the help of routine check-ups, you will be able to determine and record the differences of each individual's equipment with regards to maintenance works. In turn, this information will help you in creating maintenance programs specifically catering to each individual's equipment on your fleet.

3. **Prevent problems regarding warranty claims**

Documenting every repair or maintenance work done on your equipment will help you process warranty claims much easier. Keep a record of the type of maintenance work done to your equipment as well as the exact time and date repairs were done as this information will help determine your rights for the warranty claims.

4. **It increases the safety of operators**

If a piece of plant or equipment is well maintained, the risk of accidents occurring due to malfunctioning machinery is reduced. When incidents involving faulty machinery occur, there's a big chance that the operator is the first one to be affected. Having equipment's maintenance history documented will help you keep track of your machinery's health.
This enables you to schedule an inspection when needed, at the same time it ensures that your equipment is safe to work with.

**5. Helps you track who is accountable for a piece of equipment**

One machine might have multiple operators. Performing a routine inspection and documenting the findings after every project will help you track down who is accountable for any damage inflicted on your machinery. Keeping these types of records will also encourage operators to take better care of the equipment.

**6. It increases the resale value of the equipment**

Keeping a detailed record of all the maintenance and repairs that a piece of equipment went through will help increase its resale value. Buyers thoroughly assess a piece of equipment before purchasing it, most especially if the machines have already been used. Presenting potential buyers a documentation of your equipment's maintenance history lets them know that the equipment they are planning to buy have been well taken care of.

| Self-Check -2 | Written Test |
|---|---|

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

1. Define recording (2pts)
2. List advantages of keeping equipment maintenance record (3pts)

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

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

1. _____
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   _____
2. _____
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| Information Sheet-3 | Monitoring Machinery maintenance |
|---|---|

### 3.1. Monitoring machinery maintenance

Condition monitoring is the process of monitoring a parameter of condition in machinery (vibration, temperature etc.), in order to identify a significant change which is indicative of a developing fault. It is a major component of predictive maintenance. Machinery maintenance is the means by which mechanical assets in a facility are kept in working order. Machinery maintenance involves regular servicing of equipment, routine checks, repair work, and replacement of worn or nonfunctional parts. Maintenance of the machine can be monitor by visitor whenever he observes the maintenance of machine and equipment.

These include;

- Observing repaired machine in the farm
- Observing if all disassembled equipment are reassembled
- Seeing about sanitation of all and machine

These activities can be under taken at interval times frequently because to overcame any at our machine while maintaining. Alert mechanic if equipment malfunctions and work with them to correct problem. So monitoring every machine and equipment used in farm is essential to preceding every task progressively in safe manner.

Condition maintenance is a major component of predictive maintenance. The use of condition monitoring allows maintenance to be scheduled, or other actions to be taken to prevent consequential damages and avoid its consequences. Condition monitoring has a unique benefit in that conditions that would shorten normal lifespan can be addressed before they develop into a major failure. Condition monitoring techniques are normally used on rotating equipment, auxiliary systems and other machinery (compressors, pumps, electric motors, internal combustion engines, presses), while periodic inspection using non-destructive testing (NDT) techniques and fit for service (FFS) evaluation are used for static plant equipment such as steam boilers, piping and heat exchangers.

### 3.2. Equipment maintenance log

Equipment maintenance log is a simple document that shows all maintenance actions that have been performed on a certain asset.

While the information it contains varies depending on the type of equipment/asset in question, a standard equipment maintenance log is often split into two distinct sections;

- General information used to identify the asset
- List of performed maintenance actions on the asset and who performed them

General information usually covers;

- Name of equipment
- Model
- Serial Number
- Location

List of performed actions usually covers the following information;

- Date (when a certain action was performed)
- Action description (what was done)
- Person performing said actions (who performed it)

| Self-Check -3 | Written Test |
|---|---|

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

1. What is condition monitoring? (2pts)
2. Define Equipment maintenance log (2pts)

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

1. _____
   _____
   _____
2. _____
   _____
   _____

## References

S R W Mills (2010). Vibration Monitoring & Analysis Handbook. British Institute of Non-Destructive Testing.

Jar dine, A.K.S.; Lin, Banjevic (2006). "A review on machinery diagnostics and prognostics implementing condition-based maintenance". Mechanical Systems and Signal Processing. **20** (7): 1483 1510. doi:10.1016/j.ymssp.2005.09.012.

# POULTRY PRODUCTION

## NTQF Level - III

# Learning Guide -28

**Unit of Competence: - Maintain and operate poultry production machinery and equipment**

**Module Title: - Maintaining and operating poultry production machinery and equipment**

**LG Code:** **AGR PLP3 M07 LO4-LG-28**

**TTLM Code:** **AGR PLP3 TTLM 0120v1**

## LO4: Manage machinery and equipment operation

| Instruction Sheet | Learning Guide #28 |
|---|---|

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

- monitoring and recording machinery and equipment use
- monitoring machinery operation to ensure compliance with manufacturer's instructions
- determining procedures for the safe operation of machinery and monitoring adherence to safe procedures
- training staff in the safe operation & maintaining of machinery

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 and record machinery and equipment use
- monitor machinery operation to ensure compliance with manufacturer's
- determine procedures for the safe operation of machinery and monitoring adherence to safe procedures
- train staff in the safe operation & maintaining of machinery

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 7.
3. Read the information written in the "Information Sheets 1, 2, 3 and 4 in page 3, 8, 11 and 16 respectively". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the "Self-check 1,2, 3 and 4 " in page 7, 10, 15 and 18 respectively
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answers only after you finished answering all Self-checks).
6. If you earned a satisfactory evaluation proceed to "next Information Sheets". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #28.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

| Information Sheet-1 | Monitoring and recording Machinery and equipment use |
|---|---|

## 1.1. Monitoring and recording machinery and equipment

Machinery and equipment used in livestock production enterprises should be monitored and recorded according to enterprise requirements. Materials which are used for repairing and maintenance should be durable, list cost, easily available and accessible and manageable. Machinery operation is monitored to ensure compliance with manufacturer's instructions. Procedures for the safe operation of machinery ought to be determined and adherence to safe procedures is monitored and ensured. Staffs should be trained in the safe operation of machinery and the required procedures for the maintenance of machinery.

Records are important to the financial health of your farm. Good records do not ensure your farm will be successful; however, success is unlikely without them. Farm records are like report cards students receive in school. With a farm report card, you call tell how well you are managing your operation compared with other producers in your class. You also can see the strengths and weaknesses of you farm operation.

Machinery and equipment use should be recorded according to enterprise requirements. Besides use as a management tool, farm records are essential for preparing income tax reports. In addition, most banks require extensive records from farmers to formulate credit ratings. Finally, records are in establishing eligibility for participation in government programs, determining the proper level of insurance coverage and negotiating lease arrangements.

There are different basic types of farm records:

- ✓ Resource inventories
- ✓ Production accounts for farm operations
- ✓ Income and expense records
- ✓ Monitoring or recording technology is rapidly changing to meet increasing needs of businesses to become more efficient, increase productivity and maintain security.
- ✓ Monitoring or recording equipment provides permanent evidence of information about past events, an electronic record is created.
- ✓ Electronic records may substitute for paper and handwritten records and are subject to the same statutory and regulatory requirements. As with paper records, video or

other electronic monitoring or recording records may be designated as a record to meet hazard Analysis control Critical Point (HACCP) and Sanitation standard operational program requirements.

**Machinery record on purchased item**

The following information will provide ready reference when seeking operation help or ordering parts. When order parts always provide the machine model number, serial number, and type of machine.

Date Purchased: _____ Purchased From: _____

Distributor's Address: _____

Phone: _____ Salesman's Name: _____

Model No.: _____ Serial No.: _____

Cases /Hour _____Type of machine_____

Record keeping and meeting production targets are good management practices that allow the identification and solution of problems. When a problem is identified, the next step is to attempt to fix it. Identifying the cause of and fixing a problem is an important part of the farmer's knowledge base, and is likely to assist in preventing a recurrence of the problem. Records kept over time can help identify some of the possible causes of problems. One of the most useful record-keeping documents is poultry machinery, which can be used in combination with record-keeping sheets to record major activities, problems identified, equipment repairs, deviations from equipment settings, and any staff issues. Records of machinery and equipment should be maintained to assist investigations of sub-optimal performance.

## 1.2. Monitoring of machine and equipment

Machine condition monitoring is the process of monitoring the condition of a machine with the intent to predict mechanical wear and failure. Vibration, noise, and temperature measurements are often used as key indicators of the state of the machine. Trends in the data provide health information about the machine and help detect machine faults early, which prevent unexpected failure and costly repair.

Machine condition monitoring is important because it provides information about the health of a machine. You can use this information to detect warning signs early and help your organization stop unscheduled outages, optimize machine performance, and reduce repair time and maintenance costs.

Figure 1 shows a typical machine failure example and the warning signs.

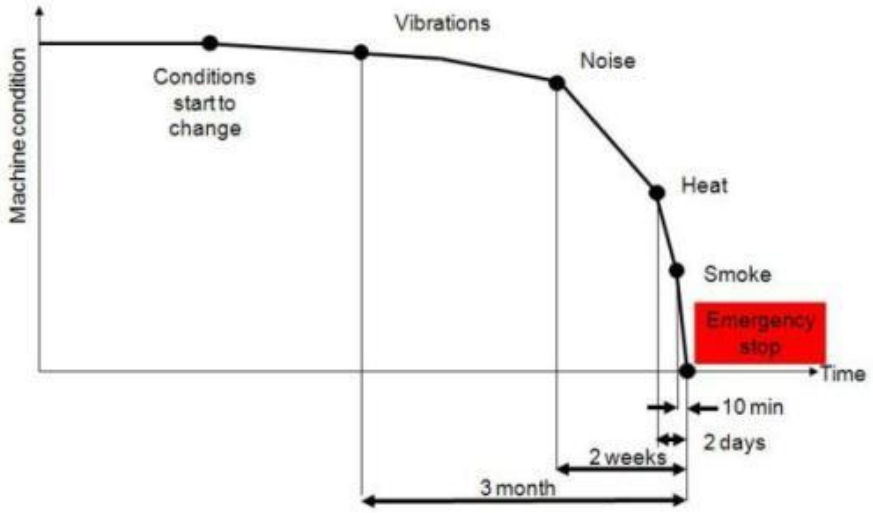


Figure1. The warning signs of machine failure: Using a machine condition monitoring system, you can detect failure signs months before repair is required, allowing for proper maintenance scheduling and shutdown.

As shown in Figure 1, vibrations are the first warning sign that a machine is prone to failure. This warning sign can provide three months of lead time before the actual failure date. Monitoring this data with vibration analysis hardware and software helps you predict this failure early and schedule proper maintenance.

**Types of Machine Condition Monitoring**

Each of the five main varieties of machine condition monitoring serves a different role.

- **Route-Based Monitoring**

Route-based monitoring involves a technician recording data intermittently with a handheld instrument. This data is then used for trending to determine if more advanced analysis is needed.

- **Portable Machine Diagnostics**

Portable machine diagnostics is the process of using portable equipment to monitor the health of machinery. Sensors are typically permanently attached to a machine and portable data acquisition equipment is used to read the data.

- **Factory Assurance Test**

Factory assurance test is used to verify that a finished product meets its design specifications and to determine possible failure modes of the device.

- **Online Machine Monitoring**

Online machine monitoring is the process of monitoring equipment as it runs. Data is acquired by an embedded device and transmitted to a main server for data analysis and maintenance scheduling.

- **Online Machine Protection**

Online machine protection is the process of actively monitoring equipment as it runs. Data is acquired and analyzed by an embedded device. Limit settings can then be used to control turning on and off machinery.

| Self-Check -1 | Written Test |
|---|---|

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

1. List basic types of farm records (3pts)
2. List types of machine condition monitoring (4pts)

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____
   _____

| Information Sheet-2 | Monitoring machinery operation to ensure compliance with manufacturer's instructions |
|---|---|

## 2.1. Operate machinery and equipment

Machinery and equipment is should be operated in a safe and controlled manner and monitored for performance and efficiency. Risks to self, others and the environment are anticipated and minimization strategies should be implemented accordingly. Suitable personal protective clothing and equipment have to be selected, used, maintained and stored according to OHS requirements.

Machinery is an important part of many jobs in agriculture and ranges from simple small hand held equipment to large machinery with complex attachments. Day-to-day maintenance and safety issues are the responsibility of the operator. A series of checks must be carried out before using machinery and equipment. Operators of machinery have a responsibility to report faults to ensure the health and safety of other users and the efficiency of operations.

Workplace health and safety Machinery accidents can be caused by many things, such as: lack of operator training, inexperience, failing to follow a safe system of work directions, haste, fatigue, risk-taking, inattention, operator's fault, using a machine that is unsuitable for the task, unsafe methods for clearing blockages or making adjustments, failing to follow safe operating or 'Safe Stop' procedures, guards and other safety devices missing or defective and poor maintenance.

Environmental implications associated with machinery operation should be identified, assessed and reported to the supervisor and concerned bodies. Machinery and equipment should be operating with the standard operating procedures of manufacturers and enterprise operating requirements. Each and every machines and equipment which are used in livestock production enterprises should have standard functional life time, maintenance and repairing schedule, supervision checklist and usage instruction.

## 2.2. Safe operation machinery

Designers must design machinery and plant that is safe to use. Some examples of designing machinery for safe operation:

- Consider the type of seating an operator may use and the ease of using the controls from the seat.

- If an operator needs to move around a large machine, provide a portable emergency stop button.
- Give easy and safe access to areas that need regular maintenance. Access will be needed for cleaning, lubrication and adjustment. Maintenance considerations include:
  - ✓ routine adjustments – people should be able to do these with the machine stopped but without needing to remove safeguards or take apart any of the machine
  - ✓ when frequent access is needed – use interlocked guards
  - ✓ when access is difficult – consider self- lubrication or central lubrication for parts
  - ✓ positive lock-off devices to stop the machine restarting accidentally, particularly if a machine was shut down in error

### 3.3. Cultural operations and their associated machinery and equipment

Poor maintenance is known to be a significant factor militating against the achievements of enhanced productivity and full utilization of industrial facilities in developing countries. The ability of equipment, machineries or plants accurately and reliably to produce desired output could only be achieved through proper maintenance culture, which is significant to any nation's economic development. This paper appraises the status of plant maintenance culture in public and private sectors, to provide adequate information that will be of help towards achieving effective operations through an enhanced total capacity utilization of equipment, tools, machineries or plants, a tool for better economic development. A general average machinery and equipment maintenance culture, which need to be improved on, to attain better and optimum plants operating condition required to satisfy expected needs of the nation at the minimum costs. This study recommended better working conditions for the skilled professionals; effective anti-corruption crusades at all levels; motivation towards enhanced local technological development for provision of good spare parts; comprehensive reforms to adopt systematic scheduling and standard maintenance policies in Nigeria, among others.

| Self-Check -2 | Written Test |
|---|---|

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

1. What do you consider in safe machinery operation? (5pts)

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

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

1. _____
   _____
   _____
   _____
   _____

| Information Sheet-3 | Determining procedures for the safe operation of machinery and monitoring adherence to safe procedures |
|---|---|

### 3.1. Determining and monitoring procedures for the safe operation of machinery

Machinery operation can be monitoring if the machine is operating according to the manufacture instruction. These can be monitored while supervising and observing machine .it is the routine activity in the farm enterprise. The safe operation of machine could be determined according to the machines manufacturer`s instructions. The skilled person or operator should follow the instruction in order to prevent hazard caused to the machine and also to things (operator, livestock) to be served. The all procedures should be listed according machine used as well as instruction stated for that machine.

This operation may include

- How keep hygiene:-including cleaning, sanitizing, washing, disinfecting.
- Adjusting temperature machineries
- Ways of disassembling parts of machineries
- How to reassemble the disassembled machineries
- How to connect each part of machine all together

Example for incubator operation;

- Hygiene
- Relative humidity
- Temperature
- Turning of eggs
- Candling
- Hatching

### 3.2. Safe use of machinery responsibilities

Employers must take all practicable steps to stop anyone under the age of 15 years old (restrictions for young people) working or helping with work with machinery.

No one under the age of 15 years old should be in an area where:

- goods are being prepared or manufactured for trade or sale
- construction work or forestry work is done

Unless they are:

- in a public access area
- under the direct supervision of an adult
- on a guided tour of the area
- in an area only used for the sale of goods or services

Here are four reasons why accidents involving machines tend to occur:

- Machines are not designed adequately for safe use, such as the lack of proper machine guards.
- Companies fail to put in place sufficient safe work procedures.
- Employees fail to follow safe work procedures due to ignorance, lack of experience or disregard for safety.
- Safety management practices to identify and eliminate unsafe acts and behaviors are not put in place.

It is important that workers receive the relevant workplace safety and health (WSH) training and are sufficiently competent to carry out WSH risk assessment for all work activities involving machines.

### 3.3. Use of machinery

When using machinery an employee is responsible for:

- their own health and safety
- not harming others through their actions or inaction
- following any safe work procedures their employer has in place
- identifying and reporting hazards and controlling them where possible
- using all guarding
- keeping their work areas clear, clean and tidy
- wearing and using all protective equipment and clothing
- alerting their supervisor to any machinery faults or maintenance needs
- telling their supervisor about any illness or condition that could stop or limit their ability to work with machinery to keep others safe and help supervisors allocate work

Machine operators should:

- check that the machinery they use is in sound working order
- report immediately any problems to their supervisor

- use any safety devices, guards, appliances, protective devices and any other methods used to make the machinery safe

Where there is a risk of entanglement with machinery, people should:

- tie long hair back close to the head
- not wear loose clothing

| Self-Check -3 | Written Test |
|---|---|

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

1. List operation of machinery that may include (2pts)
2. Mention responsibilities of employee in using machinery (4pts)
3. List four reasons why accidents in machine operation or using (4pts)

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

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
3. _____
   _____
   _____

| Information Sheet-4 | Training Staff in the safe operation & maintaining of machinery |
|---|---|

### 4.1. Training operation of machinery and procedures for the maintenance

Persons, who develop, maintain, or use electronic record and signature systems should have the education, training, and experience to perform their assigned tasks. Its procedure should follow according to the machinery manual instruction. In addition trainee must keep machines hygiene, sanitation and adjust temperature of a given machine and equipment.

### 4.2. Training requirement for staff and training in service

The quality controller, production supervisor, maintenance engineer and operators should on-the-job training on the operation, quality of product, maintenance of machinery by the expert of machinery and equipment supplier during erection and commissioning period. The veterinary technician and laborers that are operating the rearing part of the plant also needs on job training on handling of birds, i.e., sanitation of the room, feeding, drinking etc. for about recommended period.

In service training is a process of staff development for the purpose of improving the performance of an incumbent holding a position with assigned job responsibilities. It promotes the professional growth of individuals. It is a program designed to strengthen the competencies of extension workers while they are on the job. In service training is a problem-centered, learner-oriented, and time-bound series of activities which provide the opportunity to develop a sense of purpose, broaden perception of the clientele, and increase capacity to gain knowledge and mastery of techniques.

In service training may broadly be categorized into five different types:

(1) Induction or orientation training

(2) Foundation training,

(3) On-the-job training,

(4) Refresher or maintenance training, and

(5) Career development training.

All of these types of training are needed for the proper development of farm staff throughout their service in poultry production farm.

Machinery operation should be monitored to ensure compliance with manufacturer's instructions.

Procedures for the safe operation of machinery should be determined and adherence to safe procedures is monitored and ensured. Staff should be trained in the safe operation of machinery and the required procedures for the maintenance of machinery. Staff will include family and non-family labor, and casual and permanent labor working in the farm operations. Therefore, even if they have knowledge and skill to operate in the farm activities professional advice is required to update their knowledge and skill and to introduce new technologies that are helpful in expansions of farm production. Every operator must be trained to be safety conscious and should know the correct use of protective clothing. It seems important to arrange and coordinate periodic gap fill trainings on the aspects of safe and controlled operation of machinery and the required procedures for the maintenance of machinery.

### 4.3. Training and supervision of machine operators

The employer or person in control of the workplace must not let anyone use a machine unless they have had training on:

- the actual and potential hazards of the machine
- all the precautions to be take
- Unless the machine operator can operate the machine safely, then the employer or person in control should have the operator closely supervised by someone with the skills.

**When training people to use machinery, a trainer must explain:**

- how to check and adjust the machine before starting it
- how to stop and start the machine
- how the machine works
- what the machine does
- location and operation of other controls
- actual and potential hazards and appropriate ways to control them
- purpose of guards and other safety devices correct use and adjustment of guards
- correct work methods to be used
- how to recognize faults that could cause harm
- limitations and capabilities of the machine emergency procedures

| Self-Check -4 | Written Test |
|---|---|

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

1. List five categorization of in service training (5pts)

***Note:*** **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

**Answer Sheet**

Score = _____

Rating: _____

Name: _____ Date: _____

**Short Answer Questions**

1. _____
   _____
   _____
   _____

## References

Alders, R.G. & PYM, R.A.E. 2009. Village poultry: Still important to mil lions eight thousand years after domestication. *World's Poultry Science Journal,* 65: 181–190.

Gueye, E.F. 2000. The role of family poultry in poverty alleviation, food security and the promotion of gender equality in rural Africa. *Outlook on Agriculture,* 29(2): 129–136.

**The Instructors (who developed the Learning Guide)**

| No | Name of Learning guide developer | TVET Represent | Phone number | e-mail |
|---|---|---|---|---|
| 1. | Abadi Brhanu | Maichew ATVET College | 0920870056 | adonayabadi@gmail.com |
| 2. | Alemayehu Tolera | Bako ATVET College | 0994132626 | toleraalex@gmail.com |
| 3. | Alemu Abate | Burie Poly-technic TVET College | 0912355539 | adoni4@gmail.com |
| 4. | Alula Tesfaye | Assosa ATVET College | 0912004697 | alula188@gmail.com |
| 5. | Bekele Abdissa | Agarfa ATVET College | 0920839098 | bakeabdi@gmail.com |
| 6. | Dereje Kebede | Nedjo ATVET College | 0911530210 | derejekebede2012@gmail.com |
| 7. | Ewunetu Bekele | Bako ATVET College | 0920096917 | esewunetu@gmail.com |
| 8. | Mesfin Getachew | Walaita Soddo ATVET College | 0916475289 | dukekeshamo@gmail.com |
| 9. | Terefe Tolcha | Alage ATVET College | 0911067132 | terefetc@gmail.com |