Poultry Production

NTQF Level -III

Learning Guide -47

Unit of Competence: - Mix and mil standard stock feed

Module Title: - Mixing and milling standard stock feed

LG Code: **AGR PLP3 M12 LO1-LG-47**

TTLM Code: **AGR PLP3TTLM 0120v1**

LO 1: Prepare to work with poultry feed

Instruction Sheet	Learning Guide #-47

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

- Interpreting and confirming Work to be undertaken from the work program
- Identifying **OHS hazards**, assessing risk and implementing suitable controls.
- Selecting, using and maintaining Suitable **personal protective equipment**
- Selecting, Checking, and maintaining tools and equipment
- Identifying environmental implications and undertaking work

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 –**

- Interpret and confirm Work to be undertaken from the work program
- Identify **OHS hazards**, assess risk and implement suitable controls.
- Select, use and maintain Suitable **personal protective equipment**
- Select, Check, and maintain tools and equipment
- Identify environmental implications and undertaking work

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to7.
3. Read the information written in the “Information Sheets 1, 2, 3, 4 and 5”. 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 -5, 8, 15, 18 & 21, 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 answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Information Sheets”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio

Information Sheet-1	Interpreting work to be undertaken from the work program

The work program of mixing and milling standard stock feed is ordering, storing and mixing feed for poultry being produced intensively. Good feed mixing involves the skill of observation backed by analysis of performance and ration ingredients.

Feed and feed ingredients should be obtained and maintained in a stable condition so as to protect feed and feed ingredients from contamination by pests, or by chemical, physical or microbiological contaminants or other objectionable substances during production, handling, storage and transport. Feed should be in good condition and meet generally accepted quality standards. Where appropriate, good agricultural practices, good manufacturing practices (GMPs) and, where applicable, Hazard Analysis and Critical Control Point (HACCP) principles should be followed to control hazards that may occur in food. Potential sources of contamination from the environment should be considered.

The prerequisite programs might include: - quality assurance procedures, feed formulations, employee feed and ingredient handling practices.

GMP indicates a series of manufacturing and administrative procedures aimed at ensuring that products are consistently made to meet specifications and customer expectations

It supports and brings together many programs, systems, and philosophies that lead to an effective food business providing safe and quality products. The three main elements of GMP are feed safety, good practice, and quality.

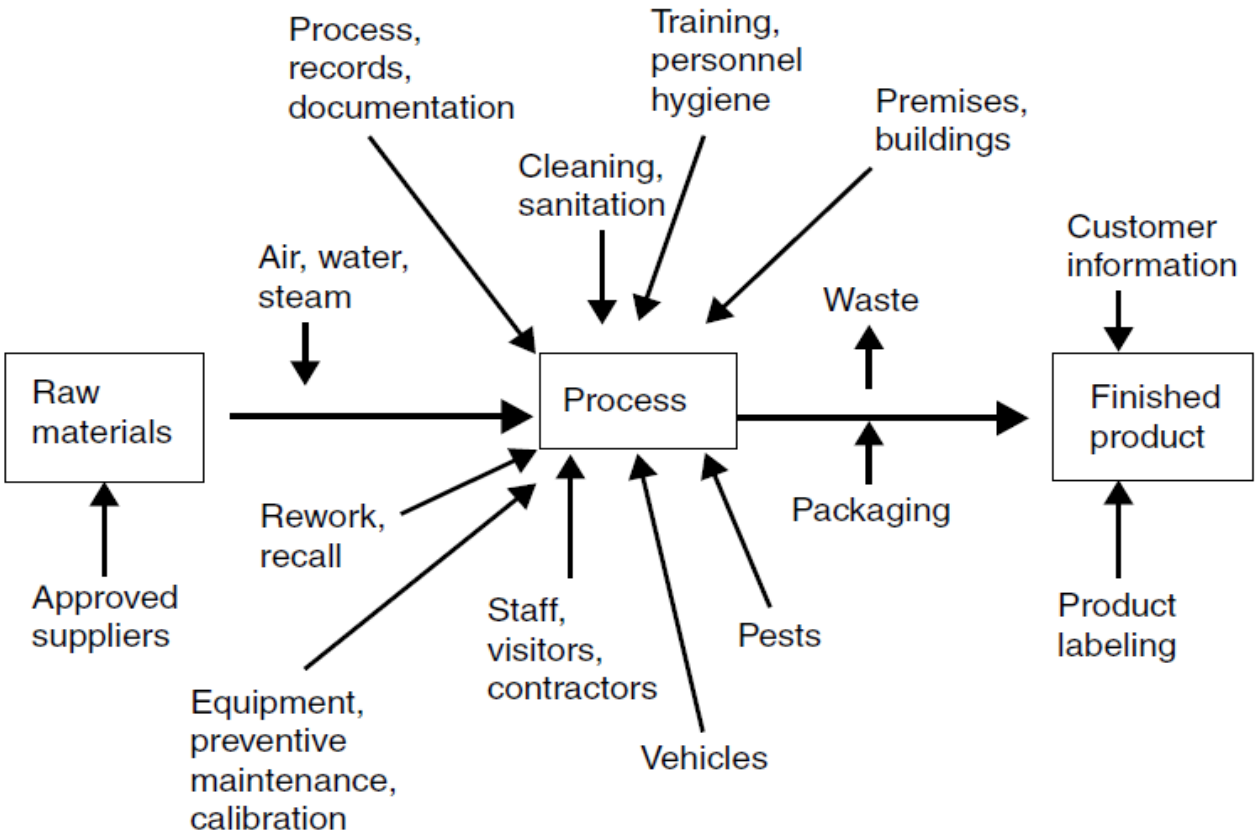

Fig 1: Summery of activities in feed mixing and milling process

Self-Check -1	Written Test

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

1. What is the three main elements of good manufacturing practice of feed processing?(3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____

Information Sheet-2	**Identifying OHS hazards, assessing risk and implementing suitable controls.**

Hazard: Anything (e.g. condition, situation, practice, behaviour) that has the potential to cause harm, including injury, disease, death, environmental, property and equipment damage. A hazard can be a thing or a situation.

Hazard Identification: is the process of examining each work area and work task for the purpose of identifying all the hazards which are "inherent in the job".

- Work areas include but are not limited to machine workshops, feed lines, storage sheds, office areas, feed processing areas, feed stores and feed transport, machine maintenance.

- Work Tasks can include (but may not be limited to) using screen based equipment (hand rails and ladder cages), audio and visual equipment, industrial equipment, hazardous substances and/or teaching/dealing with people, driving a vehicle, dealing with emergency situations, milling.
- This process is about finding what could cause harm in work task or area.

Risk: The likelihood, or possibility, that harms (injury, illness, death, damage etc) may occur from exposure to a hazard.

Risk Assessment: Is defined as the process of assessing the risks associated with each of the hazards identified so the nature of the risk can be understood. This includes the nature of the harm that may result from the hazard, the severity of that harm and the likelihood of this occurring.

Risk Control: Taking actions to eliminate health and safety risks so far as is reasonably practicable. Where risks cannot be eliminated, then implementation of control measures is required, to minimise risks so far as is reasonably practicable. A hierarchy of controls has been developed and is described below to assist in selection of the most appropriate risk control measure/s.

Monitoring and Review: This involves ongoing monitoring of the hazards identified, risks assessed and risk control processes and reviewing them to make sure they are working effective.

A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazard. The ISO Risk Management Principles and Guidelines standardize risk assessment in four parts:

- Risk identification,
- Risk analysis,
- Risk evaluation, and
- Risk treatment.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet:

1. Identify the difference between hazard and risk (4pts)
2. What hazard identification?(2pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
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   _____
2. _____
   _____
   _____

Information Sheet-3	Selecting, using and maintaining Suitable personal protective equipment

3.1. Selecting of suitable personal protective equipments

PPE should be selected based primarily on the hazards identified during the assessment. However, employers should also take the fit and comfort of PPE into consideration when selecting appropriate items for each employee. PPE that fits well and is comfortable to wear will encourage employee use of PPE. Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee.

Selecting the most suitable PPE should take into consideration the following elements:

- Ability to protect against specific workplace hazards (milling, mixing, storage and handling of stock feeds.)
- Should fit properly and be reasonably comfortable to wear
- Should provide unrestricted vision and movement
- Should be durable and cleanable

Based on above information, the suitable personal protective equipments relevant to the standard will be selected. These are Boots, hats/hard hat, overalls, gloves, protective eyewear, hearing protection, respirator or face mask, and sun protection (sun hat, sun screen).

3.1.1. Eye and Face Protection

The selection of eye and face protection are also consider the above elements. Some of the most common types of eye and face protection include:

Safety Glasses	Safety glasses have safety frames constructed of metal or plastic and impact-resistant lenses. Side protection is required.
Chemical Splash	Tight fitting eye protection that completely covers the eyes, eye sockets and facial area surrounding the eyes. Provides protection from impact, dust and

Goggles	splashes.
Dust Goggles	Dust goggles, sometimes called direct ventilated goggles, are tight fitting eye protection designed to resist the passage of large particles into the goggles.
Fluid Resistant Shields	These shields are fluid resistant or impervious and provide splash protection from biological material, such as human or non-human primate body fluids. These shields do not provide protection against chemicals or impact hazards
Face Shields	These shields extend from the eyebrows to below the chin and across the width of the employee's head. Face shields protect against potential splashes or sprays of hazardous liquids. When worn for protection against UV, must be specifically designed to protect the face and eyes from hazardous radiation. Used for chemical protection or UV protection
Laser Eyewear	Protective eyewear is required for Class 3 and 4 laser use where irradiation of the eye is possible. Such eyewear should be used only at the wavelength and energy/power for which it is intended.
Welding Shields	Constructed of vulcanized fiber or fiberglass and fitted with a filtered lens, welding shields protect eyes from burns caused by infrared or intense radiant light; they also protect both the eyes and the face from flying sparks, metal splatter and slag chips produced during welding, brazing, soldering and cutting operations

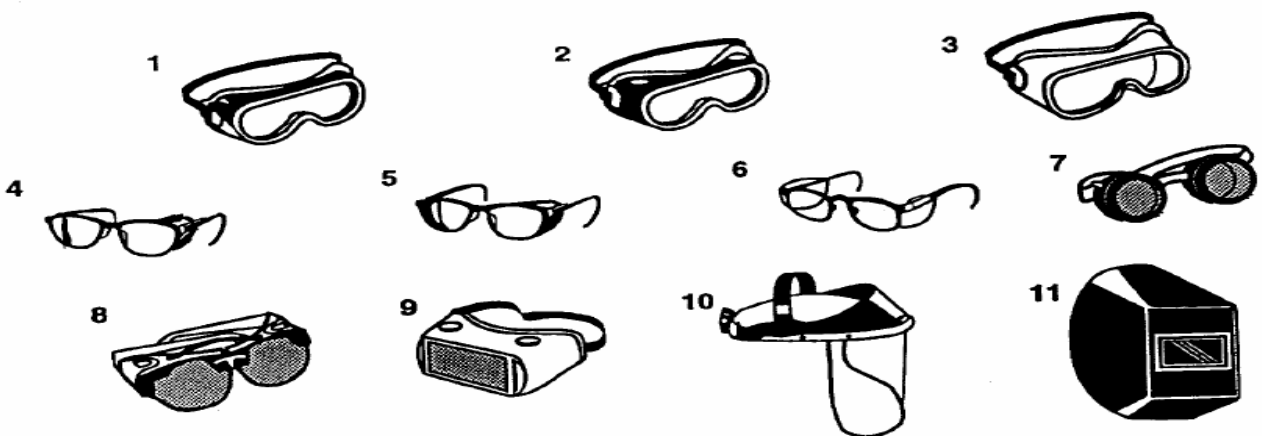

Fig 1: Different eye and face protectors

3.1.2. Foot and legs protective

Potential hazards which may lead to feet and legs injuries include falling or rolling objects, crushing or penetrating materials, hot, corrosive or poisonous substances, electrical hazards, static electricity, or slippery surfaces.

Different footwear protects in different ways. Check the product's labelling or consult the manufacturer to make sure the footwear will protect the user from the hazards they face.

Foot and leg protection choices include the following:

- **Leggings.** Protect lower legs and feet from heat hazards, like molten metal or welding sparks. Safety snaps allow leggings to be removed quickly.
- **Metatarsal Guards.** Strapped to outside of shoes to protect instep area from impact and compression. Made of aluminium, steel, fibre or plastic.
- **Toe Guards**. Fit over the toes of regular shoes to protect only the toes from impact and compression. Made of steel, aluminium, or plastic.
- **Combination Foot and Shin Guards.** May be used in combination with toe guards when greater protection is needed.
- **Safety Shoes.** These have impact-resistant toes and heat-resistant soles that protect against hot work surfaces common in roofing, paving, and hot metal industries.
    - May have metal insoles to protect against puncture wounds
    - May be designed to be electrically conductive for use in explosive atmospheres
    - May be designed to be electrically nonconductive to protect from workplace electrical hazards

3.1.3. Hand and Arm Protective

Potential hazards to hands and arms include skin absorption of harmful substances, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts, punctures, fractures or amputations. Protective equipment includes gloves, finger guards and arm coverings.

Types of Protective Gloves

There are many types of gloves available today to protect against a wide variety of hazards. The nature of the hazard and the operation involved will affect the selection of gloves. The variety of potential occupational hand injuries makes selecting the right pair of gloves challenging. In general, gloves fall into the following four categories:

1. Leather, Canvas or Metal Mesh Gloves: These types of gloves protect against cuts, burns and punctures.
2. Fabric and Coated Fabric Gloves: These types of gloves are made of cotton or other fabric. They generally protect against dirt, chafing and abrasions.
3. Insulating rubber gloves: These gloves are used for protection against electrical hazards. For more information on insulating rubber gloves for electrical work,
4. Chemical and liquid resistant gloves: When working with chemicals with a high acute toxicity, working with corrosive materials in high concentrations

Fig 2: Different hand gloves

3.1.4. Hearing Protection

When an employee's noise exposure cannot be reduced to safe levels, then hearing protection must be worn. There are several options for hearing protection available that include ear plugs, ear muffs, and hearing bands, which are also known as canal caps. Each should be carefully considered for the noise reduction they will provide, as well as for comfort and fit.

Fig 3: hearing protectors

3.1.5. **Body Protective's**

Workplace hazards that could injure the employees' bodies include the following:

- ❖ Intense heat
- ❖ Splashes of hot metals and other hot liquids
- ❖ Impacts from tools, machinery, and materials
- ❖ Cuts
- ❖ Hazardous chemicals, dusts and feed powdery
- ❖ Contact with potentially infectious materials, like moulds
- ❖ Radiation

Types of Body Protective

- ❖ Vests
- ❖ Jackets
- ❖ Aprons
- ❖ Coveralls
- ❖ Full body suits

Fig 4: body protective

Materials for Protective Clothing

- **Paper-Like Fibre.** Disposable suits made of this material provide protection against dust and splashes.
- **Treated Wool and Cotton.** Adapts well to changing workplace temperatures. Comfortable and fire resistant. Protects against dust, abrasions, and rough and irritating surfaces.
- **Duck.** Protects employees against cuts and bruises while they handle heavy, sharp, or rough materials.
- **Leather.** Often used against dry heat and flame
- **Rubber, Rubberized Fabrics, Neoprene, and Plastics.** Provides protection against certain acids and other chemicals.

3.2. Inspection, Use and Maintaining of PPE

All PPE should be inspected for signs of degradation or puncture before use. Test for pinholes by blowing or trapping air inside and rolling them out. Do not fill them with water, as this makes the gloves and foot wears uncomfortable and may make it more difficult to detect a leak when wearing the glove.

Disposable PPE should be changed when there is any sign of contamination. Reusable PPE should be washed frequently if used for an extended period of time.

While wearing gloves, be careful not to handle anything but the materials involved in the procedure. Touching equipment, phones, wastebaskets or other surfaces may cause contamination. Be aware of touching the face, hair, and clothing as well.

Before removing them, wash the outside of the glove. To avoid accidental skin exposure, remove the first glove by grasping the cuff and peeling the glove off the hand so that the glove is inside out. Repeat this process with the second hand, touching the inside of the glove cuff, rather than the outside. Wash hands immediately with soap and water.

Follow the manufacturer's instructions for washing and caring for reusable gloves.

Self-Check –3	Written Test

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

1. List the elements considered in selection of most suitable PPE.(5pts)
2. Write at list 4 types of protective equipments used in the feed milling and mixing.(4pts)
3. What care you should take in using and removing of hand gloves?(2pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

Information Sheet 4	Selecting, Checking, and maintaining tools and equipment

4.1. **Selecting and checking tools and equipments**

A number of manufacturers supply ranges of feed milling and mixing equipments and will advise on the selection of suitable models if provided with full information on the proposed operation. This must include:

- the proposed capacity of the mill,
- the types of raw materials available,
- the types of livestock feed to be produced
- the characteristics of the power supply available.

Equipments and containers selected should be made of non toxic materials, capable of being disassembled to allow proper maintenance, cleaning and inspections.

Generally, the technological process of a small and medium-sized livestock and poultry feed mill plant is composed of **raw material receiving, crushing, batching, mixing, granulating, cooling, screening and finished product packaging section**. The core production equipment is crusher, mixer, granulator, etc.

The selection of these equipments plays an important role in feed production and feed quality assurance.

The tools and equipments used for mixing and milling feed and feed ingredients are as follows but not limited to

- Spoon
- Knifes
- Spade/shovel
- Auger
- Bucket
- Sieve
- scale (plat form beam, dial)
- Mixer
- Miller (hammers and rollers)
- Wheel barrow
- Brushes
- Bags
- Wooden pallets
- Sack track
- Vehicle /cars
- Generator

- ✓ Mixers must be appropriate for the range of weights and volumes required to obtain homogeneous mixtures.
- ✓ Weighing equipment such as scales and other metering devices should be appropriate for the weights and volumes to be used. Accuracy of the weighing and dosage equipment should be compatible with the items to be weighed.
- ✓ Sieves, screens, filters and separators should be regularly checked for possible damage and to ensure their effective operation
- ✓ Coatings, paints, chemicals, lubricants and other materials used for surfaces or equipment that may have contact with feed should check not contribute to unacceptable contamination of feed before use.
- ✓ Equipment should be placed away from the walls to facilitate cleaning and maintenance and to prevent pest infestation.

4.2. Routine maintenance

All mechanical equipment is subject to wear and tear and regular maintenance should form part of the working schedule. Machinery manufacturers will give advice on maintenance programmes and a supply of spare parts should be kept in stock, a list of typical spare parts being given below.

- ➢ Grinder screen and hammers
- ➢ Auger and elevator bearings
- ➢ Belts and bushes
- ➢ Spare motors
- ➢ Pelleter dies and rollers
- ➢ Dust filter socks
- ➢ Elbows and bends in ducting which may be pron.P to wear
- ➢ Miscellaneous nuts and bolts
- ➢ Electrical spares, etc.

It is important therefore to budget for spare parts when purchasing new equipment or when determining annual inputs for an established feed mill.

Self-Check –4	Written Test

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

1. Write at 5 tools and equipments used in feed and feed ingredients mixing and milling(5pts)
2. How do you select those tools for specific purposes?(3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
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2. _____
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Information Sheet 5	Identifying environmental implications of poultry feed preparation work

Environmental Implication is a process of evaluating the likely environmental impacts of a proposed project or work, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

Poultry farming is the one consider environmental consideration during farming. Because factory poultry (chicken) farming concentrates huge numbers of chickens in small areas, feces and manure production, sick and dead animals, microbial pathogens and feed additives take a toll on the environment.

Feed production, processing and transport caused greater environmental impacts than those from any other component of production. Mixing and milling industries to be considered those involved in manufacturing end products for human consumption and livestock from raw materials imported or grown in rural areas, with animal feed simply a by-product.
With the work the environmentally relevant factors of noise, dust, process water and pesticides are considered.

The sector concerned can be divided essentially into **four parts**:

- storage, drying and seed dressing,
- flour mills,
- hulling mills,
- Heat treatment.

Given the processing techniques employed today, it may generally be assumed that large volumes of **air** are required to **produce milled and hulled products** (flour, wholemeal products, flakes, grains etc.), in addition to **power** for cleaning, hulling, grinding (milling) and the transport of intermediate and end products.
This air is used mainly for vertical and horizontal transfer inside the milling or hulling system and for dust extraction from the processing units and the entire mill complex. Furthermore, under certain climatic conditions **cool air** is required to ventilate power plant and processing machinery as well as the entire building complex.

Industrial wastewater is produced only in the cereal washing department in the mill industry, and even then only where granular or wholemeal products are to be produced. The modern mill industry makes particular use of a dry cleaning process which separates out impurities by means of screens and weighing sorters. If the plant also produces bulgur and parboiled rice, process water with low starch content is produced.

The wastewater from waste-recycling power generating plants, particularly that from rice husk gasification for the production of lean gas for gas-engine powered plants, has a phenol content of over 0.03 mg/l. When husks are burnt to produce steam, a residual quantity of 18% ash in relation to the quantity input must be disposed of. The same applies to gas plants.

It can therefore generally be stated that the environmental impacts of the feed processing operation lie in the following areas:

- dust emission,
- noise nuisance,
- hazard of dust explosions and fires,
- odour nuisance to a limited degree,
- hazard of toxic gas,
- recycling of residual substances and waste disposal,
- Process water.

The environmental protection measures to be observed for feed processing in:

- Dust emission values
- Noise emissions
- Waste gas emissions

Self-Check –5	Written Test

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

1. What environmental impact assessment? (2pts)
2. What the environmentally related factor of livestock feed processing?(3pts)
3. List the areas in feed processing operation impact on environment(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

List of References

Ramesh, R., Prabu, M., Magibalan, S. and Senthilkumar, P., 2017. Hazard identification and risk assessment in automotive industry. *International Journal of ChemTech Research*, *10*(4), pp.352-358.

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Poultry Production

NTQF Level -III

Learning Guide -48

Unit of Competence: - Mix and mil standard stock feed

Module Title: - Mixing and milling standard stock feed

LG Code: **AGR PLP3 M12 LO2-LG-48**

TTLM Code: **AGR PLP3TTLM 0120v1**

LO2: Order and store feed and ingredients

Instruction Sheet	Learning Guide #-48

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

- Ordering **Ingredients** previously selected from the supplier
- Storing Ingredients and feed safely in the location
- Rotating and ordering stock replacements to arrive at the appropriate time
- Completing all required records and documentation accurately and promptly

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 –**

- Order **Ingredients** from the supplier
- Store Ingredients and feed safely in the location
- Rotate and order stock replacements
- Complete all required records and documentation

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”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check1, 2, 3, and 4” **in page -6, 10, 13 and 16.**
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 answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “next Information Sheet”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet 1	Ordering previously selected Ingredients from the supplier

Feed and feed ingredients should be obtained and maintained in a stable condition so as to protect feed and feed ingredients from contamination by pests, or by chemical, physical or microbiological contaminants or other objectionable substances during production, handling, storage and transport

.**Feed ingredients** for poultry diets are selected for the nutrients they can provide, the absence of anti-nutritional or toxic factors, their palatability or effect on voluntary feed intake, and their cost. The key nutrients that need to be supplied by the dietary ingredients are amino acids contained in proteins, vitamins and minerals. All life functions also require energy, obtained from starches, lipids and proteins.

Feed ingredients are broadly classified into cereal grains, protein meals, fats and oils, minerals, feed additives, and miscellaneous raw materials, such as roots and tubers.

In most circumstances the raw materials coming into a feed process area will have been requested by the nutritionist as being necessary to meet the nutrient requirements of the diet to be manufactured. In developing countries raw materials will normally be delivered or collected from a supplier. The manufacturer's buyer should have a set of standards for ingredients to be purchased and only purchase from reputable ingredient sellers who will comply with the mills purchasing. Ideally the commodity merchants and supplement companies, from which feed ingredients are purchased, should provide the buyer with specifications of exactly what is to be bought.

It is inevitable that the quality of ingredients will vary, even from the same supplier from batch to batch and/or from month to month, and so it is important that this variability be characterised and monitored. Within an ingredient, nutrient content can vary significantly from one supplier to the other. For this reason, it is important to determine the nutrient content of an ingredient by supplier. Nutrient content of an ingredient can also vary by season and year. For this reason following identifies various factors to consider when deciding on the purchase and use of alternative feed ingredients.

- Composition and quality
- Variability
- Nutrient digestibility and availability
- Palatability
- Consistency in supply
- Stability
- Anti nutritional factors

Feed ingredients used in animal feeds must meet all guarantees and any pre-determined buying specifications. These guarantees include both physical and chemical parameters. The physical evaluation provides preliminary information on the quality of the ingredient. It involves assessing physical qualities such as weight, colour, smell, and whether the ingredient is contaminated with foreign material.

Chemically, feed ingredients are made up of water and dry matter.

Therefore, ingredients will largely order depend on the type, quality and quantity of stock.

Selected ingredients are ordered based on:

- Nature of ingredients.
- Level of their quality
- Rate at which items are used
- Money/credit available
- Season of use
- Customer/guest demand, needs, wants and preferences.

Options for placing orders with suppliers include:

- Purchase orders
- Verbal orders
- Standing orders
- Telephone orders
- Online orders
- Facsimile orders

- Manual or computerised stock control/management systems.

It is important to identify deliveries expected on any given day so appropriate preparation and arrangements can be made to accept and check those deliveries.

Purchase order

When ordering stock, the Purchasing Officer or staff member may complete a Purchase Order.

The order is then usually phoned or faxed through to the supplier, or it may be mailed.

In other limited instances, the Purchase Order may be given directly to a sales representative in-person.

When the stock is delivered, the delivery and invoice must be checked against the Purchase Order to ensure everything ordered has been delivered.

Purchase Orders have an identifying number on them so reference can easily be made to a specific order. The duplicate Purchase Order may stay in the Purchase Order book to be used as the point of reference when making delivery checks.

Self-Check –1	Written Test

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

1. What are ingredients used in poultry feed?(5 pts)
2. List the factors influence the order of ingredients(3pts
3. What are option placing ordering (2pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

_____

2._____

_____

3._____

_____

Information Sheet 2	Storing Ingredients and feed safely in the location

All types of ingredient, as well as completed compound feeds, require special care during storage to prevent deterioration in quality, and loss. Additionally they are very valuable commodities and need to be subjected to careful stock control to prevent theft.

Good storage is essential because the value of the feed depends on it. Feed spoils during storage -whether it deteriorates quickly or slowly depends partly on its quality when you receive it but very largely on how you store it on your farm.

Recommendations for storage procedures are given. Throughout, it has been assumed that feed will be stored in bags or other small containers, not in bulk bins which are unlikely to be found on small farms.

Environmental factors, such as moisture (feed moisture content and relative humidity), temperature, light, and oxygen influence deteriorative changes and losses in feedstuffs. These affect the feedstuff either directly or by influencing the rate of development of insects and fungi which consume the feed during storage.

The following are the major factors which affect the quality and weight of feedstuffs during storage:

- Major losses due to human theft, fire and the consumption of scavenging animals, such as rats and birds
- Damage due to rain and condensation, and to high temperatures
- Damage by insects
- Damage by fungi
- Changes in the quality of the feeds due to enzymatic actions and the development of oxidative rancidity

Of the above factors, Damage due to rain and condensation and to high temperatures is probably the most important as it influences the rate of loss or damage caused by most of the others listed. Though oxygen (from air) is necessary for the development

of oxidative rancidity and for the growth of fungi and insects, it is impracticable to exclude it from feed storage areas.

Some weight loss of feedstuffs during storage is unavoidable. The extent of loss is affected by:

- The general hygiene of the store, because that determines whether or not insects can breed in the buildings away from the produce;
- The turn-over of the goods, because they determine the length of storage;
- The way in which waste and odd lots are handled which determines whether or not large foci of infestation can develop in neglected produce; and
- The size of stacks and the closeness of packing. Most insect species are confined, more or less, to the surfaces of a stack, and weight loss is usually highest at the periphery.

If the stack is small and much of the heat is dissipated, the temperature will remain favourable for insects and weight loss will be very great. If the stack is large, the accumulated heat in the core will get too hot for the insects. After that, weight loss will occur only at the outside of the stack. For this reason, large stacks are advocated in the tropics. However, the high temperature has harmful effects that must be set against prevention of weight loss. Continuous high temperature accelerates chemical degradation, especially for vitamin destruction and the development of rancidity.

Feed storage areas should have the following characteristics:

- No direct access by birds (or other pets!)
- Dry and well ventilated –Well lit
- Clean and free dust
- Pest free

Storage Guidelines

- **Bagged Feed**

1. Store feed in a cool, dry, well ventilated area.
2. Rotate stock to use old feed first. “First in, first out” principle.

3. Keep bags stacked neatly on pallets to prevent feed from being in direct contact with damp floors.
4. Bags should be stacked to allow at least 18 inches between walls and upright supports. This allows for cleaning and placement of traps/bait boxes. This also prevents condensation on walls from damaging feed and permits necessary air flow around the bags.
5. Keep different types of feed separate and clearly marked. Be particularly careful not to mix bags of medicated and non medicated feed together.
6. If receiving skids of feed in plastic wrap, remove wrap before storing feed in warehouse. This allows better air flow around the product and helps prevent mold problems.
7. Rodent/insect control:
   - Keep exterior doors closed when not in use.
   - Position bait boxes/traps around interior and exterior walls. Glue boards or automatic traps on either side of warehouse doors are effective for preventing entry of rodents.
   - Clean up spilled feed immediately and remove torn bags as soon as possible. A continuous good housekeeping policy is the basis of any pest control program.
   - Regularly fog warehouse area with approved insecticide during warm months.
   - Regularly spray problem areas with good residual crack and crevice type insecticide.
   - Periodic fumigation of entire storage area may be required for severe problems, but is expensive and requires a qualified applicator.
   - Keep weeds and brush away from exterior of storage area.
   - Eliminate poor drainage areas which serve as breeding grounds for most insects.

8. Do not handle bags more than necessary and handle with care. Pelleted diets are designed to be durable, but they are not indestructible. Abusive handling will increase the dust level in the feed which results in poor water quality

❖ **Bulk Feed**

1. Bin design: bins should be designed to empty out completely and maintain air flow through the bin, preventing condensation.
2. Inspect bins regularly for leaks and repair immediately.
3. Allow bins to empty out completely between loads. Many bins have “dead” areas where old feed and dust can accumulate and spoil if new feed is continually put in on top of old.

4. Clean inside of bins regularly, removing encrusted material which acts as mould and insect growth areas.
5. Bins can be sealed and fumigated to kill insects, but be sure to use a qualified fumigant applicator

Self-Check –2	Written Test

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

1. Write the factors that affect quality and weight of feed stuff during storage (5pts)
2. List the character of feed storage area(5pts)

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____

2. _____
_____
_____

Information Sheet 3	Rotating and ordering stock and replacements to arrive at the appropriate time

The golden rule in **stock rotation** is **FIFO** '**First In, First Out**'. If feed is taken **out** of storage or put on display, it should be used in **rotation**. Feed **stock rotation** consists in using products with earlier use-by-date first and moving products with a later sell-by date to the back of the shelf/ bin.

What is stock rotation?

Stock Rotation – is essential to ensure old stock is used first. The aim should always be to minimize stock levels so the customers always receive the freshest stock feeds. If feed is taken out of storage or put on display, it should be used in rotation. Feed stock rotation consists in using products with earlier use-by-date first and moving products with a later sell-by date to the back to ware house

This ensures that feed is used within date and prevents unnecessary and costly waste (of feed that has passed its expiry date). Stock rotation applies to all feed types but is particularly important for high-risk feed.

How to implement stock rotation at storage?

You should ensure that all staff are aware of the importance of stock rotation and understand how your stock rotation system works. The following steps are essential to implement a feed stock rotation:

- Checking dates on bag when it is delivered, used or put on display
- Storing or displaying feed with a short shelf life at the front
- Storing or displaying feed with a longer shelf life at the back

- Always using food in the correct order
- Checking that food is in good condition before using it
- Removing any out-of-date stock from storage or display

Fig 1: Checking and stocking delivery feeds

Important of stock rotation

Stock rotation must be applied to help avoid situations such as:

- Stock loss due to items becoming out of date stock
- Stock looking old and tired by virtue of spending too long in storage. This stock is unattractive and customers will not buy it
- Damage to stock – or a reduction in quality – that may occur if stock spends excessive time in storage. The longer an item spends in storage the greater the risk of damage to it.

If a stock is nearing its use-by-date/ expiry date, stock may be reduced by including it in a day's special at a lower price in order to be more appealing to customers. While this is a possible way to reduce your stock wastage you must never try to offer a dish which contains

Self-Check –3	Written Test

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

1. Define stock rotation and its golden rule?(3pts
2. How to implement stock rotation at storage?5pts

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
2. _____
   _____
   _____

Information Sheet 4	Completing records and documentation accurately and promptly

Farmers must demonstrate the following for each raw material (including additives) utilised to produce feed ingredients:

i.) The name and address of the supplier of the raw material.

ii.) Information of the production or process from which the raw material is derived.

iii.) A risk assessment for each raw material, identifying potential hazards and the means by which these hazards are controlled by the supplier, the participant or both parties.

Delivery documents must be clear and unambiguous. All relevant contractual and legal information must be included on delivery documents or on labels attached to the product packaging. In obtaining and storing feed ingredients the following should be documented

Feed and feed ingredient register

- Feed is the major item of expenditure in poultry production. Hence, much care should be exercised in maintaining this register.
- For each of these items
  - ✓ the opening balance,
  - ✓ receipt issues,
  - ✓ rate per unit,
  - ✓ bill number,
  - ✓ unit price and mode of payment
  - ✓ storage loss,
  - ✓ manufacturing cost and
  - ✓ The closing balance has to be maintained.
- In the remarks column, the source of purchase, invoice number and date and cost per unit must be indicated.
- Since the feed ingredient prices vary frequently, the actual ingredient cost for each batch of feed mixed must be taken into account, for accurate calculation.
- Bins and containers must be properly labelled so there is no question to what ingredient is in what location

Feed additives and medicines register

- This register keeps track of the various feed additives, medicines, vaccines, disinfectants, chemicals purchased and utilized.
- The opening balance, receipts, issues, closing balance and a remarks column must be maintained for each item.
- In the remarks column, the invoice number, date, cost and source of each purchase have to be indicated.

Petty items or miscellaneous purchase/ expenditure register

- In this register, all miscellaneous purchases like tools, stationary, bulbs, nails etc. and other day-to-day expenditure has to be recorded and a monthly and annual consolidated report has to be prepared to calculate miscellaneous expenditure.
- In addition to the above mentioned common registers, the following specific registers have to be maintained, depending on the nature of the farm and type of enterprise.

The minimal information that should be collected on stock records for feed stock includes:

- Product name/ description,
- Stock on hand / beginning stock balance.
- Receipts Issues
- Losses/adjustments
- Closing/ending balance
- Transaction reference (e.g. Issues voucher number or name of supplier

All chemical usage should be recorded as well as any necessary recording of vehicle and equipment use in logbooks

Additionally, any assessment of pests and weeds, quality, module weights, breakdowns and yield should be recorded appropriately.

A feed mill operation is considered to be a food manufacturing facility, and should be operated under the same hygiene expectancy as human facilities. Record keeping systems used may be either paper-based or digital, and information will be recorded into logbooks or other records.

Self-Check –4	Written Test

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

1. What are the minimum in formations that should collected from stock feed?(5pts)
2. Write the information that should be maintained regarding to feed and feed ingredients(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

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Poultry Production

NTQF Level -III

Learning Guide -49

Unit of Competence: - Mix and mil standard stock feed

Module Title: - Mixing and milling standard stock feed

LG Code: **AGR PLP3 M12 LO3-LG-49**

TTLM Code: **AGR PLP3TTLM 0120v1**

LO3: Mix feed

Instruction Sheet	Learning Guide #- 49

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

- ❖ Calibrating scales and containers to be used for measurements
- ❖ Identifying **and** obtaining **Ingredients** from instructions and from storage locations.
- ❖ Measuring Ingredients in the specified ratios and quantities.
- ❖ Blending and milling Ingredients adequately and **hygienically.**

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 –**

- ❖ Calibrate scales and containers to be used for measurements
- ❖ Identify **and** obtain **Ingredients** from instructions and from storage locations.
- ❖ Measure Ingredients in the specified ratios and quantities.
- ❖ Blend and mill Ingredients adequately and **hygienically.**

Learning Instructions:

8. Read the specific objectives of this Learning Guide.
9. Follow the instructions described in number 3 to 7.
10. Read the information written in the “Information Sheets 1, 2, 3 and 4”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
11. Accomplish the “Self-check 1, 2, 3 and 4” **in page – 5, 9, 14 and 22, respectively.**
12. 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 answer only after you finished answering the Self-check 1).
13. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
14. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet 1	Calibrating scales and containers to be used for measurements

Calibration is a process of ensuring and maintaining the accuracy of a **weighing** instrument in alignment with a standard or accepted range of results. Therefore **weighing scale calibration** is considered the process of correcting, determining and checking the **scale** is meeting its known or assigned accuracy. Calibration is needed to determine the accuracy of a measuring instrument and the degree of deviation from a known standard. Any measurement instruments (weighing scale) should be calibrated regularly to assure that they are measuring correctly and accurately.

If equipment is found to be performing outside acceptable calibration limits the participant must investigate the effect this will have on the conformity of any feed ingredients and take appropriate corrective action to recalibrate the equipment.

Depending on the severity of the discrepancy and the nature of the test, the participant must be able to demonstrate that appropriate action has been taken (for example feed ingredient recall)

All inspection, measuring and test equipment used to confirm that feed ingredients meet specified feed safety requirements must be calibrated at intervals not exceeding 12 months.

Calibration Interval Options:

Fixed Interval — Calibrate after a set amount of time, like three, six or nine months. This is an easy method to implement and carry out but may limit accuracy with respect to the "correct" interval.

Automatic Adjustment —Each time an instrument is calibrated, the subsequent interval is extended if it is found to be within the maximum permissible error required for measurement, or reduced if found to be outside this maximum permissible error. This option is a bit more complicated, as you're evaluating after every calibration and making a decision based on historical data, and accuracy can still be an issue.

In-Use Time — Easy to calculate and potentially more accurate, but cannot be used with all instruments and can be expensive and time consuming to track all your instruments' usage. For this option, you'll plan your calibrations based on their use, such as calibrating a device after 1,000 hours of use or after every 1,000 measurements.

Similar Items — Use the same interval as like devices. Simple, but you need to make sure both devices have a similar risk tolerance, usage, and environment.

Control Charts — can be very accurate but much more complicated to implement.

Professional Calibration Service — offers a convenient alternative to the above options. Your service provider evaluates your instrument and its performance, offering a recommended calibration interval. The most substantial benefit of this option is the

Importance of calibration

There are technical and legal reasons why calibration is performed. Instrument is calibrated for four main reasons

- To determine the accuracy of the instrument readings
- To ensure readings from the instrument are consistent with other measurements
- To establish the reliability of the instrument, i.e., that it can be trusted
- To establish and demonstrate metrological traceability

To guarantee interchangeability of parts, it is fundamental to establish traceability of measurements to national standards by means of calibration. In particular, suppliers and customers producing and assembling parts with other components must ensure valid measurement results and need to measure parts with the “same measure.” For organizations with quality management systems, calibration is also a requirement of ISO 9001, which states that “when necessary to ensure valid results, measuring equipment shall be calibrated, or verified, or both, at specified intervals, or prior to use, against measurements standards traceable to international or national measurements standards”

Self-Check -1	Written Test

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

1. Define what calibration is?(2pts)
2. Why calibration is needed?(3pts)
3. Discuss the calibration interval options.(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

Information Sheet 2	Identifying and obtaining Ingredients

Poultry diets are primarily made up of macro **ingredients** such as cereal grains (eg wheat, barley and sorghum) and oilseed meals (such as soya bean or canola meal) or animal by-product meals. Cereal grains make up between 60-70% of the diet and are the major source of energy in the diet.

These are raw material for compound feeds. Raw materials for feed or feed ingredients are the building stones of a compound feed. Before attempting to formulate a balanced, compound feed for poultry we need to pay attention to the ingredients

The following will be dealt with for identification:

- Identify and recognize the different ingredients: Use your eyes, your nose, and your touch. Do not taste!
- Know their origin: what product are they or from what processes are they the (by) product?
- Look for their strong and weak properties, the effect they have on the feed, the animal and its performance
- To what extent can we use them in the different feeds?(inclusion rates)

The details of ingredients and their sources

- **Cereal grains and cereal grain by-products**
  - They are food for humans as well as feed for animal production. e.g., barley, wheat, rye, oats, maize, sorghum, millet and rice.

Fig2: Example of feed ingredients

- **Oil seed and their by-products**
  - Predominantly grown for their oil, mostly to be used for human consumption
  - Contain 20-60% oil, many of the remainders, by-products, contain good quality protein, and are of great value for animal nutrition
  - The nutritional value of these by-products depends very much on being fully or partially de husked. Particularly in by-products from peanuts, cottonseed, soybeans and sunflower seeds, the husks can have a negative influence on the digestibility and nutritional value.
  - Products with high CF have likely low protein content, and a low nutritional value.
  - The more oil remains in the by-product, the lower its protein content, but a much higher energy level.
- **Products of animal origin**
  - The nutritional quality of animal protein is higher than that of plant protein.
  - Rich in minerals and vitamins.
- **Leaf meal**

The nutritional value can vary, and depends on:

1. *Stage of growth,*

2. *Plant nutrition*
3. *Storing,*
4. *Way of drying*

- **Dried sugar beet pulp**
  - **Molasses:** the by-product of raw syrup and sugar, made from sugar beets and sugar cane.
  - **Sugar**: molasses should contain minimum 45%. Too much ash or moisture will lower the sugar proportion.
  - **Protein:** consists mostly of amides, which is not real protein, and is rumen degradable.
  - **Minerals:** Rich in potassium, and together with the sugar, potassium causes wet manure.
  - Used for not only for its nutritional value but also to bind the feed components for pelleting.

Even though the number of ingredients may vary, different groups can be classified:

- Main ingredients (soy, corn and wheat etc., typically > five percent of the formulation)
- Minerals and major additives (limestone, salt, phosphorus etc., 1-5 % of the formulation)
- Micro ingredients (amino acids, vitamins, < one percent of the formulation)
- Medication (<< 0.1 percent)

These ingredients and feeds are classified as:

- **Chick feed:** Feed that fed to layer chicks up to the age of 6 or 7 weeks.
- **Grower feed:** feed that gradually substituted for the chick feed (no sudden changes). It may be fed to pullets until the point of lay
- **Layer feed:** fed from the point of lay until the end of the production period. Different kinds of feed can be used if phase feeding is applied.

Self-Check -2	Written Test

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

1. Identify the ingredients of poultry diet and its source (10pts)
2. How you intended to identify the ingredients of poultry diets(5pts)

Note: **Satisfactory rating - 15 points** **Unsatisfactory - below 15 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

Information Sheet 3	Measuring Ingredients in the specified ratios and quantities.

The accurate weighing of raw materials according to the formulation for a given ration is perhaps the most important unit operation involved in feed manufacture. The point at which weighing occurs in the feed milling process will depend upon the design of the mill. Raw materials may be selected from store, weighed and then subjected to grinding and mixing, or materials may be pre-ground, then weighed and mixed. There are advantages and disadvantages in both approaches and their choice will depend upon the raw materials to be processed and the design considerations of machinery manufacturers.

Pre-grind refers to the storage of individual raw materials after grinding which are held in bins before weighing and mixing in their specific formulation. With post grind, the raw materials are weighed out in batches as required from their main storage bins before each batch is ground prior to mixing.

The weighing of raw materials requires great care and inaccuracies must be kept to a minimum. It should be noted that errors in the weighing of small quantities of raw materials often have far greater influence on the growth performance of animals than errors in the weighing of large quantities of material.

The use of accurate scales is of particular importance when handling expensive and/or potent raw materials such as vitamins and medicinal additives which are added at low inclusion rates.

Each type of chicken has special needs. Their feed has to match the age and the way they are being kept, which is why we make special feed for each group of chickens. We use a special recipe, according to which we weigh the materials and put them in the mill. Each category of chicken has its nutritional requirement. For example, if we want to make feed for layers, the feed should have at least 18 per cent crude protein.

If one was to formulate feed for layers, then they would have to calculate the percentage of DCP in each of the ingredients they want to use to ensure that the total crude protein content is at least 18 per cent.

Therefore, to make a 70kg bag of feed for layers, a farmer would require the following ingredients:

- 34kg of whole maize
- 12kg of soya
- 8kg of meal (fishmeal)
- 10kg of maize bran
- 6kg of lime (as a calcium source)

To find out if all the above ingredients meet this standard of 18% crude protein, a farmer can do a simple calculation as follows:

- Whole maize — 34kg x 8.23 ÷100 = 2.80 %
- Soya — 12kg x 45kg ÷ 100 = 5.40 %
- Meal — 8 kg x 55kg ÷ 100 = 4.40 %
- Lime — 6 kg x 0 kg ÷ 100 = 0.00%
- Total % of crude protein = 13.30%

To get the total crude protein percentage of all these ingredients in a 70kg bag of feed, the farmer should take this crude protein content of the combined ingredients, divide by 70kg and multiply by 100, thus — 13.30 ÷70 ×100 = 19%; this shows that the crude protein content of the above feed formulation is 19%, which is quite adequate for layers.

To ensure the chicken to get all they need in terms of nutrients such as vitamins, minerals and amino acids, you need these additives in their standard quantities.

Making a 70 kg layers of layers chick mash (1-4 weeks)

Growing chicks require feed with Digestible Crude Protein (DCP) of between 18 to 20 per cent. The following formulation can be used to make a 70kg bag of layers chick mash:

Ingredients

- 31.5kg of whole maize
- 9.1kg of wheat bran
- 7.0kg of wheat pollard
- 16.8 kg of sunflower (or 16.8 kg of linseed)
- 1.5kg of fishmeal
- 1.75kg of lime
- 30g of salt
- 20g of premix Amino acids
- 70g of tryptophan
- 3.0g of lysine
- 10g of methionine
- 70 g of Threonine
- 50g of enzymes
- 60g of coccidio stat
- 50g of toxin binder

Making a 70 kg bag of growers mash (4 to 8 weeks)

Growers (pullets or young layers) should be provided with feed having a protein content of between 16 and 18 per cent. Such feed makes the young layers to grow fast in preparation for egg laying:

- 10kg of whole maize
- 17kg of maize germ
- 13kg of wheat pollard
- 10kg of wheat bran
- 6kg of cotton seed cake
- 5kg of sunflower cake
- 3.4kg of soya meal
- 2.07kg of lime
- 700g of bone meal
- 3kg of fishmeal
- Additives
- 14g of salt
- 1g of coccidiostat
- 18g of Pre-mix
- 1g of zinc bacitracitrach
- 7g of mycotoxin binder

Making a 70 kg bag of layers' mash (18 weeks and above)

Ingredients

34kg of whole maize
12kg of Soya
8kg of fishmeal
10kg of maize bran, rice germ or wheat bran
6kg of lime
Amino acids
175g premix
70g lysine
35g methionine
70kg Threonine
35g tryptophan
50g toxin binder

Layer feed should contain a Digestible Crude Protein (DCP) content of between 16-18 per cent.

The feed should contain calcium (lime) for the formation of eggshells (laying hens that do not get enough calcium will use the calcium stored in their own born tissue to produce eggshells).

Layer feed should be introduced at 18 weeks.

Formulating a 70 kg bag of broiler feed

Broilers have different feed requirements in terms of energy, proteins and minerals during different stages of their growth. It is important that farmers adapt feed rations to these requirements for maximum production.

Young broilers have a high protein requirement for the development of muscles, feathers, etc. As the broilers grow, their energy requirements for the deposit of fat increase and their protein requirements decrease.

They therefore require high protein content in their starter rations than in the grower and finisher rations.

Broilers should have feed that has between 22 -24 per cent DCP. The following guidelines can help the farmer to make the right feed at each stage of growth:

Broiler starter feed (1-4 weeks)

- 40kg of whole maize
- 12kg of fishmeal (or omena)
- 14kg of soya bean meal
- 4kg of lime
- 70g of premix
- Amino acids
- 35g of lysine
- 35g of Threonine

Preparing broiler Finisher feed (70kg)

10kg of whole maize
16.7kg of maize germ
13.3kg of wheat pollard
10 kg wheat bran
6 kg of cotton seed cake
4.7kg of sunflower cake
3kg of fishmeal 2kg of lime
3.4kg of soya meal
40g of bone meal
10g of grower PMX
5g of salt
5g of coccidiostat
5g of Zincbacitrach

NOTE: For farmers who have more than 500 chickens, it is advisable to make 1 ton of feed at once (There are 14 bags of feed in one ton).

Therefore, to make 1 tonne of feed, all a farmer needs is to multiply each of the ingredients by 14. Ensure that all the feed you make will last for one month and not longer — this ensures the feed remains fresh and safe for chickens. Any feed that lasts more than one month may deteriorate in quality and can affect your chickens.

Daily feed requirements for each growth stage

Farmers should maintain the right feed quantities for chicken at each stage of growth as shown below:

- An egg-laying chicken requires 130-140g of feed per day.

- A chick requires a minimum 60g per day. If they finish their daily rations, give them fruit and vegetable cuttings to ensure they feed continuously.
- Young chickens (or pullets) which are about to start laying eggs should be fed 60g for 2 and ½ months and then put on layer diet (140g per day). Supplement the feed with vegetables, edible plant leaves and fruit peelings in addition to their feed rations.
- Broiler chicks require 67g per day. Broiler finishers require 67g of feed per day to the day of slaughter.
- Chickens are very sensitive to aflatoxins- never use rotten maize (maozo) while making feeds.

Self-Check -3	Written Test

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

2. By what you can categories the amount ingredients in each group of chicken?(5pts)
3. What are the right quantities of daily requirements for chicken at each stage of growth?(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
2. _____
   _____
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   _____

Information Sheet 4	Blending Ingredients and milling

4.1. Mixing ingredients

The term "mixing" can mean either blending, implying uniformity, or made up of dissimilar parts, implying scattering.

Feed ingredients with similar sizes and densities tend to blend easily and quickly. For example, ground or cracked grains have densities similar to that of the oilseed meals. Consequently, there is usually very little difficulty in obtaining a uniform blend of these feed ingredients. Minerals on the other hand have densities which are vastly greater than that of grains and oilseed meals. Drugs have intermediate densities, but very fine particle sizes. Forages have low densities, and highly varied particle shapes and sizes. This diversity of physical form and density of individual feed ingredients complicates the preparation of uniform feed mixes.

Therefore, the problems in feed mixing are due to differences among feed ingredients in particle shape, size, and density. Good uniformity of particle size is essential because birds prefer bigger particles.

The mix might consist of prepared and formulated proprietary rations, whole grains, protein additives, and/or vitamins and minerals

Effectiveness of the mixing process

- **Particle size/shape/density uniformity**
  - Feed particles that are dissimilar in physical characteristics tend to segregate (think of mixing basketballs and golf balls)

- **Mixer condition:**
  - Mixers that are dirty, worn or out of adjustment require more time to achieve an adequate mix

- **Mixing time:**
  - Mixing for a shorter time will not achieve a homogenous blend.
  - As mixer condition declines, mixing time increases.
  - Mixing feed batches that are e.g. half of rated capacity take longer to mix than batches that are closer to capacity

The objective of mixing is

- Create a homogenous blend of multiple feed ingredients
- Combines each of the scattering of dissimilar parts into a blend

Three mechanisms are involved in the mixing process:

(a) The transfer of groups of adjacent particles from one location in the mass to another,

(b) Diffusion distribution of particles over a freshly developed surface,

(c) Shear slipping of particles between others in the mass.

The mixer has to uniformly blend particles of different sizes, moisture content and bulk density into a ration.

Mixing may be either a **batch or a continuous process.**

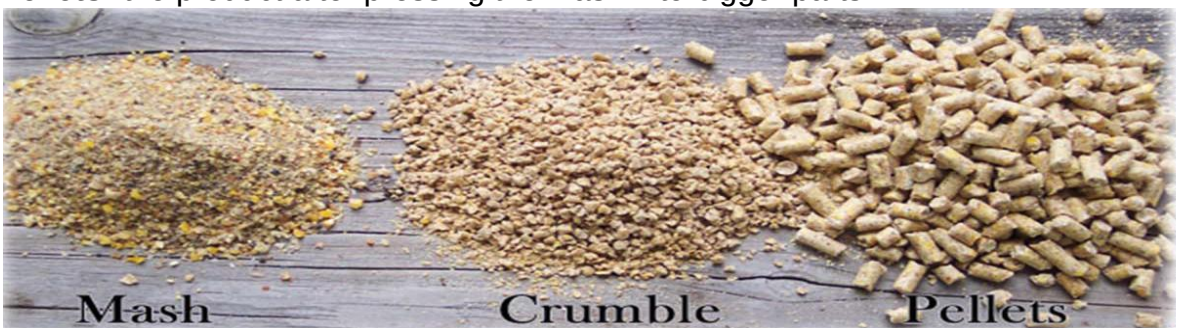
- **Batch mixing**:- can be done on an open flat surface with shovels or in containers shaped as cylinders, half-cylinders, cones or twin-cones with fixed baffles or moving augers, spirals, or paddles.

Fig 1: Mixing ingredients on flat surface

- **Continuous mixing:-** proportions by weight or volume, is a technique best suited for formula feeds with few ingredients and minimal changes

Mixed feed are formed as:

- **Meal**: the product after grinding one single raw material.
- **Mash**: the product after mixing several meals.
- **Crumbs**: the product after pressing mash into pellets and then a special way of breaking the pellets
  - To increase the feed intake and growth of young and also sometimes grown up birds.
  - To avoid feed wastage and de-mixing of a feed
- **Pellets:** the product after pressing the mash into bigger parts



It is performed by Feed mixers. Feed mixer is used in feed mills for the mixing of feed ingredients and premixes. The mixer plays a vital role in the feed production process, with efficient mixing being the key to good feed production

There are a number of different types of mixers used in the feed industry with the most widely used being

- Vertical Mixer – Used in small farms, they consist of a vertical screw which takes material to the top where it falls back down again, and repeats that process to mix materials
- Horizontal Mixer – Consisting of paddles (paddle mixer [2]) or blades (ribbon blender) attached to a horizontal rotor, these mixers usually have a higher consistent homogeneity and short mixing times.

A. B

Fig 2: Mixer. A. Horizontal B. Vertical

These machines come in a variety of configurations:

- Round bowl- The sides are shaped in rounding configuration
- Decagon bowl- The sides are shaped with angled flats creating a circular configuration
- Square bowl- The sides are similar to a square box with the top being open to load feed.
- Paddle reel- A large rotating reel with paddles to move feed forward and back.
- Auger system- Multiple augers processing feed and moving forward and backwards in the tub.

- Vertical screw- A vertical standing auger moving feed upward and down the sides to process feed.

4.2. Grinding and milling of ingredients and feeds

Grinding is Particle size reduction of ingredients. Particle size reduction as the first step in the feed manufacturing process works toward the goal of improved feed efficiency by increasing the surface area of the materials being processed. Particle size of ground feed ingredients also has a direct influence on subsequent processing and handling. The average particle size is given as geometric mean diameter (GMD), expressed in mm or microns (µm). To produce pellets or extruded feeds of acceptable quality the particle size of the ground materials must be correct.

Poultry have a short but rather complex digestive system and, depending on the makeup of the diet, can efficiently utilize feedstuffs less highly processed. The size and the age of the poultry also affect the dietary requirements so far as particle size is concerned. Generally speaking, younger animals require a finer, more highly processed feed than do older. The particle sizes are achieved by **grinder sieves**. It is **fine, medium and coarse size**.

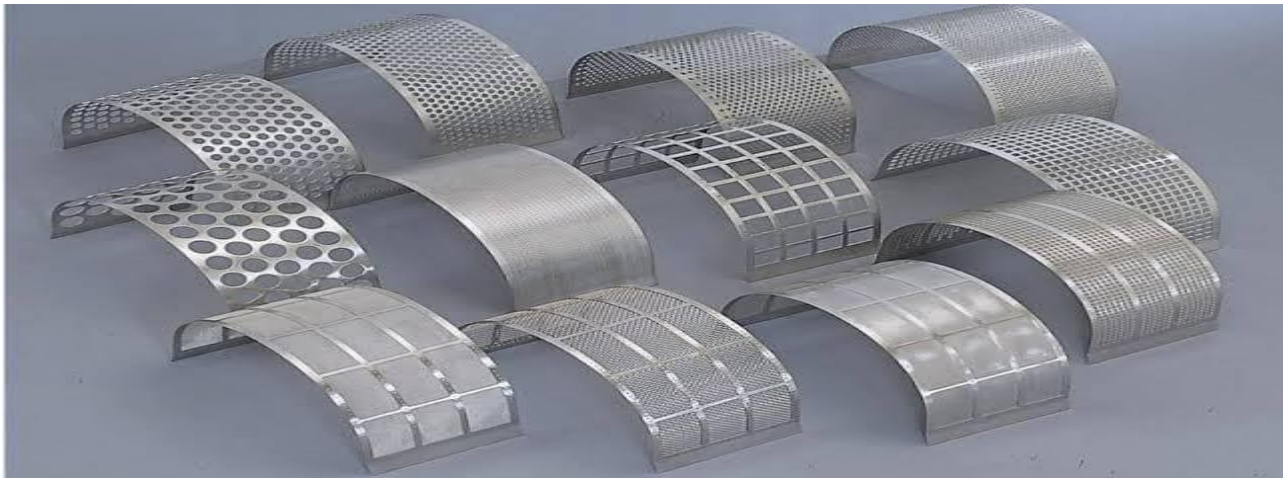


Fig 3: Sieves of hammer mill

The selection of a grinder should be based on the type of grains used in the formulas, target particle size, and the final form of the feed (meal versus pellet). The operating costs (electricity, labor, and maintenance) and capital investment should also be taken into consideration when selecting the type of grinder to purchase for the feed mill.

Both roller mills and hammer mills have been applied to the task of particle size reduction or grinding in feed milling applications.

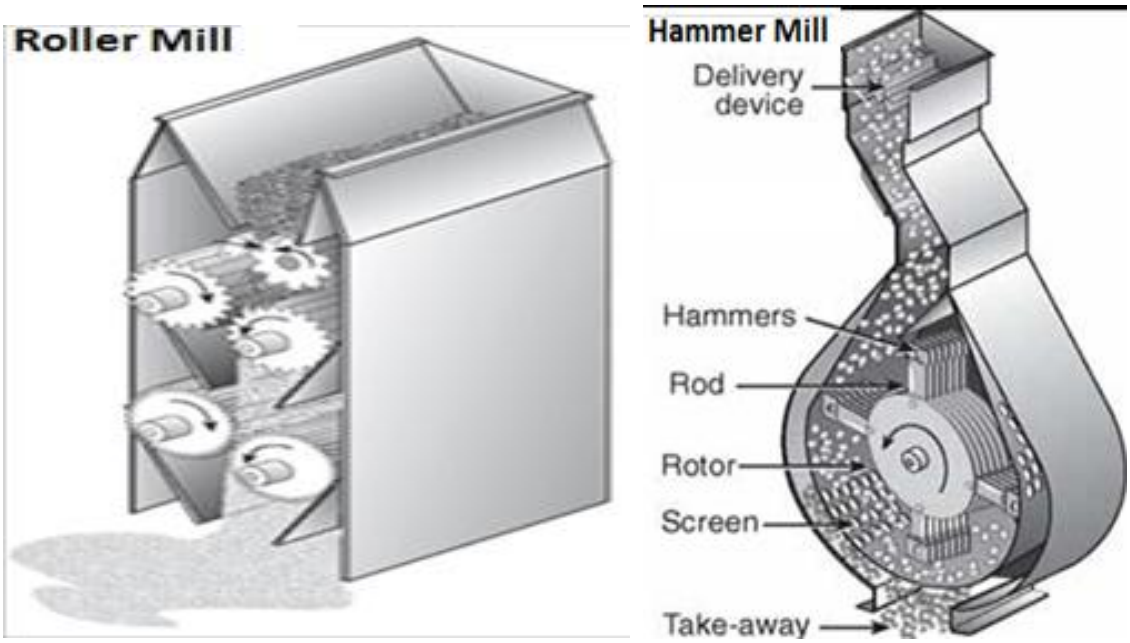


Fig 4: Feed millers

1. Hammer mill

- ❖ Feed particles are reduced by impact with rapidly rotating steel bars (referred to as hammers).
- ❖ Screens with holes of different diameters can be used to make larger or smaller particles.
- ❖ Hammer mills can process a variety of feeds including grains, oilseed cakes and even roughages like straw
- ❖ Creation of fines (dust and particles smaller than desired) can be a problem
- ❖ is a relatively simple machine and requires a fairly low degree of skill in regards to both the operation and maintenance

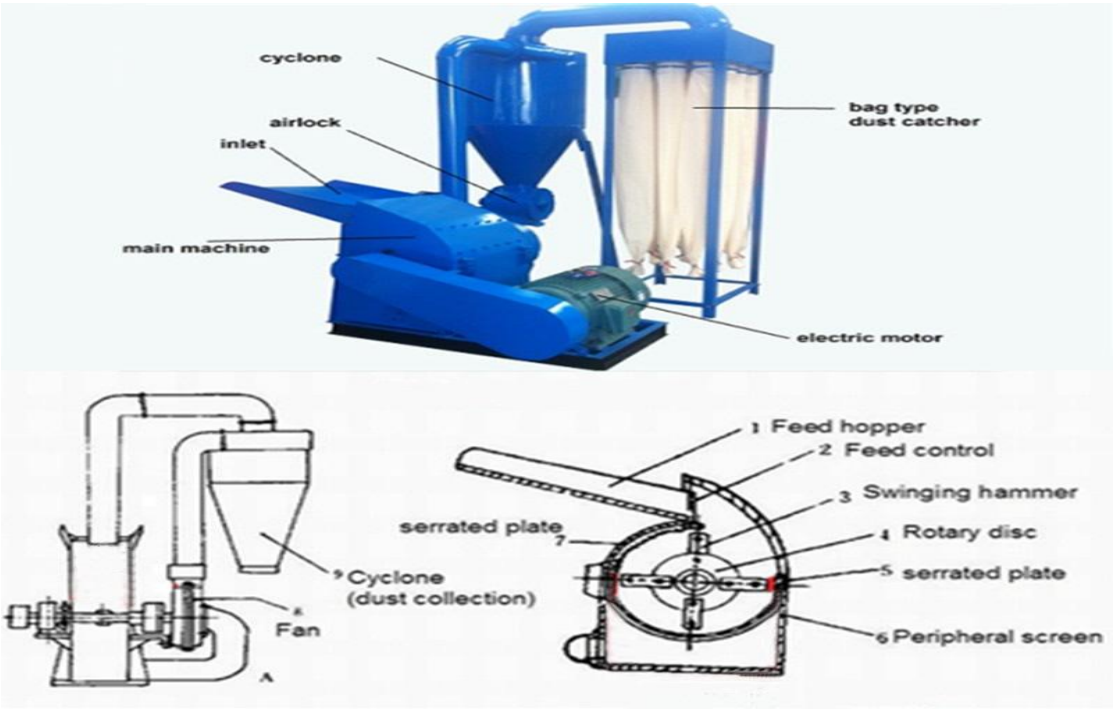


Fig5: Hammer mill

Roller mill

- Consists of two rotating, corrugated steel rolls. Feed is crushed as it passes through the gap between the rolls.
- The gap can be adjusted: to result larger or smaller particle size.
- Has the capability of reducing particle size as much as a hammer mill while generating fewer fines.
- Restricted primarily to grain not capable of processing materials such as cottonseed cake.

Fig 6: Roller mill

In grinding we have to maintain the following parameters: (for poultry broiler pellets)

- Particle Size:
  - ✓ More than 80 % of the average particle size should be below 1 mm.
- The gap between Hammer tip & Screen:
  - ✓ As for fine grinding we need a lesser gap between hammer tip & screen
  - ✓ For coarse grinding, we need more gap between hammer tip & screen.
  - ✓ There should be a gap adjustment feature in the hammer mill for different types of grinding texture required.

For all types of grinding solution Lark provides QGA “Quick Gap Adjustment”, as its name implies this technology is a boon for grinding different sizes of products as Fine /Medium / Coarse by the quick change of gap between hammer tip and screen.

Self-Check -4	Written Test

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

1. What factor can affect the uniformity of mixed ingredients?(3pts)
2. What determines the effectives of mixing?(4pts)
3. What machines are used for grinding of ingredients in feed milling?(2pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

Operation Sheet 1	Calibrating weighing scale

Procedures for calibrating digital weighing scale

Step 1- **Make Preparations: - turn on the scale and let it warm up.**

Step 2- **Start Calibration Mode**

Step 3- **Perform the Calibration Test**

Step 3- **Calibrate**

Operation Sheet-2	Mixing ingredients

Techniques for mixing ingredients of to make poultry feed

Step 1- wears all necessary protective equipments

Step 2- Prepare all necessary equipments and materials

Step 3- Determine the method by which mixing is performed

Step 4: Measure each ingredients required into a container according to specification

Step 5. Mix thoroughly by spade until it uniformly mix (if it is manual mixing on flat surface)

Step 6. Add the mash into bag/ containers

Step 7. Store it in safe and clean storage

.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3hrs hour.

Task 1. Calibrate weighing scale

Task 2. Mix feed

List of Reference Materials

FAO, I., 2010. Good practices for the feed industry–Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding. *FAO Animal Production and Health Manual*, (9 s 79).

Adetifa B. O., Okewole O. T. 2015. Characterisation of small scale feed mills in a developing country. Agric Eng Int: CIGR Journal, 17(3): 208-216.

MAKANGE *et al*.,2016. Design and Fabrication of an Animal Feed Mixing Machine

Poultry Production

NTQF Level -III

Learning Guide -50

Unit of Competence: - Mix and mil standard stock feed

Module Title: - Mixing and milling standard stock feed

LG Code: **AGR PLP3 M12 LO4-LG-50**

TTLM Code: **AGR PLP3TTLM 0120v1**

LO4: Conduct hygiene and administration activities

Instruction Sheet	Learning Guide #-50

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

- ❖ Cleaning equipment to maintain hygiene standards
- ❖ Completing required records and documentation

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 –**

- ❖ Clean equipment to maintain hygiene standards
- ❖ Complete required records and documentation

Learning Instructions:

Read the specific objectives of this Learning Guide.

Follow the instructions described in number 3 to 7.

Read the information written in the “Information Sheets 1 and 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.

Accomplish the “Self-check 1 and 2” **in page -6 and 9, respectively.**

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 answer only after you finished answering the Self-check).

If you earned a satisfactory evaluation proceed to “next Information Sheet”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.

Information Sheet-1	Cleaning equipment to maintain hygiene standards

Hygiene is a serious practices performed to preserve health. Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases. Many people equate hygiene with 'cleanliness,' but hygiene is a broad term. To maintain it should be habit to clean all equipment involved before and after in mixing and milling feed.

Hygienic practices are in place, including:

- proper hand-washing or use of sanitizers/gloves or boot wash
- rules for employee conduct
- precautions for personnel with open wounds or a communicable disease
- Where there is potential for cross-contamination, incompatible operations are controlled by physical separation or other effective means
- store and handle waste and hazardous substances in such a way that it cannot contaminate your food products or feed products
- store feed away from chemicals or any other products that are prohibited for use as animal feed
- store and handle medicated and non-medicated feeds separately, to ensure that they are fed to the right animals and there is no cross-contamination
- if you use feed additives, veterinary medicinal products, or biocides on your farm, use them in accordance with the dosage, application and storage stated on the label or as prescribed
- take adequate measures to prevent the introduction and spread of contagious diseases which are transmissible to humans through food, including statutory herd testing for bovine tuberculosis, pre-movement tuberculosis testing of animals, taking precautionary measures when introducing new animals and reporting suspected disease outbreaks to the competent authority
- use establishments that are registered with and/or approved by your local authority when sourcing feed for food-producing animal

Bulk bins need to be cleaned prior to receiving an ingredient to prevent carryover and/or contamination. Augers, pits, and handling equipment need to be cleaned, as well.

Cleaning equipment is the **removal of dirt and organic substances from surfaces of tools and equipments**. Cleaning must remove residues and dirt that may be a source of contamination. The necessary cleaning methods and materials will depend on the nature of the business and may include disinfection / sanitizing, but must be compatible with feed ingredients. Method of cleaning may be **dry cleaning and wet cleaning.**

Only food compatible cleaning and disinfectant / sanitizing agents may be allowed to come into contact with feed ingredients and must be used in accordance with manufacturers recommendations and safety data sheet requirements.

Where cleaning agents and disinfectants / sanitizers come into contact with feed ingredients, the participant must ensure that control systems provide the correct and effective dilution levels at all times

Cleaning and disinfection programmes must be monitored for their suitability

Ideally, equipment should be decontaminated before and after every use and stored in a clean condition. However, it is more realistic to expect that equipment is cleaned, as a minimum, at the end of each production shift.

The method of equipment decontamination will depend on a number of factors, including:

- What is being cleaned—environmental or food contact surface
- The risk level of the feed being produced—low risk, high care, high risk
- Type of feed product/environment—wet, dry
- Type of clean—interim, daily, weekly, periodic deep clean
- Type of contamination—microorganisms, allergens, foreign bodies, product residues (eg, meat or fish species, organic or nonorganic).

The following is a suggested generalized equipment cleaning method; as appropriate:

- Remove gross debris—Brush, shake, bang, or rinse equipment
- Clean with detergent and water
- Rinse with clean water

- Disinfect
- Sterilize (eg, autoclave at 121°C, 15)
- Dry.

For more specific cleaning methods reference should be made to the:

- sites cleaning equipment cleaning and disinfection instructions—method, frequency, these training—should all be documented as part of HACCP prerequisite program, and available for audits;
- cleaning equipment manufacturers' cleaning and disinfection (and sterilization) instruction cards;
- Cleaning in accordance with chemical manufacturers' instructions—use of recommended chemical, concentrations, contact times, and temperatures.

Self-Check -1	Written Test

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

1. What are techniques of cleaning?
2. Write method of equipment decontamination?

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Completing required records and documentation

All cleaning techniques must be documented in relevant cleaning policies and standard operating procedures. All staff should be familiar with the required cleaning techniques and supervisors should regularly monitor cleaning staff adherence to the procedures.

Record is a type of document that permanently captures information demonstrating that an action was taken. It can be in either hard copy (printed) or electronic (digital) format. The information can take various forms such as text, figures, graphics, data pictures and videos.

Cleaning programmes must be documented and ensure that feed ingredient production, storage and transport facilities are cleaned in a manner that is sufficient to maintain feed ingredient safety at all times.

Maintaining records enable cleaning staff, supervisors and managers to ensure that all cleaning activities are being completed and in the event that it has been missed, the matter can be rectified without delay. Additionally keeping records allow managers to identify trends in cleaning requirements of the facility and this in turn enables resources to be used more efficiently and effectively.

Types of records cleaning staff may need to keep include:

- sign off when the task has been completed (i.e. staff to put their initials against a daily work schedule to verify that they have done that task)
- Notes to identify when a task has been unable to be completed and what action has been taken to remedy non-compliance (i.e., cleaners should highlight which tasks were unable to be completed on their daily work schedule and reasons). Their manager/supervisor should review and note what action has been taken to remedy the matter. Type of records supervisors or contract managers need to keep include:

internal verification records (see sub-section 6.8 Internal verification and assessment) > complaints that have been received and notes relating to the investigation and outcome. The healthcare facility may choose to use any method including paper forms, electronic logging, personal digital assistants etc., to maintain records, demonstrate compliance and identify the action taken when compliance has been unable to be achieved.

The key with record keeping is to:

- Keep records to a minimum – only record information that is required or will be useful
- Make it clear and easy for the recorder

- Develop processes to ensure completed records are collected, reviewed and filed ready for review in a timely manner, and ensure replacement forms are readily and available
- Use accepted/agreed abbreviations where possible. It is suggested that all records be stored for a period of at least four years.

Self-Check -2	Written Test

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

1. write the purpose of recording taking(3pts)
2. what is the key information in record keeping?(3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____

Operation Sheet 1	Cleaning Equipment based on specifications

Procedures for cleaning equipments

Step 1. Wear PPE
Step 2. Prepare material used for cleaning
Step 3. List and select required tools and equipment
Step 4. Select methods of cleaning mechanism
Step 5. Clean the selected equipments and tools
Step 6. Put the cleaned equipments to their former place
Step 7. Clean the Work site after you finished your work
Step 8. Return back the left cleaning maters and tools to its former place

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3hrs hour.

Task 1. Clean the equipments according to specification.

List of Reference

Von Essen, S.G. and McCurdy, S.A., 1998. Health and safety risks in production agriculture. *Western Journal of Medicine*, *169*(4), p.214.

Cleaning Standard for South Australian Healthcare Facilities 2014 (updated 2017)

Bakka, R.L. and Sistowicz, R.F., Ecolab Inc, 1975. *Method for cleaning meat processing facilities*. U.S. Patent 3,873,363.

American Psychological Association, 2007. Record keeping guidelines. *The American Psychologist*, *62*(9), p.993.

Bearman, D.A., 1993. Record-keeping systems. *Archivaria*, *36*.

Rabin, M.I., 2003. *Apparatus and method for record keeping and information distribution*. U.S. Patent 6,603,464.

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