POULTRY PRODUCTION

NTQF Level -II

Learning Guide -48

Unit of Competence: - Collect and Pack eggs for human consumption

Module Title: - Collecting and Packing eggs for human consumption

LG Code: **AGR PLP2 M14 LO1-LG-48**

TTLM Code: **AGR PLP2TTLM 1219 v1**

LO 1: Collect eggs

Instruction Sheet	Learning Guide #-48

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

- Collecting eggs
- Placing *eggs* in egg trays
- Lifting and bending eggs safely
- Completing records of all collections to monitor production levels.
- Controlling vertebrate and invertebrate pests in egg grading and storage areas.

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 –**

- Collect eggs using either hand or mechanical means.
- Place ***eggs*** in egg trays with the pointed end down.
- Lift and bend eggs safely.
- Complete records of all collections to monitor production levels.
- Control vertebrate and invertebrate pests in egg grading and storage areas.

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". 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" **in page -5, 7, 9, 11 and 14.**
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-check 1).
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 that information sheet.
7. Submit your accomplished Self-check. This will form part of your training portfolio
8. Finally do the operation written in page 15. Do the LAP test in page 16 by your self

Information Sheet-1	Collecting eggs

1.1. Concept of egg collection for human consumption

The egg collected for human consumption is called table. Table eggs or shell eggs are eggs in the form most familiar to consumers – fresh and in-the-shell. Though commercial table eggs may come from a variety of birds, and many of the procedures are the same, this discussion will focus on chickens. It also focuses on relatively small operations, particularly those with direct-to-consumer sales or sales to local restaurants and retailers

1.2. Collecting eggs

The condition of the egg that you collect is directly related to how well the flock is managed. Nests should be equipped with a closing or ejection system to avoid nest staining at night.

A hen's laying time will vary depending on the temperature of the coop and at what time the hens are exposed to light. It is best to collect the eggs as soon as possible after they are laid, so get to know your flock's cycle.

It is best to collect the eggs as soon as possible after they are laid. The longer the egg is allowed to stay in the nest, the more likely the egg will get dirty, broken or will lose interior quality. Collecting eggs at least twice daily is advisable, especially during extreme weather temperatures then stored below 15 °C (+ /- 3°C). The embryo will start to develop above 22°C and later changes in temperature.

Eggs shall be collected and either manually or automatically packed into clean keys trays or suitable clean containers; Egg containers shall not constitute a hazard to health.

Collect eggs and brush off any debris adhering to the egg shell, and then put them in an easy-to-clean container, such as a coated wire basket or plastic egg flat. This will prevent stains from rusted metal and contamination from other materials that are difficult to clean and disinfect.

Paper trays that are damp, dirty, or contain liquid egg, shall be discarded. Eggs shall be handled as little as possible. Depending on the farm size and design, different methods can be used for daily egg collection. Custom made egg collection system such as elevators, lift systems, curve and rod conveyors as well as multi-tier, multi-level egg collection systems can be used to collect clean eggs with a minimum number of cracked and hair-cracked eggs

Important points to remember when collecting eggs:

- Clean eggs should be separated from dirty eggs
- Eggs should be collected in an easy to clean container like coated wire baskets or plastic flats.

- Do not stack eggs too high. If collecting in baskets do not stack eggs more than 5 layers deep. If using plastic flats do not stack more than 6 flats
- Eggs should be held below 15°C with 70% humidity prior to cleaning
- Never cool eggs rapidly before cleaning. The egg shell will contract and may pull any dirt or bacteria on the egg surface into the pores when cooled
- keep egg temperature fairly constant until the eggs are washed to avoid sweating
- sweating occurs when eggs are moved from cold storage to a warm environment, and
- Condensation on the surface of the egg facilitates movement of microbes inside the shell.

Self-Check -1	Written Test

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

1. How often it is advisable to collect eggs per day?(2pts)
2. Why eggs should collected soon after laid?(3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1_____

_____

____

2._____

_____

_____

Information Sheet-2	Placing eggs in egg trays

Eggs should be stored pointed end down to keep the yolk centered and keep any bacteria as far as possible from the yolk, which is far more likely to be contaminated by any bacteria that enter the egg than the non-bacteria friendly white. Air and bacteria enter the egg through the blunt end into the air sac located there.

If you store the egg blunt end down, the air pocket will rise, touch the yolk and risk contaminating it. By storing eggs blunt end up, the pocket of air stays away from the yolk, and the egg stays fresh longer.

Therefore, when eggs are put in trays, they should be placed with the larger end up. This helps the yolk remain centered and away from the air pocket inside the **egg**, which in turn helps with freshness. If you go through the trouble of moving the **eggs**, there's a chance you'll replace them incorrectly.

Fig1. Positioning of eggs on egg tray

Self-Check -2	Written Test

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

1. How do you put the egg on egg tray?(3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____.

Information Sheet-3	Lifting and bending eggs safely

Lifting can be safe in an egg retrieval cycle, but be careful to keep the twisting and bending to a minimum. Based on the farm size, the house design and the individual customer requirements there are different egg collection systems available. This includes elevators, lift systems, curve, rod and vertical conveyors, multitier collection systems as well as table drive systems and manual collection tables.

The elevator system of egg collection is a simple, compact, and highly efficient piece of equipment that increases overall productivity. The elevator system gives you the ability to take eggs from any height during collection and then transfer them for manual sorting, packaging, and to other egg transporting systems.

Before an egg collection system is installed, the following questions should be taken into consideration:

- Are there uneven ground levels on the farm and are the houses built at different elevations?
- How large is the capacity of the packer and sorting system?
- Do you intend collecting the eggs separately for each flock or simultaneously?

It is important to prevent any damage to the eggshells by collecting equipment during lifting the stacked eggs manually or automatically by machine. Lifting should undertake in correct position when it is performed manually.

The lift, which acts as an elevator during collection, can be installed in the cage equipment and is guaranteed to be reliable and precise throughout the entire egg transporting process.

Self-Check -3	Written Test

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

1. What should have you consider before installing egg collection system?(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
   _____

Information Sheet 4	Completing records of all collections to monitor production levels.

These records are useful in measuring the performance of the flocks and the farms. It contributes greatly to the economic appraisal of the enterprise. Eggs produced – Eggs must be collected and recorded daily. Be sure to include any inconsistency noticed. Whenever you begin a record keeping system, you must learn the information requested on each form
Complete records of all collections are:

- Quantity of egg collected per nests
- Condition of collected egg
- Number of stained eggs
- Number of shell deformed eggs
- Time of collection
- Frequency of collection

The real value is to support the farmer and the advisors to keep track and take decisions.
The format of all records should be simple, easy and quick to interpret, and then they can be supplemented with remarks which can explain some unusual events or findings.

Self-Check -4	Written Test

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

1. What to be recorded in complete collection of farm?(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1,_____

_____

_____

_

Information Sheet 5	**Controlling Vertebrate and invertebrate pests in egg grading and storage areas.**

5.1. **Definition of pests**

A pest can be defined as an organism that causes, or is perceived to cause, or is likely to cause economic or aesthetic damage to humans or their property. This can be categorized as invertebrate and vertebrate pests

- Invertebrates are animals that neither possess nor develop a vertebral column (commonly known as a backbone or spine). E.g. Insects like flies, mites, lice, bed bugs, fleas, beetles, red imported fire ants, chiggers and gnats, and nematodes
- Vertebrate pests include birds, mammals, or reptiles that cause damage to eggs

5.2. Controlling pests

Pests should be controlled using a properly designed pest control program as they are recognized as vectors for pathogenic organisms. Any pest control measures should not result in unacceptable levels of residues, such as pesticides, in or on eggs.

Pests such as insects and rodents are known vectors for the introduction of human and animal pathogens into the production environment. Improper application of chemicals used to control these pests may introduce chemical hazards into the production environment.

A properly designed pest control program should be considering the following:

- Before pesticides or rodenticides are used, all efforts should be made to minimize the presence of insects, rats and mice and reduce or remove places which could harbor pests.
    - ✓ As cages/pens/enclosures/coops (if used) attract such pests, measures such as proper design, construction and maintenance of buildings (if applicable), effective cleaning procedures and removal of faecal waste should be used to minimize pests.
    - ✓ Mice, rats and wild birds are attracted to stored feed. Any feed stores should be located, designed, constructed and maintained so as to be, where practicable, inaccessible to pests. Feed should be kept in pest proof containers.
- Bait should always be placed in “bait stations” so that they are obvious, cannot be accessed by animals or insects they are not intended for and can be identifiable and found easily for checking.

- If it is necessary to resort to chemical pest control measures, the chemicals should be approved for use in food premises and used in accordance with the manufacturer's instructions.
- Any pest control chemicals should be stored in a manner that will not contaminate the laying environment. Such chemicals should be stored in a safe manner. They should not be stored in wet areas or close to feed stores or be accessible by birds. It is preferable to use solid baits, wherever possible.

In addition to the shell egg's natural antimicrobial properties, some factors can control the microbial pathogens that are most likely to cause food safety concerns during egg products storing, egg handling, and packaging.

- Prevent contamination
- Temperature control
- Good sanitation
- Preventing cross-contamination

Self-Check -5	Written Test

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

1. Write the pest control design programs (5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1,_____

_____

_____

_

Operation Sheet 1	Collecting eggs

Procedures for manual collecting eggs

Step 1- Prepare necessary materials and equipments

Step 2- Wear PPE

Step 3- check laid eggs in each coops/nests

Step 4- pick the eggs carefully one by one

Step 5- put it in egg tray in narrow pointed down

Step 6 – stack the egg tray (not more than 6) and lift up carefully

Step 7- take it to storage room

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

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

Task 1. Collect and put the eggs in proper manner

List of Reference Materials

Alaska Cooperative Extension Service, Safe Egg Handling for Small Egg Laying Flocks and Operations:

http://www.uaf.edu/files/ces/publications-db/catalog/anr

USDA Agriculture Marketing Service, National Organic Program:

http://www.ams.usda.gov/AMSv1.0/nop

USDA Agriculture Marketing Service, Egg Grading Manual:

http://www.ams.usda.gov/AMSv1.0/getfile?

Virginia Cooperative Extension Service, Proper Handling of Eggs: From Hen to Consumption: https://pubs.ext.vt.edu/2902/2902-1091/2902-1091

POULTRY PRODUCTION

NTQF Level -II

Learning Guide -49

Unit of Competence: - Collect and Pack eggs for human consumption

Module Title: - Collecting and Packing eggs for human consumption

LG Code: **AGR PLP2 M14 LO2 LG-49**

TTLM Code: **AGR PLP2TTLM 1219 v1**

LO 2: Assess and grade eggs

Instruction Sheet	Learning Guide #-49

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

- Calibrating equipment
- Sorting eggs
- Candling eggs
- Grading eggs into appropriate weight and quality
- Removing cage marked and dirty, cracked or weak shelled eggs
- Recognising and reporting grading, cleaning, and packing machine problems and abnormal noises
- Recording graded eggs
- Washing eggs.
- Oiling eggs

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 equipments to be used
- Sort eggs according to industry standards and organisation quality assurance program.
- Candle eggs using appropriate equipment
- Grade eggs into appropriate weight and quality grades
- Remove cage marked and dirty, cracked or weak shelled eggs
- Recognise and report grading, cleaning, and packing machine problems and abnormal noises
- Record graded eggs clearly and accurately according to organisation requirements
- Wash eggs using approved equipments.
- Oil eggs when required

Learning Instructions:

9. Read the specific objectives of this Learning Guide.
10. Follow the instructions described in number 3 to 20.
11. Read the information written in the “Information Sheets 1, 2, 3, 4, 5, 6, 7, 8 and 9”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 1” **in page -6, 8, 11, 16, 19, 21, 21, 23, 26 and 28.**

13. 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).
14. 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.
15. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Calibrating equipment

Calibration is the process of evaluating and adjusting the precision and accuracy of measurement equipment.

- **Precision** is the degree to which repeated measurements under unchanged conditions show the same result
- **Accuracy** is the degree of closeness of measurements of a quantity to its actual true value.

Calibration is needed to determine the accuracy of a measuring instrument and the degree of deviation from a known standard. The difference between the reading of the instrument and the standard of manufacture's the correction factor (CF) for that instrument

Purpose of instrument calibration is

- To eliminate or reduce bias in an instrument's readings over a range for all continuous values.
- Allow people to have a safe working environment and produce valid data for future reference
- To convert the instrument readings to the units of interest

All equipment used on these premises that weighs, measures, inspects or tests product is calibrated to ensure that they are reading accurately.

Below is a list of all the equipment that requires Calibration at these premises:

- Electronic scales.
- Hand held thermometer.
- Egg Grader
- Mix all scales
- Egg washer temperature gauge
- Cool room temperature gauge and thermostat.
- Freezer temperature gauge and thermostat.
- Truck temperature gauge and thermostat

Methods of Calibration

The methods of calibration are as follows.

- The Electronic scales will be tested against a test weight.
- The Egg grader will be tested using the supplied egg weights that will be checked on the Electronic scales after it has been verified accurate.
- The mix all scales will be tested against a test weight
- The hand held thermometer will be tested annually using ice water slurry.

- ❖ Every other temperature gauge will be tested against the hand gauge after it has been verified accurate.
- ❖ Every thermostat will be tested against the gauge supplied with it.

Basic steps for correcting the instrument for bias

The calibration method is the same for both situations stated above and requires the following basic steps:

1. Selection of reference standards with known values to cover the range of interest.
2. Measurements on the reference standards (manufacturer's standard) with the instrument to be calibrated.
3. Functional relationship between the measured and known values of the reference standards (usually a least-squares fit to the data) called a *calibration curve*.
4. Correction of all measurements by the inverse of the calibration curve.

When do instruments need to be calibrated?

- ❖ Before major critical measurements.
- ❖ After major critical measurements
- ❖ After an event
- ❖ When observations appear questionable
- ❖ Per requirements
- ❖ Indicated by manufacturer

Frequency of Calibration

- ❖ Thermostats and Temperature gauges will be tested annually.
- ❖ The Electronic scales, the mix all scales and the hand held thermometers will be verified as accurate annually.
- ❖ The Egg grader will be checked quarterly.

Self-Check -1	Written Test

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

1. List at least five the equipment that requires Calibration at these premises(5pts)
2. Describe the difference between precision and accuracy (3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

Information Sheet-2	Sorting eggs

Eggs come in many sizes and weights, depending on

- The hen's age,
- Breed and weight,
- Any stressful environmental factors such as heat, overcrowding or poor nutrition.

Eggs are categorized in six categories, based on the net weight of an entire dozen. That's weight, not size. The designations by-the-dozen weights are

1. jumbo
2. extra large
3. large
4. medium
5. small and
6. peewee

It is best that you sort the eggs before you store, sell, or consume them. It can be sorted by using machine egg grader (Fig 1) into different weight and size. We can also sort the by looking their internal quality by candling them with a bright light. This process can help you eliminate cracked eggs or eggs with foreign matter inside like blood spots.

Cracked, dirty, and unsafe/unsuitable eggs should be segregated from clean and intact eggs.

Fig1. Machine egg grader

Self-Check -2	Written Test

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

1. How you sort your eggs?(3pts)
2. What are the weight categories of eggs?(2pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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

Information Sheet-3	Candling eggs

Candling is means of carefully examining of the interior and exterior of a whole egg in a dark place that is placed in front of a strong light source. It is the only method of testing eggs for quality, internally and externally, without breaking them.

Candling is used to judge interior egg quality because external appearance is not an accurate indication of overall egg quality. The instruments used are called Candler (Fig 1 and 2). A very simple form of candling is placing a candle in a dark room and positioning an egg in front of the flame and looking at the interior quality.

How to candle eggs

- Hold the large end of the egg up to the light in a slanted position
- You should be able to see the air cell, yolk, and white
- The air cell is almost always on the large end
- Gently whirl the egg-you may see the yolk move

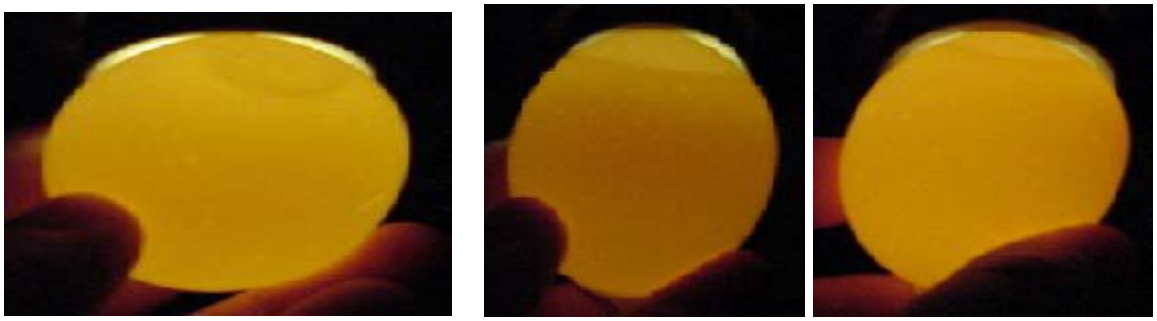


Figure. Examples of different air cell sizes as seen when candling eggs

According to table egg grading and marking rules, air cells of grade A should be up to 4mm in depth and practically regular

To candle an egg, hold it up to the Candler with the large end against the light. It is best to hold the egg between your thumb and first two fingers. If you feel you may drop the egg, place your other hand underneath to catch any eggs that may drop. With the egg at a slight angle, turn your wrist first one direct and then the other. This will cause the inside content of the egg to whirl. Repeat the procedure with the small end of the egg against the light.

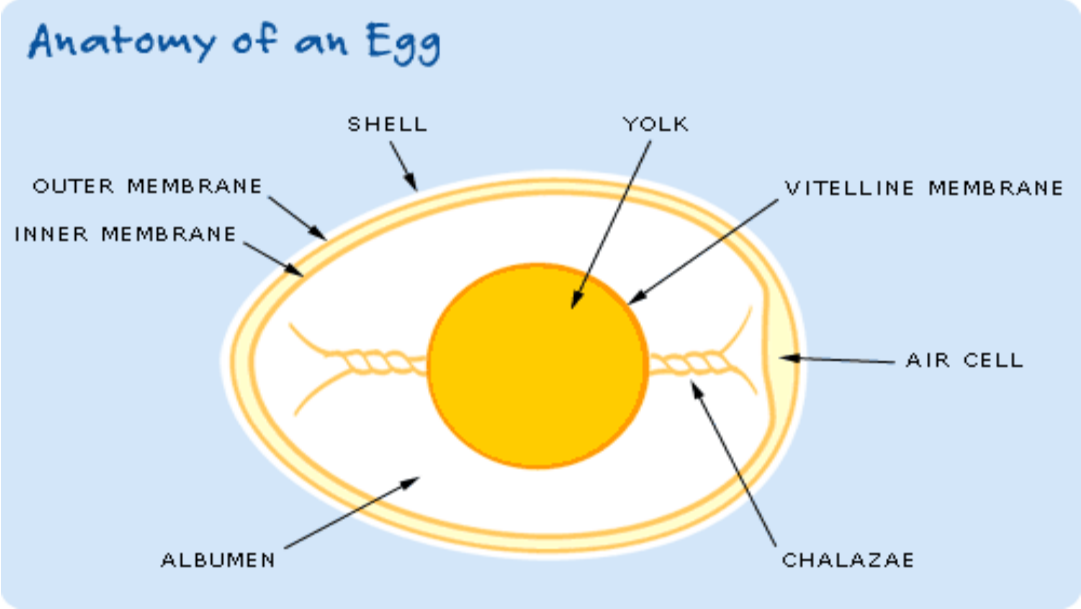
Fig A. Hand Candling Fig B. Candling with local material

This procedure will allow you to determine if a meat or blood spot is present. This will immediately make the egg a 'Reject' egg and no other evaluation is needed

The main interior quality points to be observed in candling can be summarized as follows:, namely:

- Yolk
- Albumen or egg white
- Shell membranes
- Shell
- Air cell

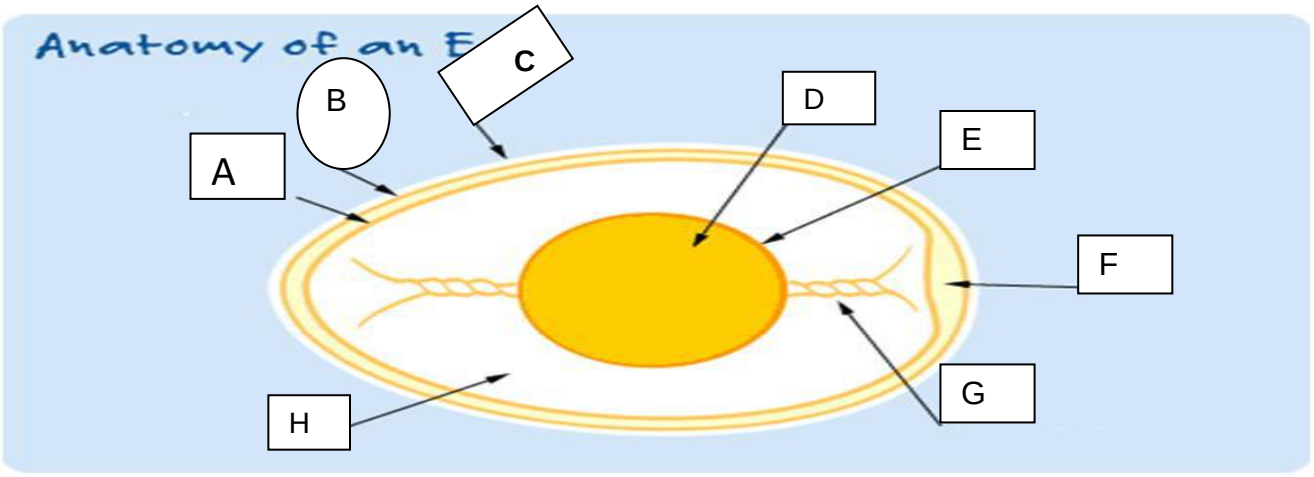
The following figure provides a better understanding of its physical structure



Self-Check -3	Written Test

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

1. Label the parts of the egg. (5pts)



2. What is the use of candling eggs?(3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

_____

_____

2. _____

_____

Information Sheet-4	Grading eggs into appropriate weight and quality

Grading is a process of identification, classification and separation. Grading generally involves the sorting of products according to quality, size, weight, and other factors that determine the relative value of the product. Egg grading is the grouping of eggs into lots having similar characteristics as to quality and weight. The grading for quality of eggs is the classifying of the individual egg according to established standards.

The standards for quality of individual eggs have been developed on the basis of such **interior quality** factors as condition of the ***white and yolk, size of the air cell***, and the **exterior quality** factors of cleanliness and soundness of the shell. These standards apply to eggs of the domesticated chicken.

Eggs are also classified according to weight (or size) expressed in gram per dozen. Although eggs are not sold according to exact weight, they are grouped within relatively narrow weight ranges or weight classes, the minimum net weight per unit being specified. When grading, eggs must meet minimum individual egg, carton, and case weight requirement

There are three categories involving the grading of table eggs (i.e., eggs for consumption rather than for incubation).

- External
- Candling, and
- Broken out.

These parameters can be influenced by many factors, like: temperature, storage time, age of hens, nutrition and housing system.

1. **Exterior Egg Quality**

   The exterior quality of the eggs based on the visible portion of each egg. The main factors to consider in grading exterior surfaces are stains and foreign materials. The three grades for exterior egg quality are A, B, and Dirty.

Grade AA or A Grade B Dirty /rejected

- Free from readily visible stains or discoloration
- May show small specks, stains or cage marks that do not detract from general clean appearance of the egg
- May show traces of processing Oil
- The shell surface must be free of adhering dirt or foreign material

- Can have slight blemishes on the shell, even small calcium deposits
- Slight or moderate localized stains less than 1/32nd of shell

OR

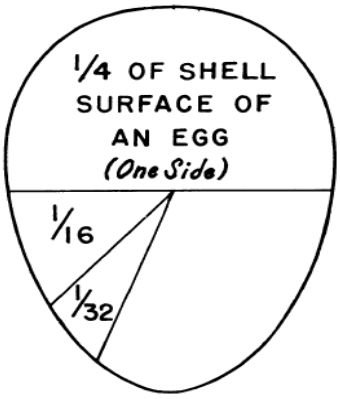
- Slight or moderate scattered stains less than 1/16th of shell
- The shell surface must be free of adhering dirt or foreign matter.

- Prominent stains
- Moderate stains covering more than 1/32 (if localized) or more than 1/16 (if scattered) of the shell surface
- Found adhering dirt or foreign material (1.0 mm in area or greater

Techniques for grading exterior quality

Because it may be difficult to visualize the approximate areas of surface stains or to judge whether or not dirt actually adheres to the egg's surface, inexperienced egg graders may find it helpful to use the following techniques:

1. **If the egg has only one stain then use the 1/32 rule**. If the stain covers more than 1/32 of the egg it is considered Dirty.



2. **If the egg has two or more stains then use the 1/16 rule**. If the egg has more than one stain, consider them all together (as an aggregate) and apply the 1/16 rule. One-sixteenth of an egg's surface is approximately ¾ inch x ¾ inch.

3. **Stain or dirt**. Ask yourself, "Can I scratch the material off the egg?" If the answer is "yes," then it should not count against the exterior grade.

4. **Appearance: shape, texture, soundness.** Specific areas to observe include spots or stains on the egg, thickness of the shell, blemishes, shape, calcium deposits, ridges or cage marks on the shell. Eggshells may also be sound (unbroken), check or cracked, or leaking. Obviously leaking eggs will not be used for contests, so report any that are unsound.

Shape of Practically Normal egg: Keep in mind the "ideal" egg shape, good texture and strength, free of thin spots. Any ridges or rough areas do not detract from or materially affect the shape, texture and strength of the shell.

Shape of Slightly Abnormal egg: The shell is somewhat unusual in shape and faulty in texture and strength. The shell may exhibit pronounced ridges (body checks), thin spots, pimple, heavy calcium deposits or rough areas. Such eggs lack consumer appeal and may be the result of improper nutrition, disease or poor physical condition of the hen.

2. Interior quality

Refers to egg white (albumen) cleanliness and viscosity, size of the air cell, yolk shape and yolk strength. The grades based on internal egg quality are AA/ A, B or inedible. To evaluate the egg contents without breaking them out the shell, candling is use. The egg contents are surrounded by two membranes—an inner and outer shell membrane– and, of course, the shell. As an egg ages it loses moisture and the contents contract even more, enlarging the air cell. Air cell size, therefore, is a good indication of egg quality and can be evaluated without breaking the egg open

Specifications for each quality factor

Quality	**Quality AA**	**Quality A**	**Quality B**
Shell	Clean Unbroken. Practically normal	Clean Unbroken. Practically normal	Clean to slightly stained Unbroken. Abnormal
Air Cell	1/8 inch or less in depth.	less in 3/16 inch depth	over 3/16 inch in depth
White	Clear and firm	Clear and reasonably firm	weak and watery small blood and spot
yolk	Outline slightly defined Practically free from defects	Outline fairly well defined Practically free from defects	Outline plainly visible defined Practically free from defects

Grading system is advantageous to adopt the following in egg marketing

- Eliminate inedible and defective eggs;
- Separate eggs into high and lower acceptable categories; and
- Establish uniform weight classifications.

Quality Factors in Grading of Egg

The various interior and exterior quality factors used in grading eggs are as follows:

I. **Interior quality**

- **Condition of the yolk**: Visibility of yolk, ease of its movement and shape are examined. In fresh egg, yolk is in the centre of the egg compared to old eggs. Presence of any blood spot or meat spot is also examined.
- **Condition of the albumen**: Albumen should be thick and firm in fresh eggs.

- **Condition of the air cell**: Air cell size is small in fresh egg and it increases with time of storage.

2. Exterior quality

- **Soundness of the shell:** Shell may be broken, dented or may have cracks
- **Cleanliness of the shell**: It has consumer appeal. Shell should be free from any visible dirt.
- **Size:** Eggs may be of jumbo size, extra large, large, medium, small, peewee size.
- **Shape and texture of the shell**: Visual inspection reveals mis-shaped, rough or thin- shelled eggs.
- **Color of the shell**: It has consumer's preference. Brown shell are preferred than white shell but it has no significance in quality. Shell colow may vary from white to brown, depending upon the breed of the hen.

Grading Egg in weight

The weight of eggs varies widely depending on many factors such as the breed, the age of the layer and environmental temperature. In Africa, for example, the egg weight may range from 35 to 65 grams, while in Europe it may range from 45 to 70 grams. As a layer gets older the weight of egg increase. Eggs are categorized in six: jumbo, extra large , large , medium , small and peewee categories, based on the net weight of an entire dozen.

The components of an egg weighing 60 grams are made up as follows:

- yolk (29%) - 17.4 g
- white (61.5%) - 36.9 g
- shell (9.5%) - 5.6 g

Self-Check –4	Written Test

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

1. What are categories involving the grading of table eggs?(3pts)
2. Write advantages of grading (2pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____

2. _____
   _____
   _____

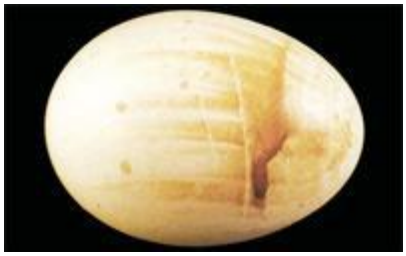
Information Sheet 5	Removing cage marked and dirty, cracked or weak shelled eggs

Freedom from stains and foreign material on the shell must be considered in assigning a quality designation to an individual egg.

Cage marks' is the term used to refer to dirty marks, dirty lines or translucent lines on the shell when eggs are collected. It is caused by rusty or dirty wires in the cage floor or roll-out trays.

Dirty egg is an individual egg that has an unbroken shell with adhering dirt or foreign material, or prominent stains. This can be happen if the egg is stayed overlong period in cage or nests before collection as well as if the nest or cage is not clear.

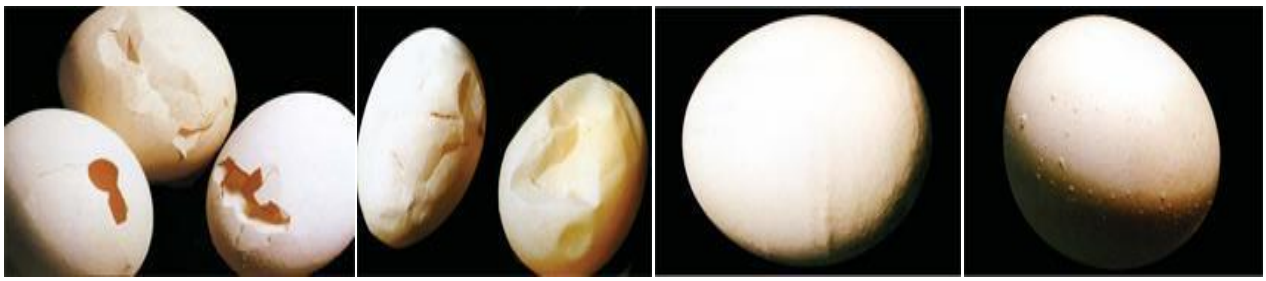
It is described when all or part of the egg shell may become stained by various substances, e.g. blood, faeces.



Sorting, grading and packing of the egg refers to the stage between primary production and retail or further processing, where the whole egg may undergo one or more activities to prepare it for either the table egg market or for processing into egg products. Cracked, dirty, and unsafe/unsuitable eggs should be segregated from clean and intact eggs. Cracked eggs should be segregated (for example, by candling) and sent for processing or disposed of in a safe manner. Dirty eggs may be cleaned and if appropriately cleaned, used for the table egg market or the egg product industry in accordance with country requirements. Dirty eggs sent for processing should be clearly labeled that they are not suitable as table eggs,

There are five major types of shell problems in the egg industry as it shown below figures

- cracks due to excess pressure;
- cracks due to thin shells;
- body-checks;
- pimpled or toe holes, and
- shell-less eggs



Gross cracks thin shell body –checks pimpled

Methods used to collect, handle, store and transport eggs should minimize damage to the shell, and avoid contamination and practices should reflect the following points:

- Cracked and/or dirty eggs should be excluded from the table egg trade.
- Cracked and/or dirty eggs should be directed to a processing or packing establishment, as appropriate, as soon as possible after collection (see Section 5.1).
- Hygienic practices, which take into account time and temperature factors, should be used to protect the egg from surface moisture in order to minimize microbial growth. •
- Where appropriate, broken and/or dirty eggs should be segregated from clean and intact eggs.
- Broken eggs and incubator eggs should not be used for human consumption and be disposed of in a safe manner

Self-Check –5	Written Test

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

1. Identify and name the major shell problems?(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

3. _____
   _____
   _____

Information Sheet 6	**Recognising and reporting grading, cleaning, and packing machine problems and abnormal noises**

Even with good farm-management practices and careful handling, a small percentage of dirty eggs will be produced. Producers must bear in mind that dirty eggs are covered with bacteria that will cause spoilage if they enter the egg. If this kind of egg is found in during grading and washing it should be reported to the supervisors.

All equipment and packing rooms should be thoroughly cleaned at the end of each packing day and should remain reasonably clean throughout the storage and packaging shift.

So recognition of these problems should identified regularly during you work. Not only this the abnormal shape, noise, and unsound egg should reported to the supervisors

Recognizing and reporting all condition of the following during working

- Farm site,
- Grading machine,
- Formation of eggs shell,
- Kinds dirty and adhering materials

These are useful for mitigation of egg lose during production, lose of customer and helps find solution to the products prior to disseminate.

Self-Check –6	Written Test

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

1. What kind of problems will be indentified and reported to supervisor during cleaning, grading and packing?(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____

_____
_____
_____

Information Sheet 7	Completing Grading records clearly and accurately

The grading service is based on the standards for quality of individual shell eggs. The grades and weight classes for consumer and nest run grades of shell eggs. In addition, contract purchase specifications serve as another basis for performing grading or inspection of lots of eggs tendered for delivery under purchase agreements. The various purchase specifications are, of course, based on the country standards for quality of individual shell eggs.

Packing centres shall record separately, by farming method and by day:

- the quantities of ungraded eggs they receive, broken down by producer, giving the name, address and producer code and the laying date or period
- after the eggs are graded, the quantities by quality and weight grade
- the quantities of graded eggs received coming from other packing centres, including the code of those packing centres and the date of minimum durability;
- The quantities of ungraded eggs delivered to other packing centres, broken down by producer, including the code of those packing centres and the laying date or period
- The number and/or weight of eggs delivered, by quality and weight grade, packing date in the case of Class B eggs or the date of minimum durability in the case of Class A eggs, and by purchaser, with the name and address of the latter.

Self-Check –6	Written Test

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

2. What will be recorded during grading?(5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

2. _____
_____
_____

_____
_____
_____

Information Sheet 8	Washing eggs.

A slightly dirty egg can be brushed with an egg brush or rubbed with a sanding sponge, paper towel and plastic scorer (if stained) with a gentle rubbing motion. Eggs with visible faeces, soil or other matter that cannot be removed by dry cleaning should be segregated and disposed of hygienically, away from clean intact eggs

To dry clean eggs: disposable paper towels are recommended to avoid reuse, if a dry cloth is used, an adequate supply should be available so that only clean cloth is passed over the egg each time and make sure the cloth is changed if there is any sign of soiling dirty cloths must be washed, sanitised and dried afterwards if they are to be reused for cleaning, and if cloth or any other alternative material is used for cleaning, it should be suitable for contact with food.

Any brushes, cloths, etc. used in cleaning should be sanitised in 100 ppm (parts per million) of chlorine for 20 minutes after use. Materials used for cleaning eggs should be food grade and must not be used for any other purpose. Sanding blocks should not be used as they are not made to be used with food and loose grit could be left on the egg

As egg shells are porous, washing can allow microorganisms to enter through the pores of the shell. Eggs contract as they cool and may draw wash water into the egg. Therefore,

Wash eggs as soon as they are collected. This will help limit the opportunity of contamination and loss of interior quality

Eggs need to be washed in water that is at least 11°C higher than the temperature of the warmest egg. This will make the egg contents swell and push the dirt away from the pores of the egg.

During egg washing:

- Eggs should be washed only once, except for any pre-wash that may be used
- Wash water temperature should be between 41–44°C
- Solutions should be changed regularly, at least every 4 hours for continuous operations or after 20 dozen eggs
- Eggs should not be allowed to stand or soak in water; once the temperature equalizes eggs can absorb contaminants out of the water
- if you have extremely dirty eggs, a mild detergent approved for washing eggs can be used.

Final rinsing procedure removes the residue of any chemicals and loose dirt adhering to the surface of the shell. When rinsing it’s important to note: rinse water should be a few degrees

higher than the wash water to prevent drawing of water into the egg, rinse solutions should not be re-circulated.

Drying

Eggs must be promptly and thoroughly dried after rinsing and prior to packing drying can be achieved with high speed air flow which causes water to evaporate from the shell surface. Air could be warmed or dehumidified. Eggs should be stored between 5°C to 15°C under clean and dry conditions with their broad pole uppermost. Condensation on the eggs should be avoided.

Self-Check –8	Written Test

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

1. Which kind of eggs can be cleaned by gentle rubbing motion? (2pts)
2. Why egg should washed soon after collected? (3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____

2. _____
   _____
   _____

Information Sheet 9	Oiling eggs

If oil is used to protect shell eggs, the oil shall meet the requirements of the standards quality.It is coating eggs with a thin film of oil greatly reduces losses by evaporation, especially where eggs are in cold storage for several months or are held at temperatures above 21° C. Special odourless, colourless, low viscosity mineral oils should be used.

Where eggs must withstand high temperatures, they should be oiled from four to six hours after lay. If eggs are to be stored at a temperature of 0° C, they should be oiled 18 to 24 hours after lay.

Eggs can be oiled by hand dipping wire baskets or by machine. The temperature of the oil should be at least 11° C above that of the eggs. Before the oil is reused it should be heated to a temperature of 116° C to prevent bacteria survival and then be filtered. The oil reservoirs should be cleaned properly. In terms of appearance oiled eggs differ from other eggs only in the slight shine left on the eggshells by the more viscous oils.

Any shell egg protection oil treatment shall be performed in a manner that prevents egg contamination and preserves egg quality. Eggs with excess moisture on the shell shall not be treated with oil to protect the shell

Self-Check –9	Written Test

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

3. Why it is necessary to oil eggs? (2pts)
4. When it is advised to oil eggs? (3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

3. _____
   _____
   _____

4. _____
   _____
   _____

Operation Sheet 1	Candling eggs

The best time to candle your eggs is in the evening, or anytime you can take advantage of dim lit conditions

Materials required:

- ❖ Clean candling room
- ❖ Prepare candling table
- ❖ Candling flash/ Candler
- ❖ Egg tray:-empty and with egg to be candled

Procedures:

- ❖ Prepare candling all tools and equipments for candling
- ❖ Clean candling room
- ❖ Candling room temperature (more than 20℃ is appropriate).
- ❖ Put down Candler (torch) in dark room.
- ❖ Bring the eggs to be candled in egg trays and place them on the candling table
- ❖ Hold each egg, one at a time, against a Candling Torch
- ❖ Identify the egg internally clear and blood spot, presence of cobweb structures
- ❖ Place the normal eggs safe for human consumption in separate tray and spoiled in other
- ❖ Record the numbers of abnormal eggs and normal eggs.

Operation Sheet-2	Grading eggs

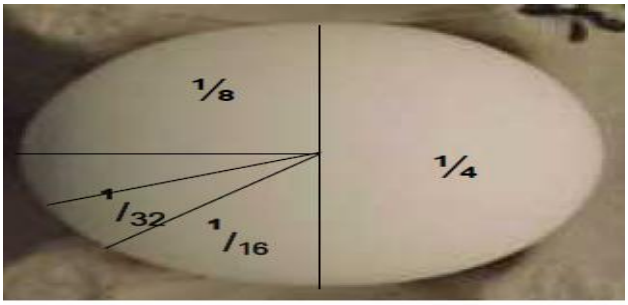
Techniques for grading exterior quality
Material required

- **Table**
- Pencil/ marker
- Egg tray
- Eggs to be graded

Procedures

- Prepare candling all tools and equipments for grading
- Eggs are laid horizontally on an egg flat. Don't touch the egg by hands

- The eggs are evaluated using the criteria set for external quality standards.
- Indentify the visible stain and localize stain



- Count the number of stain and foreign material
- Grade the according to their stain and adhering materials

Operation Sheet-3	Washing eggs

The techniques of washing eggs wet cleaning

- Add water at **least 20° F. warmer than the eggs and at a minimum of 90°** that is warmer In a bowl
- Identify dirty eggs which do not clean in dry cleaning
- Select a detergent or detergent sanitizer that is compatible with the wash water and one that will not give off foreign odours that may be imparted to the egg.
- Dip your egg into the water, and lightly wipe them clean.
- Rinse the egg under running water.
- Gently dry your egg.
- Refrigerate or use immediately.

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 3hour.

Task 1. Candle eggs properly

Task 2. Sort the eggs based on their grades

Task 3. Wash dirty egg in wet cleaning

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Skoog, DA. Holler, FJ. Crouch, SR., 2007. Principles of Instrumental Analysis, 6th Ed.

Seidler, E.S., 2003. Egg marketing. A guide for the production and sale of eggs. *FAO Agricultural Services Bulletin (FAO)*

USDA/AMS., 2000. Egg Grading Manual Agricultural Handbook Number 75

Brown, S., Idzorek, K., Lhotka, L., Warner, D., Pettit, A. and Gerlach, R., 2017. *Safe Egg Handling for Small Egg-laying Flocks and Operations*. Cooperative Extension Service, University of Alaska Fairbanks.

Brown, Philip J. ,1993.Measurement, Regression, and Calibration. Oxford statistical science series, 12. Oxford [England]: Clarendon Press

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POULTRY PRODUCTION

NTQF Level -II

Learning Guide -50

Unit of Competence: - Collect and Pack eggs for human consumption

Module Title: - Collecting and Packing eggs for human consumption

LG Code: AGR PLP2 M14 LO3-LG-50

TTLM Code: AGR PLP2TTLM 1219 v1

LO 3: Pack and store eggs

Instruction Sheet	Learning Guide # 50

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

- ❖ Placing eggs /packing eggs.
- ❖ Labelling on packed eggs.
- ❖ Cleaning, sanitizing and checking cool groom and equipment.
- ❖ Adjusting Cool room temperature and humidity
- ❖ Transferring eggs to storage and positioned in order of age, grade or dispatch.

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 –**

- ❖ Place eggs in correct cartons or trays/pack eggs.
- ❖ Label all information on packed eggs.
- ❖ Clean, sanitize and check cool room and equipment for safe operation.
- ❖ Adjust Cool room temperature and humidity
- ❖ Transfer eggs to storage and position in order of age, grade or dispatch.

Learning Instructions:

16. Read the specific objectives of this Learning Guide.
17. Follow the instructions described in number 3 to 7.
18. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
19. Accomplish the “Self-checks” **in page -5.**
20. 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).
21. 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.
22. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Placing and packing eggs in correct cartons or trays.

All eggs shall be packed in clean, new, single use trays or cartons. Egg packaging equipment should be designed, constructed, maintained and used in a manner that will minimize damage to the eggshell and avoid the introduction of contaminants in or on eggs. Wherever eggs are stored, it should be in a manner that minimizes damage to the eggshell and avoids the introduction of contaminants, or growth of existing microorganisms in or on eggs, giving consideration to time and temperature conditions. Any egg packaging, storage or associated equipment should not transfer substances to eggs that will present a health risk to the consumer

Different containers used packaging's of eggs are:

- Firm –wall basket and boxes: wooden and plastic
- Barrels
- Flat box
- Paper –board case with filler and cup flats
- Fibre cages
- Plastic Trays

Fig1: a. Paper board tray b. plastic c. plastic

Where permanent equipment is used, it should be corrosion resistant and easy to clean and disinfect or if necessary able to be dismantled and reassembled. Storage temperatures, times and humidity should not have a detrimental effect on the safety and suitability of eggs.

Several requirements must be met before packaged eggs may be grade labeled with the official grade shield:

1. The eggs must be graded by and identified under the supervision of a licensed grader. The eggs may be graded by an authorized company employee, but then must be check-graded by the supervising grader.

2. Eggs to be packed in packages and marked U.S. grades: grade AA,. grade A, or. grade B must be packed from eggs of current production. Current production means that the eggs are not older than 30 days when packed.
3. Once packed and shipped for consumer sales, officially graded and identified eggs may not be regarded, repackaged, or re dated.
4. Eggs must be packed in establishments meeting the facility and operating requirements set forth in the USDA regulations.

Fig 2: Packed eggs

There are many different types of egg packages, which vary both in design and packaging materials used.

- Packing eggs with clean and odorless rice husks, wheat chaff or chopped straw in a firm walled basket or crate greatly decreases the risk of shell damage.
- A very common form of packaging is the filler tray. The fillers are then placed in boxes or cases. Filler trays are made of wood pulp molded to accommodate the eggs. Fillers can also be made of plastic. The advantages of using plastic egg fillers are that they can be reused and are washable. The fillers can be covered with plastic coverings and be used as packages for final sale to the buyer.
- Eggs can also be packed in packages that are smaller and specific for retail sale. Each package can hold from two to twelve eggs. These cases can be made of paperboard or molded wood pulp, or can be made of plastic. The use of small cases is restricted by availability and cost considerations. However, small cases are good for retailers and customers. They are easy for the retailers to handle and customers are able to inspect the eggs.

Self-Check -1	Written Test

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

1. Write the characters of permanent equipment in packaging of egg?(2pts)
2. List container used for packaging without looking note of information sheet 1 (5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
2. _____
   _____
   _____
   _____

Information Sheet-2	Labelling all information clearly and accurately.

Labels are a source of important information for the wholesaler, retailer and consumer and not just pieces of paper stuck onto cartons or boxes. The important facts on the label contain information for buyers concerning:

- The eggs size and weight
- Quality/grade description - AA, A or B
- The producer
- When the eggs were laid,
- How to store them and
- Their expiration date.

Persuading the buyer to purchase the product without tasting, smelling or touching is another function of labeling.

Packed eggs must be labelled with the following:

- Name of product ('eggs')
- Number of eggs (unless this can be easily determined from outside the package)
- Name and address of packer or seller.
- Packing centre code.

Self-Check -2	Written Test

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

1. Write the facts that should be labeled on packed eggs. (3pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____

Information Sheet-3	Cleaning, sanitizing and checking cool room and equipment for storing eggs

After eggs are graded and packed in cases, they should immediately be moved to the shipping room cooler and held there until ready for distribution.

Cooler rooms should be free from objectionable odours and mould and should be maintained in a sanitary condition at all times. The coolers must be capable of maintaining the temperature and humidity necessary for the preservation of eggs.

Rooms where equipment and utensils are cleaned and sanitized must:

- ❖ Have the same construction and cleaning requirements of previous rooms mentioned.
- ❖ Be adequately sized to handle the equipment and utensils.
- ❖ Have an exhaust system to remove odors.

Some plants may not have a specific room to clean and to sanitize equipment and utensils. In this case, the following precautions must be taken: • The area must be segregated from the breaking room. • The area must be well ventilated with air flow that travels away from the breaking room

It is normal practice for cool stores to be cleaned prior to charging with the product by adopting the following practices:

i) Dry clean-up of cool store
ii) Floors washed down (If required)
iii) Excess water removed

It is better to clean at regular schedule

Scheduled Weekly Cleaning

Each week and in addition to the above routine cleaning practices, cool stores are cleaned using an approved detergent suitable for the purpose. Ceilings and high walls are inspected and cleaned as necessary.

Scheduled Monthly Cleaning

Each month, (more frequently if required), overhead structures are cleaned, as appropriate. The cleaning of cool stores is recorded in the cleaning and sanitation record book

Effective cleaning and sanitizing will minimize the risk of eggs becoming infected with pathogenic organisms. Mobile containers and tankers should be cleaned and disinfected prior to being refilled.

Self-Check -3	Written Test

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

1. Write adopting practice of cool room cleaning (5pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

_____

Information Sheet-4	Adjusting Cool room temperature and humidity

Temperatures of all temperature controlled areas shall be monitored at least every 24 hours when operating. These findings shall be routinely logged and any out of specification findings shall cause corrective action to be instigated and recorded.

All refrigeration equipment, including thermometers shall be independently maintained and calibrated at least every six months by a refrigeration contractor. A maintenance report shall be retained on file and made available, upon request to authorised officers Careful and accurate control of the air condition is essential.

Coolers should be equipped with thermometers and hygrometers to verify and monitor temperature and humidity

A temperature between - 1.5° and - 0° C is recommended. At a temperature of - 2.5° C eggs freeze. The room should be well constructed and insulated and the refrigeration should be capable of maintaining an adequate uniform temperature in all areas. Periodic ventilation of the storage room is advisable to promote air exchange.

The relative humidity should be between 80 and 85 percent at a cold storage temperature of - 1° C. Ideal storage temperature is between 12ºC and 15ºC (50 – 69ºF). At cold storage temperatures of about 10° C the relative humidity should be between 75 and 80 percent. The best humidity level at which to store eggs is between 75 to 85% RH to avoid significant drying out of the egg before incubation. In such instances, on average, egg weight loss should not exceed 0.5 percent per month.

During the early stages of storage when the packaging material is absorbing moisture at a high rate, the floors should be sprinkled with clean water several times a day. If forced-air circulation is feasible, a controlled temperature water-spray air washer may be used. If the humidity becomes excessive, part of the air can be cycled through a unit containing calcium chloride. Where eggs have been oiled less attention can be paid to the humidity level.

The most important factors in successful cold storage are as follows.

- The selection and packaging of eggs.
- The equipment and preparation of the cold store.
- Proper temperature, humidity and air circulation.
- Periodic testing for quality.

- ❖ The gradual adjustment of eggs to higher temperatures when removed from storage.

Care must be taken in removing eggs from storage to avoid the condensation of moisture on shells. This is minimized by raising the temperature slowly or by moving the eggs through rooms with intermediate temperatures. If condensation occurs, the eggs should be held under conditions that allow the moisture to evaporate within a day or so. The average storage life for eggs is between six and seven months.

The following factors should be considered when contemplating cold storage.

- Refrigeration is a complex and highly technical business.
- Capital investment and operating costs must be estimated.

Self-Check -4	Written Test

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

1. Write the important factors in successful cold storage. (3pts)
2. What is the ideal storage temperature and humidity? (2pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____

_____

_____

_____

2. _____

_____

Information Sheet 5	Transferring eggs to storage and positioning in order of age, grade or dispatch

For the successful transport of shell eggs three essential requirements must be met.

- Well protected against mechanical damage.
- Careful handling.
- The eggs must be protected at all times against exposure to temperatures

The permissible range of temperatures during loading and transport depends on the local climatic conditions and the duration of the journey.

Care is needed to avoid excessive shaking, especially where roads are bad. Egg containers should be stacked tightly and tied down securely to minimize movement. Covers should be used to protect them from the heat of the sun, rain and extreme cold where applicable.

Recommended temperatures for loading and transport

	Transport over 2 or 3 days	**Transport over 5 or 6 days**
Maximum on loading	+6° C	+3° C
Recommended for transport	-1° to + 3° C	-1° to + 1° C
Acceptable for transport	1° to + 6° C	1° to + 3° C

Delivery of high quality eggs over long distances, especially in hot climates, generally calls for refrigeration. Requirements for the successful operation of refrigerated transport equipment are rather rigid especially as regards the following factors:

- Efficiency and durability of insulation;
- Adequacy and reliability of the cooling mechanism; and
- Adequate circulation of air within the vehicle or container so that variations of temperature are slight.

Eggs are then sized by weight, packaged into cartons and placed in refrigerated storage, until being shipped to retail stores and restaurants.

Dispatch and Transportation

Vehicle Inspections

All vehicles used to convey eggs from the premises will be maintained in good repair and clean condition. The vehicles will not be used to carry extraneous material which may be deleterious to the conveyance of eggs.

Dispatch Procedures

Adequately cooled product will only be removed from the premises. Temperature requirements are: not more than 17°C.

Temperature shall be monitored for every consignment and the findings will be recorded in the Dispatch If any product is found to be outside of specification it shall be returned to storage until temperature parameters are achieved.

Transportation

All product dispatched from the premises will be transported in a cartage vehicle that incorporates facilities for the product to be carted under active refrigeration.

The temperature of all products at load out and the condition of vehicles carting eggs is recorded and retained on file. The vehicle is equipped with a refrigeration unit to maintain product at required temperatures.

Delivery

Delivery drivers are to visually check a random selection of each consignment with customers to verify egg integrity, customer to sign the delivery docket upon receival of product if satisfactory. Any defective eggs will be replaced and if not disposed of at the store, will be marked and returned to the place of origin for disposal

Self-Check -5	Written Test

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

3. What is the recommended temperature on loading for 2 -3 days trasnportation?

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

3. _____
_____
_____
_____

4. _____
_____

List of Reference Materials

SHELL EGG PROGRAM EGG PRODUCTION (TEMPLATE)., 2015. Template FSP Egg Production - V1.7

POULTRY PRODUCTION

NTQF Level -II

Learning Guide -51

Unit of Competence: - Collect and Pack eggs for human consumption

Module Title: - Collecting and Packing eggs for human consumption

LG Code: **AGR PLP2 M14 LO4-LG-51**

TTLM Code: **AGR PLP2TTLM 1219 v1**

LO 4: Clean and disinfect equipment

Instruction Sheet	Learning Guide #- 51

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

- ❖ Cleaning, sanitizing and disinfecting all machines, equipment, and egg handling areas
- ❖ Handling and measuring all chemicals used in the cleaning process
- ❖ Taking and preparing samples for testing
- ❖ Managing and disposing of all waste containers, fluids and run-off

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, sanitize and disinfect all machines, equipment, and egg handling areas
- ❖ Handle and measure all chemicals used in the cleaning process
- ❖ Take and prepare samples for testing
- ❖ Manage and dispose of all waste containers, fluids and run-off

Learning Instructions:

23. Read the specific objectives of this Learning Guide.
24. Follow the instructions described in number 3 to 7.
25. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
26. Accomplish the “Self-check 1” **in page 4.**
27. 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).
28. 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.
29. Submit your accomplished Self-check. This will form part of your training portfolio.

Information Sheet-1	Cleaning, sanitizing and disinfecting all machines, equipment, and egg handling areas

1.1. Cleaning

Cleaning is removal of gross contamination, organic material, and debris from the premises or respective structures, via mechanical means like sweeping (dry cleaning) and/or the use of water and soap or detergent (wet cleaning).

Different cleaning agents are used depending on the item to be cleaned; the cleaning method and the type of soiling found on the item. Different cleaning agents are used depending on the item to be cleaned, the cleaning method and the type of soiling found on the item. There are four main types of cleaning agents used commercially:

1. Detergents
2. Degreasers
3. Abrasives
4. Acids

All machines, equipments, and egg handling areas should

- Clean out dust, waste, etc.;
- Take all movable equipment outside, clean and wash;
- Disconnect electrical equipment as necessary- DANGER
- Drain, flush, clean water system, dismantle as necessary;
- Clean ancillary rooms, fans, storage areas, , farm vehicles and other equipment;
- Clean bins used for waste material, boot dips;
- Clean equipment used for the storage and disposal of discarded eggs;

1.2. Sanitizing

Sanitization is reducing a contamination or micro organisms to a safe level after cleaning

Follow cleaning with sanitizing

Cleaning is only the first step to a germ-free equipments and machine. Cleaning is done using detergent, but it doesn't kill bacteria or other microorganisms that can cause food poisoning. Sanitization is reducing a contamination or bacteria to a safe level, while disinfection is killing everything on a particular surface

Effective cleaning and sanitizing also helps to:

- prevent pests from entering your business
- prevent cross-contamination
- Prevent allergic reactions caused by cross-contamination

Make sure everyone who handles eggs or food in your business knows how to clean and sanitize properly and why it's important.

1.3. Apply disinfection

Disinfection is the methods used on surfaces to destroy or eliminate a specific species of infectious microorganism through physical (e.g., heat) or chemical (e.g., disinfectant) means. Example s Chemical disinfectants are: alcohols, phenolics, aldehydes, formaldehydes ..etc The factors contribute to the disinfectant selection are:

- Requirements of the incident,
- Specific microorganism concern
- Disinfection methods, and
- Environmental factors

A combination of methods may be required

- Ensure the machine and equipments are dry;
- Follow label instructions;
- Apply approved disinfectants at correct dilution (e.g. formaldehyde at 2-5%) to:
  - the building structures**;**
  - moveable equipment and reassemble;
  - all ancillary and common areas;
  - egg storage areas, bins, hoppers;
  - Equipment used for the storage and disposal of dead birds, discarded eggs.

Self-Check -1	Written Test

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

1. What precaution you should follow to apply disinfection?(3pts)
2. Write the purpose of cleaning and sanitizing (3Pts)
3. What are factors contribute to disinfectant selection?(4pts)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

_____

_____

2._____

_____

_____

3._____

_____

_____

Information Sheet-2	Handling and measuring all chemicals used in the cleaning process

All chemicals are purchased from reputable suppliers. The chemicals fall into four categories: detergents, sanitisers, hand cleaners and deodorisers. (Deodorisers are not used in packing and storage areas, i.e. used in toilet, amenities areas.)

All cleaning chemicals are stored in a designated place, away from and with no direct contact with slaughter and/or processing areas

2.1. Handling of cleaning chemicals

Before handling chemicals, follow the following advises

- ❖ Wear suitable protective equipment. .
- ❖ Ensure good ventilation.
- ❖ Use cold water.
- ❖ Pour the product into the water, not the other way round.
- ❖ Dose cleaning agents correctly.
- ❖ Use original container

2.2. Measuring all chemicals used in the cleaning process

The proper mixing of cleaning chemicals is critical to achieving the right concentration for effective disinfection and the health and safety of Cleaning &disinfectant personnel. This section describes a general disinfectant mixing protocol:

1. Wear appropriate PPE when opening and mixing disinfectants. At minimum, wear disposable outwear (for example, coveralls, boots, hat, and gloves).

2. Ensure that the chemical disinfectant has been stored properly (a cool location is necessary to maximize shelf life) and is within the maximum shelf life before mixing. Check the product label for the expiration date.

3. Calculate the required amount of disinfectant as manufactures instruction. For liquid chemical disinfectant solution, calculate the total surface area of the floor, walls, ceiling, and fixed equipment requiring treatment.

4. Ensure that the correct proportion of disinfectant concentrate is added to the correct volume of water.

5. If ambient temperature is below freezing, either heats the surfaces to be treated to prevent freezing, use heat blankets around liquid containers, or add up to 40% propylene glycol in water when mixing solutions.

6. Mix the required amount of disinfectant solution in accordance with label instructions. Always add concentrate to water, not water to concentrate.

7. In cold temperatures, the building may require heating to ensure that the disinfectant is effective; please consult with a subject matter expert on disinfectant effectiveness.

8. Once a solution has been prepared, it must be used on the same day or it may become inactive. If there are concerns about the chemical's effectiveness, test kits can help to determine whether any chemical degradation of the disinfectant's active ingredients has occurred.

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Self-Check -2	Written Test

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

1. How do you handle cleaning chemicals?
2. What will happen if you add water to concentration?

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	**Taking and preparing samples for testing as required by organization**

Sample is a collection of one or more units from a lot drawn for examination or testing purposes. Sample units could be entire packages, portions of packaged, or portions being prepared.

Sampling is the process of collecting and testing products, ingredients, the environment or other materials. Sampling is commonly used to monitor or verify the effectiveness of control measures put in place to prevent, eliminate or reduce to an acceptable level the hazards that present a risk of contamination to a product. Sampling can also provide assurance that incoming materials, finished products and water meet food safety standards.

It is important to collect food samples that are representative of a lot or eggs contact surface being assessed. It is also important to ensure that samples are not compromised when being collected, stored or shipped, as this could lead to inaccurate results.

Sampling is commonly used to:

- Assess the acceptance of consignments
- Test for batch release
- Control raw materials
- Control in process products
- Assess the finished product
- Monitor, verify and validate the effectiveness of control measures, for example:
    - determine whether control measures such as sanitation procedures are effective in preventing the contamination of a food
    - determine whether the water used in your establishment meets potable water requirements
    - monitor the pH or A_w level of a food at a critical control point to ensure that it is within the critical limits
    - validate the shelf life established for the food
    - assess the acceptability of an ingredient

Sampling is used to assess the presence and level of the following three types of hazards.

How to sample

It is important to practice proper sampling techniques to avoid contaminating samples and exposing yourself to contaminants.

- Wear protective items, such as gloves and protective clothing.
- Use only clean equipment and containers to take samples.

Samples should be labeled with the information you need to link the results back to the food, ingredient or food contact surface being assessed. Sample labels should include:

- date and time of collection
- description of what was sampled
- lot number
- sampling site
- name of the person who collected the sample

The sample units should be representative of the lot and obtained randomly:

- Each sample unit should be selected by chance and each unit in the lot should have an equal chance of being included in the sample.
- you can use a table of random number generated using a computer software to assign a number to each unit in a lot and select units to be sampled

Collecting ingredients of samples

When collecting samples:

- Wash and dry hands prior to sampling
- Use aseptic techniques when taking microbiological samples
- Pre-packaged food samples should be collected in an original, unopened package
- Use appropriate sampling containers that can withstand handling and shipping
- Securely seal sample containers after filling so they cannot leak or become contaminated during further handling or transportation
- Note: Open, broken or damaged containers are not appropriate for sampling

Self-Check –3	Written Test

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

1. What is sample
2. When to take sample?
3. How do you take sample?

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 4	Managing and disposing of all waste containers, fluids and run-off

Any small amount of unused waste disinfectant concentrate should be disposed of according to the label instructions. Consult a qualified waste disposal professional for the disposal of larger quantities of disinfectant concentrate. No special procedures of disposal are required for small quantities of waste disinfectant solution resulting from excess spray and runoff. Large amounts of waste disinfectant must be collected, tested, characterized, and disposed of by the appropriate jurisdiction. If possible, it can be filtered and reused.

Waste management (or **waste disposal**) is the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.

Waste can be solid, liquid, or gas and each type have different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological and household. In some cases, waste can pose a threat to human health. Waste management is intended to reduce adverse effects of waste on human health, the environment or aesthetics.

Self-Check –4	Written Test

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

1. Write the types of wastes?
2. What is waste management?

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
2. _____
   _____
   _____

List of Reference Materials

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