Oil Seed and Pulse Processing Level-II

Based on September 2020, Version2 Occupational standards

Module Title: Implementing Sampling Procedures
LG Code: IND OSP2 M17 LO (1-3) LG (53-54)
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LG #53	LO #1 Prepare for Sampling

Instruction Sheet

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

- Identifying sampling requirements
- Preparing sampling equipment, Containers and labels

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify sampling requirements
- Prepare sampling equipment, containers and labels

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1- Identifying Sampling Requirements

1.1 Introduction

Sampling is very difficult to lay down detailed directions for sampling oils and rats that will encompass all conditions and circumstances which may confront the individual charged with the responsibility of taking the sample. There are many instances in which the experience and judgment of the individual should prevail. There are, however, certain general rules relating to the drawing. Preparation, storage and handling of samples which should always govern if the sample is to be representative

1.2 Sampling requirements

The refined edible oil shall comply with the following requirements:

- The oils shall be clear and free from:
  - ✓ Rancidity,
  - ✓ Adulterants,
  - ✓ Sediments,
  - ✓ Suspended and
  - ✓ Other foreign matter,
  - ✓ Separated water,
  - ✓ Added coloring and flavouring substances and
  - ✓ Mineral oil.
- However, it may contain food additives permitted in these Regulations and Appendices.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer

1. Define sampling? (5 points)
2. List sampling requirements? (5 points)

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

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

Information Sheet 2- Preparing Sampling Equipment, Containers and Labels

2.1 Sampling instruments

All sampling instruments should preferably be made of stainless steel; if made of copper, brass or bronze, these should be nickel-plated. And all sampling apparatus shall be clean and dry when used. Sampling instruments may be cleaned with hot soapy water or other detergent, care being taken to wash away the last traces with scalding hot water. If a source of steam is available, the instruments may receive a final clean sing in a jet of steam and it is recommended that this procedure be carried out when edible oils are sampled and where the taste is likely to be of primary importance.

2.1.1 Sampling bottle or can

Instrument is suitable for sampling large vessels arid tanks of liquid oil. It consists of a weighted bottle or metal container with removable stopper or cork, to which is attached a suitable chain, pole or cord. This device is lowered to the various desired depths at which the stopper is removed and the container is allowed to fill.

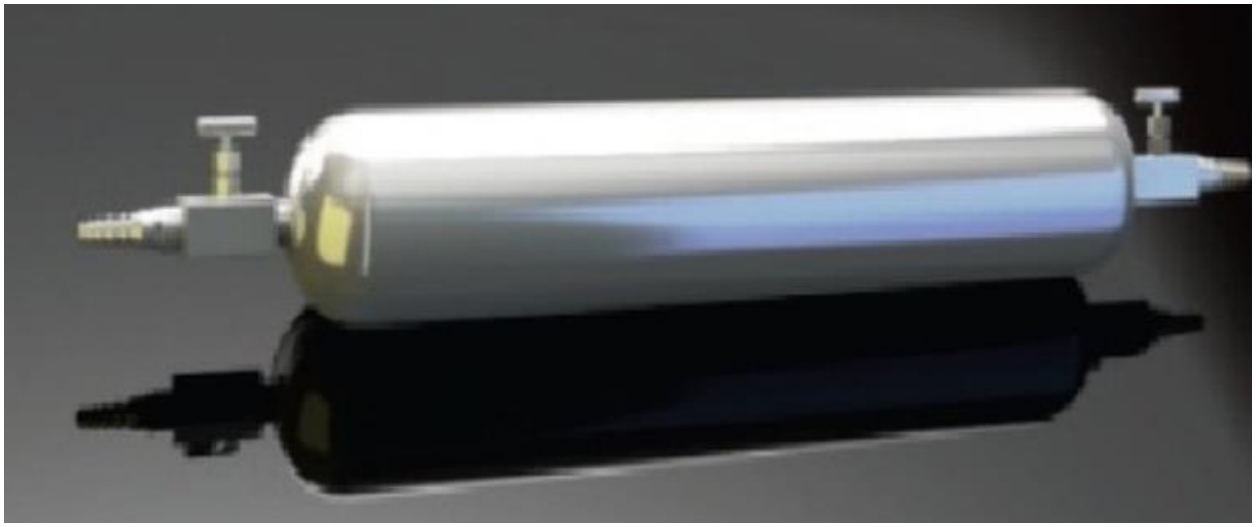

Figure 1 sampling bottle

2.1.2 Sampling tubes

The recommended forms of sampling tubes are:

a. **Closed-type sampling tubes**, undivided or divided for sampling liquid and semi-liquids that may not be homogeneous; and
b. **Open type sampling** tube for sampling homogeneous liquids.

a. **Closed type sampling tube, undivided**:

It consists of two concentric metallic tubes closely fitted into each other throughout their entire length, so that one tube may be rotated within the other. Longitudinal openings of about one-third the circumference are cut in both tubes. In one position the openings in the two tubes coincide; the sampling tube is open when in this position and admits the material. By turning the inner tube through an angle of 180°, it becomes a sealed container. The inner tube may have a diameter of 20 to 40 mm and is undivided along its length to serve as a single container. The two concentric tubes are provided with ports at their bottom ends, so, placed that it becomes possible to drain the material contained in the instrument through them, when the longitudinal openings coincide. The length of the instrument should be such as to enable it to reach the bottom of the container being sampled. The instrument is inserted closed, the material is admitted by opening it, and finally, it is closed and withdrawn.

b. **Closed type sampling tube divided**:

It is also of metal and has D-shaped cross section. It is provided with compartments along its length and is opened and closed by means of a closely-fitting shutter which moves up and down throughout the entire length. It may be from 25 to 50 mm wide.

c. **Open type sampling tube for homogeneous liquids:** It is made of metal or thick glass and may be of 20 to 40 mm diameter and 400 to 750 mm length. The upper and lower ends are conical and narrow down to 6 to 12 mm diameter. Handling is facilitated by two rings at the upper end. For taking a sample, the instrument is first closed at the top with the thumb or a stopper and lowered until the desired depth is

reached. It is then opened for a short time to admit the material and finally closed and withdrawn.

Figure 2 sampling tubes

2.1.3 Sample scoops

These instruments are of the open type and are suitable for taking samples of naturally occurring vegetable fats or hydrogenated vegetable oils. They are of metal, of semi-circular or C-shaped cross-section, and will bore out a core of the sample through the material being sampled.

2.2 Sample containers

The sample shale be packed in clean dry containers, preferably of glass or tin-plate the sample container should be almost but not completely filled. Glass bottles of 500 ml capacity arc recommended for liquid oils and glass jars for solid vegetable oils or fats. All sample containers shall be fitted with suitable tight stoppers. Rubber stoppers should not be used to close the containers. In the case of glass containers, glass stoppers or new good quality velvet corks should be used and, in the case of tin containers tin caps should be suitably soldered on the top, avoiding contamination of fat with acid flux. Use of resin as a flux is recommended. Tinfoil or grease-proof paper may be wrapped round the corks to prevent contact of the sample with them, and it is recommended that this be done in the case of refined or deodorized edible oils. In the case of oils with high acid

value neither metal containers nor tinfoil is recommended. The sample containers shall be sealed with sealing wax in such a manner that it is not possible to remove the contents and the label without breaking the imprint of the seal.

2.3 Labeling general requirement

Every prepackaged food shall carry a label containing information as required here under unless otherwise provided, namely

- The particulars of declaration required under these Regulations to be specialized on the labels shall be in English or Amharic.
- Pre-packaged food shall not be described or presented on any label or in any labeling manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect.
- Labels in pre-packaged foods shall be applied in such a manner that they will not become separated from the container.
- Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use.
- Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it.
- License number shall be displayed on the principal display panel in the following format.

2.4 Labeling of sampled edible oil

In addition to the general labeling requirements specified above every package of oil sample shall carry the following information on the label, namely:

- Sampler name
- Type of edible oil
- Declaration regarding food additives
- Date of Manufacture / sample
- Lot / Code / Batch identification

All the contents provided on the label must be clear, prominent, indelible and legible.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. List and explain recommended sampling tubes? (5 points)
2. Mention labeling general requirements? (5 points)
3. Explain characteristics of sampling instruments? (5 points)

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

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

Operation Sheet – 1 Steps of Preparing for Sampling

Sequence of preparing for sampling

1. Wear appropriate personal protective equipment
2. Identify sampling tools and containers
3. Select appropriate sampling containers
4. Clean sampling containers
5. Put in appropriate place
6. Record preparing activity

LAP TEST	Performance Test

Name……. ID……..
Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-1 prepare for sampling

LG #54	LO #2 Collect Samples

Instruction sheet

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

- Sampling technique
- Handling and preparing Samples
- Identifying and reporting defects in sample
- Recording sample information
- Maintaining work place
- Workplace environmental guidelines
- Policies and procedures

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

- Identify sampling techniques
- Demonstrate handling and preparing Samples
- Identify and report defects in sample
- Record sample information
- Maintain work place
- Explain workplace environmental guidelines

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
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Information Sheet 1- Sampling Technique

1.1 Introduction

Sampling is the process of collecting and testing edible oil, 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 food. 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 a food 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.

1.2 Sampling technique

There are several sampling methods/techniques in common use. These are probability sampling, non-probability sampling, bulk sampling, and acceptance sampling. These are described in brief below:

1.2.1 Probability sampling

Probability Sampling Probability sampling is used when a representative sample is desired, and uses principles of statistical sampling and probability i.e. elimination of human bias. It is a random selection approach that tends to give each unit an equal chance of being selected.

- **Simple random sampling**

Requires that the number of units in the population be known and each unit is assigned a number. A specific quantity of random numbers between one and total number of population units is selected. Sample size is determined by lot size and potential impact of a consumer or vendor error. Units corresponding to the random numbers are then analyzed as an estimate of the population.

- **Systematic sampling**

Systematic sampling is used when a complete list of sample units is not available, but when samples are distributed evenly over time or space, such as on a production line. The first sample is selected at random and then every nth unit after that.

- **Stratified sampling**

Stratified sampling involves dividing the population into overlapping subgroups so that each subgroup is as homogenous as possible. Group means, therefore, differ from each other as much as possible. Random samples are then taken from each subgroup. The procedure provides a representative sample because no part of the population is excluded and it is less expensive than simple random sampling.

- **Cluster sampling**

Cluster sampling entails dividing the population into clusters or subgroups so that cluster's characteristics are as identical as possible, that is, the means are very similar to each other. Any heterogeneity occurs within each cluster. Clusters should be small and having a similar number of units in each cluster. The clusters are sampled randomly and may be either totally inspected or sub-sampled for analysis. This sampling method is more efficient and less expensive than simple random sampling, if populations can be divided into homogenous groups.

- **Composite sampling**

Composite sampling is used to obtain samples from bagged products such as flour, seeds, and larger items in bulk. Two or more samples are combined to obtain one sample for analysis that reduces differences between samples. For example, FDA composite 12 and at least six subsamples, respectively, for the sample to be analyzed for compliance with nutrition labeling regulations.

1.2.2 Non-probability Sampling

Non-probability sampling is used when it is not possible to collect a representative sample, or a representative sample is not desired. For example, in case of adulteration such as rodent contamination, the objective of the sampling plan may be to highlight the adulteration rather than collect a representative sample of the population. The sample collector uses judgment rather than statistical considerations in the selection of the sample. The unusual or unexpected characteristics in a population could be selected to be identified. This type of sampling is done in many ways, but in each case the probability of including any specific portion of the population is not equal because the investigator selects the samples without estimating sampling error.

- **Judgment sampling**

Judgment sampling is solely at the discretion of the sampler and therefore is highly dependent on the person taking the sample. This method is used when it is the only practical way of obtaining the sample. This method may present a better estimate of the population than random sampling if sampling is done by an experienced individual and limitations of extrapolations from the results are understood.

- **Convenience sampling**

Convenience sampling is performed when ease of sampling is the key factor. The first pallet in a lot or the sample that is most accessible is selected. This type of sampling will not be representative of the population, and therefore is not recommended.

- **Restricted sampling**

Restricted sampling may be unavoidable when the entire population is not accessible. For example, if sample is to be taken from a loaded truck, but the sample is not a representative of the entire population.

- **Quota sampling**

Quota sampling is the division of a lot into groups representing various categories, and samples are then taken from each group. This method is less expensive than random sampling but also is less reliable.

1.2.3 Bulk sampling

Bulk sampling involves the selection of a sample from a lot of material that does not consist of discrete, identifiable or constant units. Sampling may be performed in static or dynamic situations. Bulk sampling poses special problems requiring certain decisions to be made: the number of increments to be taken, the size of the increments, from where in the pile or stream they should be drawn, the sampling device to be used, and how to reduce the increments taken to a reasonable size of sample for delivery to the laboratory.

1.2.4 Acceptance sampling

Acceptance sampling differs from the previous types and involves the application of a predetermined plan to decide whether a lot of goods meet defined criteria for acceptance. The risks of accepting “bad” or rejecting “good” lots are stated in conjunction with one or more parameters, for example, quality indices of the plan. Statistical plans can be designed to regulate the probabilities of rejecting good lots or accepting bad lots.

1.3 Scale of sampling

1.3.1 Lot

All the containers in a single consignment of one type and grade of material drawn from a single batch of manufacture shall constitute the lot. If a consignment is declared to consist of different batches of manufacture, the batches shall be marked separately and the groups of container in each batch shall constitute separate lots.

1.3.2 Gross Sample

The general procedure for taking a gross sample is to draw a number of portions from the bulk quantity or a number of portions form all or several packages and mix them thoroughly. Representative portions of the gross sample shall be transferred to air-tight containers of suitable size for the test samples.

Gross sample from small packages: when sampling from drums, barrels, etc. the packages from which the samples are drawn shall be selected at random from the lot. The following schedule is recommended for the number of packages to be sampled.

Table1 Number of edible oil packages to be sampled

Number of packages in the lot	Number of packages to be sampled
1 to 4	Each package
5 to 100	At least 20% with a minimum of 4 packages
More than 100	At least 10% with a minimum of 20 packages

1.3 General precaution in sampling

- All sampling instruments should preferably be made of Stainless steel.
- All sampling apparatus should be clean and dry when used.
- Samples should not be taken in an exposed place.
- Samples should be stored in a manner that they are protected from light, temperature and other abnormal conditions.
- Sample containers should be filled such that the air space above the liquid level should be 5 to 10% of the capacity of the sample container.

1.4 Sampling Procedure

1.4.1 Oils in Barrels, Casks, Drums, Tierces

- **Liquid or semi-liquid oils:**

Roll the container to mix the contents and insert the sampling tube slowly through the bung hole or any other convenient opening. If possible, the sample should be drawn

from end to end. As soon as the tube is fully inserted, close the upper constriction with a thumb or a stopper. Withdraw the tube and transfer the sample into a clean dry container. Take several such portions and mix well.

- **Solid oils or fats:**

Remove the bung and insert the sampling scoop through the opening, push it through the opposite end or side, turn it in a complete circle and withdraw the sample. If possible the sample should be drawn from end to end. Collect several such portions, soften and mix thoroughly.

- **Very hard Fats:**

If the sample material is in the form of flakes or loose lumps or pieces take grab samples of uniform and proportional size. If the sample material is in the form of large pieces, it should be broken up before taking grab samples. Mix thoroughly and quarter and take a representative sample.

1.5 Tests and referee samples

1.5.1 Size of test samples

The minimum size for each test sample shall be 0·5 kg.

1.5.2 Preparation of test sample

Normally, all the samples drawn shall be put into a clean dry receptacle, such as a bucket or tub, and the contents of this receptacle shall be thoroughly mixed and at least four uniform samples (test samples) shall be drawn there from.

1.5.3 Referee sample

Two of the test samples bearing the seals of the purchaser and the supplier shall constitute, the referee samples, to be used in cue of dispute between the purchaser and the supplier, and shall be kept at a place agreed to between the purchaser and the supplier.

1.6 Test for acceptances

1.6.1 Examination and Tests

The purchaser may separately examine test samples of each of the separate qualities for compliance with the requirements of the individual specification, or he may prepare, for the purpose of such examination and at any stage of the progress of the examination, a composite sample representing the whole of the consignment, by mixing the test samples.

1.6.2 Criterion for judgment

The lot shall be considered to conform to the requirements of this standard if the test sample satisfies all the requirements and passes all the tests. If two or more qualities are examined from a consignment and if one or more of them do not comply with the requirements of the specification for that particular material, the purchaser shall have the right to accept only that portion, which complies with the requirements, or accept or reject the whole of the consignment.

1.6.3 Quality testing parameters

Quality testing parameters are:

- Moisture
- Color
- Refractive Index
- Acid value and free fatty acids
- Saponification value
- Unsaponifiable matter
- Iodine value
- Peroxide value
- Fatty acid methyl esters (FAME)

- **Moisture content**

Water in oil can exist in three stages: Dissolved emulsified and free. Below saturation level, the molecules of water are dispersed alongside oil molecules, resulting in water in the oil that is not visible. This is known as dissolved water, the least dangerous water state to a lube system. When the amount of dissolved water exceeds the saturation point, the oil is no longer able to absorb more water molecules, resulting in emulsified water. This is characterized by a hazy or cloudy appearance of the oil. Further

increments of water content in oil will result in separate levels between oil and water forming. This state is known as free water. Due to its higher density, the water forms the lower layer, settling at the bottom of the sump, with the oil floating on top.

- **Colour**

Colour determination is used for determining the quality of oils & in refining process. It also checks the measure of bleaching process also. The method determines the colour of oils by comparison with Lovibond glasses of known colour characteristics. The colour is expressed as the sum of total of the yellow & red slides used to match color in a cell of the specified size.

Figure 3 Edible oil color quality tester

- **Refractive Index**

The refractive index (RI) of oil or fat is a mean for identification of a nature of particular oil due to the difference in saturation, conjugation, presence of hydroxyl substituted & chain length fatty acids. It is measured under different temperature conditions - 20°C for oils, 40°C for solid fats, 60°C for hydrogenated fats & 80°C for waxes. Refractive index is very specific for particular oil. It is defined as ratio between the sine of the angle of incidence to the sine of the angle of refraction when ray of light of a known wavelength (mean of the D lines of sodium) passes from air into oil or fat.

- **Acid value and free fatty acids**

Acid value indicates the proportion of free fatty acid present in oil or fat and may be defined as the number of milligrams of caustic potash required to neutralize the acid in 1 gm. of the sample. Refined oil acid value for most samples lies within 0.5. If any titrable acid other than a fatty acid is present in the sample, it will be an error. A high acid value indicates a stale oil or fat stored under improper conditions.

- **Saponification value**

Saponification is the hydrolysis of fats or oils under basic conditions to afford glycerol and the salt of the corresponding fatty acid. Saponification literally means "soap making". It is important to the industrial user to know the amount of free fatty acid present, since this determines in large measure the refining loss. The amount of free fatty acid is estimated by determining the quantity of alkali that must be added to the fat to render it neutral.

- **Unsaponifiable matter**

Unsaponifiable matter is calculated as the difference between the amounts of material which are Unsaponifiable, soluble in diethyl ether and insoluble in water, and the amount of fatty acids expressed in terms of the amount of oleic acid. The unsaponifiable matter is that portion of oil or fat which is not saponified with caustic alkali but soluble in non-polar solvent. The Unsaponifiable matter consists of oil soluble vitamins, hydrocarbons, higher alcohols & sterols which are not soluble in water after esterification. The material is completely saponified with alcoholic potassium hydroxide, & extracted with petroleum ether. The petroleum extract is washed with alcohol & ether. The washed extract is evaporated & residue is weighed. The fatty acids in it are determined by titrating with sodium hydroxide solution. The difference in weight of residue & free fatty acids will give the unsaponifiable matter.

- **Iodine value**

Unsaturated fatty acids can be converted into saturated by the process of hydrogenation. Depending upon the degree of unsaturation, the fatty acids can combine with oxygen or halogens to form saturated fatty acids. So it is important to know the extent to which a fatty acid is unsaturated. There are different methods for checking the unsaturation level in fatty acids, one among them is by determining the iodine value of fats. Iodine value or number is the number of grams of iodine consumed by 100g of fat. A higher iodine value indicates a higher degree of unsaturation.

- **Peroxide value**

Detection of Peroxide gives the initial evidence of rancidity in unsaturated fats and oils. It gives a measure of the extent to which an oil sample has undergone primary oxidation. Peroxide value, concentration of peroxide in an oil or fat, is useful for assessing the extent to which spoilage has advanced. The peroxide value is defined as the amount of peroxide oxygen per 1 kg of fat or oil. Traditionally this was expressed in units of mill equivalents, although if we are using SI units then the appropriate option would be in mill moles per kilogram (N.B. 1 mill equivalents = 0.5 mill mole; because 1 mEq of O2 =1 mmol/2=0.5 mmol of O2, where 2 is valence). Note also that the unit of mill equivalent has been commonly abbreviated as mequiv or even as mEq.

- **Fatty acid methyl esters (FAME)**

Fatty acid methyl esters (FAME) analysis is an important tool both for characterizing fats and oils for the determination of total fat content in foods. Fat can be extracted from a matrix, using a non- polar solvent, and saponified to produce salts of free fatty acids. After derivitizating the free acids to form methyl esters, the mixture readily can be analyzed by Gas Chromatography (GC), due to the volatility and thermal stability of the FAMEs.

1.6.4 Safety parameters

- **Contaminants**

It is provided under the conditions of license as per food safety and standards requirement (FSSR) licensing and registration regulations that every Food Business Operators (FBO) shall ensure that his food product is tested for relevant chemical and microbiological contaminants through food safety and standard authority (FSSA) notified /National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited or own laboratory at least once in six months.

Figure 4 oil testing

1.7 Marking of sample containers

- Each sample container after filling shall be sealed and marked with full details of sampling, the number of packages sampled, the date of sampling, and other particulars of the consignment.
- A label bearing the particulars shall be attached and sealed to every sample container.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write down sampling techniques? (5 points)
2. When at what condition used systematic sampling? (5 points)
3. What is composite sampling? (5 points)
4. Mention general precautions in sampling? (5 points)
5. Write quality testing parameters? (5 points)

Note: **Satisfactory rating - 20 points** **Unsatisfactory - below 20 points**

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

Information Sheet 2- Handling and preparing Samples

2.1 Handling and preparing samples

2.2.1 Sample preparation

Sample preparation refers to the ways in which a sample is treated prior to its analyses. Preparation is a very important step in most analytical techniques, because the techniques are often not responsive to the analytic in its in-situ form, or the results are distorted by interfering species. Sample preparation may involve dissolution, extraction, reaction with some chemical species, pulverizing, treatment with a chelating agent, masking, filtering, dilution, sub-sampling or many other techniques. Treatment is done to prepare the sample into a form ready for analysis by specified analytical equipment. Sample preparation could involve: crushing and dissolution, chemical digestion with acid or alkali, sample extraction, sample clean up and sample pre-concentration.

2.2 Sampling plan

Sampling plan criteria should be considered in formulating a sampling plan:

- Type of food product
- The size of food articles to be sampled
- The degree of hazard to human health
- The potential for fraud formulating a sampling plan:
- Acceptance and rejection criteria:
    - ✓ Adulteration,
    - ✓ Tolerance limits,
    - ✓ Compositional standards,
    - ✓ Net contents

2.3 Sample collection

The reliability of analytical data thus obtained depends on several factors, sampling being the major factor. Current analytical methods require only few grams of food sample to analyze. Thus, it is necessary that a sample be as representative of the population as possible. There are three basic activities involved in analysis of food products:

- Collection of representative sample.
- Sample preparation.
- Analysis using appropriate methods and instruments.

These activities, although independent in nature, yet can have decisive influence on each other. Furthermore, each of these activities has their own potential sources of variations that contribute to the uncertainty level associated with any analytical result. Thus, care must be taken to identify the sources of variation and minimize or avoid them while accomplishing any activity. On the part of the laboratories, it is therefore necessary to develop a plan for the proper performance of each activity, and then establish quality standards and written procedures in compliance with the standards. Many times, the activity of sampling falls outside the purview of a laboratory's mandate or control. To improve the overall quality of the analytical process, a laboratory must do all it can to receive appropriate, applicable, defensible samples. The development of appropriate plans will depend upon an understanding of the problems involved in each activity, and then the application of reasonable judgments in seeking solutions.

In the sample collection the collector need to know:

- Number and size of sample to be collected
- Distribution of samples
- Stratification to be used

Sample label should be permanently attached to the sample

- Common name of food
- Sample code number
- Date of receipt in Lab

2.4 Sample handling

The aim of sample handling is to protect the sample from changes in composition and contamination

Things to note:

- Ingredients added if any
- Method of mixing and reduction (grinding, homogenization)
- Types of storage (addition of preservatives, temp of storage)
- Methods used of take analytical samples
- Storage of analytical samples or further processing
- Name and signature of person completing record
- Date of record
- Other details

2.5 Preparation of analytical portions

If the particle size or bulk is too large for analysis, it must be reduced in bulk or size for analysis and Separate edible/inedible portions, record descriptions and weigh all parts. Measure portion sizes, weights, volumes, density etc. Documentation of sample preparation is very important.

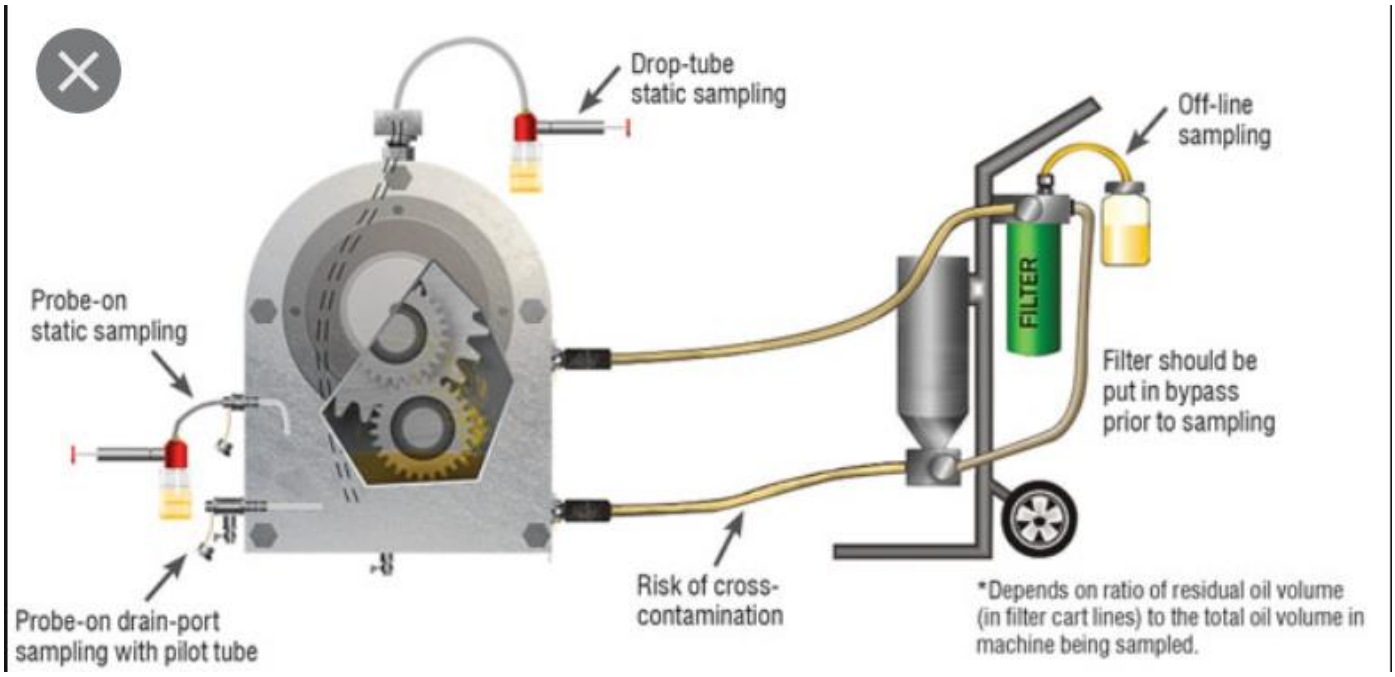

Figure 5 Anatomy of a representative edible oil sample

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is sample preparation? (5 points)
2. Write criteria to be considered in formulating sampling plan? (5 points)
3. Write the basic activities involved in analysis of food products? (5 points)
4. What is the main aim of sample handling? (5 points)

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

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

Information Sheet 3- Identifying and Reporting Defects in Sample

3.1 Identifying defects

A defect (nonconformity) occurs within an item when one or more, quality characteristic does not meet its established quality specification. A defective sample contains one or more defects. Lot quality may be judged in terms of the acceptable percentage of defective items or the maximum number of defects (nonconformities) per hundred items, in respect of any type of defects. Most acceptance sampling involves the evaluation of more than one quality characteristic, which may differ in importance with respect to quality and/or economic considerations.

When the required number of cans has been selected they should be carefully examined for defects. The first step is to carefully observe the overall external appearance of the cans, paying particular attention for any signs of swelling or leakage. The latter may be evidenced by the presence of product on the can or staining of the label. The label should be removed from a suspect can after its position has been marked. This allows for easier location of a defect on the can. Defects or non conformities are:

- Consistency
- Abnormal color
- Abnormal smell etc…

3.2 Reporting defects

When an inspector finds any defect shown in the manual he should either notify his superior or follow established procedures which set out criteria regarding the action to be taken. It may be appropriate to retain the lot and send defective cans to a laboratory for further investigation. It is important to remember that the individual cans which have unacceptable defects may represent a health hazard and proper care should be exercised in handling, shipping or disposing of such cans. All defective cans should remain under control until destroyed.

Information on inspection of sampling

- Date of inspection
- Inspector's name, address and agency or affiliation
- Sampling plan used
- Method by which sample was taken
- Was it possible to sample freely?
- Number of containers (sample units) in the sample taken
- How were sample units identified?
- List all defects found for each container and note which are unacceptable defects
- List containers sent to laboratory for further examination
- Results of laboratory analysis
- Other comments or observations related to the inspection

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer

1. Write the main source of defects? (5 points)
2. List information's on inspection? (5 points)

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

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

Information Sheet 4- Recording Sample Information

4.1 Sample information

Sample information in edible oil sampling includes the following points:

- Standard Operating Procedures (sops)
- Specifications
- Production schedules and instructions
- Manufacturers' advice and
- Sampling plans

4.1.1 Standard operating procedures (SOPs)

- **Standard operating procedure for testing of edible oil**

A standard operating procedure is a written procedure prescribed for repetitive use as a practice, in accordance with agreed upon specifications aimed at obtaining a desired outcome.

- **Standard operating procedures are:**
  - ✓ SOPs are written procedures that describe the activities specific to your menu and operation to ensure compliance with the requirements within the Michigan Modified Food Code and Michigan Food Law. These procedures should be used to train the staff members responsible for these activities.
  - ✓ If your operation is conducting a specialized food process, as described on page 2, a HACCP plan will be required in addition to any appropriate SOPs.

4.2 Product Information

Before collecting any sample, the Food and Safety Organization FSO/ Authorized Officer must observe the lot from which the sample is to be collected, and record relevant observations. Information obtained should include the following as appropriate;

- Name of the food;
- Lot size;

- Type of packing;
- Container size or sizes;
- Product code or control numbers;
- Number of consignments;
- Labeling information;
- Condition of the lot, i.e., broken packages, evidence of rodent or insect infestation, debris, etc.
- General condition of the area or building in which the lot is stored.

If the subsamples for packaged food are drawn from boxes or crates, the sample units should be marked with numbers. Corresponding numbers should be written inconspicuously on the boxes or crates, together with the FSO/ Authorized Officer‘s initials and the date. The boxes or crates are thus identified, as is the entire lot, so that they can be recognized later if they are re-sampled.

4.3 Sampling report

The sampling report should include the reason for sampling, the origin of sample, the sampling method and the date and place of sampling together with any additional information like transport time and conditions. Any deviation from the specified sampling procedure to be reflected in report.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write the main sampling information? (5 points)
2. List appropriate product information record? (5 points)

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

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

4.2 Maintaining work place

The work environment, facilities and amenities are required to be maintained in a safe and healthy condition, and need to be hygienic, secure and in a serviceable condition. This includes replenishment of consumables, repair of broken or damaged furnishings and equipment and ensuing cleanliness of these areas.

Steps to Creating and Maintaining a Safe Workplace

- Eliminate potential hazards.
- Make sure all workers are properly trained.
- Ensure workers have the proper equipment.
- Provide visual safety aids and messages.
- Create a safety committee and hold monthly safety meetings.
- Make safety fun.

4.3 Work layout

The layout of the workplace is required to allow persons to enter and exit the workplace and move within safely, both under normal work conditions and in an emergency.

- **Entry and exit**

Entries and exits are required to be safe to allow impeded access and egress for all workers, students and visitors including those with special needs.

4.4 Work areas

The layout of the work area should be designed to provide sufficient clear space between machines, fixtures and fittings so workers can move freely without strain or injury also evacuate quickly in case of an emergency. In determining how much space is required, the following should be considered:

- The physical actions needed to perform the task
- The need to move around while working
- Whether the task is to be performed from a sitting or standing position

- Access to workstations
- The equipment to be handled and the personal protective equipment that may be worn to perform the work.
- Environmental factors including heat or noise may require an increase to the space, as will work activities that involve manual tasks or the use of equipment.

4.5 Floors and other surfaces

Floor surfaces shall be suitable for the work area and be chosen based on the type of work being carried out at the workplace, as well as the materials used during the work process, the likelihood of spills and other contaminants, including dust, chemicals, and the need for cleaning.

4.6 Lighting

Sufficient lighting is required to allow safe movement around the workplace and to allow workers to perform their job without having to adopt awkward postures or strain their eyes to see. Emergency lighting is to be provided for the safe evacuation of people in the event of an emergency.

The following factors are to be taken into account:

- The nature of the work activity
- The nature of hazards and risks in the workplace
- The work environment
- Illumination levels, including both natural and artificial light
- The transition of natural light over the day
- Glare Workplace Environment Guidelines
- Contrast
- Reflections.

4.7 Air quality

Workplace are to be adequately ventilated which includes provision of fresh, clean air drawn from outside the workplace, uncontaminated from flues or other outlets and be

circulated through the workplace. Workplace inside buildings may have natural ventilation, mechanical ventilation or air conditioning.

4.8 Heat and cold

Refer to the Thermal Comfort Guidelines for further information on managing health and safety risks associated to hot and cold environments

4.9 Welfare facilities

Workers, including those who have particular needs or disabilities, must have access to the facilities provided.

Workers are to be provided with:

- Adequate breaks to use the facilities
- Facilities which are within a reasonable distance from the work area
- Shift workers have similar access to those who work during the day
- A means of access which is safe.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Mention welfare facilities should be fulfilled in the work area? (5 points)
2. What the types of work place? (5 pts)
3. Write at list three items that a work environment, facilities and amenities are provided for basic health and welfare of employees, contractors and visitors? (5pts)

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

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

Information Sheet 6- Workplace Environmental Guidelines

6.1 Environmental guide lines

Environmental issues associated with the operational phase of edible oil production and processing primarily include the following:

- Solid waste and by-products
- Water consumption and management
- Energy consumption and management
- Atmospheric emissions
- Greenhouse gas emissions
- Hazardous materials

The surfaces in the area or environment where food is prepared are sampled to verify the effectiveness of cleaning and sanitation procedures. For example, samples of food contact surfaces are taken to test for:

- Adenosine tri-phosphate (ATP) bioluminescent, an indicator of remaining food debris after cleaning.
- Remaining viable bacteria such as aerobic colony count (ACC) or coli-forms (after sanitizers are applied)
- Listeria spp. or L. monocytogenes to determine whether control measures put in place are effective.
- The document Control measures for Listeria monocytogenes in ready-to-eat foods provides additional information you should consider.

6.2 Sampling sites

The sites for collecting environmental samples are selected according to what information you are trying to gather. For example, your goal may be to assess the effectiveness of your sanitation procedures in an establishment; or your goal may be to monitor the microbiological state of the environment while food is being prepared. The following are examples of sampling sites:

- food contact processing equipment, such as tables and conveyors
- walls, floors, and drains in processing areas
- fluid piping systems
- vacuum and air blower systems
- refrigeration units

Sample sites can be grouped to obtain an assessment of common areas such as:

- food contact surfaces
- non-food contact surfaces
- raw ingredient handling areas
- finished product handling areas

6.3 Environmental and hygiene monitoring

For hygiene evaluation and environmental sampling, the sample size and numbers mostly depend on the objective of the investigation. When the source of a spoilage organism has to be traced in a food production plant, the samples can be taken from food ingredients, intermediates and products, but it is helpful to take swab samples or scrapings from plant and equipment. When the food processing environment is monitored for contaminants or pathogens, this can be achieved by using small sponges (maxi swabs) or by collecting food debris or dust. When the hygienic status of the food plant is monitored, agar contact plates are often used to sample the flat surface of equipment. Since agreed sampling protocols for hygiene/environmental monitoring do not exist, protocols will have to be introduced for specific investigations.

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write environmental issues associated with the operational phase of edible oil processing? (5 points)
2. Write the goal of environmental samples? (5 points)

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

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

Information Sheet 7- Policies and procedures

7.1 Applying policies and procedures

Workplace policies are statements of principles and practices dealing with the ongoing management and administration of the organization.

Policies act as a guiding frame of reference for how the organization deals with everything from its day- to-day operational problems or how to respond to requirements to comply with legislation, regulation and codes of practice.

It is important that policies are reasonable, that employees are aware and clearly understand what the policy is trying to achieve.

Policies: Are a statement of purpose, which highlight broad guidelines on action to be taken to achieve that purpose. It is a statement which underpins how human resource management issues will be dealt with in an organization. It communicates an organization's values and the organization's expectations of employee behaviors and performance. The statement of purpose should not be more than one page in length, but this will vary depending on the policy.

Workplace policies often reinforce and clarify standard operating procedure in a workplace. Well written policies help employers manage staff more effectively by clearly defining acceptable and unacceptable behaviors in the workplace, and set out the implications of not complying with those policies. A workplace policy consists of a statement of purpose and one or more broad guidelines on action to be taken to achieve that purpose. The statement of purpose should be written in simple terms, free of jargon. The length of the policy may vary depending on the issue it addresses.

Procedures: Explain how to perform tasks and duties.

A procedure may specify who in the organization is responsible for particular tasks and activities, or how they should carry out their duties.

7.2 Benefits of workplace policies

Well-written workplace policies:

- Are consistent with the values of the organization and employment legislation
- Demonstrate that the organization is being operated in an efficient and businesslike manner
- Ensure uniformity and consistency in decision- making and operational procedures
- Save time when a new problem can be handled quickly and effectively through an existing policy
- Foster stability and continuity
- Maintain the direction of the organization even during periods of change
- Provide the framework for business planning
- Assist in assessing performance and establishing accountability
- Clarify functions and responsibilities.

7.3 Policy checklist

A workplace policy should:

- set out the aim of the policy
- explain why the policy was developed
- list who the policy applies to
- set out what is acceptable or unacceptable behavior
- set out the consequences of not complying with the policy
- Provide a date when the policy was developed or updated.

Policies also need to be reviewed on a regular basis and updated where necessary. For example, if there is a change in equipment or workplace procedures you may need to amend your current policy or develop a new one. Employment law changes, changes to your award or agreement may also require a review of your policies and procedures.

7.4 Types of workplace policies

Here are some examples of common workplace policies that could assist your workplace:

- Code of conduct
- Recruitment policy
- Internet and email policy
- Mobile phone policy
- Non-smoking policy
- Drug and alcohol policy
- Health and safety policy
- Anti-discrimination and harassment policy
- Grievance handling policy
- Discipline and termination policy
- Using social media.

Self-Check – 7	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Define policies (2pts)
2. Define procedures (3pts)
3. Explain benefits of work place policies (5pts)
4. Mention steps of work place? (5 points)

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

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

Operation Sheet – 1 Steps of Taking Samples for Testing

Sequence of taking samples for testing edible oil

1. Wear personal protective equipments
2. Prepare sampling container or tubes
3. Roll the oil container to mix the contents
4. Insert the sampling tubes slowly through the bung hole /other convenient opening
5. Draw/take samples
6. Close the upper constriction with a thumb or a stopper
7. Transfer the sample into a clean dry container
8. Take several such portions and mix well
9. Select representative/ working samples
10. Record all sampling activities

LAP TEST	Performance Test

Name……. ID……..
Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1:30** hour. The project is expected from each student to do it.

Task-1 transfer samples for testing

Reference Materials

Book:

- TY - JOUR AU - Yusuf, A.PY, (2018)- A Review of Methods Used for Seed Oil Extraction VL - 7 DO - 10.21275/1121804 JO International Journal of Science and Research (IJSR) ER
- Food Safety and Standards Authority of India training manual food safety supervisor manufacturing, oil & fats, (2015).
- The peoples university, Sampling techniques of food products
- Food safety and standards authority of india ministry of health and family welfare government, (2015) Manual of methods of analysis of foods, new delhi

WEB ADDRESSES

- http://www.agicosolution.com/

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