GUIDELINE FOR FOOD SAFETY AND QUALITY MANAGEMENT

OF

NATIONAL FOOD SECURITY RESERVE



Food Corporation of Bhutan Limited







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1. INTRODUCTION

Food maybe spoiled and lost during delivery, storage and distribution. Many of these losses can be reduced through improved procurement, transportation, handling and store management practices. Prepositioning of emergency food stocks is highly critical and sensitive operation. If food consignments get spoiled or there is lack of surety as to the fitness of the food, this would defeat the very purpose of the food security reserve.

Food safety is a shared responsibility. It is vital to ensure all possible steps are taken during procurement, transport, handling, storage and distribution to assure qualitative and quantitative maintenance of food commodities. This requires a broad knowledge and competence in food commodity management, which can be guided by a quality manual. Sections 53-56 of Food Act of Bhutan 2005 also require food safety enhancement and orderly development of the food industry by defining minimum hygienic requirements for food business and compliance procedures.

NATIONAL FOOD SECURITY EMERGENCY ACTION PLAN FOR COVID-19 has overall aspects for ensuring the quality and safety of food commodities but it does not detail out the quality assurance mechanism for implementation. The various gaps on the NFSR in terms of food safety and quality controls are as follows;

- 1. The requirements for fair average quality are not defined in the document which requires quality specification for each food commodities (cereals, pulses and edible oils) under NFSR.
- 2. There is no quality assurance mechanism established to ensure the "fair average quality" is maintained during procurement, storage, handling, transportation and distribution. The quality assurance program should specify the responsible personnel and frequency of inspection. It should also include external audit by food safety authority.
- 3. There is no pallet inspection program in place to verify they are suitable for use (e.g. clean, dry, free from mold, off-odors and infestation, no broken wood or loose nails).
- 4. Though there is a mention of stock rotation via FEFO/FIFO, there is no system in place for stock records & control.
- 5. There is a reference to segregation of goods that are infested, damaged and expired during the storage to avoid cross infestation and further damages. However, there is no reference to how these damaged, infested goods would be handled and disposed.
- 6. There is no established supplier verification program. Appropriate supplier verification program must be put in place to ensure that foods are purchased as per the quality specifications of the food commodities.
- 7. FCBL has a Standard Operating Procedure for quality control on food and warehouse management (2019) which covers some operational aspects like stacking, pest control etc but it requires further procedures, SOPs and checklist for effective implementation.

8. The maximum stack height for rice and pulses is prescribed as 20 layers. However, stack height should be defined based on weight of the bags and carrying capacity of the pallets as well.

Therefore, it is important to develop a detailed guideline which will serve as a reference document that can be appended to the NFSR emergency action plan.

2. FOOD QUALITY & SAFETY

Food quality refers to all those characteristics of food or food products that make it acceptable or palatable to the consumers which include the physico-chemical properties (weight, volume, presence of foreign matter, moisture, protein content etc), textural properties (hardness, softness), appearance (size, shape, colour, gloss), sensory attributes (aroma, flavour). Food safety is an assurance that food is acceptable for human consumption according to its intended use or it is a set of processes that make food safe to eat i.e. the food does not pose any harm to consumer. Food safety issues mainly arise due to hazards (intentional and/or unintentional), spoilage and adulteration (intentional and/or unintentional).

Hazards refer to any agent with the potential to cause adverse health consequences for consumers. Hazards can be of following types:

- Physical: For e.g., Stones, Hair, Nails, Bolts, Jewellery etc.
- Chemical: For e.g., Cleaning agents, Disinfectants, Fumigants, Pesticide residues, Veterinary drug residues etc.
- Biological: For e.g., Living organisms like worms, flies, cockroaches or microorganisms like bacteria, yeast, mold etc.

Food spoilage, food adulteration and food contamination are the three major concerns from a food safety perspective. Food spoilage means any undesirable changes (physical, chemical or biological) in food which makes it unfit for consumption. Spoilage 'may' cause changes in colour, texture, flavour and/or nutritional value of food. For e.g., Fruits and vegetables poorly handled during transportation or storage can cause physical bruising and subsequently spoilage. If edible oils are stored in areas with direct sunlight, there might be chances of developing oxidative rancidity ultimately leaving the oil unfit for consumption.

Food adulteration is an act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredients. Food adulterants refer to the foreign, usually inferior substances added to the food which may cause harm to the consumer or introduce unknown hazards in the food. The common type of adulteration is economically motivated adulteration which is intentional and targeted towards financial gains. This is also known as Food Fraud. Various forms of adulteration or food fraud with a potential to hamper food quality and safety include the following:

- Dilution of food
- Substitution (whole or in part) of food with inferior or cheaper quality substances/ingredients
- Addition of unapproved ingredients

- Overuse of certain ingredients (more than legally prescribed limits) like additives to improve appearance, texture or shelf life of foods
- Mislabelling of food with an intent to mislead consumers
- Tampering
- Counterfeiting

3. SCOPE

This guideline provides basic principles of good store management practices for food commodities particularly commodities being procured as part of the National Food Security Reserve (NFSR). It also contains practical tools to help assure food safety and quality of the commodities through inspection/audit checklists, sample proformas like stack card, quick tests for adulteration check, upfront sensory evaluation techniques to assess food safety & quality and lastly standards of identity/specifications to ensure compliance by suppliers.

It is designed to provide implementation guidance to FCBL warehouse managers, storekeepers and quality control officers as well as BAFRA inspectors. It attempts to cover some of the basic principles of:

- Infrastructure including design, facilities and sanitation
- Control of operations including transportation, receipt of goods, handling & stacking, warehouse maintenance & cleaning, inspection, pest control, waste-disposal, documentation & record-keeping
- Training including guidance notes/SOPs for dissemination

This document can serve as a dynamic document which can be updated as and when new information, guidance, best practices are available. It can be used to train new incumbents and develop SOPs or simpler instructions for daily use by the relevant staff.

4. FOOD SAFETY AND QUALITY MANAGEMENT

4.1 WAREHOUSE MANAGEMENT

1. Location & Surroundings:

Potential sources of contamination should be considered when deciding where to locate food storage establishments or warehouses.

- **1.1** The warehouses should be located away from areas that may be:
 - Environmentally polluted orwhere industrial activities are undertaken
 - Prone to flooding and other hazards that may affect food safety
 - Prone to infestation of pests
- **1.2** The warehouse boundaries should be clearly identified with appropriate access control.
- **1.3** External perimeters should be kept clean and a minimum of18-24-inch (1.5 to 2 feet) vegetation free barrier zone should be maintained around the building.
- **1.4** Hard paving of at least 45cm in width should surround the exterior of the storage buildings. Receiving and dispatch areas as well as materials or products in transit should be protected from weather.

2. Design of premises:

The internal design and layout of warehouse should permit good food hygiene practices including protection against cross contamination during operations.

2.1Layout

- **2.1.1** The warehouse should be of sufficient size/capacity to allow handling and storage of food products in a manner that does not result in product contamination.
- **2.1.2** The building should provide adequate space with a logical flow of materials, products, and personnel.
- **2.1.3** The storage areas should have adequate barriers to avoid direct exposure to external environment and to facilitate access control.
- **2.1.4** The warehouse layout should allow proper space for inward and outward vehicle movement.
- **2.1.5** Adequate provisions should be in place to allow transfer of food materials via conveyors, forklifts, trolleys so as to minimize any cross contamination during handling.
- **2.1.6** All the loading and unloading points should have shades to prevent damage to food materials due to weather.
- **2.1.7** Proper signage should be provided for all storage and non-storage areas.

2.2Internal structures & fittings:

Structures within the warehouse should be **built of sound and durable mat**erials. The structure should be easy to maintain, clean and where appropriate to be disinfected. The Specific requirements are:

- **2.2.1** Walls and partitions should have a smooth surface up to a height appropriate to the operation, free from flaking paint or plaster to prevent the accumulation of dust, minimise condensation, and shedding of particles.
- **2.2.2** Floors shall be maintained in a sound condition to minimize the accumulation of dirt, spilled food material or any undesirable spoilage and infestation.
- **2.2.3** Floors should be made of impervious material and should be smooth and allow adequate drainage and cleaning.
- **2.2.4** General warehouse space should be floored with a concrete slab to carry wheel loads and withstand the abrasion generated by the continual use of pallets, material handling equipment's such as forklift trucks.
- **2.2.5** Floor should be levelled for appropriate stacking of food materials as well as for safe operation of material handling equipment.
- **2.2.6** Ceilings and overhead fixtures should be constructed to minimize the buildup of dirt and where necessary be fitted with removable and cleanable insect proof screens.
- **2.2.7** The overhead fixtures should be suitably protected so that they do not act as contaminants in case of breakage.
- **2.2.8 Doors/shutters** should have smooth, non-absorbent surfaces and be easy to clean and where necessary disinfect.
- **2.2.9** Entry/exit points should be suitably protected with appropriate provisions such as PVC strip curtains/air curtains/ wire meshes/ doors with self-closing devices etc. to ensure dust, insects, birds and animals are kept out.
- **2.2.10** The doors should be able to be fully closed and not allow dust and pests.
- **2.2.11** The gaps between the door and the floor, if any should be closed with suitable material like rubber strips, polyurethane etc. to avoid pest entry.
- **2.2.12 Ventilators/Windows** and all other openings to outside environment should be well screened with wire-mesh or insect proof screens as applicable to protect the warehouse from fly and other insects / pests / animals etc.
- **2.2.13** The mesh/screen should be constructed to minimize the accumulation of dirt and should be of such type which can be easily removed for cleaning.
- **2.2.14** Working surfaces that come into direct contact with food should be made of smooth and non-absorbent materials and should be in sound condition

2.3Facilities & Utilities

- **2.3.1** There should be adequate supply of potable water or water from municipal supply, with appropriate facilities for its storage, distribution and temperature control to ensure the safety of food.
- **2.3.2** The water used for operational and cleaning needs should meet the requirements of WHO guidelines on drinking water.
- **2.3.3** Water should be tested for compliance at least once a year.
- **2.3.4** Water storage tanks should be cleaned at least once in a year /six months and records of the same should be maintained.
- **2.3.5** The tanks should be covered to prevent access by animals, birds, pests and other extraneous matter. The manholes to the tanks should be locked and access should be granted to authorised personnel only.
- **2.3.6** Facilities should be in place for drainage and waste disposal designed and constructed in such a way as to minimize the risk of contamination of food or potable water supply.
- **2.3.7** Adequate control measures should be in place to prevent insects and rodents from entering the storage areas from drains. Example: Covering the openings of the drain with wire mesh.
- **2.3.8** Drainages should have grated covers and are to be devoid of any stagnation of water to prevent contamination.
- **2.3.9** Waste disposal systems and facilities should be designed and constructed so that the risk of contamination is avoided.
- **2.3.10** Waste such as corrugated cardboard, unused or damaged wooden pallets, wooden crates, paper board boxes, shrink-wrap, plastic bags &other damaged goods should not be kept open inside the warehouse premises and should be disposed of periodically in an appropriate manner as per local rules and regulations including those for plastics and other non-environment friendly materials.
- **2.3.11** Discarded equipment and boxes should not be dumped around the building.
- **2.3.12** The garbage dump should not be located near the storage area.
- **2.3.13** Containers/bins used to carry waste materials should be dedicated and may be colour coded for identification and cleaned adequately in timely manner to prevent accumulation of dirt/dust/infestation etc.
- **2.3.14** Different types of waste should be segregated for correct disposal and to prevent contamination.
- **2.3.15** Set up a convenient collection bins for packaging materials that can be reused.
- **2.3.16** All waste from the warehouse should be taken to the identified location for disposal.

- **2.3.17** Adequate ventilation should be provided to minimize air borne contamination.
- **2.3.18** Ventilation systems shall be designed and constructed so that air does not flow from contaminated areas to clean areas.
- **2.3.19** The warehouse should be properly ventilated to prevent moisture condensation.
- **2.3.20** There should be adequate lighting for the warehouse to ensure good hygienic practices.
- **2.3.21** Lightings should be enclosed with shatterproof covers so as to ensure that food or food package surfaces are not contaminated during breakages.
- **2.3.22** Personal hygiene facilities such as wash basins (with adequate supply of water), toilets (of appropriate hygiene and design) should be in place. Where appropriate changing and resting facilities should be provided. The facility should not directly open to food storage areas.
- **2.3.23** Adequate clothing and safety footwear should be provided to employees working in storage areas
- **2.3.24** Appropriate facility for hand washing and drying of hands and sanitizing before entering the storage facility or handling food packs should be available. Hand wash basins equipped with soap and disposable paper or hand towels should be provided adjacent to the toilets.
- **2.3.25** Toilets must not open directly into any place where food products are stored and suitably located & designated adequate number of toilet facilities should be provided depending on the number of employees (male /female) in the establishment and they should be made aware of the cleanliness requirement while entering storage areas or when handling food.
- **2.3.26** A display board mentioning Do's &Don'ts for the workers should be put up inside at a prominent place in local language for everyone's understanding.
- **2.3.27** Adequate health check-up should be conducted for all workers especially food handlers as per local regulations.
- **2.3.28** Employees suffering from any communicable diseases or related symptoms should not be allowed to enter the premises.
- **2.3.29** Adequate storage facilities should be provided for storage of food and food ingredients. Non-food items such as chemicals and detergents should be preferably stored in separate premises to prevent contamination with food.
- **2.3.30** The food products should be protected against rodents, insects and pests and other infestations
- **2.3.31** All openings such as manholes, inlets, outlets, draining out of points, etc. should be made such that they can be locked and/or effectively sealed
- **2.3.32** Storage of materials in bulk quantity should be done off the floor on pallets and away from the walls to ensure easy and adequate cleaning and prevent harbouring of any insects, pests or rodents

- **2.3.33** Stack numbering scheme (layout) should be displayed in each warehouse/godown clearly labelling the location and number of each stack. Each material/lot should be stacked separately, ensuring no mix-ups.
- **2.3.34** Appropriate periodic dusting and fumigation should be done in order to preserve the goods
- **2.3.35** FEFO / FIFO system should be followed while releasing materials from store.

4.2 CONTROL OF OPERATIONS

1. Transportation

A list of factors such as temperature, humidity, moisture, ventilation, odour, contamination, mechanical influences, insect infestation/disease, stacking and handling practices play a role in ensuring food safety and quality during transportation.

- **1.1** The type of transport and handling equipment should be selected based on the nature of the food and the conditions under which it has to be transported. Ideally, transportation vehicles should be dedicated for certain food products to avoid any cross contamination from other food or non-food commodities. For example, rice bags require appropriate temperature, humidity, moisture and ventilation conditions to be transported safely.
- **1.2** Each vehicle should be inspected before loading for infestation, spills, rodents, insects/pests as well as any vehicle damages or spillages or residues from previous deliveries which may jeopardize the food safety and quality of the next lot.
- **1.3** The vehicle should be covered, and the inside structure should be intact with locking/sealing facility, well painted with no signs of rusting, flaking paint & corrosion or damage that can let in outside heat, cold, moisture, dirt, and insects.
- **1.4** The internal surfaces of the vehicle body should be impervious to water, easy to clean and the vehicle body should be sealed to avoid the entry of pests, exhaust fumes or other sources of contamination.
- **1.5** The bottom of the delivery vehicle should be covered with hygienic and infestationfree tarpaulin and after loading the food commodities the surface/top should also be covered with a clean tarpaulin.
- **1.6** Doors and latches should be tight to prevent the entry of moisture and pests. Hatch covers must be in weather- tight condition.
- **1.7** Broken or contaminated pallets should not be used for transportation.
- **1.8** Frequently touched surfaces such as keys, steering wheels, door handles, shift lever, dashboard, seat, mobile devices, etc. should be sanitized with an approved disinfectant to avoid spread of germs. (or cross-contamination).
- **1.9** The manufacturer's instructions should be followed for the recommended dilution rates, contact times and conditions specific to the surface. Disposable gloves should be worn when cleaning and disinfecting surfaces.
- **1.10** Gloves should be discarded after each cleaning. If reusable gloves are used, those gloves should be dedicated for cleaning and disinfection of surfaces and should not be used for other purposes.
- **1.11** Food materials should be loaded, arranged or unloaded in a manner that prevents damage, contamination or deterioration of the food and packaging materials.
- **1.12** The load should be equally distributed on the vehicle. Records should be kept of daily checks and maintenance.

- **1.13** Reception and unloading of food materials should be performed by adequately trained personnel.
- **1.14** Damaged or infested goods should not be accepted
- 2. Food Receipt

Prior to receiving commodities, an assessment must be made of the usable capacity within the store. The usable capacity is often much less than might be thought and depends on the stacking equipment available and the number of different commodities or consignments to be stored. The greater the number of stacks, the smaller will be the usable capacity. A storage plan should be prepared that considers the expected pattern of demand the store will have to meet, and the likely size and frequency of deliveries and discharges that need to be achieved.

Typically, there might be a large volume of bagged grain, a smaller quantity of cooking oil and processed foods, and less of other foods. Space should be allocated according to the volume of stock expected, allowing easiest access to the most frequently moving stocks. It should be remembered that there might be a need to construct a new stack while at the same time drawing down from an existing one. The distance between stacks must be adequate to allow two workers to pass. Greater distances are required for mechanized handling systems. The storage plan must ensure working access to all stacks at all times.

- **2.1** Food should be purchased from approved suppliers.
- **2.2** A dedicated qualified person should be available to identify, list and establish the appropriate quality and safety specifications (**fair average quality specification**) for acceptance or rejection of incoming food material.
- **2.3** Incoming stocks must be carefully inspected.
- **2.4** All commodities should be examined for signs of live insects, and any infested bags must be segregated.
- **2.5** Similarly, containers of oil should be examined for damage and leakage. Damaged items are best stored separately and re-packaged where necessary.
- **2.6** Particular care must be taken with any commodities that have been wetted with rainwater during delivery. Wet bags must not be built into a stack. They must be issued and used immediately if possible, or the contents should be carefully dried before being re-bagged and stacked separately for early despatch.
- **2.7** Necessary documents such as certificate of analysis (COA), quality report, delivery challan etc should be received with each delivery and maintained.
- **2.8** Raw material reception areas and distribution areas should be isolated from other areas in the premises to avoid cross-contamination.

3. Storage & Handling

- **3.1** Food materials must be stored in a clean area, away from direct sunlight and off the ground using pallets.
- **3.2** Tarpaulins and/or pallets must be used as appropriate.
- **3.3** Stocks should be rotated according to the 'First In- First Out, FIFO system' or 'First Expire-First Out, FEFO system' and adequate records for the system must be maintained.
- 3.4 Good Warehousing Practices (GWP) should be adopted.
- **3.5** The food materials, if stacked up, should be of a reasonable height for ease of handling and to prevent falling.
- **3.6** The condition of product in stacks shall be assessed at appropriate intervals in order to detect contamination, tampering, theft or deterioration, e.g. due to pest infestation, age, unsanitary conditions and temperature/humidity control abuses.
- **3.7** Stacks should be adequately spaced from the walls (minimum 12 inches / 30 cm) to allow for inspection of areas for cleanliness, insect or rodent activity. Additionally, where rodent control devices are placed there should be an 18 inch / 45 cm gap to allow for inspection.
- **3.8** Pallets used for the storage of food materials should be in good usable condition and free from damages such as cracks, protrusion of nails and wooden splinters.
- **3.9** Pallets should be stored in areas that are free of moisture, dirt and litter and free of bird, insect or rodent contamination. A pallet inspection program should be in place to verify that pallets are suitable for use (e.g. clean, dry, free from mould, off-odours and infestation, no broken wood or loose nails).
- **3.10**Access to storage areas should be restricted to authorized personnel only. Cleaning materials or any other hazardous chemicals should not be stored in the warehouse, but in designated areas with proper labelling.
- **3.11**Damaged food materials and non-food items should be handled and stored in a manner to avoid taint / contamination, transfer of odours or any quality or food safety risk.
- **3.12**Zoning, section dividers or other precautions, e.g. traffic controls, separate air systems should be used to avoid cross-contamination.

4. Stacking

- **4.1** Stack numbering scheme (layout) should be displayed in each warehouse/godown clearly labelling the location and number of each stack.
- **4.2** Unloading of food materials should be done in individual stacks, with at least 1 Meter gap with next immediate stack or the wall or roof support for movement of people, for the purpose of cleaning/housekeeping as well as for proper sealing of the stack for any future fumigation.
- **4.3** In case the food material is placed on a tarpaulin sheet, the sheet should extend at least half a meter beyond the stack.
- **4.4** Commodities, except those packed in strong, vapour-proof containers, should not be stacked directly on the floor because there is a risk of moisture from the ground rising into the stack. They should be stacked on a moisture-proof floor cover, such as polythene sheeting, or on dunnage such as wooden or plastic pallets.
- 4.5 Each material/lot should be stacked separately, ensuring no mix-ups.
- **4.6** The tops of stacks should be clear of the roof or roof supports so that it is possible for a person to pass easily around all sides and over the top of each stack for inspection and for fumigation or other pest control work.
- **4.7** Stacks must be built in an orderly manner that permits reliable audit to avoid collapse and injure people or cause damage to the commodity and/or the fabric of the store. Plastic sacks made of polyethylene and woven polypropylene are more difficult to stack properly than are jute sacks, because there is less friction between them. Special care is needed to ensure stack stability, particularly on corners. To ensure stability, the sides should not be vertical; they should slope inwards from the base upwards.
- **4.8** Where there are instructions on the packaging advising a maximum number of layers, this must not be exceeded.
- **4.9** Damaged cartons should be kept separately in low stacks to avoid crushing and should be issued first.
- **4.10** Size of each stack should be a maximum of 180MT (around 20 layers high for 25 kg bags), for easy and efficient fumigation.
- **4.11** Stack register should be maintained which shows the entire history of each stack. Infestation check should be done on regular basis, preferably weekly in the evening time for all stacks and reported through the Commodity Health Register (CHR).
- **4.12** The dose and duration of fumigation exposure should depend on the counts obtained in CHR.
- **4.13** All fumigated stocks should be always kept under covering to avoid cross-infestation. Alternately, unfumigated stocks can be kept under covering to avoid chances of cross-infestation.

- **4.14** Stack card for each stack should be displayed prominently and should be always accessible.
- **4.15** The data should be updated immediately after completion of stacking or issuance or any treatment/disinfestations.
- **4.16** Unused gunny bags, any chemicals/pesticides or any other ancillary equipment should be always kept away from food material stacks in covered condition.
- **4.17** Infestation control including fumigation must be carried-out by a trained and experienced fumigator, holding a recognised, approved and current/valid certification.
- **4.18** Fumigation activity must capture all details including, date, temperature, fumigation sheet, sang bags, compound used, dosage, area and service person's initials.
- **4.19** Stacks/bags under fumigation must be adequately covered and sealed to ensure no open ends or loose seals are present. Stocks under fumigation must be identified and labelled.
- **4.20** Floor must be flat and free of stones and other sharp objects, drains, so that a gastight seal can be made between the sheets and the surface.
- **4.21** Any spillages under the stack should be cleaned out.

Commodity		Weight of bags	Stack height
Rice, Sugar, Cereals Pulses	and	20-25kg	20 layers
Rice, Sugar, Cereals Pulses	and	50kg	16 layers
Mineral water	and		As indicated on the package
vegetable oil cartons			(carton)

5. Handling the damaged goods

- **5.1** The damaged goods should be stored in a designated area in order to not expose other products within the storage facility to contamination or probable infestation.
- **5.2** Returned or damaged goods should be physically segregated from other food materials to avoid cross-contamination or infestation.
- **5.3** Where damaged goods should be disposed, all labelling should be removed to prevent the products from re-entering the distribution chain.

6. Establishment maintenance & sanitation

The main purpose of sanitation in warehouse is to create an environment that will discourage pests/insects harbourage and growth.

6.1 Entire warehouse facility should be periodically inspected and cleaned to avoid development of dust; unintended debris built up in difficult to access areas.

6.2 Warehouse should adopt dry cleaning methods such as Brooming/sweeping, Dry wiping and Vacuum Cleaning. and avoid introduction of water.

7. Warehouse cleaning and hygiene

During storage, the food materials can be deteriorated by physical and biological factors. These factors include moisture, temperature, insects, birds and storage fungi amongst others. Losses by these factors may be reduced to a minimum level by maintaining cleanliness and hygiene in the warehouses.

- **7.1** The following steps should be taken to ensure cleanliness and hygiene in the godowns/warehouses:
 - a. The floor space in the godowns/warehouses should be cleaned regularly, preferably daily (cleaning schedule & records).
 - b. The stacks should be brushed at weekly intervals and after every fumigation
 - c. Cleanliness should be maintained in entire warehousing complex.
 - d. The sweepings including dead insects after spraying of insecticides and Fumigation should not be left in godowns/warehouses and should be immediately removed.
 - e. The waste material and dead stock items including used old gunny bags, wooden crates, polythene sheets etc. should not be stored in warehouse. These should be stored in separate rooms.
 - f. Spilled grains should be immediately collected, sieved and filled in separate bags for disposal. Regular floor cleaning will enable most grain spillages to be recovered and re-bagged if collected in a hygienic manner.
 - g. If the floor is swept clean at the end of the working day and spillage is observed at the start of the next day, it will be clear to managers that there has been unauthorized activity in the warehouse or that there was heavy rodent infestation during the night or weekend.
 - h. Every month it will be useful to sweep the walls and also any ledges that permit the accumulation of spillage or dirt.
 - i. Timely prophylactic and curative treatments (spraying of chemicals and fumigation for insect/pest control) should be carried out in the warehouses. Similarly, rodent control operations in and around warehouses should also be carried out as and when required
 - j. Measures to check birds' entry in the warehouses should be carried out and these should not be allowed to contaminate the food materials. Warehouses can be made bird proof by fixing wire meshes on windows, ventilators and other possible entry points. PVC strip curtains may be used on doors/entry points of godowns / warehouses to check the entry of birds.
 - k. Proper and timely aeration which reduces the food material temperature and moisture and also eliminates infestation should be carried out
 - 1. Warehouse should have adequate light arrangements.

- m. The pipes/ducts entering the warehouse should be fixed with wire mesh properly to check the entry of rats.
- n. All the roofs of the warehouses should be painted with waterproof material and should be leak proof.
- o. Cracks and crevices should get repaired periodically.
- p. Leakage of vegetable oil can be extremely problematic and needs to be cleaned as soon as possible before it becomes a safety hazard or contaminates other commodities.
- q. A location wise register about the cleanliness and hygiene in the warehouse should be maintained along with a written schedule.
- **7.2** If during periodic inspection of food materials in storage, it is observed that these have been damaged or deteriorated either due to packaging failure, infestation, moisture absorption or due to natural calamity like fire, flood, excessive rain, etc, these should be handled as under:
 - a. Damaged goods should be segregated, and possibility of salvaging determined under guidance of competent and trained quality personnel
 - b. Salvaged goods should be kept in separate stacks with proper identification in the "Stack Card" clearly indicating the parent stack(s) details.
 - c. Damaged goods should be kept separately to prevent mix up with acceptable goods. All damaged goods shall be stacked and marked "NOT FOR ISSUE".
 - d. If the damaged goods require immediate disposal, dispose-off the same as per established guidelines.
 - e. A procedure must be introduced whereby stocks that are declared unfit for human consumption can be removed from the store and from the stock records, and disposed of or salvaged without delay. Untreated insect infestations or mouldy commodities must not remain in the store where they can put other stocks at risk.
- **7.3** Warehouse must be disinfested with approved agents or thermally at periodic intervals wherever necessary.

4.3 QUALITY CONTROL

1. Inspection & Sampling

Inspection in relation to food storage management will involve a detailed examination of all or part of the consignment of stored commodities, the methods of handling and transport, the storage building, and the standards of storekeeping and pest control. The overall objective of inspection is to provide information as a basis for management action and future planning to ensure that deterioration and loss of stored commodities are kept to a minimum.

The best time to inspect a commodity is when it is being moved into or out of the warehouse, silo, ship or truck, because all parts of each lot can be examined. However, routine inspections of commodities in store are needed to detect any early signs of deterioration.

The number of bags to be sampled depends on the nature of the problem; the type of commodity; its amount; the amount that can be sampled and the age of the stack. In general terms, fewer samples are required if insects and fungi are the major problems, but more samples should be taken if mycotoxin contamination is suspected. The sampling can be done as per the SOP (Annexure II)

A knowledge of the history of the consignment can help considerably in determining how best to sample for insect infestations. Well-kept records and stack cards will provide the best source of information. If it is known that the consignment was free from infestation when it was taken into store, or that it had been fumigated recently, it can reasonably be assumed that any live insects subsequently entering the store or cross-infesting the commodity will be located in the outermost layers of stacks or in the top 100 mm of a bulk of grain. Sampling can, therefore, be restricted to these superficial areas.

If the history of the consignment is unknown, it may be necessary to conduct a more extensive examination involving the collection of samples from inner parts of the stack or bulk. This is relatively easy in the case of bulk commodities, as a probe sampler can be used to draw samples from parts below the surface. However, sampling deep within a stack of a bagged commodity involves moving bags and is satisfactorily achieved only when the stack is completely dismantled. If this is not practicable or desirable, a compromise of sampling bags in the top two to three layers has to be accepted.

Different sampling protocols are needed for different commodities, and for different problems, to ensure the sample taken is representative of the lot. Thus, submitted samples for free-flowing and finely divided commodities (cereal grains, pulses and blended foods) should be not less than 1 kg. It is important to note that, while the principles of representative sampling can be used to establish a basic sampling scheme for a wide range of commodities, there are occasions when more specialized schemes are needed, for example, when samples are required for mycotoxin analysis. Thus submitted or final lot samples for cereals and blended foods should be 10 kg if mycotoxin, fungal or bacterial analysis is required, with 1-2 kg being sufficient for insects, moisture content and general quality parameters.

Representative sample drawn from each truck/lorry at the time of receipt, should be examined for general conditions of the stock, infestation etc. The observations should be recorded at the back side of stack card. Fortnightly inspection should be conducted to check on the conditions of food commodities during storage.

4.4 PERSONNEL CLEANLINESS AND BEHAVIOUR OF FOOD HANDLERS

Food handlers should maintain a high degree of personal cleanliness and where appropriate wear suitable clothing, protective head covering and footwear. Food handlers should not report to work if in case of fever, cough or other flu-like symptoms.

- **1.** All food handlers should always wash their hands with soap and water for at least 20 seconds or with an alcohol-based hand rub:
 - a. At the start of food handling activities
 - b. Immediately after using the toilet
 - c. After handling raw food or any contaminated material where this could result in cross contamination.
- 2. Persons engaged in food handling activities should refrain from:
 - a. Wearing watches, jewellery or other items that could pose a threat to the safety and suitability of food
 - b. Smoking
 - c. Spitting
 - d. Chewing or eating
 - e. Sneezing or coughing. When coughing and sneezing, food handlers must practice respiratory hygiene such as covering their mouth and nose with flexed elbow or tissue;
 - f. Touching eyes, nose and mouth with unwashed hands
 - g. Scratching nose, running fingers through hair, rubbing eyes, ears and mouth, scratching beard, scratching parts of bodies etc.
- **3.** Food handlers must practice physical distancing recommendation of 2 metres along with safe greetings including a wave, nod or a bow. They should not shake hands.
- **4.** Food handlers/ warehouse staff should be medically examined once in six months to ensure that they are free from any infectious, contagious and other communicable diseases.
- **5.** A record of these examinations signed by a registered medical practitioner should be maintained for inspection purpose.

4.5 TRAINING

- 1. All personnel in storage warehouse should be provided with appropriate training.
- 2. Where necessary training programmes should be reviewed and updated to ensure that all personnel are aware of all procedures necessary to maintain the safety and suitability of food.
- **3.** All personnel should be aware of their role and responsibility in protecting food from contamination or deterioration.
- **4.** Food handlers should have the necessary knowledge and skills to enable them to handle food hygienically.
- **5.** Those handling strong chemicals or potentially hazardous substances should be trained in safe handling procedures and techniques.
- **6.** Personnel employed as drivers should be adequately trained to meet the specific quality, hygienic and safety requirements of the transported goods.
- **7.** These training programmes should be delivered by qualified and trained personnel. Records of training should be maintained.
- **8.** Periodic assessments of the effectiveness of training, instructions programmes as well as routine supervision and checks should be made to ensure that food hygiene and food safety procedures are being implemented correctly and effectively by all personnel.
- **9.** Managers and supervisors of warehouses should have the necessary knowledge and skills in food hygiene (GHP and GMP) principles and practices to be able to judge potential risks and take necessary action to remedy deficiencies

ANNEXURE I: Quality specifications for Food Commodities

I.A. Rice

Parameter	Requirements	Remarks	
Moisture Content	Max 14%	Safety parameters	
Foreign matter	Max 0.8%		
Aflatoxin*	Max 30µg/kg		
Damaged grains	Max 1.5%		
Adulterants	Absent		
Microbiological	No visual sign of microbial		
parameters	growth		
Discoloured grains	Max 0.5%	Quality parameters	
Chalky grains	Max 7%		
Broken grains	Max 15%		
Paddy count	Max 30 grains/kg		
Labelling	Minimum requirement as per Technical Regulations for Labelling of Pre-packaged food	Some quality aspect of labelling may be relaxed as deemed fit in consultation with BAFRA	

*Sampling and testing of aflatoxin will be done by BAFRA during random inspection

I.B. Split Red Lentils (Masoor)

Parameter	Requirements	Remarks
Moisture Content	Max 12%	Safety parameters
Foreign matter	Max 1%	
Aflatoxin*	Max 30µg/kg	
Adulterants	Absent	
Microbiological	No visual sign of microbial	
parameters	growth	
Damaged grains	Max 2%	Quality parameters
Discoloured grains	Max 1%	
Admixture of lower class (immature seeds or other edible grains)	Max 2%	
Labelling	Minimum requirement as per Technical Regulations for Labelling of Pre-packaged food	Some quality aspect of labelling may be relaxed as deemed fit in consultation with BAFRA

*Sampling and testing of aflatoxin will be done by BAFRA during random inspection

I.C. Soybean oil:

Parameter	Requirements	Remarks
Insoluble Impurities	0.05 % m/m	Safety parameters
Adulterants	Absent	
Peroxide Value	up to 10 milli equivalents of active oxygen/kg oil	
Labelling	Minimum requirement as per Technical Regulations for Labelling of Pre-packaged food	Some quality aspect of labelling may be relaxed as deemed fit in consultation with BAFRA

ANNEXURE II: Sampling Protocol for Food Grains

II. A. General principles

- 1. Samples should be taken by the National Food Regulatory Agency.
- 2. Samples should be representative of the lot from which they are taken. Therefore, as the composition of a lot is seldom uniform, a sufficient number of increments shall be taken and carefully mixed, thus giving a bulk sample from which the laboratory samples are obtained by successive divisions or otherwise.
- 3. It is important to ensure that all sampling materials are clean, dry and free of foreign odours.
- 4. Sampling shall be carried out in such a manner as to protect the samples, sampling instruments, and the containers in which the samples are placed, from contamination from rain, dust, etc.

II. B. Definitions:

- 1. Consignment: The quantity of grain dispatched or received at one time and covered by a particular contract document. It may be composed of one or more lots.
- 2. Lot: A stated quantity presumed to be of uniform characteristics taken from the consignment and allowing the quality to be assessed.
- 3. Increment samples: A small amount of grains taken from a single position in the lot. A series of increments should be taken from different positions in the lot.
- 4. Bulk sample: The quantity of grain obtained by combining and mixing all the increment samples taken from a specific lot.
- 5. Laboratory or representative samples: The amount of grain reduced from of the bulk sample for analysis proposes.

II. C. Sampling materials

Sack type of spears for cereals, tarpaulin, buckets, tape, sampling bags and labels, scoops and scissor.

II. D. Sample size(number of bags to be sampled)

Increment samples shall be drawn from selected bags selected at random from the whole consignment, accordingly the table below:

In consignment	Number of bags to be sampled
Up to 10	Each bag
10 to 100	10 bags taken at random
more than 100	Square root of total number taken according to a suitable sampling

Sampling scheme for consignments of more than 100 bags

The consignment shall be divided into (n - 1) groups containing n or (n - 1) bags; the remaining bags constitute a group. | n = number of bags to be sampled

Example:

A consignment comprising 1000 bags

The square root of 1000 = 31,623 therefore **n** (number of bags to be sampled) = 32:

- make up 31 groups of 32 bags (i.e. total of 992 bags);
- draw up a list from 1 to 32;
- cross out one number, for example 15;
- sample the 15th bag from each group of 32 bags; the remaining group (i.e. 15) is smaller than 32 bags, so sample one bag from this group at random. A total of 32 bags has therefore been selected.

It is more convenient to select bags throughout the loading or unloading of food commodity. If this method it is not possible, bags should be selected from all sides of the stacks.

Incremental samples

Increment samples shall be drawn from selected bags uniformly, by a piercing spear from the top, middle and bottom of each selected bag. If it is not possible to draw a sample by spear efficiently, then selected bags may be opened to sample by hand scoop.

II. E. Bulk Sample

The bulk sample shall be obtained from the accumulation, combined and well mixed of all the increment samples of the lot.

II. F. Laboratory Samples

The laboratory samples shall be obtained by dividing the bulk sample to obtain the required number of laboratory samples by coning and quartering or by using of the sample dividers (see below "Conning and quartering technique"):

Conning and quartering technique



II. G. Size of Laboratory Sample

The size of laboratory samples will be determined by the type and requirements of the tests to be undertaken. Generally, it is **a minimum of 1 kg.**

II. H. Packaging and labelling of samples

Laboratory samples shall be packed and labelled in containers suitable for the purpose (according to the tests to be carry out), and sealed.

Example of a sample label (Use BAFRA procedures for this purpose):

a 11.	a
Commodity:	Quantity:
Lot size/No:	Quantity bulk sample:
Lab. Sample (Qty/No):	No of set of samples:
Contract No:	Name of seller:
Date of sampling:	Name of buyer:
Place of sampling:	Sampled by:
Receiver:	Quantity:

- ✓ Containing bags (CB) shall be new, made of non-toxic, odourless, unglazed, in sewn, man-made or natural fibre or a mixture thereof, sufficiently tightly woven to retain all dust and/or foreign matter and prevent the moving apart of the warp and the weft of the material. They shall be tightly filled and securely tied before sealing.
- ✓ Moisture proof containers (MPC) means the containers shall be bottles, jars or tins with close fitting lids, or strong polythene of a minimum 250 µm gauge bags securely tied, and that such containers are labelled and shall be sealed, and if required, enclosed in a sealed "CB".

II. I. Dispatch of samples

- \checkmark 3 set of identical composite samples have to be prepared for:
 - Analysis 1 set of 3 packets of 500g
 - Rice miller/Blender 1 set of 3 packets of 500g
 - - 1 set of 3 packets of 500g
- ✓ Laboratory samples should be dispatched as soon as possible (exceptional circumstances more than 48h after sampling).

II. J. Sampling report

The sampling report should be composed by the following sections (Use BAFRA procedures for sampling report):

- Commodity:
- Consignment (quantity (MT and bags) and number of lots):
- Contract number:
- Sampling location:
- Date of sampling:
- Lot size:
- Quantity bulk sample:
- Number of laboratory samplesset and weigh of this samples per set:

- Transport and storage conditions of the samples:
- Comments / Remarks:
- Name of the officer, who carried out the sampling:

ANNEXURE III: Quick qualitative tests to detect presence of adulteration or old stocks

Test I Detect adulteration with extraneous matter (pebbles, dust, stone, straw, damaged grains, insects, rodent excreta) or substitution with old stock

- 1. Take small quantity of sample on a petri/glass plate
- 2. Examine the sample visually. Look for physical presence of extraneous matter such as pebbles, dust, stone, straw, damaged grains, insects, rodent excreta etc.
- 3. Check for any colour variations in the sample to identify if certain % of old stocks have been substituted with new ones.
- 4. Check the sample for any offodours

Test II Detection of adulteration with added colour

- 1. Take a transparent glass of water.
- 2. Add approx. 2 teaspoons of the food grains and mix thoroughly.
- 3. Observe for any color leaching out into the water

Test III Detection of adulteration with Lead chromate in Pulses

- 1. In a test tube, mix around 5g of pulse/grain sample with 5ml of water.
- 2. Add a few drops of concentrated HCl.
- 3. Observe the change in color.
- 4. Presence of chromate ions will be indicated by a pink color in the test tube.

Test IV Detection of adulteration with Metanil Yellow in Pulses and Parboiled Rice

- 1. Take 1g of the pulse/food sample in a test tube.
- 2. Add lukewarm water to extract Metanil yellow into the solution.
- 3. Vortex the contents and let the mixture stand.
- 4. Add a few drops of conc. HCl.
- 5. Observe the change in color.

ANNEXURE IV: Inspection Checklist for Warehouses (Food storage)

Name of	BAFRA Office:	Name of Inspector/Officia	Date:	Time:
Name of	f the Warehouse:	Location:	Name of the Manager/Sup	ervisor:
Type of	Inspection:			
①Surveillance:		② Regulatory:	③ Complaint:	④Others (specify) :
Rating o	btained:			
Complia	nce-Excellent (86-96):	Compliance - Fair (85-79):	Needs improvement (78-50	Non-Compliance (<50):
S.N	REQUIREMENTS	SCORING (Possible points)	SCORED POINTS	CORRECTIVE ACTIONS
1	Legal requirement			
1.1	The Warehouse has a Food Safety License (BAFRA License)	2		
2	Location and Surrounding Areas			
2.1	boundaries away from toxic chemical industries and clean surrounding areas without uncontrolled vegetation at least 6 feet away	2		
2.2	open spaces, such as yards, streets, side or rear lanes and roof tops are not used for storage of food, cleaning and storage of equipment and	2		
3	Design and layout			
3.1	The building has sufficient space to allow proper storage of food commodities, maintenance and cleaning, as well to prevent entry of pests and foreign matter.	2		
3.2	There is adequate water supply.	2		
3.3	There is adequate drainage and waste disposal.	2		
3.4	Adequate ventilation is provided in the storage fa	2		
3.5	The warehouse has sufficient lighting. Lighting devices are covered to protect food against contamination (especially when non-packaged foods are stored)	2		
3.6	There is an adequate separation between the food storage areas, and chemical and other hazardous substances; personal items, etc.	2		
3.7	Appropriate loading and unloading points are identified with adequate protection from pests and rain.	2		
3.8	There are adequate facilities for protection from pests, rain, and other contaminants			
3.9	Personnel hygiene facilities are available (Adequate number of hand washing facilities, toilets, changing rooms, etc.). These areas should not open directly into food storage areas.	2		

Inspection Checklist for Warehouses (Food storage)

S.N	REQUIREMENTS	SCORING (Possible	SCORED POINTS	CORRECTIVE
4		points)	Jeoned Fontio	ACTIONS
4	Internal Structures and Fittings			
4.1.	Flooring are made of smooth concrete, clean, no water logging, and free of rubbish.	2		
4.2	Roof is gap free, water resistant, and finished.	2		
4.3	Walls and partitions have smooth surface without wall paint flaking off and no crevices to harbour pests.	2		
4.4.	Windows and ventilators allows easy cleaning and mesh on windows/ventilator have no cuts or damages to avoid entry of pest.	2		
4.5	Doors have smooth non-absorbent surfaces easy to clean, and disinfect. Entry and exit points are fitted with adequate devices to ensure dust, insects, birds and animals are kept out.	2		
5	Control of operation			
5.1	Food commodities are stored on clean pallets of the floor and away from the walls.	2		
5.2	Products are handled adequately at receiving and dispatch points.	2		
5.3	Temperature and humidity are adequately monitored and maintained.	4		
5.4	Chilled food products are received at 5°C or below. Frozen food products are received at - 18°C or below.	2		
5.5	Stock rotation system (FIFO/FEFO) is implemented.	2		
6	Maintenance and Sanitation			
6.1	The warehouse facilities (including Pallets, other storage equipment and materials) and premises are kept clean as per cleaning schedule and the records are maintained.	2		
6.2	The equipment are well maintained (adequate condition) and records are maintained.	2		
6.3	Pest control programme is in place and records are maintained.*	4		
6.4	Only trained/authorized personnel carry out pest control activities. Check records.	2		
6.5	Rodent traps are in sufficient numbers and are mapped. Insecticutors used are functional and cleaned regularly.	2		
6.6	No signs of pest activity or infestation in premises (eggs, larvae, faeces, etc.)	2		
6.7	Food waste and other refuse are removed periodically from food storage areas to avoid accumulation.	2		

Inspection Checklist for Warehouses (Food storage)

S.N	REQUIREMENTS	SCORING (Possible points)	SCORED POINTS	CORRECTIVE ACTIONS
7	Personal Hygiene		r	
	Personnel working in the food storage area does			
7.1	not have any open cuts or wound/injury,	2		
	contagious disease, or sickness.			
	Personnel working in the food storage area			
	maintain personal cleanliness (clean cloths,			
7.2	trimmed and clean nails, without nail polish,	4		
	and hair restrain, etc.) and personal behaviour			
	(hand washing, no loose jewellery, no smoking,			
	Personal hygiene practices in simple local			
73	language, understood by the personnel and/or	2		
	pictorial are suitably displayed at appropriate			
	places.			
7.4	Personnel are quipped with suitable aprons,			
	gloves, headgear, shoe cover, etc.; wherever	2		
	necessary to avoid food contamination.			
8	Training and Record Keeping			
	Managers and supervisors have appropriate			
8.1	knowledge of food hygiene and sanitation as per	2		
	GMP and GHP requirements.			
87	A proper record system is maintained and is	2		
0.2	available.	Z		
9	Transportation			
	Food products are transported in clean and			
9.1	sanitized vehicles and trucks, and adequately	2		
	protected during transport.			
	During transport, there are adequate measures			
	to ensure that temperature, humidity,			
9.2	atmosphere and other necessary conditions, as	2		
	appropriate to the product are maintained.			
		10	l	

inspection checking for varenouses (rood storag	Inspection	Checklist for	Warehouses	(Food	storag	e
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Score guide		Total possible points: 86	Total scored points
Full complia:	2		
Partial compli	1	Rating	Points
Not fulfille	0	Compliance - Excellent	69-78
		Compliance - Fair	59-68
		Needs improvement	50-59
		Non Compliance	< 50

Asterisk mark (*): Critical aspects that have a major impact on food safety and any failure in this regard will result in non-compliance.

Not applicable (NA): It is when the aspect under examination does not apply to the scope of the inspection.

ANNEXURE V: Inspection checklist for Transporters

Date	Location	
BAFRA/FCBL	Transporter	
official		
Vehicle type	# of person	
	accompanying	
	driver	
Material received		
in the vehicle		

Inspection criteria	Status	Remarks
The type of transport and handling equipment		
has been selected considering the nature of		
the food and the conditions under which it has		
to be transported.		
The design & construction of transport		
venicle permit adequate maintenance,		
cleaning, storage of food and do not provide		
The vehicle is covered and inside structure is		
intact well painted with no signs of		
rusting flaking paint & corrosion		
The vehicle has proper locking/ sealing		
facility to ensure that the products are not		
exposed to external weather conditions		
andpilferage		
Vehicle is inspected for debris, dust, previous		
loads, pest activity & other non-food		
orhazardous items before loading. Check for		
records		
Hazardous material like chemicals, fuels,		
flammable materials are not transported with		
Ioounnaternal.		
food products to transporting food products		
proper cleaning is conducted to avoid		
contamination of food. Check for records		
Mix loads of food material are adequately		
compartmentalized to prevent		
crosscontamination.		
Check for visual signs of damage due to poor		
handling during loading, unloading and		
stacking		
Food handlers including driver and loaders		
are complying with personal and respiratory		
nygiene requirements	antial Commission of	WINA Not Applicable

C- Compliance; NC – Non-Compliance; PC - Partial Compliance or NA – Not Applicable

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