ICE-CREAM & FROZEN DESSERTS

Module 10. Hygiene, cleaning and sanitation

Lesson 27
PERSONNEL, EQUIPMENT AND PLANT HYGIENE; CLEANING AND SANITIZATION OF ICE CREAM FREEZERS AND RELATED EQUIPMENTS

27.1 Introduction

People have the right to expect the food they eat to be safe and suitable for consumption. Food borne illness and food borne injury are at best unpleasant; at worst, they can be fatal. But there are also other consequences. Outbreaks of food borne illness can damage trade and tourism, and lead to loss of earnings, unemployment and litigation. Food spoilage is wasteful, costly and can adversely affect trade and consumer confidence.

International food trade and foreign travel are increasing, bringing important social and economic benefits. But this also makes the spread of illness around the world easier. Eating habits too, have undergone major change in many countries over the last two decades and new food production; preparation and distribution techniques have developed to reflect this. Effective hygiene control, therefore, it is vital to avoid adverse effect on human health and economic consequences of food borne illness, food borne injury and food spoilage. Everyone, including farmers and growers, manufacturers and processors, food handlers and consumers, has a responsibility to ensure that food is safe and suitable for human consumption.

Ice cream is one of the most popular foods widely consumed by people of all classes and age groups including high-risk people without further processing; for this they rely on the hygienic standards of premises where ice cream is manufactured. Consumers do not have the available knowledge or means of determining the hygienic quality of ice cream they purchase.

The main objective and importance of maintaining hygiene and sanitization is

To maintain good product quality and shelf life it is essential to have proper cleaning and sanitizing practices, including personnel hygiene and habits. The primary purpose of cleaning dairy equipment after each use is to remove all milk based residues. Residues harbour the bacteria which affect dairy product quality, shelf life and have a potential to cause disease. The cleaning of equipment does not guarantee a sanitary surface at the time

of next use. For this purpose an efficient bactericidal treatment is necessary. Sanitization involves bactericidal treatment.

27.2 Plant Hygiene and Sanitation

Plant hygiene and sanitation may be classified into

I. Design and facilities

II. Control of operations

III. Plant maintenance and sanitation

27.2.1 Design and facilities

Establishment should be located away from the environmentally polluted area, which may be threat to contamination. It should be located away from areas prone to flooding, infestations of pests and where wastes (solids or liquid) cannot be removed effectively.

a) Location of equipment

Location of equipment should permit adequate maintenance and cleaning, function in accordance with its intended use and facilitate good hygiene practice including monitoring.

b) Internal structure and fittings

Surfaces of walls, partitions and floors should be impervious materials with no toxic effect. Surface should be smooth up to working height, i.e. operation height. Floors should be constructed to allow drainage and cleaning. Overhead ceiling and fixtures should be properly finished to minimize build up of dirt and condensation and shedding of particles. Windows should be easy to clean, minimize the build up of dirt, with removable and cleanable insect proof screen. Door should be smooth, non-absorbent surfaces, easy to clean and disinfect. Surfaces coming in direct contact with food should be in sound condition, durable and easy to clean, maintain and disinfect, should be made of smooth, non-absorbent materials and inert to the product, detergent and disinfectants.

c) Equipment

Equipment and containers coming in contact with food should be designed and constructed to cause that they can be adequately cleaned,disinfected and maintained to avoid the contamination of materials with no toxic effect in use, durable, movable or capable of being disassembled to facilitate maintenance, cleaning, disinfections and monitoring.

d) Containers for waste and inedible substances

Containers should be specifically identified and suitably constructed for waste, byproducts, and inedible or dangerous substances.

27.2.2 Facilities

a) Air: Air plays a major role in ice cream manufacture. Air is rather an ingredient of ice cream. Proper care should be taken of the area from where the air is drawn. It should have a clean environment without any off smell and controlled humidity to ensure the safety and suitability of ice cream. It is desired that the air that is incorporated in ice cream should pass through sterile filters.

b) Water: Plants must have adequate water supply. Potable water should be used. Potable and non-potable water should be properly and clearly identified.

c) Drainage and waste disposal: There should be adequate and proper drainage and waste disposal system and facilities so that there is no risk of contamination.

d) Storage: Ice cream requires special storage at low temperatures (-18° to -20°C), so appropriate food storage facilities should be designed and constructed to permit adequate maintenance and cleaning and should enable food to be effectively protected from contamination during storage.

27.2.3 Control of operations

Effective control of temperature is critical, the safety and suitability of product should be taken into account and the following steps are to be taken to control the hazards in ice cream processing

- Identify- possible hazards in process lines
- Implement- effective control procedure for these
- Monitor- control procedure for continuous effectiveness
- Review- periodically the operations.

System should be in place to prevent contamination of chemical as well as physical nature during processing.

Packaging materials should provide adequate protection for ice cream to minimize contamination. Packaging material must be non-toxic.

27.2.4 Plant maintenance and sanitation

Plant and equipment should be kept in an appropriate state of repair and condition to facilitate all sanitation procedures to prevent contamination from metal shards, flecking plasters, debris and chemicals.

a) Cleaning: procedure and method

Cleaning should remove milk residues and dirt, which may be a source of contamination. Physical methods and chemical methods may be used for cleaning i.e. combination of heat scrubbing, turbulent flow, vacuum cleaning and using detergents,alkal is or acids. Cleaning procedures should remove gross debris from surface. Apply detergent solution to loosen soil and bacterial film and hold them in solution or suspension. Rinse with water to remove loosened soil and residue detergent. Apply appropriate methods for removing residues and disinfecting plant.

b) Cleaning programme

Cleaning and disinfections programme should ensure that all parts of the plant are appropriately cleaned. Cleaning and disinfections programme should be continuous and effectively monitored for its suitability and effectiveness.

c) Personnel hygiene training

Those engaged in ice cream operations that come directly or indirectly in contact with products should be trained and/or instructed regarding food hygiene to a level appropriate to the operations they are to perform. Training is fundamentally important to any ice cream hygiene system. Inadequate ice cream hygiene training, and/or instruction and supervision of all people involved in ice cream related activities pose a threat to the safety of ice cream and its suitability for consumption.

No worker should be allowed to perform tasks in the plant without having been taught the necessities of personnel hygiene and approved practices within the plant. The personnel hygiene is the key issue; contaminate the ice cream, post processing directly or indirectly. To ensure the product quality it is important to see that those who come directly or indirectly in contact with the product are not likely to contaminate the product by maintaining an appropriate degree of personnel cleanliness and behaving and operating in an appropriate manner. People known or suspected to be suffering from, or to be a carrier of a disease or illness transmitted through product, should not be allowed to enter any product handling area if there is likelihood of their contaminating the ice cream. Any person so affected should immediately reportillness or symptoms of illness to the management. Medical examination of a product handler should be carried out if medically or epidemiological indicated. Conditions which should be reported to management so that they need medical examination and possible exclusion from food handling can be considered, including: jaundice, diarrhoea, vomiting, fever, visibly infected skin lesions (boils, cuts, etc.) and discharges from the eye, ear or nose.

d) Personnel cleanliness

Product handlers should maintain a high degree of cleanliness and where appropriate wear suitable protective clothing, head covering and footwear. Suitable waterproof dressing should cover cuts and wounds where personnel are permitted to continue working. Personnel should always wash their hands when personnel cleanliness may affect the

product safety, for example at the start of product handling activities; immediately after using the toilet; and after handling any raw material of contaminated material, where this could result in contamination of other product items.

e) Personnel behavior

People engaged in product handling activities should refrain from behavior, which could result in contamination of product, for example, smoking, spitting, chewing or eating and sneezing or coughing over unprotected product. Personnel effects such as jewellery, watches, pins or other items should not be worn or brought into product handling areas if they pose a threat to the safety of the product.

f) Visitors

Visitors to the ice cream manufacturing, processing or handling areas should wear appropriate protective clothing and cap and adhere to other personnel hygiene provisions given above.

g) Personnel hygiene practices

Good personnel hygiene of ice cream handlers is an essential factor in reducing the risk of food poisoning. Ice cream handlers must be aware of the sources of bacteria to prevent the contamination or cross contamination by the food handler. To comply with the personnel hygiene requirements employees need to follow good hygiene practices and in order to do this, proper facilities need to be provided.

h) Plant Hygiene and practices

- Freedom from infection, which can be transmitted (e.g. tuberculosis, hepatitis A, typhoid fever, dysentery, parasites, etc.)
- Wearing of protective clothing such as gloves, hair and beard nets
- Hygienic procedures in manufacturing
- High standard of personnel hygiene that includes: hygienic toilet habits, clean body and clothing, control of subconscious hand movements and not spitting or chewing of beetle nut.

Issues to consider include education of employees, socio-economic status, cultural and religious beliefs which may impart on personal hygiene practices.

i) Hand habits

Hand habits are of particular significance to the ice cream handler. There are many actions, which may be done sub-consciously which are potentially hazardous when associated with ice cream handling. Examples include

- Picking the nose
- Running fingers through hair
- Rubbing eyes, ears and mouth
- Scratching parts of the body

j) Basic hygiene rules

Clothing must be washed regularly. Clean clothes, apron and headgear must be worn when handling ice cream. Hands must be kept clean. Nails should be kept short without nail polish. Cuts, scratches and other wounds must be covered with a waterproof bandage and changed regularly. Hair must be covered with a net and a cap. Ice cream handlers are not permitted to wear jewellery (jewellery harbors bacteria and there is a risk that part of or whole ear rings and jewellery may fall off).

27.3 Cleaning and Sanitization of Ice Cream Freezers and Related Equipments

All the storage tanks should be cleaned by hand or internal spray systems and should be completely dried after washing. For cleaning the packaging machinery, conveyor belts and ancillary equipment they need to be completely dismantled followed by hand cleaning and chlorine sterilization. Pasteurizers are cleaned by cleaning-in-place (CIP) procedures.Some precautions need to be taken during cleaning by CIP are

- All enclosed plant should be inspected at weekly intervals
- Parts located out of circuit e.g. some specialized type of pumps should be cleaned by hand.

27.3.1 Freezers

1. **Batch freezers**: The freezer is rinsed with cold water to remove any traces of ice cream. Then it is dismantled, cleaned and sanitized. Before re-assembly, it should again be sanitized. The freezer should be allowed to drain properly. Before use, it should be rinsed with 200 ppm chlorine solution.

Cleaning and sanitation of batch freezers

1. Turn off refrigerant and turn beaters on to expel remaining product.

2. Rinse freezer with cool tap water.

3. Prepare chlorinated alkaline detergent solution at52-55ºC at 0.5-1% concentration.

4. Remove the hopper cover and mix tube assembly. Pour detergent into the hopper

and brush thoroughly as the solution flows into the freezer cylinder.

5. Run dasher for 30 s then draw off the detergent solution. Rinse with warm water (Note: Running the beater without any mix in the chamber causes excessive wear and tear of the blades and cylinder).

6. Remove freezer door, dismantle all the parts and clean it manually.

7. Rinse all the parts thoroughly. Inspect all gaskets for cracks or hard deposits and replace if necessary (at least every 90 days).

8. Just prior to use sanitize the freezer with 250 ppm chilled chlorine solution and minimum contact period of 10 min. Drain completely (do not rinse with non - chlorinated solution because this may reintroduce contaminants to the machine).

27.3.2 Cleaning of continuous freezer

The usual steps are

1. Rinse with water at 38°C until the rinse runs clear.

2. Circulate alkaline detergent (1-1.5%) solution at 65-70°C through the equipment for 20-30 min.

3. Rinse with water.

4. Rinse with low concentration (0.1%) of phosphoric acid.

Drain at all low points in the system. The entire assembled system must be sanitized with suitable sanitizer before use.