



Technews

**National Dairy Development Board
For Efficient Dairy Plant Operation**

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GOOD MANUFACTURING PRACTICES II

This bulletin includes technical and latest development on products, systems, techniques etc. reported in journals, companies' leaflets and books and based on studies and experience. The technical information on different issues is on different areas of plant operation. It is hoped that the information contained herein will be useful to readers.

The theme of information in this issue is **Good Manufacturing Practices II**. It may be understood that the information given here is by no means complete.

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INTRODUCTION

The last issue of the Technews presented the guidelines on the Good Manufacturing Practices (GMPs) related to 'Factory

Construction'. This issue presents measures related to some more areas of GMPs for the benefit of dairy managers.

EQUIPMENT DESIGN AND MAINTENANCE

Dairy plant must use equipment that is designed for the production of dairy products and must maintain equipment in ways to prevent conditions that may result in contamination of dairy products. Plants must have adequate programme in place to monitor and control of elements in this section and maintain appropriate records. Following points must specifically be attended to:

- Equipment and utensils must be designed and maintained in ways that prevent contamination of dairy foods and be constructed using corrosion resistant materials.
- Food contact surfaces should be non-absorbent, non-toxic and smooth.
- All chemicals and paints used in equipment coming in

contact with food must be appropriate for their intended use.

- The equipment and utensils must be installed in a way that prevents contamination of food and should have adequate space within and around the equipment.
- Equipment must be accessible for cleaning, sanitizing, maintenance and inspection.
- Where necessary, equipment must be appropriately vented.
- Equipment must be maintained in a clean and sanitary manner in accordance with the sanitation programme detailed separately.
- Equipment and utensils used to handle inedible material must not be used to handle

edible material.

- Containers for inedible and waste material should be clearly identified and should be lead proof.
- Protocols and calibration should be established for those equipment and monitoring devices which need calibration. This may include thermometers, pH meters, humidity or water activity meters, refrigeration unit controls, hygrometers and other equipment.
- Frequency of calibration, responsible persons, monitoring and verification procedures, appropriate corrective action, and record keeping must be specified.
- If reagents are used for verification and monitoring activities, procedures for keeping and calibrating the reagents must be

documented.

- Required information on the calibration of reagents includes frequency of testing, responsible person, dating system, storage conditions, and records to be kept.
- A preventive maintenance programme should be in place that lists equipment and utensils together with preventive maintenance procedures.
- The programme should include necessary servicing of the equipment and frequency, responsible person, method of monitoring, and records to be kept.

SANITARY OPERATIONS

General

- Plant should have an adequate sanitation programme in place and maintain appropriate records.

- Sanitation programme should outline the parameters that need to be controlled to ensure safety of the dairy food product.
- Sanitation procedures must

be developed for equipment, utensils, overhead structures, floors, walls, ceiling, drains, lighting devices, refrigeration unit and anything else that affect the safety of the dairy food.

- Equipment and facilities must be cleaned and sanitized as defined in a written document. Equipment must be visually inspected for cleanliness. Equipment must be free of any residue of foreign material before being used.

General Maintenance

- Building, fixtures and other physical facilities of the plant should be maintained in a sanitary condition and should be kept in repair sufficient to prevent dairy food from becoming adulterated.
- Cleaning and sanitizing of equipment and utensils should be conducted in a manner that protects against contamination of dairy food, food contact surfaces or food packaging materials.

Cleaning and Sanitizing Agents

- Cleaning compounds and sanitizing agents used in cleaning and sanitizing procedures should be free from undesirable micro-organisms and should be safe and adequate under the conditions of use.
- Compliance with these requirements may be verified by any effective means including supplier's guarantee and certification or examination of these substances for contamination.
- Only the following toxic materials that are required to maintain sanitary condition may be used or stored in plants where dairy food is processed or exposed:
 - Those required to maintain clean and sanitary condition,
 - Those necessary for use in laboratory testing procedure,
 - Those necessary for plant and equipment maintenance and operations; and
 - Those necessary for use in

the plant's operations.

- Toxic cleaning compounds sanitizing agents and pesticide chemicals should be identified, held and stored in a manner that it protects against contamination of dairy food, food contact surfaces or food packaging materials.
- All relevant regulations promulgated by Central Government, State Governments and Local Government agencies for the application and for holding of these products should be followed.
- In wet processing when cleaning is necessary to protect against the introduction of micro-organisms into dairy food, dairy contact surfaces should be cleaned, sanitized before use and after any interruption during which the dairy food contact surfaces may have become contaminated.
- Where equipment or utensils are used in a continuous production operations, they should be cleaned and sanitized as necessary.
- Non-food contact surface of equipment used in the operation of dairy food plant should be cleaned as frequently as necessary to protect against contamination of food.

Sanitation of Equipment

- All dairy food contact surfaces should be cleaned as frequently as necessary to protect against contamination of dairy food.
- Dairy food contact surfaces used for manufacturing or holding low moisture product should be in a dry sanitary condition at the time of use. When the surfaces are wet cleaned, they should, when necessary, be sanitized and thoroughly dried before use subsequently.
- Single service articles (such as paper cups, paper towels) should be stored in appropriate containers and should be handled, dispensed, used and disposed of in a manner that protects against contamination of dairy food, or food contact surfaces.
- Sanitary agents should be adequate and safe under

conditions of use.

- Any facility, procedure or machine will be acceptable for cleaning and sanitizing equipment if it is re-established that they will routinely render equipment clean and provide adequate cleaning and sanitizing treatment.
- Chemicals should be used in accordance with the manufacturers' recommendations.
- The general house-keeping and the special sanitation procedures carried out during the operation must be specified.
- Information to be included in the written sanitation programme includes:
 - Area/line, equipment to be cleaned, the frequency and the responsible person,
 - Special instructions for cleaning, specific equipment and responsible person,
 - Cleaning equipment that is to be used, alongwith instruction for its operation (e.g., pressure, volume),
 - Detergents/sanitizer to be

used (including commercial and generic names, dilution factor, temperature, concentration to be used), Method of application of solution, contact time, scrubbing if necessary, high/low pressure, Cleaning sequence, Rinsing instructions, water temperature, Sanitizing instructions, Final rinsing instruction and safety instructions for products.

- It should be ensured that the dairy product contact surface:

Is free from visible film or soil when viewed under good lighting condition with the surface wet or dry,

Does not emit any objectionable odour,

Does not give a greasy and rough feeling to clean fingers when they are rubbed on the surface,

Does not dis-colour a new white paper tissue, wiped several times over the surface,

Does not show any signs of excessive water break

when water is draining from it, and

Does not contaminate dairy food product in contact with it.

- The clean-in-place (CIP) system should consider the following:

All surfaces and areas should be accessible to the cleaning solutions,

All surfaces in contact with the dairy food or with detergent solutions should be of stainless steel,

All internal part should be sound or of tubular material to avoid accumulation of debris and to permit cleaning and flushing away of soil.

All walls must be smooth,

Tanks, pipes should be designed to facilitate self cleaning and self drainage,

There should be no dead-ends in any lines of piece of equipment,

There should be no interior ledges, recesses, pits,

unfinished welds or areas for dairy food or debris to be lodged,

All joints should be continuously welded and finished smoothly,

The solution velocity should be more than 1.8 metre per second,

3 or 4 tanks are required for the cleaning solutions and sanitizing solutions,

Tanks should be of sufficient size to hold upto 50% or more solution than needed for cleaning the equipment.

- Effectiveness of the sanitation programme must be monitored on a routine basis by a representative (e.g., using microbiological, swab tests, visual inspection of the equipment or direct observation of approved sanitation procedures by designated personnel.
- Deviations and corrective actions taken must be recorded.

SANITARY FACILITIES AND CONTROL

Water Supply

- Water supply should be sufficient for the operations intended and should be derived from an adequate source.
- Any water that contacts milk products or product contact surfaces should be safe and of adequate sanitary quality.
- Running water at a suitable temperature, and under pressure as needed, should be provided in all areas where required for the processing of milk and milk products, for the cleaning of equipment or for employee sanitary facilities.

Plumbing

- Plumbing should be of adequate size and design and adequately installed and maintained.
- Should carry sufficient quantities of water to required locations throughout the plant.
- Should properly convey sewage and liquid disposable

waste from the plant.

- Should avoid constituting a source of contamination to food, water supplies, equipment or utensils or creating an unsanitary condition.
- Provide adequate drainage in all areas where floor are subject to flooding type cleaning or where normal operations release or discharge water or other liquid waste on the floor.
- Should provide that there is no back flow from, cross connection between, piping systems, discharge waste water or sewage and piping systems that carry water for food and food manufacturing.

Sewage Disposal

- Sewage disposal should be made into an adequate sewerage system or disposed of through other adequate means.

Toilet Facilities

- Each plant should provide its employees with adequate readily accessible toilet facilities.
- The facilities should be maintained in a sanitary condition.
- The facilities should be kept in good repair at all times.
- Should provide self closing doors to the facilities.
- Should provide doors that do not open into areas where product is exposed to airborne contamination, except where alternative means have been taken to protect against contamination (such as double doors or positive air flow system).

Hand Washing Facilities

- Hand washing facilities should be adequate and convenient and be flushed with running water at a suitable temperature.
- Hand washing and, where appropriate, hand-sanitizing facilities should be provided at each location in the plant where good sanitary

practices require employees to wash and/or sanitize their hands.

- Should provide facilities for sufficient hand-cleaning and sanitizing preparations.
- Should provide sanitary towels or suitable drying devices.
- Should provide devices or fixtures such as water control valves so designed and constructed to protect against re-contamination of clean, sanitized hands.
- Should provide readily understandable signs directing employees handling unprotected food, unprotected food packaging materials, of food contact surfaces to and, where appropriate, sanitize their hands before they start work, after each absence from post of duty, and when their hands may have become soiled or contaminated.
- Should provide refuse receptacles/bins that are constructed and maintained in a manner that protects against contamination of food.

Rubbish and Offal Disposal

- Rubbish and any offal should be so conveyed, stored and disposed of as to minimize the development of odour, minimize the potential for waste becoming an attractant and harbourage and breeding places for pests, and protect against contamination of food, food contact surfaces, water supplies and ground surfaces.
- Any receptacle used should be so constructed that it does not leak and may be thoroughly cleaned and maintained in a sanitary condition.
- Such receptacles should be equipped with solid tight fitting cover, unless it can be maintained in a sanitary condition without a cover.
- All sweepings, solid or liquid wastes, refuse and garbage should be removed in such a manner as to avoid creating a menace to health and as often as necessary or appropriate to maintain the place of work in a sanitary condition.

PERSONAL HYGIENE

- Any plant employee who appears to have an illness, open lesion, including boils, sores or infected wounds or any other abnormal source of microbial contamination by which there is a reasonable possibility of food, food contact surfaces or food packaging materials to be contaminated, should be excluded from any operations which may be expected to result in such contamination until the conditions are corrected. Personnel should be instructed to report such health conditions to their supervisors.
- All plant employees working in direct contact with milk food, food contact surfaces and food packaging materials should conform to hygienic practices while on duty.
- They should wear uniforms

suitable to the operations in a manner that protect against the contamination of milk food, food packaging materials or food contact surfaces.

- Should maintain adequate personal cleanliness.
- They should wash their hands thoroughly (and sanitize them if necessary to protect against contamination with undesirable micro-organisms), in an adequate hand washing facility before starting work, after each absence from the work station, and at any other time when the hands may have become soiled or contaminated.
- Should remove all insecure jewellery and other objects (such as pen, pencil, wrist watch, etc.) that might fall into food, equipment or containers and remove hand jewellery that can not be adequately sanitized during the periods in which milk food is worked by hands. If such hand jewellery can not be removed, it may be covered by material which can be maintained in an

intact, clean, and sanitary condition and which effectively protects against the contamination by these objects of milk food, food contact surfaces or food packaging materials. Preferably garments/uniform should not have pockets above the waist-line.

- Should use gloves when the milk food is handled by hands. Should maintain gloves in an intact, clean and sanitary condition. The gloves should be of an impermeable material.
- Should wear, where appropriate, in an effective manner, hairnets, headbands caps, beard covers or other effective hair restraints.
- Should store clothing and other personal belongings in areas other than where milk food is exposed or where equipment or utensils are washed.
- Should confine the following to areas other than where milk food may be exposed and where equipment or utensils are washed; eating food, chewing gum or betel nut, drinking beverages,

using tobacco or smoking beedi/cigarette.

- Should take any other necessary precautions to protect against contamination of milk food, food contact surfaces or food packaging materials with micro-organisms or foreign substances including, but not limited to, perspiration, hair, cosmetics, tobacco, chemicals and medicines applied to the skin.
- Plant personnel should take bath daily.
- They should wash their hair atleast once in a week.
- They should keep their nails clean and appropriately trimmed.
- They should keep underclothing and uniforms clean.
- All plant personnel should learn to wash hands after :
 - coughing and sneezing,
 - visiting the toilet,
 - after smocking,
 - after breaks,
 - before returning to work stations,
 - handling soiled containers or waste materials, and
 - after using the

telephone.

- Glass bottles, cups, glasses, beakers and other glass containers should not be permitted in the product preparation, processing or packaging areas, unless used for packaging of products.
- Safe personal conduct within the dairy plant should be strictly observed. Running, riding on trucks or lift, taking short-cuts (ducking under conveyers etc. whether operating or not) should be prohibited.
- Protective shoes and uniforms, including goggles where appropriate, should be worn at all times.
- Each plant employee must be responsible for maintaining his or her work area from undue accumulation of food, dust, dirt or waste in which insects or bacteria may harbour or breed.
- All employees must flush urinals or toilets after each usage.
- Doors and windows should never be left ajar.
- All intermediate containers should be kept covered when containing products.

- Sweaters or other wool substances on employee's should be avoided in the production, processing or packaging of product. If a sweater is worn, it should be covered with a non-lint uniform.
- Fingernail polish should never be worn in the preparation, processing or packaging areas.
- Maintenance personnel should not place their tools, parts being repaired, etc. on milk food contact surfaces areas.
- Any milk food items dropped and coming in contact with the floor must be immediately discarded rather than placed back into production.
- Responsibility for assuring compliance by all personnel with all requirements should be clearly assigned to competent supervisory personnel.
- Certain hand habits of the plant employee are potentially hazardous when associated with handling dairy products, and food contamination may occur through the transfer of bacteria from the employee to product during its preparation. Such actions like scratching nose, running finger through hair, rubbing eyes, ears and mouth, scratching beard, scratching parts of bodies should be controlled. After each such action, if unavoidable, hands should be effectively washed before resuming to work.
- Proper and adequate facilities should be provided for compliance to the personal hygiene policy. These facilities include :
 - Dining room, dressing room and shower and wash room for employees.
 - Toilet facilities in appropriate locations which will not cause potential contamination.
 - Hand wash basins with warm running water, soap and paper hand towels to be provided in toilet areas.
 - Hand wash basins with warm running water, soap and paper hand towels to be provided in the manufacturing areas.
 - Provision of suitable

RECALL

The dairy plant should have a recall programme which should outline procedures that would be implemented in the event of product recall. The objective of the written procedure is to ensure that the identified dairy product is removed from the market as efficiently and rapidly as possible via a plan that can be put into operation at any time. A written recall procedure may include the following:

- Documentation pertaining to the product coding systems. All products should be identified with a production date or code identifying each lot.
- Finished product distribution records should be maintained for a time that exceeds the shelf-life of a product.
- Records must be adequately maintained for identifying the location of the product if it is recalled.
- A complaint file including records, documentation of related complaints and actions taken must be maintained.
- Responsible individuals, and their alternates, who are part of the recall team, along with their respective business and telephone numbers must be listed. Roles and responsibilities for each member of the recall team must be clearly defined.
- The step by step procedures to follow for a recall should be described.
- Means of notifying the affected customer in a manner appropriate to the type of hazard should be defined.
- Typical messages to consumers, retailers or wholesalers according to the severity of the hazard should be included.
- Control measures for the return recalled product should be planned. Control measures and disposal of the affected product must be described according to the type of hazard involved.

- Means of assessing progress and efficacy of the recall should be stated.

These GMPs are required to be followed in the dairy plant to produce quality and safe products. These practices

make the HACCP plan, if implemented, simple and more effective. Each dairy employee involved in the production of dairy products must understand and comply with the GMP requirements.



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Quality and Plant Management Group
National Dairy Development Board
PB No.40
Anand 388001
Gujarat

Fax No. (02692) 60157
Email : nnv@nddb.coop