Technews

National Dairy Development Board

For Efficient Dairy Plant Operation

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DAIRY PLANT EFFICIENCY : MILK SOLIDS LOSS CONTROL - 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 **Dairy Plant Efficiency: Milk Solids Loss Control - II**. It may be understood that the information given here is by no means complete.

In this issue:

INTRODUCTION

The last issue (September-October 2002, No.40) of Technews included general measure for milk solids loss control. This issue suggests measures to control losses in specific processes/product manufacture.

LIQUID MILK PROCESSING

All pipelines, tanks and processing vats should be thoroughly drained before rinsing which must be performed before the product dries on the surface. This may be guaranteed visually as well as automatically depending upon the method of operating the dairy. Before caustic cleaning, small product saving pre-rinses should be used. Milk solids obtained from such pre-rinses should be collected and reused.

Extensive pipelines in larger dairy plants result in considerable product losses. These losses can be reduced considerably if the pipelines are emptied fully by air or water pressure.

Drips and leaks that occur during processing should be collected in containers and reused.

Separating and clarifying

Airtight separators and proper seals on pumps and pipeline connections should be used to avoid incorporation of air under partial vacuum causing foaming.

Homogenization

Losses of milk and milk products in homogenization facility may occur mainly as a result of leakage and the cleaning process. Therefore, it should be ensured that there is no leakage. If any leakage occurs, the product from the leaks should be collected and reused. Likewise, the pre-rinse

during the cleaning process should also be collected properly and reused.

Heating

The equipment used for pasteurization or other heat treatment of milk contains considerable surface area and after use, there is a correspondingly great amount of milk adhering to these surfaces. Further, start up and shut down as well as product change over in heat treatment facilities are important sources of milk loss. The pre-rinses from these equipment should be collected and reused.

Milk deposits in heat exchanger contribute to a great loss. Forming of deposits may be reduced by elimination of air leaks causing foaming.

Cooling

During cooling, either after heat treatment or prior to storage, milk adhering to the cooling surface can represent significant losses.

When milk or cream freezes on to a very cold cooling surface and the plant is washed this is melted and lost to the drain with the wash water. To prevent this the coolant should be used with the temperature not below the freezing point of water.

Further, it should be ensured that correct connections are made on plate heat exchangers so that there is no possibility of milk being pumped to the water side of the exchanger or water pumped into the milk side. Pressure should be greater on the milk side by about 0.07 kg per sq. cm. Periodic check should also be made to ensure that no corrosion of the plates has taken place which may result in milk passing into the cooling water or vice-versa.

PACKAGING OF PRODUCTS

Packaging machines should be maintained in great order to avoid milk and product spillage. Settings on sachet

machines should be checked frequently to ensure proper package formations and sealing so as to minimize leaking.

Fillers should be equipped with drip savers and spills should be collected. Filler valves should be checked to see that all packages are filled correctly. Foaming at the filler supply bowl should be eliminated to minimize spills and to ensure proper functioning of the packaging machines.

The pouches should be handled carefully during putting in crates, stacking, loading and delivery to avoid product losses.

Returns from shops etc., if accepted, should be properly utilized after further processing, if necessary.

BUTTER MAKING

Cream and butter adhere to surface of equipment more firmly than liquid milk, and, therefore, any residue of these left in equipment after processing will contribute substantially to loss. Therefore, pre-rinsing of tanks and cans should be carried out with skimmed milk which can then be reclaimed.

The practices described for pasteurization equipment should also be employed to separators and their auxiliary equipment. Special consideration should be given to drainage and rinsing. The residual butter and cream should be removed from the equipment by hot water or steam and collected for reuse. Where the equipment is dismantled for cleaning a central washing area should be provided to facilitate for collecting milk fat removed which should be reused.

Collecting facilities underneath churns should be big enough to take all the buttermilk discharged. The management should find out the ways of using buttermilk.

If butter is rinsed with water,

the first rinse water should be collected and the fat reclaimed. Alternatively, chilled butter-milk can be used for butter washing which should be collected and the fat reclaimed.

As in the milk heating process, start up and shout down in cream pasteurization result in losses of products, which is greater than in case of milk. The use of skim milk for pre-rinsing of the equipment, which is collected and reused, results in reduction of fat losses.

MILK POWDER PRODUCTION

The main source of loss in milk powder production is from spillage of milk and milk powder occuring in most steps the process. A considerable loss can also result from cleaning.

Evaporators should be operated at sufficient low liquid level so as to prevent product boiling over. They should also be retained to specifications; excessively long runs or running at higher rates than specified can result in blocked tubes which are not only difficult to clean but also result in high product loss.

Calandria evaporator should be equipped with efficient separators. If vapour condensate is recovered for reuse (e.g., instead of fresh water), separator efficiency is a matter of point to bear in mind.

Contact type (jet or spray) condenser evaporator should be equipped with a filler barometric level so as to eliminate the possibility of sucking water back into the product zone in case of pump or power failure. When the evaporator is started, insufficiently concentrated milk has to be re-circulated until the required concentration is achieved.

When the evaporator is shut down, the first rinsing water can be limited and led to the spray dryer. Otherwise it should be retained to be

evaporated during the next run. It may be economical to consider retaining the rinse down to about 7% total solids with anything below that level being used elsewhere. The dryer should be cleaned as far as possible by air sweeping. If wet cleaning of the dryer is required, the first rinsing water should be collected and evaporated with the milk rinses from other operations.

When the dryer is shut down, the powder in the chamber should be brushed out and collected, and depending upon the quality, reused properly.

Powder leaks should be sealed to prevent losses. Spray dryer should be equipped with highly efficient powder separation system from the exhaust air so as to minimize the powder loss. Wet scrubbers can be used as a final step. Then the wash water from the wet scrubber should be recycled and added to the product or the product itself can be used as the washing liquid provided hygienic problems could be controlled.

Care should be taken so that powder is not spilled on the floor. Any spillage should be swept up and reused appropriately.

Care should be taken in handling of packaged product to avoid spillage.

OTHER MEASURES

By-product utilization is a major factor in reducing losses and effective methods of processing excess skim milk, buttermilk etc. must be used.

Correct production scheduling can help to minimize loss by eliminating over production and the resulting excessive product return; minimize the number of start ups and shut downs required on loss generating operations such as separation, pasteurization, filling etc.; ensure that there is sufficient supply of raw material for the process and avoid unnecessary clean up between products.

Effective quality control will also help to eliminate waste by reducing the quantity of returned product, and minimize the need for recycling and reprocessing of product which is out of specification.

Many equipment, process and system improvement can be made within dairy plants for better control of losses. The most common engineering improvement include automated cleaning systems, product recovery lines and automated process systems. The use of automated system require superior maintenance and well educated plant operators to fully realize the system's potential. Improper operation of automated recovery and control systems can actually markedly increase losses and decrease yield.

The level of control of losses in a dairy plant can be co-related directly with the maintenance programme in operation. A good loss management control programme cannot be achieved without a good maintenance programme involving both plant operators and engineers. From loss control point of view, the operations associated repair and preventive maintenance programmes are the most important.

The important fact of loss elimination is to keep staff and management motivated. Regular publication of losses with their monetary values and recognition of yield improvement are important. The fostering of some friendly competition between departments or shifts can be a major motivating factor.

Utmost care should be taken in processing milk and manufacturing products. All the parameters should be correctly maintained so that products are manufactured at the required quality which will avoid losses.

Storage conditions of milk and milk products should be appropriate to eliminate spoilage and losses.

Issues of Technews during 2002

Issue	Month	Theme
36	Jan-Feb	Codex Guidelines on Food Hygiene - II
37	Mar-Apr	Codex Guidelines on Food Hygiene - III
38	May-Jun	Good Manufacturing Practices - I
39	Jul-Aug	Good Manufacturing Practices - II
40	Sep-Oct	Dairy Plant Efficiency: Milk Solids Loss Control - I
41	Nov-Dec	Dairy Plant Efficiency: Milk Solids Loss Control - II

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Only entertaining ☐ Boring ☐

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