

**Dairy Plant Management**  
**Training programme report**

16<sup>th</sup> February 2015 to 20<sup>th</sup> March 2015, at NDDDB Anand



**National Dairy Development Board, Anand**

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### **Introduction:**

NDDDB had taken proactive steps to share both knowledge and experience to build competent and trained professionals. Because, well trained and better equipped dairy professionals are an asset to dairy cooperatives facing the challenges of an increasingly competitive environment. The dairy cooperatives need to focus on milk production, processing and value addition in a cost effective manner. Proper utilization of resources is also necessary.

To build professional competence in Co-operative dairy industry National Dairy Development Board has conducted 5 week Dairy Plant Management training programme.

Total 24 Dairy Plant Professionals (Dairy Technologist, Engineer, Food Technologist) from eight states (Tamil Nadu, Bihar, West Bengal, Kerala, Maharashtra, Gujarat, Jharkhand, Assam) undergone training programme. (For participants List Annexure 1)



**“Hon. Chairman NDDDB and Executive Director NDDDB having interaction with the participants”**

## **Topics covered:**

In this training programme 74 classroom sessions were conducted by 32 expert faculties from NDDB, IRMA, KDMPCUL, GCMMF, IDMC, GEA, TetraPak, Siemens and Rockwell. Following topics covered.

### **1. Sustainable dairy plant operations**

- New developments in energy & water management
- Advances in automation in dairy industry
- Waste management in dairy sector
- Total productive maintenance
- Environmental safety management system

### **2. Product process development**

- Cheese
- Ice cream
- Indigenous products

### **3. Food-safety quality and regulatory environment**

- Overview of food regulations
- Food safety & quality management systems

### **4. Financial and physical performance analysis of dairy cooperative industry**

- Finance for non-finance personnel
- Costing tools and techniques for managerial decision-making
- Areas of cost reduction, cost of quality and Kaizen costing
- Major areas and different environment for decision making
- 

### **5. Human resource development**

- Legal environment in dairying
- Business process re-engineering
- Process analysis/management & operation management
- Leadership, team building, motivation & conflict management
- Enhancing innovations & its management



### **Dairy Plant visits:**

Practical exposure to India's best dairy plants enabled participants to correlate theory and search out ways to implement them in dairy plant. Best practices followed in different plant which can be replicated to other dairy plant. During training programme 10 days visit is organized at different Dairy Plant that includes Amul Dairy, Banas Dairy, Sumul Dairy, IDMC and Vidya Dairy that covered following topics.

Product and process Development at Vidya Dairy (4 Days)
Equipment Operation and Maintenance with specific work plan Process flow chart, production bottleneck & equipment balancing at Amul satellite dairy at Khatraj (Cheese , Paneer, Whey Powder Plant)
Energy Management at Amul Dairy, Anand
Equipment Operation and Maintenance specific work plan Process flow chart, production bottleneck & equipment balancing at Amul Food Complex, Mogar (Chocolate plant, Malted food, Bakery products, sweets manufacturing)
Equipment Operation and Maintenance at Banas Dairy, visit to Cattle feed Plant Katarva & semen station Dama. Interaction with Shri Sanjay Karamchandani MD & Dr PR Vaghela Manager Q.M.S.
Energy Management at Sumul Dairy, Surat (observing energy, water & waste mgt. process flow & ways for balancing the production flow)
IDMC, Unit- 2,3,4,5

## **Important points covered by different faculties in DPM:**

### **1. Sustainable dairy plant operations:**

For making co-operative industry sustainable faculty have covered different aspects that needs more focus such as importance of operations, people to remain competitive & relevant, future scenario of the dairy industry, energy conservation in dairy plant to reduce the operational cost, reducing operational FAT & SNF loss, reducing operational losses on account of excessive human effort, utility management that includes Power, fuel, steam, water, refrigeration and compressed air. Topics covered under sustainable dairy plant operation are listed below.

#### **1.1 Indian Dairy Industry:**

- ✓ Executive Director, NDDB has given insight on important aspects of the dairy industry to improve the quality of Milk and milk product, increase shelf life of milk and milk product, maintaining cold chain from cow to consumer, Improve productivity of animals.
- ✓ Waste stream management by minimization of product losses, maintaining optimum inventory, use of energy efficient equipment.
- ✓ Broaden the horizon of thinking by answering “why should I Do?” that will make work more interesting and product and service will be better.
- ✓ Develop a continual learning attitude in the organization by Learning from failure and continual Improvement for growth of cooperative dairy.
- ✓ Managing Director, Amul Dairy emphasized about the future scenario of dairy industry and requirements of investment to upgrade the dairy plants for sustainable business.
- ✓ Investment in product diversification and value addition in existing product. Expand consumer Market and brand building.

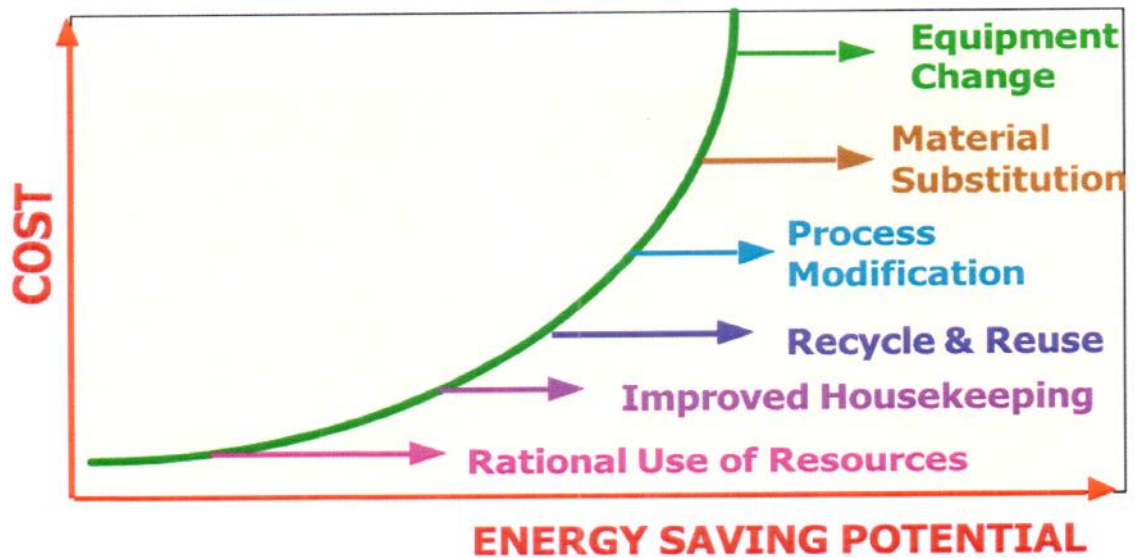
#### **1.2 Energy conservation in Dairy Industry:**

Over a period of time Amul dairy cut down their power consumption from 64.33 KWH/ MT milk processed in the year 2012-13 to 55.84 in 2014-15. This can be achieved by any dairy plant if they adopt following measures.

- ✓ Measurement of Utility (steam, water, electricity, fuel) is essential for energy conservation, unless we can't measure we can't improve it. Section wise utility measuring meter and review of utility consumption data and improve it.
- ✓ Prevent oil leakage and spillage. Refrigeration plant at Sumul found clean and having no oil leakage. Personal Protective Equipments (PPE) was available for safety.



- ✓ Approach of energy conservation in dairy plant. Following graph describes the steps of energy conservation.



- ✓ In dairy industry, 60 % of electricity is consumed by refrigeration section therefore use of energy efficient equipment in this section will considerably reduce the cost of production.
- ✓ Prevent leakages in utility lines. Major loss are found in compressed air, steam line, water and Furnace oil, etc. 1 mm diameter leakage in 6 bar pressure compressed air line can lead to approximately Rs 10000 loss yearly. Cutting the losses can save precious fuel and water.
- ✓ Use of steam turbine instead of PRS which generates electricity and reduce the pressure of steam require for processes in Sumul Dairy, Surat.
- ✓ Cold cleaning concept in BMCU eliminates heating process during CIP. This chemical has bactericidal effect. This is useful for DCS where hot water facility is not available. Participants have observed meaningful application for village DCS.
- ✓ Hermitically sealed compressor in BMCU is not advisable to open as it reduces the efficiency of the compressor and consumes more power
- ✓ Steam condensate and powder plant Condensate recovery from dairy plant and use it as boiler feed water. This concept is implemented at Banas Dairy, Amul Dairy and Sumul Dairy.
- ✓ Use of RO treated water for Boiler and other processes which reduces blow down operation and reduce scaling in boiler.
- ✓ Use of Duel burner in a boiler can provide choice to use cost effective fuel to generate steam.
- ✓ New concepts like Electricity trading that will reduce per unit cost.
- ✓ Installation of soft starter, which reduces the initial load and prevents initial shock to the motor and gear. Approximately Rs. 15000/- to Rs. 50000/- per annum, per equipment is saved by virtue of energy saving. The exact amount of energy saved depends upon the loading conditions.
- ✓ Installation of variable frequency drive saves electricity consumption.

- ✓ Use of Dry type transformer, instead of oil cooled transformer. Dry type transformers consume 50% lesser power than that of oil type transformer.

<b>(Dry type transformer)</b>		
<b>Losses per hour</b>		
<b>KVA</b>	<b>Half Load (W)</b>	<b>Full Load (W)</b>
500	2465	4930
750	3950	7900
1000	4360	8720
1500	6940	13880
2000	8155	16310

<b>Oil type Transformer</b>		
<b>Losses per hour</b>		
<b>KVA</b>	<b>Half Load (W)</b>	<b>Full Load (W)</b>
500	5000	10000
750	7500	15000
1000	8200	16400
1500	11250	22500
2000	13200	26400

- ✓ Use of evaporating condenser instead of conventional shell & tube type condenser saves energy.

Particulars	Shell and tube type condenser	Evaporating condenser
No. of condenser (EA)	5	5
Capacity	456 TR/EA	456 TR/EA
Actual Power Consumption	373 kw/hr	142 kw/hr
Replacement of shell & tube condenser with capacity of evaporating condenser saving : 231 kw/hr		

- ✓ Use of Heat recovery unit in BMCU or Refrigeration unit can generate hot water for Cleaning of BMCU; Participants have seen this in IDMC unit.
- ✓ Proper insulation of utility lines to prevent heat loss.
- ✓ To increase boiler efficiency, Flue gas temperature should be optimum, the air supplied to the furnace should be optimized and Feed water temperature should be high.
- ✓ Boiler may be provided with accessories like Air Pre heater, Economizer and Super heater to increase the boiler efficiency.
- ✓ Some of useful information for improve the boiler efficiency
  - About 5% improvement in excess air that will attained, the fuel saving will be 1%.
  - Every 21 C rise in combustion air temperature in air heater result in 1% fuel saving
  - Boiler efficiency increased by 1 % for every 22 C reduction in stack temperature.



### 1.3 Waste Management in Dairy

- ✓ Use of Methane Gas generated during Effluent treatment it can be used in various heating application such as Amul is planning to use it in Mogar Food complex (chocolate and other food product manufacturing unit). This project is in progress at Amul, Banas and Vidya Dairy.
- ✓ Use of treated effluent for pre rinsing of crates coming from the market in Vidya Dairy
- ✓ Reduce the load on Effluent Treatment Plant by reducing product wastage; reduce water consumption, preventing oil spillage and optimum use of chemicals.
- ✓ Zero discharge plant by using treated water in gardening in dairy plant in Khatraj cheese plant Amul and Banas Dairy, Vidya dairy.
- ✓ Detailed Effluent treatment plant visit at Vidya dairy, discussion about pollution control board standard, chemical analysis such as COD and BOD, test for raw and treated effluent.

### 1.4 Automation in dairy industry

- ✓ Benefits of automation are addressed during classroom session of Advances in automation in the dairy industry. Major Benefits of automation are listed below.
  - Improved consistency, of processes or product.
  - Improved quality or increased predictability of quality.
  - Reduced direct human labor costs and expenses
  - Automation Increased productivity.
- ✓ Dairy plant having capacity of more than one LLPD can go for Automation. For higher capacity dairy plant Automation is very useful for precise control of the processes.
- ✓ Visit of Automatic plant like Banas Dairy 100 TPD powder plant, Banas 2 &3 plants, Amul cheese plant and paneer plant khatraj, Amul Dairy Anand.

### 1.5 Total Quality Management and Total Productive Maintenance

- ✓ In Total Productive Maintenance concept, person who is working on that machine should be responsible for maintenance of the machine. Create a feeling of ownership among employee (operator). This concept will minimize breakdown. Regular preventive maintenance can reduce breakdowns and ensures continuous functioning of equipment.
- ✓ Use of standard deviation for minimizing process loss. Minimize standard deviation in packing machine and product standardization, minimization in variation will improve the profit of the organization.
- ✓ PDCA- Plan, Do, Check, Act for process implementation and improvement. In this cycle planning is most important part as proper planning will make the successful execution of the project.



- ✓ Total Quality Management tools for continual improvement of dairy co-operatives that includes total employee involvement, total waste elimination and total quality control
- ✓ Introduction of KAIZEN for continual improvement, small improvement of individual employee turns into a large benefit to the organization. An operator working on the machine knows about it in detail and he can make improvements that will make it more efficient and increase productivity.
- ✓ Estimating Fat & SNF Losses & its implication in dairy control of losses as fat is costliest component.
- ✓ Management Information summary for optimum utilization of resources and will be useful in decision making.

## **2. Product and process Development**

- ✓ 4 days practical session conducted at a Vidya dairy in that following section are covered. Participants gone through Good Manufacturing practices, Good hygiene practices, good laboratory practices and implement it in their plant.
  - Process, CIP, Automation & Instrumentation
  - Milk packaging , Dispatch & Marketing , Butter & ghee
  - Ice- cream
  - Cheese
  - Fermented Milk Products
  - Quality assurance
- ✓ In classroom session faculty given idea about increase yield of product and functionality. Some of the key points are listed here such as use of enzyme like transglutaminase for improving yield and texture of cheese, use of buffalo milk for mozzarella cheese to improve functionality, use of ultra-filtration (U.F.) technology for improving yield of cheeses.
- ✓ Also parameter like recipe modification, process modification, equipment development and proper packaging will increase shelf life for the products. Canned technology has extended the shelf life of rasogolla up to 12 months.

## **3. Food-safety quality and regulatory environment**

Food safety and Quality is going to be a major concern for the dairy industry as milk is perishable in nature and a good source of nutrition in veg. dominated Indian society. Contamination may lead major health outbreak therefore assuring best quality milk supply to Indian consumer is the prime mandate to Indian dairy cooperative. During interaction with participants **Chairman NDDB stated that "Providing best quality milk to Indian consumer should be USP of dairy cooperative"**



- ✓ Food Safety and Standards Act (2006) a food law that introduce in India to give hygienic and safe food to consumer, and it is applicable to all food item manufacturers, packers, storage, distributor, importer, and retailer.
- ✓ FSSAI Act have incorporated some new features such as Regulation of food imported in the country, Provision for recall of unsafe food , Surveillance (Residue levels in food; epidemiological) , Establish large network of food testing laboratories ,Harmonization of domestic food standards with international food standards ,Covering health food, supplements and nutraceuticals ,Provision of Improvement Notices to food businesses ,Compensation to consumers for any injury, death etc.
- ✓ Registration and licensing procedure for small, medium and large food business operator.
- ✓ Improvement in Quality of milk and milk products by applying hazard analysis and critical control point, hazard elimination in supply chain from cow to consumer.
- ✓ Improving personnel and plant hygiene.
- ✓ Implementation of food safety management system.
- ✓ Codex standard for Milk and milk products may help in exporting milk and milk products to the international markets. This is also important and FSSAI standards in future may be at par with Codex standards.
- ✓ Effective cleaning of Equipment, pipes, tanker. Method of cleaning In Place and COP.
- ✓ Validation of cleaning processes, advance techniques such as rapid bioluminescence test is the one of the most desirable measures to check cleaning efficiency.
- ✓ Improve raw milk quality with installation of the BMCU and Maintaining SOP at Village dairy co-operative society.
- ✓ Incentive to be given to society on the basis of Quality of milk based on Microbial count.
- ✓ Frequent check to prevent adulteration. Amul Dairy has mobile laboratory van that keeps check on adulteration and this van visits randomly to DCS.

#### **4. Financial and physical performance analysis of dairy cooperative industry**

- ✓ Finance for Dairy plant personnel in this session basics of double entry bookkeeping system explained.
- ✓ Working capital management to manage the firm's current assets and liabilities in such a way that a satisfactory level of working capital is maintained. It covered net working capital and gross working capital, three alternative working capital investment policies conservative, moderate, aggressive.
- ✓ Understanding balance sheet of Dairy will help in providing clarity in the financial condition of dairy. In addition to this, it will also provide information about assets, liability and price returned to the farmers. It was also shared that some of the successful milk unions returning 85% of price realisation to the farmers.
- ✓ Calculating breakeven point, Return on Investment, Present and Future value will help the management to decide on project viability.



- ✓ Capital budgeting, working capital & milk pricing will provide insights on product cost and fixing the selling price.
- ✓ Dairy Costing that includes Capital cost, fixed cost, variable cost calculation. Right costing reflects and provide justification for the profitability.
- ✓ The Payback period of an investment project tells us number of years required to recover our initial cash investment based on the project's expected cash flows. The decision for inducting any equipment, product or processes should be based on payback period as any changes have financial implications.
- ✓ Induction of any equipment or project should be based on cost and payback period so that viability and sustainability is enhanced.

## **5. Human resource development**

- ✓ Identifying complimentary skills of each individual in the teams and utilize it for achieving the organization objective is always beneficial to achieve desired results.
- ✓ Conflict management at the workplace is an essential component for getting significant results.
- ✓ Knowledge & skill up gradation is a continuous process and is required for each employee working.
- ✓ Win-Win approach and Co-operation among team member is of utmost importance for achieving sustainable growth of the institution, this was explained by the exercise of envelope making and Rabbit and Rat exercise.

### **Re-entry Plan of Participants:**

On 20<sup>th</sup> March the last day of programme participants has presented key learning's during Dairy Plant Management training programme and re-entry plan for their respective plant with an action plan.

To share improvement or problem at different dairy plant WhatsApp and Facebook Group is created with web based social media site.

Information about Dairy Knowledge portal <http://www.dairyknowledge.in/> shared with Participants for knowledge up gradation and discuss the issue related to co-operative dairy industry.



## Action Points by Participants:

Sr. No	Improvement that Participants want to apply at respective plant#	No. of participants	Name of Milk Union
1	R.O. plant should be introduced - to raise the efficiency of refrigeration system and boiler. the rejection water of R.O. plant may be utilized for crate washing and many other cleaning purposes	5	Ambattur Dairy, Sholingannlur Dairy, Villupuram Union, Dharmapuri Union
2	A prechiller should be introduced before IBT (Ice Bank Tank) to reduce the compressor load, which will give better efficiency of refrigeration system.	5	Ambattur Dairy, Sholingannlur Dairy, Villupuram Union, Dharmapuri Union, Barauni Dairy
3	VFD (variable frequency drive) for pumps should be introduced, where high "load fluctuation" arises, hence electrical energy will be saved drastically, Use of VFD in compressor motor	8	Ambattur Dairy , Sholingannlur Dairy, Villupuram Union, Dharmapuri Union, Malabar MU, Barauni Dairy, Kishan MU
4	Automated "power factor controller" should be introduced to achieve full efficiency of all electrical devices.	7	Ambattur Dairy, Sholingannlur Dairy, Villupuram Union, Dharmapuri Union, Barauni Dairy, Vikramshila MU, Kishan MU
5	Provide sand filters in ETP treated water and utilize it for pre rinsing of crates.	4	Ambattur Dairy, Ichhamati MU, Katraj Dairy, Vikramshila MU
6	Construct separate receiving doc for raw milk reception	1	Sholingannlur Dairy
7	Install Rotary spray balls in ice cream mix tank for efficient cleaning.	1	Malabar MU
8	Mobile CIP system for ICF (Ice Cream Freezer) for More Effective Flushing, Less Water Usage, Saves Time and Optimum Time +Temp.	1	Malabar MU
9	Rubber ring for Hose pipe at RMRD, it will increase the life span of hose pipe and prevent leakages.	2	Malabar MU
10	Ghee production by Pre-stratification method.	1	Malabar MU
11	Flow meter to be fixed in water , steam lines and energy meter in section wise to find out the actual consumption of water, steam and electrical energy.	5	Villupuram Union, Dharmapuri Union, Malabar MU, Sangamner MU, Jharkhand Milk Federation
12	Reducing the pasteurizing temperature from 76 °c to 74°c, hence furnace oil could	1	Trichur Dairy Ernakulam



	be saved.		
13	CIP only with lye and acid change in CIP combination after the of study of effectiveness , avoiding second lye, hence savings of chemical, time and energy (alkali-acid-hot water)	4	Trichur Dairy Ernakulam Malabar MU
14	Replacing compressed air pack machines with mechanical type - saves energy. Purchasing of high speed packing machine saves-space, time and energy.	2	Trichur Dairy Ernakulam, Kishan MU
15	Introduce new packing variant of curd in 50 Gm cup	1	Malabar MU
16	Reducing the concentration of chemicals in CIP from 1% to .7% - saves chemicals, Reduce load on ETP.	1	Trichur Dairy Ernakulam
17	Nonconductive coating for compressor head to prevent energy losses	1	Malabar MU
18	Improve hospitality for visitors to improve goodwill of organization among visitor. It will also help in market promotion.	1	Malabar MU
19	Soft starter shall be provide for high HP motors and long running motors which will prevent initial jerk to motor and other adjoining component	3	Malabar MU, Barauni Dairy
20	To improve the raw milk quality, with respect of MBRT/bacteria load incentive shall be given to BMCS (DCS)	1	Malabar MU
21	Conveyer installation for loading trays (crates) for higher capacity vehicle	1	Malabar MU
22	Install sight glass in milk pipeline to avoid water mixing during flushing	1	Malabar MU
23	Installation of capacitor bank for power factor control	1	Barauni Dairy
24	Implementation of 5's & kaizen, TQM at our plant for continual improvement.	4	Barauni Dairy, Jharkhand Milk Federation, Vikramshila MU, Katraj Dairy
25	Process modification in refrigeration plant to get chill water at low temperature. Installation of prechiller before IBT and ice limit switch in IBT	3	Barauni Dairy, Trichur Dairy, Ernakulam, Katraj Dairy
26	Training at chilling sector about BMCU operation and it's maintenance	1	Ichhamati MU
27	Create awareness about Clean milk Production at society and BMC level	1	Katraj Dairy
28	Increase shelf-life of paneer by improving Quality and certain process modifications.	1	Ichhamati MU
29	Improve plant and personnel hygiene practices for milk & milk products at Dairy plant	2	Ichhamati MU,WAMUL Assam
30	To stop steam leakage and other utility leakages. start condensate recovery from steam trap and use it as boiler feed water	3	Banas Dairy, Vikramshila MU, Kishan MU



	or other application		
31	Minimize use of water as much as possible by this we can reduce load on ETP and conserve energy as well as natural resources.	2	Banas Dairy
32	Maximum utilization of machine and man power to reduce the production cost.	1	Banas Dairy
33	Continuous watch on packing machine data and analysis the data to improve the machine performance, reduce losses by controlling excess weight and controlling weight as per standard.	1	Banas Dairy
34	Hygiene station installation for improve personnel Hygiene, hand washing and sanitization.	1	Banas Dairy
35	Power generation by steam turbine using at steam PRS station.	1	Banas Dairy
36	Coating of Di-electric paint in place of rubber mats in MCC and PCC room to improve the safety of plant personnel.	2	Banas Dairy, Vidya Dairy
37	Collection of methane gas generated during effluent treatment from ETP plant and use in canteen, heating of boiler feed water & other application.	3	Banas Dairy, Sangamner MU
38	Start steam trading and find out other ways to get low cost steam	1	Banas Dairy
39	Heat Recovery System for cluster BMC units that generate Hot water for general purpose cleaning without incurring heating cost	1	Maahi Milk Producer Company
40	Standard Deviation in PPM Reducing standard deviation by tightening over standardization and overweight	6	Banas Dairy, Maahi Milk Producer Company, Katraj Dairy, Kishan MU, WAMUL Assam, Sangamner MU, Jharkhand Milk Federation
41	Water Conservation- energy flow meters, Hose guns, reducing wash points etc. To Reduce milk to water ratio thereby reducing overall energy costs(1:1.6 at present)	3	Maahi Milk Producer Company, Katraj Dairy, Sangamner MU
42	Utilize heat of condensing unit in Incubation room (Heat pump)	4	Malabar MU, Maahi Milk Producer Company, Katraj Dairy
43	CIP system for tanker cleaning instead of manual cleaning	1	Maahi Milk Producer Company
44	Convert diesel fired boiler to Furnace oil to minimize steam production cost	1	Kishan MU
45	Install water softening plant	1	Kishan MU
46	Install Desuperheater	2	WAMUL Assam, Ichhamati MU
47	Installation of turbo blender in process section	1	Sangamner MU
48	Controlled environment for Paneer	1	Sangamner MU



	packing room		
49	Install metal detector cum x-ray machine for product inspection	1	Sangamner MU
50	Inventory management by Classification of store material	2	Katraj Dairy, Jharkhand Milk Federation
51	Procurement of infrared thermometer for measurement of temperature instantaneously and areas where it is difficult to reach.	1	Vidya Dairy
52	Application of special paint on Ammonia Receiver and Hydro tank to enhance safety	1	Vidya Dairy
53	Step by step replacement of CFL with LED lighting for energy savings	1	Vidya Dairy
54	Installation of automatic controller for chilled water pumps for energy savings	1	Vidya Dairy

# Participants re-entry plan would be implemented till June 2015 and two days workshop will be organized in July to discuss improvement carried out at respective dairy plant.

### **Group Photo:**



## **National Dairy Development Board, Anand.**

**Dairy Plant Management Programme**  
February 16 - 20 March 2015



**“Hon. Chairman, Executive Director NDDB and faculty of DPM with participants”**



**List of Participants:**

<b>Sr. No</b>	<b>Name</b>	<b>Designation</b>	<b>Milk Union</b>
1	Mr. Mathew Vergheese	Manager	MCP, Nilambur Malabar Milk Union, Kerala
2	Mr. Anil Kumar	Technical Officer	Kozikode Dairy Malabar Milk Union, Kerala
3	Mr. Arun M	Manager	MCP, Pattambi Malabar Milk Union, Kerala
4	Mr. Nisar Bava	Technical Suptd.	Malabar Milk Union, Kerala
5	Mr. K K Sreekantha	Asst. Manager	Ernakulum MU, Kerala
6	Mr. Ashok Kumar Biswas	Dy. Manager DT	Ichhamati MU, WB
7	Mr. Kishalay Hazra	Technical Officer	The Kishan Co-operative Milk Producers' Union Ltd, WB
8	Mr. Pranoy Sarkar	Dairy Technologist	WAMUL Purbi Dairy , Assam
9	Mr. Rajiv Kumar Gupta	Asst. Manager	Barauni Dairy, Bihar
10	Mr. Bipin Kumar	Asst manager	Vikramshila MU, Bihar
11	Mr. Ravindra Kumar	Manager-plant	Jharkhand Milk Federation
12	Mr. Pratik M Patel	Asst. Manager QA	Maahi Milk producer company , Gujarat
13	Mr. Ajay Jala	Asst. Manager	Vidya Dairy, Gujarat
14	Mr Dilip V Patel	Asst. Executive	Banas Dairy, Gujarat
15	Mr. Kamlesh Patel	Jr. Executive	Banas Dairy, Gujarat
16	Mr. S. Saravana Kumar	Manager (Dg.)	Ambattur Dairy, TN
17	Mr. A Durairaj Devapriyam	Manager (Dg.)	Sholinganallur Dairy, TN
18	Mr. N Deivanayagam	Jr. Manager Engg	Product Dairy, Ambattur, TN
19	Mr. T. Shridhararaju	spl.Gr. Dy. Mgr(Dg)	Dharmapuri MU, TN
20	Mr. K. Sivakumar	Manager (Dg.)	Villapuram MU, TN
21	Mr. Jaideep Naik	Dairy Technologist	Katraj Dairy, Pune Maharashtra
22	Ms. Sujata	Dairy Technologist	Katraj Dairy, Pune Maharashtra
23	Mr. Rahul Nikam	Technical Officer	Sangamner MU, Maharastra
24	Mr. Pravin Bochare	Technical Officer	Sangamner MU, Maharastra

**Indicative Schedule**  
**Dairy Plant Management Programme**  
**February 16 – March 20, 2015**

<b>Participants</b> : Dairy plant professionals from Kerala, Tamil Nadu, Maharashtra, West Bengal, Gujarat, Jharkhand, Assam and Bihar state cooperative milk unions	<b>Venue</b> : Newly constructed MPD Seminar room, Class room-5
<b>No. of participants:</b> 24	<b>Programme No:</b> HRD-CTD/Reg/Exe/30
<b>Training Coordinator</b> : Shri Dushyant J Desai	<b>Duration</b> : 16 Feb-20 March 2015

**Indicative Schedule**

Date	10:00 - 11:30	12:00 - 13:30	14:30 - 16:00	16:30 - 18:00
16-2	Registration (9:30-10.00) Inauguration (10.00-10:30) (Chairman/MD/ED)	Ice Breaking Exercise & overview of Dairy Plant Management Programme (HB & AKG)	Participants expectations (AKG & HB)	Future scenario of dairy industry (Dr. K Rathnam)
17-2	Estimating Fat & SNF Losses & its implication in dairy (Niraj Garg)	Reducing operational losses (materials, FAT & SNF-through packing losses) (HB)	Win-Win approaches (zero sum game) (HB)	Achieving excellence in dairy sector. ( S N Singhal)
18-2	Food Safety quality along with appreciation of dairy microbiology (Narinder Sharma)	Milk drying operations (SS Hardaha)	Energy conservation measures in milk powder production (SS Hardaha)	Equipment cleaning & CIP including piping & tanker (Gokul Krishna)
19-2	An overview of engineering in Dairy industry- Electrical (Shashi Kumar)	Overcoming civil work related issues in dairying (Mayur Vyas)	Food Safety quality and regulatory environment (Sunil Bakshi)	Food Safety quality and regulatory environment (Sunil Bakshi)
20-2	Product Process Development at Vidya Dairy (Day-1)			
21-2	Product Process Development at Vidya Dairy (Day-2)			
22-2	Holiday			
23-2	Reflection-1 (HB & AKG)	Reflection-2 (HB & AKG)	Reducing operational losses on account of excessive human efforts (HB)	Importance of operations, people to remain competitive & relevant (ED, NDDB)
24-2	Advancement in automation in dairy industry an Over view (S Talukdar)	Advancement in process technologies and product development in dairy industry (Shyam Bhatnagar)	Advancement in product & processes in dairy industry (Gaurav Parekh)	Advancement in product & processes in dairy industry (Gaurav Parekh)



25-2	Equipment Operation and Maintenance with specific work plan Process flow chart, production bottleneck & equipment balancing(Day-1) at Khatraj Cheese Plant			
26-2	MIS for plant operations (Niraj Garg)	Advancement in automation in dairy industry (Siemens Baroda)	Quality Management-SGA, PDCA, Kaizen (HB)	Parikrama visit
27-2	Energy Management at Amul Dairy, Anand (Day-1)			
28-2	Equipment Operation and Maintenance (Day-2) at Banas Dairy & interaction with Shri Sanjay Karamchandani & Dr PR Vaghela			
1-3	Holiday			
2-3	Reflection-3 (HB & AKG)	Reflection-4 (HB & AKG)	Concept of overall equipment effectiveness (HB)	Energy conservation & management (S D Jaisinghani)
3-3	NDP movie & 5S: A tool for self-development (Subhanwesa/Dushyant)	BMC operation & maintenance (Ankit Gupta)	IDMC visit	IDMC visit
4-3	Equipment Operation and Maintenance specific work plan Process flow chart, production bottleneck & equipment balancing (Day-3) at Amul Chocolate Plant			
5-3	Energy Management at Sumul Dairy, Surat (observing energy, water & waste mgt. process flow & ways for balancing the production flow)(Day-2) Sustainable dairy operations (Jayesh bhai Desai, Sumul)			
6-3	Holi			
7-3	Holiday (sessions were conducted on 15 <sup>th</sup> March)			
8-3	Holiday			
9-3	Reflection-5 (HB & AKG)	Reflection-6 (HB & AKG)	Advancement in automation in dairy industry (Aditya Vyas Rockwell, Automation)	Automatic continuous butter systems, cold concentration & BMC modules (Raj Malik)
10-3	Communication for effective management (HB)	Communication for effective management (HB)	Inventory Management (HB)	Inventory Management (HB)
11-3	Project Management (HB)	Project Management (HB)	Utilities Management: Power & Fuel (Amit Vyas)	Overcoming problems that can impact sustainability of a dairy (MC Vyas)
12-3	Utilities Management: Water/Steam (Amit Vyas)	Utilities Management: Refrigeration & compressed air (Amit Vyas)	Dairy plant operations in competitive environment (HK Desai)	Managing Dairy efficiently (MN Bhatt)
13-3	Product Process Development at Vidya Dairy (Day-3)			



14-3	Product Process Development at Vidya Dairy (Day-4)			
15-3	Problem identification & solving(HB)	Quality Management-Shwet Ganga dairy case study (HB)	Quality Management-Continuous improvement (HB)	Deming's Red Beads Experiment (HB)
16-3	Leadership & managing teams (SNB)	Leadership & managing teams (SNB)	Human Resource Development- need of conflict management (SNB)	Human Resource Development- need of knowledge & skill up gradation (SNB)
17-3	Reflection-7 (HB & AKG)	Reflection-8 (HB & AKG)	Total Productive Maintenance (Amit Vyas)	Technological Advancement in Dairy Industry-(Rajesh Golani, GEA)
18-3	Understanding Dairy Balance sheet & P&L account (MC Shah)	Finance for non-finance (Dairy Financing) management (MC Shah)	Capital budgeting, working capital & milk pricing (MC Shah)	Dairy Costing (MC Shah)
19-3	Steven Covey's 7 habits for personal & organisational development (HB)	Steven Covey's 7 habits for personal & organisational development with emphasis on time management(HB)	Product & Process R&D (Aditya Jain)	Global opportunity for Indian dairy sector( Jayen Maheta)
20-3	Work-life balance (HB)	Re-entry Plan (HB & AKG)	Re-entry Plan (HB & AKG)	Valedictory & Closing (Chairman & ED)



"Participants of DPM during classroom session"



**List of Faculty:**

1. HB: Prof. Hitesh Bhatt, IRMA
2. SNB: Prof. S N Biswas, IRMA
3. Shri Jayen Maheta, GM GCMMF
4. Dr. K. Rathnam MD, Kaira milk union
5. Shri Jayesh Bhai Desai, MD SUMUL
6. Dr. H K Desai , Kaira milk union
7. Shri Amit Vyas , Kaira milk union
8. Shri Gokul Krishna, , Kaira milk union
9. Shri Sangram Chaudhary, ED NDDB
10. Shri S N Singhal, NDDB
11. Shri Sunil Bakshi, NDDB
12. Shri Shashi Kumar, NDDB
13. Shri Narinder Sharma, NDDB
14. Shri M C Shah, NDDB
15. Shri S S Hardaha, NDDB
16. Shri Niraj Garg NDDB
17. Shri Ashok Kumar Gupta, NDDB
18. Shri Subrata Talukdar, NDDB
19. Shri S D Jaisinghani, NDDB
20. Shri Aditya Jain, NDDB
21. Shri Subhanvesha Mahapatra, NDDB
22. Shri Dushyant Desai, NDDB(Training Coordinator)
23. Shri M C Vyas, Ex MD Uttam Dairy
24. Shri Mayur Vyas, Ex MD Sabar Dairy
25. Shri Mahesh M Bhatt
26. Shri Raj kumar Malik, IDMC.
27. Shri Ankit Gupta, IDMC.
28. Shri Shyam Bhatnagar Tetrapack, Vadodara
29. Shri Mahesh Parkhi & Team, Siemens
30. Shri Aditya Vyas & Team, Rockwell Automation
31. Shri Rajesh T Golani & Team, GEA.
32. Shri Gaurav Parekh, Gaurav Dairy, Bhavnagar

**Participants Feedback:**

<b>FEEDBACK SUMMARY</b>								
	<b>Particulars</b>	<b>Excellent</b>	<b>Very Good</b>	<b>Good</b>	<b>Avg.</b>	<b>Total</b>	<b>Total Weightage</b>	<b>Weighted Average</b>
		<b>[4]</b>	<b>[3]</b>	<b>[2]</b>	<b>[1]</b>			
1	<b>Use and relevance of the training for you</b>	20	4			24	92	<b>3.83</b>
2	<b>Programme design</b>							
a)	Extent of coverage	14	8	1		23	82	<b>3.57</b>
b)	Conceptual framework	12	10	1		23	80	<b>3.48</b>
c)	Duration of the training programme	10	6	6	1	23	71	<b>3.09</b>
d)	Correlation of my time spent with the learning I had	15	6			21	78	<b>3.71</b>
e)	Orientation of programme	17	5	1		23	85	<b>3.70</b>
f)	Reading material	12	7	5		24	79	<b>3.29</b>
3	<b>Support Services:</b>							
	Boarding	14	8	1		23	82	<b>3.57</b>
	Lodging	13	7	3		23	79	<b>3.43</b>
4	<b>Overall Rating</b>	<b>16</b>	<b>7</b>			<b>23</b>	<b>85</b>	<b>3.70</b>

**Participants Remarks /Suggestion for improvement:**

- Participation of SMC College of dairy science for new innovation in industry and State of Art testing equipment.
- Provide ID cards for long term training programme.
- Overall good exposure from the visits and lectures, however extend visit especially at big plants like Amul and Banas.
- Total Productive Maintenance, session is Excellent could have been prolonged.



**Dairy Plant Management Training Programme actual cost**

**16-02-2015 To 20-03-2015**

<b>Sr. No.</b>	<b>Particular</b>	<b>Rs (INR)</b>
1	Tuition fees of NDDB (300 rs per participant per Day)	237600
2	IRMA charges	337080
3	Training fees for conducting training at Vidya Dairy (4 Days)	37753
4	Honorarium & Transportation of faculty	10800
	<b>Training cost</b>	<b>6,23,233</b>
5	Lodging charges (160 rs per participant per Day)	126720
6	Boarding Bill	166545
7	Expenses during plant exposure visit	8434
8	Dinner for DPM participants & faculty	8647
	<b>Lodging and Boarding cost</b>	<b>3,10,346</b>
9	Training Kit	12000
10	Miscellaneous Training expenses	2631
	<b>Stationary &amp; Miscellaneous cost</b>	<b>14,631</b>
11	Travelling expense of participants to Khatraj Amul, Banas Dairy, Sumul Dairy.	35915
	<b>Travelling cost</b>	<b>35,915</b>
	<b>Total Cost</b>	<b>9,84,125</b>
	<b>Training cost per Participant @ 33 Days (24 participant)</b>	<b>41005</b>
	<b>Training cost per Participant per Day (24 participant)</b>	<b>1243</b>

## Annexure-VI

### **Mail Received From Malabar Milk union regarding implementation of learning After Dairy Plant Management Training at NDDB.**

**From:** AM Production [mailto:kkd.prd@malabarmilma.coop]

**Sent:** 30 April 2015 16:04

**To:** hiteshbhatt@gmail.com; Ashok Kumar Gupta; Dushyant J Desai

**Cc:** kkd.ice@malabarmilma.coop; MCP Pattambi; kgd.prd@malabarmilma.coop

**Subject:** FW: suggestions given by production officers after NDDB training & Dairy visit

Sir

Our presentation has done in the front of MD, Senior officials and Dairy Managers of MRCMPU ltd on 28/04/2015.

Appended mail for your information and guidance

Thanks once again to NDDB and Bhatt Sir

Mathew Varghese

Anil Kumar IS

Arun.P

Nizar Bava

DMM students

**From:** SM kozhikode dairy [mailto:vijayakumaran@malabarmilma.coop]

**Sent:** Thursday, April 30, 2015 1:55 PM

**To:** 'VN Kesavan-Senior Manager(P&M)'; 'SM P&P HO'; 'kkd engg 2'

**Cc:** 'PROD. Section, KKD Dairy'; kkd.ice@malabarmilma.coop;

kkd.eng@malabarmilma.coop

**Subject:** RE: suggestions given by production officers after NDDB training & Dairy visits

Dear all

Good suggestion. Some of my observations noted. WE shall do many a things with .

1. Supplier to be tracked by mathew / Anil for teflon rings, Strip curtains, rotating CIP, Cream chiller etc
2. Hydro flow system: deputing Mr.Ramchandran to Cochin on May 2. AM engg HO shall also join to have a study / design of the system

Details below

Sm kkd

1. No alkali cleaning required after acid cleaning of lines, silos and tanks : **To be discussed with Pdn & QC officers to implement is plant – Educating the operators.**
2. Facility to chill cream up to 10 deg.C (possibility to chill cream using incoming chilled milk) : **Good. But, Our cream is approx 70 % fat chilling in PHE may not be easy as 40 %.**
3. Machinery layout to be prepared first. The Drainage layout is to be prepared based on the machinery layout. The amul traps should be located exactly above below the drainage points of equipment: **OK**



4. Floors should have sufficient slop towards drains. Floors to be maintained dry. :  
**to be addressed in GHP/ ISO**
5. Rotating devise should be provided inside silos to ensure effective cleaning :  
**Supplier to be tracked by mathew / Anil**
6. Refrigeration suction lines to be insulated : **Done, it is something related to painting Hammertone**
7. Hoppers (Funnel shaped) to be provided below valves in front of silos and tanks to direct any leakage / spillage to amul traps : **to be addressed in GHP/ ISO**
8. Di electric paints to be provided in front of Electric panels instead of rubbers sheets : Good **Supplier to be tracked though / by mathew / Anil**
9. Water flow meter for pasteuriser and pre heaters: **Required in RC also, earlier KD dairy had it**
10. Photo sensors for pouch filling machines: **Tried in butter milk at PKD, KKD have 2 nos**
11. High speed machines(10000 packets /hr) with belt conveyor up to cold store should be provided: **KKD provided bgt. New dairies shall have TU to be discussed**
12. Level transmitters for silo and tanks(SCADA): **To be discussed in detail**
13. Rejected heat from the condenser to be utilised: **Depends on proximity of machines of refr and incubation area**
13. Auto de sledging separator should be considered to save time and energy: Good depends of capacity of dairy
14. Soft starter and VFDs for motors: **implemented in possible areas**
15. Hydro flow system to ensure availability of water at constant pressure at points: **WE are on the process of the system for Chilled water at KKD. Fabrication at EKM. Financially supported by EMC. Inspection / discussion required at supplier site on Saturday 2/5/2015.**
16. Steam availability should be ensured at all points (example CIP and ghee ): **To be covered in system design. High pr equipments near to Boiler eg. Ghee CIP etc**
17. Steam condensate to be utilised as boiler feed water in the beginning itself: some works done at CPD & plkd
18. Teflon rings to be provided on milk hoses to prevent damage: **Supplier to be tracked by mathew / Anil**
19. View glass to be provided on milk lines: **Supplier to be tracked by mathew / Anil**
20. Flow meters should be provided on all section wise steam, water, electricity ,air lines for measurement : **we have in electricity, instrumentation to be covered fully.**

**From:** VN Kesavan-Senior Manager(P&M) [mailto:vnkesavan@malabarmilma.coop]

**Sent:** 29 April 2015 16:00

**To:** 'jim@milma.co.in'

**Cc:** 'Babu pv'; 'SDK ENG'; 'The Managing Director,MRCMPU Ltd., Kozhikode'; Premanandan DE-HO

**Subject:** suggestions given by production officers after NDDDB training & Dairy visits

Sir,

The following are the suggestions put forward by Production officers (Mr. Mathew, Mr. Anil, Mr. Arun and Mr. Nisar bava )of MRCMPU after their 6 weeks Gujarat dairy visits and training under NDDDB recently. They suggest to implement the same in the new dairy plants. Idea is to reduce wastage and make accountability for wastage.

- No alkali cleaning required after acid cleaning of lines, silos and tanks
- Facility to chill cream up to 10 deg.C (possibility to chill cream using incoming chilled milk)
- Machinery layout to be prepared first. The Drainage layout is to be prepared based on the machinery layout. The amul traps should be located exactly above below the drainage points of equipment
- Floors should have sufficient slop towards drains. Floors to be maintained dry.
- Rotating devise should be provided inside silos to ensure effective cleaning
- Refrigeration suction lines to be insulated
- Hoppers (Funnel shaped) to be provided below valves in front of silos and tanks to direct any leakage / spillage to amul traps
- Di electric paints to be provided in front of Electric panels instead of rubbers sheets
- Water flow meter for pasteuriser and pre heaters
- Photo sensors for pouch filling machines
- High speed machines(10000 packets /hr) with belt conveyor up to cold store should be provided
- Level transmitters for silo and tanks(SCADA)
- Rejected heat from the condenser to be utilised
  
- Auto de sledging separator should be considered to save time and energy
- Soft starter and VFDs for motors
- Hydro flow system to ensure availability of water at constant pressure at points
- Steam availability should be ensured at all points (example CIP and ghee )
- Steam condensate to be utilised as boiler feed water in the beginning itself
- Teflon rings to be provided on milk hoses to prevent damage
- View glass to be provided on milk lines
- Flow meters should be provided on all section wise steam, water , electricity ,air lines for measurement

Please go through the above for further discussions while deciding the equipment.

V.N.Kesavan

SM(Engg)