Introduction

Strengthening Infrastructure for Quality and Clean Milk Production (CMP), a centrally sponsored scheme, has been launched since October 2003 to promote clean milk production through multi stage intervention at household, DCS and Dairy levels. The scheme is being implemented by the States through the Milk Unions/Federations. Since launching 130 projects at a total cost of Rs 194.93 crore with a central share of Rs 159.08 crore have been approved up to 31.10.07. It covers 176 districts and 101 Milk Unions spread over twenty one states and one Union Territory. Several states and Unions have come forward with new projects for assistance under the scheme. However the benefits that accrued to the farming community and dairy cooperatives due to the implementation of the scheme is yet to be clearly understood. Therefore the GOI decided to have a comprehensive review of the scheme being implemented in the states and entrusted the task to Centre for Management Development (CMD), Thiruvananthapuram, Kerala. Six States – Karnataka, Maharashtra, Orissa, Rajasthan, UP and Mizoram – and eleven milk Unions from these states were sampled to represent the agro climatic zones in the country. The consultants from CMD traveled extensively in all the eleven districts/Taluks studying the scheme and meeting the major stake holders. The outcome of the study laid out in six sections; Introduction, Evaluation Objectives and Methodology, Planning and Implementation, Study Findings, Key Issues and Recommendations and Conclusion apart from an Executive Summary in the beginning, is presented in this document.

2. CMP Scheme : Situation Analysis

The major components of the scheme are training farmers on CMP procedures, creation of cooling facility for raw milk at villages, strengthening of labs (DCS and Dairies), distribution of cleaning materials and sanitizers to farmers, supply of SS milking pails and utensils to farmers, and planning and monitoring. Each of this component and their performance in selected states and milk Unions is briefly described below.

i. Training

Training of farmers is a key element of clean milk production. All IAs, except Bulandshahr Union, had achieved almost 100% of target. The information gathered through the household survey shows that the farmers are trained, theory and practical, on essential aspects of CMP. The training has induced changes in the mindset of farmers and there has been spread effect. Farmers have become hygiene conscious and can perceive direct and indirect benefits of clean milk production. The adequacy of practical training, however, on udder hygiene and milking is doubtful. The staffs in DCS and dairy labs, elected members of DCSs and Unions apart from farmers are also key players of CMP. The study identify that the absence of provision to train them is a major lacunae of the scheme. More details can be had from section 4.1 on training.

ii. Cooling Facility

One of the pre conditions for the success of CMP is quick and efficient cooling of raw milk to around 4oC and facilitate the maintenance of cold chain up to the processing point. This is best achieved through the creation of chilling facilities at the local collection points, DCS, itself and transporting the chilled milk in insulated trucks. There are
225 BMCs installed in 204 DCS spread across the study area. The BMCs installed are of capacities ranging from 500 to 5000 liters and most of them are functioning well. In eight out of eleven Unions studied, capacity utilization is between 60 and 100% or more. The concept of CMP has caught up well with the dairy farmers and cooperatives with the creation of chilling facilities at village DCS. The souring and spoilage of milk in village DCSs has virtually been reduced from 1.5% of collected milk to zero enabling better returns (for quantification see ‘Impact’ below). The other benefits of BMCs include higher flexibility in milk collection and dispatch timing directly benefiting dairy farmers and DCS, absence of milk holidays, put a stop to en-route pilferage of milk by transport crew, savings on transport of milk from collection points, savings on chilling apart from offering a risk free working environment in dairies and innumerable options for value addition and product manufacturing from clean and high quality milk. The quality assurance enables the dairies to program product manufacturing in advance. The system however is not without problems. The key issues encountered during our study include closing down /non commissioning of installed BMCs (five out of eleven IAs have defunct BMCs of varying numbers), lack of hygiene and cleanliness, absence of proper housing for BMCs, inadequacies in power and water supply, faulty site selection and insufficiency of marketable surplus of milk in the area. More details can be had from section 4.1.2 and 5.3

iii. Strengthening of Existing Labs

The emerging trends in dairy industry indicate that the microbial content in milk will be a crucial factor in the marketability of milk and milk products and therefore quality assurance at all levels is decisive. Realizing the importance of testing in quality assurance, the scheme has included strengthening of existing labs at DCS and dairies as an important component. However on completion of the projects the condition of the laboratories in several of DCS and dairies studied are not encouraging. Most of the DCS are yet to be equipped to carry out simple tests like MBRT. The system to screen milk samples of individual farmer is yet to be introduced (only one out of 91 DCS studied is doing this). Out of the seven labs in processing dairies studied, three are under equipped and poorly maintained (Bulandshahr, Sambalpur & Hassan). The skill and knowledge levels of lab personnel, leave alone their enthusiasm and commitment, are far from desired. Modernization of dairy labs and equipping the DCS labs to enable them to screen farmer’s samples needs to be taken up in right earnest in future programs. (for more details see chapter 4.1.6 and 5.4)

iv. Distribution of Cleaning Materials & Sanitizers

Six out of eleven Unions studied have the approval of GOI for this component. Eight Unions distributed cleaning and sanitizing materials to farmers (Baramati & MULCO Mizoram have no financial provision) as per their record. The study reveals that judicious distribution to eligible farmers and ensuring genuine use of cleaning materials/sanitizers is difficult and the impact of this component on clean milk production, udder hygiene and udder health is minimal. (for more details see section 4.1.3)

v. Distribution of SS milking pails and cans to farmers

The SS pails and vessels are distributed to farmers by all Unions except Sangamner to facilitate clean milk production. Different Unions have distributed different type of vessels ranging from bucket to cans of five liter capacity. The distributed vessels are found to be of good quality and extremely useful to farmers but for the smaller capacity. The farmers in
the entire study area demand for SS cans of ten liter capacity in the place of five liter cans. Both types of vessels are not supplied in adequate numbers (for more details see 4.1.4)

vi. Planning and Monitoring

The activities under planning and monitoring are limited to the purchase of laptops/PCs and accessories and meeting the fuel costs /telephone bills etc. It is unfortunate that the provision is not utilized for the real planning process while there is so much to be done under planning, evaluation and monitoring. Clear guideline from GOI is lacking on this and hence we suggest that all IAs shall be appraised to utilize the fund for conceptualization, planning, evaluation and monitoring. (for more details see section: 4.1.7 and 5.6)

vii. Utilization of Facilities created under CMP Scheme

BMCs are the biggest assets created under CMP scheme. The capacity utilization ranges from 19 to 100% or even more in few Unions. The utilization is good in all but two Unions (Bulandshahr & MULCO Mizoram). Yet some of the Unions, Baramati and Sangamner, have the potential to improve. Such Unions should be urged to exploit the unused potential before attempting to create additional facility. Among the other assets/facilities provided, farmer’s training, SS utensils and vessels to farmers and lab facilities at DCS are well utilized with few exceptions and is serving the purpose. Among the lab facilities created in Dairi 50% has to go a long way to achieve the goal. (for more details see section 4.2)

viii. Funding Pattern

The funds is routed to IAs through the state Govt and state Milk Federation or Dairy Development Department. It takes about five to six months for the funds to reach the IAs, it is learnt. The system lacks merit and causes inordinate delay. Because of the funding ratio of 75:25 (GOI:IA) for BMC and that the IAs have to raise equal or even more share to meet civil constructions and other amenities like electricity and water, the financially weak IAs find it hard to take up clean milk production ( more details section4.4).

ix. How to Improve (broad base) Scope of CMP Scheme

a. Marketing
The CMP is relatively a new program launched by GOI. The program has a crucial role in shaping the future of dairy development in the country. Wherever implemented (properly), the scheme delivers splendid results in quality improvement and takes dairy developments to new horizons. However because of the very focused goal, Clean Milk Production, the scheme is getting self limited and is not reaching out to the general public in large. To overcome this deficiency, clean milk production should aim at the organized dairy industry promoting clean milk production end to end: from the farm gate to the dairy plant and beyond to the consumer. This is not to say that what is being attempted through CMP is irrelevant to the dairy industry, but merely to emphasize that such minimalism would take the Indian Dairy industry nowhere in the world markets. To achieve the goal of CMP in full, the clean milk collected through the BMC should be processed separately, value added and marketed as premium milk and milk products fetching extra money for farmers, DCS and Unions. Therefore the CMP scheme should add Marketing as a priority component.
b. Sub clinical mastitis
Sub clinical mastitis among dairy cattle and buffalo is widespread in India resulting in production loss poor quality of milk. Only a healthy udder can produce clean milk. The ongoing CMP scheme has no program to address this issue. A comprehensive Mastitis Eradication Program should therefore be taken up hand in hand with the CMP program (More details can be had from 5.7)

c. Housing for BMC
As pointed out elsewhere the absence of standard buildings for BMC is a major constraint in the successful implementation of CMP scheme. In near future the focus of dairy development in the country is bound to change from mere milk production to safe milk production and this will call for expansion of the CMP several folds. Therefore a phased program to house the BMCs in buildings congenial to cleaning and hygiene may be initiated in right earnest so that the entire scheme area has own buildings for DCS/BMC in the next ten to fifteen years.

d. Water source Development
Along with the initiative for own building equally or even more important is to develop water sources in CMP adopted villages and BMC buildings. The villages having dairy farmers in sizable numbers may be helped to develop water source (open well, bore well) through loan and subsidy. The help of local bodies and other agencies could be sought for this purpose.

3 Impact of CMP Scheme

i. Milk quality
The analysis of household data reveals that there is marginal increase in Fat and SNF content due to the adoption of better management practices- feeding and milking – among households. MBRT has increased from 54 to 154 minutes and SPC declined from 310 to 60 lakhs CFU/ml. Coliform count, an indication of unsanitary production practices and/or mastitis infection, has also decreased from 4.36 lakhs to 0.45 CFU/ml. Those positive changes show that CMP has impacted the milk quality tremendously in such a short span of time. The quality improvement enables the Unions to deliver high quality milk with natural flavor and taste to the customers apart from offering a range of opportunities for value addition and product diversification. (more details 4.7.1)

ii. Adoption of CMP practices among households In comparison to the pre-project situation, the proportion of farmers adopting CMP practices is significantly higher after the implementation of CMP scheme. So also the number of farmers adopting clean milk practices is considerably higher among CMP villages than in control villages. These positive changes are the direct results of training and indirectly due to the BMCs functioning in villages. (more details can be found at 4.7.2) 3.3 Economic gains to Unions, DCS and farmers The study reveals that the Unions make savings on milk transport and chilling costs consequent to the implementation of CMP scheme. The estimated savings per liter of milk on transport works out to Rs 0.205 and on chilling Rs.0.17. The study also shows that only 15% of the milk collected in the study area is through BMCs. Even at the current rate of milk procurement, the Unions make a substantial annual profit of Rs.2.4 crores on transport and Rs.1.98 crores on chilling. Two out of eleven Unions studied, however, disagree to this finding and according to them there is no saving on chilling cost (more details in section 4.7.4). At DCS level, the loss on account of souring and spoilage is avoided. The estimated saving, 1.5% of 3.5 lakhs LPD collected through CMP priced at Rs.14/- per liter works out to Rs.2.46 crores per year. In addition, the tanker collection nets
significant gain by preventing malpractice and pilferage by truck operators during transit of milk from collection point to dairies. With the introduction of tanker collection, the investment on milk cans in DCSs is totally avoided and that in cluster DCS is reduced to half. As a result, the cleaning and sanitizing cost of milk cans is also reduced. The BMCs allow higher flexibility in collection, dispatch and daily operations in societies.

The farmers do not have direct monetary gains except for the incentives paid by DCS and marginal increase in payment due to the increase in fat and SNF content. However a host of indirect benefits like absence of milk holidays, flexibility in milking time, flexibility in supply time at DCS, increased milk output and solids due to the adoption of standard milking interval apart from the added convenience in domestic operations are enjoyed by farmers. Milking hygiene and clean practices help to reduce clinical and more often sub clinical mastitis.

4. Recommendations

i Eligibility & General Criterion

o Agencies having a minimum procurement of one lakh liters per day during the last three consecutive years shall be considered for assistance under CMP scheme. Mega agencies with a daily turnover of ten lakh liter and more may be excluded from the scheme.

o The project should be of economic scale. While admitting that this would vary from state to state and agency to agency, the viable volume is estimated to be 50,000 liters for a single project. The period of implementation of single project shall not exceed three years.

o The IA should have a line marketing activity or an evolving program to market clean milk as a value added product, generate extra income and pass on the extra profit to farmers and DCS.

o In preparing the project proposal, none of the IAs made a systematic and realistic pre-project appraisal (benchmarking) of the ground realities. In future pre-project survey by an independent agency should be made mandatory to the approval of CMP scheme. Producer Incentive and Marketing

o On completion of a project, the CMP should be a self sustainable activity. This could be made possible through two strategic interventions – first providing incentives to producers for bacterial quality and the other marketing of clean milk as premium product.

o The simplest way to usher in clean milk production is to start paying for milk on the basis of its bacterial quality. If fat test and SNF count (milk analyzers) can be carried at the collection point, there is no reason why bacterial count too cannot be introduced (introducing MBRT or other appropriate tests / analyzers) right at the milk collection point enabling the primary processing unit (BMC) to pay for bacterial quality. The Clean Milk producers should fetch a better price than others. (see section 5.1)

o Clean milk production should aim at the organized dairy industry promoting clean milk production end to end: from the farm gate to the dairy plant and beyond to the consumer.

The clean chilled milk transported to the dairy dock in clean trucks should not be mixed with the main stream milk and instead should be used for specific value addition (UHT treated and aseptically packed milk, fermented/semi fermented milk, cheese, butter, casein lactose etc), positioned as premium products and marketed through high end market channels to fetch premium price for farmers, DCS & Union. Therefore Marketing should be incorporated as a priority component of CMP Scheme (see section 5.1)

o While sanctioning, preference must be given to those Unions who already have a differential marketing/ pricing system for clean milk. In any case the scheme should be sanctioned only to those who already have or have a future program to implement a differential pricing/marketing system for clean milk and pay additional price to the farmers.
As part of market development mass consumer awareness on clean milk and its significance on health and nutrition must be initiated on a campaign mode with financial support from CMP scheme.

Training

- Capacity building of farmers, their representatives and the key functionaries through training and extension and their motivation on a continuing basis should assume very high priority under the scheme. The provision for training should be extended to DCS staff, Board Members and staff of dairy plants.
- The training program for farmers should be reorganized to make it more utility oriented. An Extension Worker (EW), preferably a lady should be recruited from the BMC and trained on all aspects of CMP including detection and prevention of sub clinical mastitis. The EW in turn shall provide hand on training to cattle keepers in the village itself with special emphasis on clean milk production. The EW should be on contract on a monthly wage of Rs.3000/-, initially paid from the scheme for three years and later by the IA. Women cattle keepers should get priority in training. This procedure would enable continuous training and follow-up during the initial period, very essential for the success of the scheme.
- A unified syllabus should be prescribed for each level of training – farmers, DCS staff, BODs of DCS & staff of dairy plant.
- The implementing agencies should be encouraged to take up the farmers and staff training in advance of the installation of BMC at DCS. The DCS who have trained farmers/DCS employees should get preference for CMP program and BMC (see section 4.1.1 and 5.2 for details).

Cooling Facility

- Financial support for new building/modifying the existing building for BMC and allied equipments like generator set should find a place in the scheme. In addition developing water source, installing generator set and three phase power supply should also be included in the package for cooling facility. The support for building and other infrastructure shall be limited to 75% of actual cost or Rs.10/- lakhs whichever is less. A sample design for building is annexed as 6&7.
- Those agencies who offer to provide suitable buildings with provision to accommodate milk reception bay, quality assessment equipments, BMC and Genset should be given preference. Pre inspection of proposed site by GOI officials or independent agency may be considered.
- Facility for washing of can/utensil of suppliers at DCS itself should be provided. An MS/steel tub with three compartments - one each for washing, cold sanitizing and rinsing- and a high pressure pump is recommended. Approximate cost – Rs.25,000/.
- Solar water heating facility should be provided at all BMC Points. The estimated cost is Rs.2/- lakhs per unit.
- Shifting location and changing capacity of BMCs from original proposal should be discouraged. If at all such changes are inevitable, it should be done only with prior approval of GOI during project period. Failure to adhere to this condition should attract penal provisions like disqualification from further release, it is suggested.
- The IAs shall be made responsible for the defunct BMCs during the project period. Penal clauses including cost recovery/ disqualification from CSS (until the IA perform well in this regard) may be built in to the scheme.
- Before considering new proposals, the redeployment of defunct
BMCs within the Unions or outside shall be considered on top priority
- The market price of BMC is often higher than the ceilings prescribed. Provision may be made to reimburse 75% of market price or ceilings enhanced on the basis of market price.
- The IA (Unions) should be made to overview cleaning and sanitizing BMCs on a regular basis. The IA should educate and train the BMC operators on proper cleaning, sanitizing and upkeep of the BMCs, pipe lines, valves and milk pumps and periodically inspected. Arrangements for making available the required cleaning materials and brushes on a continuing basis should be made. (refer 4.1.2 and 5.3 for more details) Strengthening Existing Labs
- All BMC DCS collecting not less than 500 LPD and Cluster DCS collecting 300 LPD shall be provided with AMCU – electronic weigh scale, digital indicator, milk analyzer, computer, printer and software. Estimated cost – Rs.1.7 lakhs per Unit
- The decision to support processing and marketing of clean milk as a premium segment should be linked ISO/HACCP certifications and expenditures to be incurred including those for building modifications and installation of equipments may be met by GOI and IA at a ratio of 75:25, as in the case of BMC
- A set of essential tests (minimum standards) to be carried out at DCSs and Dairies must be specified and funded.

Suggested tests are:-
- DCS- Fat, SNF Daily, MBRT adulterants, preservatives and neutralizers biweekly of individual farmers
- Dairy - MBRT, SPC, Coliform, PIT, Somatic Cell Count, tests for Antibiotic Residues, Adulterants, Preservatives and Neutralizers of bulk samples - daily. A list of essential equipments required in Dairies is included as annex-2. The estimated cost comes to Rs.110.5 lakhs
- Introduction of chromatography for the determination of components and adulterants may be considered in dairy laboratory
- The mindset of personnel working in labs needs to be changed through exposure visits to institutions of high standards (eg: Schreiber Dynamix, Baramati) to impress upon them that they have the key responsibility of quality controlling a food commodity.
- The technicians and professionals working in DCSs and Dairies, needs to be trained and re-trained to update their knowledge and skills and to familiarize them with the latest techniques and equipments applied in quality control. Tailor-made training courses in reputed institutions like NDDB/IRMA, NDRI is recommended
- In order to review the quality assurance procedures in position and to recommend new procedures and to decide the equipments required for quality assurance to comply with national/international standards an Expert Committee shall be constituted (more details in 4.1.6 & 5.4)

Distribution of Cleaning Materials & Sanitizers (more details 4.1.3)
- This component may be discontinued from future sanctions. The IA shall be requested to make available the cleaning materials and detergents at subsidized rate

Distribution of SS milking pails and cans to farmers
- A corpus may be created under each Union to extend support for utensils and vessels. The pails and vessels may be distributed at subsidized rate – 50% subsidy from scheme, 25% by Union and 25% as farmers share. The corpus should be large
enough, at least Rs.50/- lakhs per Union, to generate adequate amount to meet the subsidy component. (more details 4.1.4 & 5.5)

**Planning and Monitoring**

- A midcourse evaluation of each project by a competent external institution shall be undertaken and midcourse corrections made if found essential. Midcourse release of funds shall be considered only on the basis of such evaluation.
- At the end of the project, impact assessment by a management institute shall be made obligatory. Further project proposals from the IA shall be considered in the light of such assessment.
- All the DCSs with BMCs should be networked with the Union/QC lab and test results made available on line to enable the QC lab to follow up and monitor the lab procedures and make corrections, if necessary. In the first phase all BMC attached DCSs shall be networked with Union and Federation followed by the networking of cluster DCS. The estimated expenditure comes to Rs.50/ lakhs for one Union
- Until the networking and MIS is in full swing, suitable formats shall be developed to overview, evaluate and monitor the quality performance at Union level.
- All the Union Executives shall be trained in reputed management institutions on scheme formulation, execution, supervision, evaluation monitoring, and motivation with special emphasis on quality assurance. (see 4.1.3 for more details)

**Funding Pattern**

- The routing of funds through state government/state Federation lacks merit. Instead funds should be directly released to the IA to avoid delay, better accountability and efficient utilization.
- The current funding pattern for BMC, 75:25, and 100% funding for other components may be continued. The additional components of marketing, buildings for BMC, facility for water and electricity are also to be financed along with the financing of BMC as a single package.
- At current level CMP takes care of 15% of milk collected in the study area. The estimated coverage through own fund and supported by other schemes is almost equal to this and adds up to 30%. The investment required to cover the remaining 70% collected by milk Unions in the next ten years or so is enormous. Hence a cut off point should be set for providing support under the scheme. We recommend to continue the support at the current rate until 50% of procurement is covered and thereafter the support shall be scaled down and coupled with an interest free loan under Venture Capital Fund/CMP or any other scheme.
- Post scheme arrangements to continue the CMP should entirely be the look out of IA. (more details 4.4) Other components to broad base the scheme
- The study identifies sub clinical mastitis as one of the major hurdles in CMP. A comprehensive Mastitis Eradication Program (CMEP) through DCS should be initiated as a priority activity to prevent the occurrence of sub clinical mastitis among dairy cattle and buffalo. The major activities suggested under CMEP are providing assistance to construct cattle sheds, cement flooring of existing cattle sheds, early detection of sub clinical mastitis through strip cup/CMT and treatment, both preventive and curative (more details under 5.7 A,B,C&D). The estimated cost for a model cattle shed for five cows works out to Rs.1.2 lakhs (more details in annex-4)
- The other activities suggested to broad base the scheme for the overall welfare of the farming community includes adding marketing as a component (section 5.1), expansion of coverage and providing more BMCs (Chapter 4.1.2 & 4.4),
buildings for BMC, generator sets, three phase power supply & water source development (chapter 4.1.2) and milk production enhancement (Chapter 5.7) through dovetailing of CMP with ongoing schemes like IDDP and NPCBB (more details chapter 5) (more details under 5.7)

Conclusion

The study on CMP scheme proves beyond doubt that there is substantial improvement in microbial quality of clean milk produced under the scheme. The scheme is capable of delivering a basket of direct and indirect benefits to farmers, DCS and Unions. Quality improvement of milk is crucially important to the future if Indian dairy industry. It is also important from the food safety and security point of views apart from health and nutrition. Therefore the scheme should not only be continued in future plans but also strengthened and expanded to cover new areas. (more details under 5.7)