A Quality Based Milk Payment System

A Guideline for Implementation

Extracted from the Quality Based Milk Payment Study report submitted to SNV in March 2013, (Authors: I. Foreman and B. de Leeuw)

Author: Irwin Foreman MSc (Agric), Dairy Industry Consultant (UK)

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1. Background

The introduction of a quality based milk payment (QBMP) system will be a tool to strengthen the dairy sector in Kenya. By improving the raw milk quality, possibilities for export will develop, there will be improvement in product shelf life, and production costs can be expected to go down. Food safety will improve, and general product quality will be enhanced. Stakeholders within the Kenyan dairy industry are aware of the potential benefits, and the study concludes that the industry should proceed to implement a QBMP. To support the effort, the Dutch Government/SNV is willing to co-finance this initiative by providing knowledge support.

Introduction of a QBMP system will not change the price setting of milk, only the pricing structure. Bonuses for high-grade milk will be financed from penalties for sub-graded milk. There will be an investment in quality control and extension services, which will be paid back by the accruing benefits of value addition of the products.

The expected benefits deriving from a QBMP system are better efficiency in the supply chain due to the early detection of milk that does not conform to the agreed quality standards, and therefore reduced costs across the chain. Low quality milk is identified, isolated and/or is rejected, and therefore is not transported, and does not cause damage to pooled milk. For the processor this can be a significant financial saving in both lower spoilage rates. The early detection of spoiled milk eliminates the need to conduct retroactive rescue operations on batches of milk which have been identified as containing problematic milk after they have entered the plant. The result is reduced labour and handling costs.

In designing a specific system, thought should be given to whether the chosen test parameters that are to be applied should target hygienic quality, adulteration, or preference for specific milk components. The advantage of the system is that any combination, or all of these possible target outcomes, can be prioritized, by the selection of appropriate test parameters. In this way, processors are able to select a combination of test parameters that suit their own specific requirements for the products they process. Cheese makers may wish to prioritize payment for protein to achieve better yields of final product, UHT milk processors may be more interested in freshness and low spore counts, while infant food processors may be more sensitive to chemical adulteration.

The quality target thresholds can be as flexible as the processors require them to be. Baseline surveys of milk quality at MCCs and plant reception docks will provide the guidance on where to position the target quality bands when the system is introduced. Thresholds are flexible and can be adjusted to meet changing circumstances, and will probably differ between systems. When introduced, the number of quality parameters and the number of quality bands should not exceed three of each. Adopting this approach will enable the farmers to more readily adapt their operations and responses to the system outcomes. As the system is implemented, there is a learning curve involved which everyone in the supply chain must experience and adjust operational habits to its consequences. Therefore, it is advisable to keep the implementation design quite simple to enable everyone to move through the learning curve and allow the system managers to make adjustments to improve the efficiencies and results. As the system becomes established and accepted, consideration can be given to increasing the range of quality parameters and expanding the number of quality bands.

To ease implementation of a QBMP system, the design should be kept simple, understandable, and easily manageable. The proposed design in this study is a ‘whole chain’ approach, where the farmer, the

bulk collection tank, and the processor are all participating players in the payment system. The proposed system aims to utilize the existing milk testing facilities at the collection centre and at the processing plant, with the provision of some additional testing equipment. Training of the operators and milk testers will be required.

To deal with quality issues as they arise, the processing plants in the programme will be required to provide farm extension workers to provide support and instruction to the farmers, cooling tank operators and transporters along the chain.

Before launching the programme a baseline study must be carried out in order to generate data on the current quality of the milk. The data will be used to determine and set the thresholds for each of the quality parameters to be tested.

The payment system will be two-tier, farmer to cooling tank, and cooling tank to processor. The test parameters for each tier will be selected to meet the specific local requirements and circumstances and are unlikely to be identical for each tier. The processor will pay the collection centre for quality, and the collection centre will pay the farmers for quality.

Acceptance thresholds will be chosen without reference to the raw milk standard. The thresholds for each band of milk quality will be selected to meet the capacity of the farmers to attain them.

Three quality bands are proposed:
1) Standard grade which will receive the standard milk price as it is at present.
2) Superior quality grade, which will receive a bonus payment.
3) Inferior quality grade, which will receive a deduction.

The deductions will pay for the bonuses so the pot of money remains the same as currently, and there will be no increase in the milk price. The QBMP system influences the price structure but does not affect price setting. The quality bands will be selected to ensure that 75% - 85% of the farmers will receive the standard price, 5% - 10% will receive the bonus, while 10% - 15% will receive the deducted price.
The system will provide advantages along the chain. The farmer will be encouraged to improve quality by the introduction of a monetary incentive. To receive the bonus payment from the processor, the cooling tank operator will be required to tighten the inspection of the farm milk being delivered, while the processor will be the ultimate beneficiary receiving milk that has been more carefully tested to eliminate quality faults along the chain.

Operating a QBMP system, for the processor, the plant quality control system now extends to the farm level as everybody along the chain now has an interest in the quality of the product he passes along the chain. Previously, plant quality control started at the reception dock. With the active support of extension officers, quality problems can be identified at the farm level and rectified before they reach the dairy.

The milk collection center has to ensure, that the milk quality from the moment it is purchased from the farmer until the moment it is delivered at the factory gate stays the same. If the handling of the milk is not performed properly during this period, the intermediary will lose money.

QBMP systems have been successfully introduced in countries with dairy economies similar to Kenya. Farmers and processors have benefitted, with improved incomes resulting in efficiencies in the processing plants and better quality products delivered to consumers.

2. Operational Guidelines for QBMP systems

Designing and developing a QBMP system presents several options for selection. A QBMP system is a dynamic system, which may gradually be adapted over time to meet changing circumstances such as farmer performance in reaching the target thresholds, changing local conditions and changing demands. It should be clear that there is not one single recipe, but there are several, all of which can be shaped and adapted to meet local circumstances, and all can lead to the desired milk quality improvements.

3. Keep It Simple

A range of parameters are included in QBMP systems in countries where QBMP systems have already been in place for many years. As they gain experience, milk suppliers become familiar with the system and adjust easily when new parameters are introduced. This is a quite different situation to the one prevailing in Kenya at present, where there is none or only minor experience with QBMP systems.

Every change made in the selection of parameters can be expected to have a significant impact on the payment system and the farmers' reactions. Farmers and milk collection centers need time to familiarize themselves with the introduced parameter. For example, when a test parameter expressing the bacterial count of milk is introduced, it is of utmost importance that farmers understand the fundamentals of the sources and growth of bacteria, and what steps need to be taken by them to reduce the bacteria count in milk.

Farmers as well as milk collection centers will have to adapt and change their working procedures in order to supply milk of a higher grade. Collection times need to be shortened, cleaning procedures improved and, predictably additional investments will required. This will require considerable efforts and milk collection centers and farmers will need support from the processor in order to improve and to implement these changes. Therefore, introducing the QBMP system parameters will have to be introduced gradually, step by step. A new parameter can only successfully be introduced when farmers and milk collection centers are familiar and comfortable with the system.

4. All inclusive

The whole chain from farm to processing plant has to be included for the successful introduction of a QBMP system. In Western Europe this is not an issue, because farmers deliver directly to the processors and the processor pays the milk money directly to the farmer. In Kenya, the payment system is structured differently.

Farmers deliver the milk to the co-operative (MCC) and these intermediaries then sell the milk to the processor. To introduce a QBMP system from MCC to farmer will be only successful if there is a QBMP system also implemented from the processor to the intermediary and vice versa. When an intermediary makes the effort to introduce a QBMP system to the farmer and the processor does not put in place a financial incentive for his efforts, then the objectives of the QBMP system will not be attained. Also, when processors introduce a QBMP to the intermediary and the intermediary does not take any action

at the farm level, no progress will be made. Integral introduction along the complete chain is crucial. For practical purposes, the chain is divided into two sections, 1) farmer to milk collection center, and 2) milk collection center to dairy processing plant. Each section is treated as an entity, and the parameters selected for payment need not be identical for each section. The payment system applied in each section is designed and operated as separate entities without interdependence.

5. Adequate milk testing facilities

The testing facilities must be adequate and reliable. For example, suitable incubators, trained staff and laboratory facilities have to be available if a processor is to decide to introduce the total plate count into its payment system. The capacity should be sufficient to do all the required tests. In general, this will be possible under Kenyan conditions. At present, it is not possible for the milk collection center to do total plate counts on milk from all its suppliers. Logistically it would be impossible to implement a large scale weekly testing regime e.g. to undertake running a thousand total plate counts a week, not to mention the high costs that would be involved. Therefore, the intermediary must choose a simpler but yet effective solution. The intermediary may decide to use the methylene blue reduction test for payment purposes or the results of the resazurin test in order to pay its farmers for microbiological quality. Reduction tests provide a broad measure of bacteriological quality. The tests are indirect and not absolute. The test measures bacterial activity, and does not enumerate bacterial populations. There is no direct correlation between the results and absolute bacterial numbers present in the sample. Provided incubator water bath temperatures are accurately maintained and good laboratory practice procedures are followed, the tests can be used for payment purposes.

Another example is the introduction of protein content into the payment system. Reliable milk gross composition analysers are required to test this parameter. The capacity of the analyser needs to be sufficient to be able to handle the number of samples. Milk analysers as currently used in Kenya are not regarded by the consultants as being suitable for use for a payment system. These instruments have inherent problems with maintenance of the instrumental calibrations. Any instrumental system that is to be considered suitable for payment purposes must be beyond reproach in terms of the stability of its calibration and the accuracy and repeatability of the data it produces. Low cost instruments do not meet this requirement. Consequently, without access to more accurate instrumentation, the introduction of payment according to compositional analysis would not be a primary choice for the introductory phase of a QBMP system.

6. Adulteration by Water

The buyer should not pay for added water. By introducing payment for Total Solids, Solids-Non-Fat, weight of protein or fat into the payment system, the incentive to adulterate the milk with added water will be removed. This may not entirely stop adulteration with water, but adding water will at least no longer be an attractive incentive. It is usual to apply a ‘financial penalty’ when added water is detected. The severity of the penalty can be adjusted to suit local requirements.

7. Milk Temperature

In Kenya, farm milk is delivered warm. It is the MCC’s business to bulk and cool.

Payment for temperature is a norm when individual farms have their own milk cooling tanks. This is not the case in Kenya and therefore payment to farmers for milk temperature is not generally applicable.

Any processor purchasing milk from a MCC would be advised to introduce payment for temperature, measured at the reception dock. The normal target is 4 degrees Celsius, known to be the critical upper storage temperature, and any milk arriving above this temperature may be penalised. However, it has been observed that in Kenyan milk collection systems, MCC operators frequently switch off the tank cooling systems to save operating costs. Milk which has been allowed to warm above the critical temperature may be subsequently cooled prior to transportation to the processor in order to mask the fundamentally malpractice. This aspect needs to receive attention from the extension workers and appropriate safeguards put into place.

8. Perform a baseline study

To set the band ranges for each parameter, a pre-survey of the quality of the local milk supply is required. The survey must include all the test parameters which will be included in the payment scheme. To generate test result data which can be used for construction of the payment bands the sample size must be sufficiently large, so that the distribution curves of the results are representative of the quality parameter being investigated.

The thresholds of the payment bands must be selected to ensure that when the QBMP system is launched at least 10% of the farmers will be able to deliver first grade milk. The system will fail if this is not the case. For instance if it is decided to define first grade milk as milk with a TPC below 100,000 cfu/ml, while the majority of suppliers deliver milk with over 1,000,000 cfu/ml, the farmers will be discouraged as they struggle attempting to meet the target.

The baseline survey can be expected to also provide information on critical points in the supply chain, and may be expected to identify particular problematic activities in the milk collection and handling routines. The milk may suffer its greatest quality reduction not at the farm level, but at the transportation stage perhaps due to poor temperature control or use of ineffectively cleaned and sanitized milk cans. Such faults can be expected to be revealed by the baseline survey and through training, changes in routines and practices can be introduced before the payment system is implemented.

9. Conduct a confidential test run before introduction

The QBMP system should be run in parallel to the existing payment system for 3-6 months before actual implementation for ‘real payment’. During this period the financial effects of the expected changes in the payment system should be compared with the existing system, in order to avoid undesirable financial outcomes. The system should be fine-tuned after analysing all the data from the test run. To become even more confident about the outcomes, the QBMP should be run parallel to the existing system, whilst the suppliers are kept informed about the payment they would have received in the proposed system. By informing the suppliers of the financial outcomes of each of the systems when compared, the implementers will be able to judge the willingness of the farmers to cooperate, or whether they are resistant to the proposed changes. It is of utmost importance to develop the trust and loyalty of the farmer and his dairy society.

10.Reporting Results

Integral to the system is the assurance of prompt and efficient flow of information. Test results must be fed back to the farmer immediately they are available. The reporting procedure must be designed to ensure that there is no delay in sending the results to the farmer. This can be done using the mobile phone system. The results should also be displayed publically in the milk collection center where the farmers can compare their own results with the results of others. This will create awareness and interest. Farmers will discuss test results with each other and adapt their routines to improve their results. The farmers with less successful test results will be able to take steps to make changes in their work routines.

11. Individual payment

To achieve the optimum results, all farmers should be tested and paid individually. The processor will pay the milk collection center once a month, on the basis of the results of the tests done during that month. The milk collection center will pay the farmers according to the results of the tests on his individual milk samples done during the same period. This will create a common responsibility. Experience has shown that such systems work, but it requires cooperation and motivation on the part of the farmers. The motivation is financial improvement, and that induces the cooperation.

12. Extension service in place

The creation of an effective extension service manned by a knowledgeable individual who can gain the respect of the farmers is essential to the success of the system. As they adjust to the new payment system, the farmers will need access to technical support from someone who is able to visit their farm and provide guidance. Many will need training and information. Access to a skilled extension worker will create awareness and goodwill for the benefit of the system. This strengthens the relationship between the supplier and the buyer. The buyer should not only be a buyer, but should also be a provider of technical information and support for the farmer. In this respect it is very important not to combine the functions of the extension worker with the milk tester. Under no circumstances should the extension worker become a policeman.

The extension worker should be equipped with transport (motorcycle) and a cell phone, and he should be immediately responsive to calls from farmers seeking support and advice. He will also act as a go-between for the farmer in his relationship and dealings with the milk collecting center and the MQC.

13. Milk Quality Parameters

For the introductory phase of a QBMP-system, it is important not to make the system design too complicated. The processor has to set his priorities with regard to the parameters of importance to him. Also, appropriate testing equipment and sampling equipment, together with written operating procedures have to be made available.

14. Selection of Tests for use as Test Parameters

The payment system has two tiers, farmer to milk collection center, and milk collection center to processing plant. The tests chosen for each tier can be different. Predictably, the processor will choose more sophisticated, difficult to perform tests, while the milk collection center will use simpler easy to perform tests.

The possible tests can be grouped according to category,

Table 1: Possible Tests for Selection According to Category

Freshness	Microbiological	Chemical	Adulteration
Alcohol test	Methylene blue (indirect)	Fat	Cryoscopy (added water)
Titratable acidity	Rezasurin (indirect)	Protein	Specific Gravity (added water)
Clot-on-boiling	Total Plate Count (direct)	Total solids	Hydrogen peroxide
Organoleptic	Direct microscopic count		Starch
Temperature (processor)	Petrifilm		Antibiotics
	Somatic Cell Count		

Each test has pros and cons, both technical and practical. These need to be evaluated by the implementers of the system.

15. Compositional Analysis

In many QBMP systems the chemical composition of the raw milk is included as a payment parameter. The payment is made for fat, protein and total solids content. It may be for one component or for all, depending on the design of the specific system.

Chemical composition can be measured in different ways. At the milk collection level, a milk analyser is most suitable for determination of the chemical composition of milk. At the processing plant level, a more accurate instrument should be selected. Milk analysers are available in different capacities and qualities. Prices vary from 500 to 50.000 Euros. With all such instruments, regardless of level of sophistication, it is essential to implement a routine system of checking and maintaining the instrument calibrations. No payment system can be based on use of an instrument which has questionable calibrations.
Milk composition analysers commonly measure the following components:

- Fat
- Protein
- Lactose
- SNF

- Total Solids
- Calculated Freezing Point / Water adulteration percentage

The Gerber method, which is the traditional wet chemistry method for measuring fat content, is the cheapest option of all the available methods to determine fat levels in milk. However, in order to ensure accuracy of the results, it must be performed precisely according to the standard methodology. The implementers must be quite clear if they are reporting the results by weight or by volume. Using standard formulae, combining Gerber results with the density of the milk can provide calculated information on the solid non-fat (SNF) content of the milk.

16. Milk Adulteration

In an attempt to improve milk quality test results, milk suppliers may add adulterants to the milk. This is of course a criminally fraudulent practice. Tests are available to detect the presence of adulterants and when identified, financial penalties need to be applied to discourage the offenders.

Some examples:

- Starch to improve density
- Malto-dextrin to improve density
- Salt to improve density
- Bi-carbonate to improve density & acidity
- Peroxide to decrease bacteria counts
- Melamine to increase protein content

Discovery of adulterants in a farm sample should result in a penalty.

17. Water adulteration

One of the major quality issues in many countries is the adulteration of milk with water. Water does not only decrease the total solids in milk, but the added water may not be of drinking-water quality and may contain undesirable microorganisms and/or chemical substances. The detection of more than 15% added water in supplied raw milk has been observed.

Adulteration by added water can be detected by several instrumental methods, of varying accuracy:

- Lactodensimeter
- Milk analyser
- Cryoscope

18. Antibiotics and other growth inhibitors

The detection of antibiotics should result in rejection of the milk from the individual farmer until it has been shown by collection of daily samples that the milk he supplies no longer contains antibiotics. Besides rejecting the milk for several days, it is common practice for a substantial fine to be imposed on the farmer.

Antibiotics in milk can be tested by:

- 3 hour broad spectrum incubation tests
- 5 minute specific antibiotic tests

Milk containing antibiotics has to be rejected, and suppliers of antibiotic milk should be financially penalized.

19. Aflatoxins

Aflatoxins are of major concern for the feed and dairy industry in Kenya. At the moment the dairy industry does not have ready access to a laboratory with capacity to test for aflatoxins. There are simple fast semi-quantitative test kits commercially available. Kits using ELISA (enzyme-linked immunosorbent assay) technology are available to test on the farm as well as commercially. The cost per test on the farm (USA prices) is usually about $20 to $25 when prorating the cost of the incubator to conduct the test.

20. Somatic Cells

Though a number of plants in Kenya do process cheese, the volumes are insufficient to justify major expenditure on the purchase of high-end analytical instrumentation to be used for general application. Somatic cell counts are used as an indicator of mastitis. Various useful low cost testing methods are commercially available. These may be included in QBMP systems where the parameter is of interest to a cheese-making plant.

21. Foreign Matter

Milk can be rejected when straw, dirt, manure, concentrates, or any other physical contaminants are detected in the milk. Also other organoleptic abnormalities in colour and odour will lead to rejection of the milk. Traditionally, the parameter has been used as a quality test for milk. The method, described in an International Dairy Federation standard, requires filtration of 1 litre of milk through a standard cotton pad. The dirt left on the cotton pad surface is then compared with a set of standard photographs, each representing a grade. Using the method, the milk can be conveniently graded for cleanliness. The method has the advantage of being objective.

Assessment of milk quality by visual inspection for dirt, colour and taints is subjective and the results cannot be quantified. The person inspecting the milk will be required to make subjective decisions about quality and ultimately whether to accept or reject a batch of milk. This kind of decision, without the support of measurable numerical data, will lead to conflict as farmers will argue against decisions to reject milk. To avoid conflict arising from such situations, we suggest that organoleptic assessment should not be included in a pilot trial QBMP system. However, if testing equipment for the cotton pad filter method is made available, then this test could be included.

22. Specific Gravity

The measurement of Specific Gravity is almost universal in Kenyan milk collection systems, therefore it is to be anticipated that the test will be selected for inclusion in a QBMP system. In many milk payment systems in other countries, the test has been replaced by cryoscopy, which is precise, repeatable and easy to do by unskilled operators. Observations at milk collection centers in Kenya and elsewhere in East Africa have shown that the test is seldom performed correctly. It is not possible to provide a direct correlation between the specific gravity of milk and the percentage of added water.

23.Price Structuring and Calculations

A QBMP system is not an instrument to increase the milk price. According to certain selected test parameters, incentives, and penalties are applied to the milk price. The simplest way is to introduce a three grades system of extra quality milk, standard milk, and second-class milk. In general they are constructed to ensure that:

5-10% of the milk is extra quality milk
75% - 85% of the milk is standard or first-class milk
10% - 15% of the milk is sub-standard or second-class milk

The penalty deduction applied to the sub-standard milk will pay for the extra-quality milk.
The payment system could be expanded to more than three quality bands. If there were four or five bands it would provide greater opportunity for farmers to move up to the next band. Assuming the use of three quality bands for payment, an example of a quality band payment structure, for bacteriological and chemical quality is presented in Table XX

Table 2: An example of a payment structure for a QBMP system Price Band

Bacteriological Quality		**Notes**
Standard Price (100%) Paid for milk in Standard Grade Band	To be determined	1. The thresholds are set to ensure that 75% - 85% of farmers receive the standard price. 2. Deductions made for Lower Grade should finance the Supplementary Payment for Superior Grade. This aspect of the system needs to be closely monitored.
Supplementary Payment (100% + 1-2 KShs/litre)* Paid for milk in Superior Grade Band		To be determined
Deducted Payment (100% - 1-2 KShs/litre) Paid for milk in Lower Grade Band		To be determined
Differential Payment for Chemical Quality		

Fat Content	The weight of fat will be calculated (Percent Fat x Kgs Milk = Kgs fat). Fat will be priced at X KShs/kg Standard Price (100% + X KShs/kg above 3.25% will be paid.	1. The COMESA Standard has set the legal minimum fat content at 3.25% 2. Payment according to weight of fat delivered will reduce the incentive to adulterate with added water.
Standard Price minus X KShs/kg below 3.25% will be paid for milk containing less than 3.25%		
Adulteration of Milk		
Added Water	The weekly milk samples delivered to the processor's laboratory for Total Plate Counts will also be tested for Freezing Point Depression. The calculated volume of added water will be deducted from the volume of milk delivered.	The sample used for this test will be a weekly sample, but the calculated volume of water to be deducted will be applied to the total volume of milk delivered.

* The supplementary payment could be flexible depending on season, and it could be set at 3 KShs/litre to make it more attractive, or it could be flexible and adjusted according to the balance of supplementary payments against deductions. The exact amount would need to be determined periodically.

For illustrative purposes, the following table provides an indication of how the graded payment system could be structured.

Table 3: An Example of Graded Payment Bands

Price Band	Bacteriological Quality	Targeted Percentage of Farmers in Band	Notes
Standard Price Paid for milk in Grade II Band	2.0 x 10^5/ml to 1.0 x 10^6/ml (acc. to harmonized COMESA Standard)	75% - 85%	1. Bands will be set to ensure that 75% - 85% of farmers will receive the Standard Price. 2. Deductions made for Grade III will finance the Supplementary Payment for Grade 1. 3. As bacteriological quality improves the band thresholds can be raised.
Supplementary Payment Paid for milk in Grade I Band	< 2.0 x 10^5/ml (acc. to harmonized COMESA Standard)	5% - 10%	
Deducted Payment Paid for milk in Grade III Band	1.0 x 10^6/ml to 2.0 x 10^6/ml (acc. to harmonized COMESA Standard)	10% - 15%	
Differential Payment for Chemical Quality			
Fat Content	Milk received with 3.25% and above will be paid according to weight of milk fat. Milk received with less than 3.25% will be suspected of adulteration and subjected to further investigation.		1. The COMESA Standard has set the legal minimum fat content at 3.25% 2. Payment according to weight of fat delivered will reduce the incentive to adulterate with added water.
Adulteration of Milk			
Added Water	The calculated volume of added water will be deducted from the volume of milk delivered.		1. At a later stage it is possible to set a punitive fine (e.g. Deduction of value of 2 litres of milk for every litre of added water).
Antibiotics and Inhibitory Substances	Detection of presence of antibiotics or inhibitory substances will receive a reduced payment.		1. The harmonized COMESA standard prohibits sale of milk containing antibiotics or chemical preservative substances.

Initially when the system is launched, the bacteriological grades selected would need to reflect the reality and not the COMESA standard requirements. As the bacteriological quality improves, the thresholds would be moved.

The Standard Price would remain undefined and left to market forces as it is now. Each processing plant would continue to set its own price with the farmers as they do now, but under the proposed system the processing plant would be obliged to pay the premium for better quality milk delivered to the plant, and equally be entitled to make a deduction for sub-standard milk.

To make the system fairer and less draconian to the farmers and to remove the potentially catastrophic negative effect of a single bad result in any calendar month, the payment system should be constructed in such a way as to use a rolling average payment system. Each quality parameter would be tested perhaps 3 times per month, but the farmer's payment grade would be determined for example, on the basis of the rolling average of the past 5 test results, thus reducing the effect of a single bad result on the average in a single calendar month. Suitable tables would need to be devised for each quality parameter.

24. Recording and Tracking of Data

To operate the system, it will be necessary to design one uniform data collection system, which will be used at each of the pilot or trial locations. A manual or computerized data system (e.g. spread sheet programme) should be prepared to include and track milk deliveries per farmer.

The following suggested minimum list of data should be recorded and tracked. Any additional data thought to be necessary by the stakeholders may be added as required.

Table 4: Data to be recorded for a QBMP system

Data Item	Farm Level	Milk Collection Center Level	Processor Level
Farmer's Name		+	
Farm Producer No. / MCC No.		+	
Date of Milk Delivery		+	+
Time of Milk Delivery		+	+
Volume of Milk (litres)		+	+
Results of Laboratory Tests		+	+
Date Notification of Test Results Sent to Farmer	+	+	+
Date and content of all communications made to the farmer by extension worker	+	+	+
Date and content of all notifications made to the bulking centre from farmers and from the processor / extension worker	+	+	+
Results of the calculation of the monthly Grade		+	+
Calculation of the actual monthly payment		+	+

25. Milk Quality Council

A QBMP system deals with two components, milk quality and the money payment. Both are sources of potential conflict. An essential requirement for success is transparency in all the QBMP procedures and operations.

To manage the payment system and to achieve transparency it is proposed that a stakeholders committee be appointed to supervise the system. The committee could be designated as the Milk Quality Council/Committee (MQC). Its function would be to oversee the operation of the QBMP system, through a system of data collection, reporting to the stakeholders, monitoring and review.

The committee membership should be composed of elected representatives from the farmers and the processors who are participants in the QBMP. The committee should be chaired by a person elected from within the committee membership. To provide a national perspective, alternatively, this function could be provided by a representative of Kenya Dairy Board.

The committee's functions would be:

- To administer and oversee all matters pertaining to the management and operation of the QBMP system.
- To provide public transparency for all the operations and procedures.
- To act as the linkage between the farmers, the collection centre and the processor.
- To supervise the sampling, testing and distribution of results.
- To elect and form an independent appeals sub-committee.

26. Appeals Committee

An absolutely essential component of the proposed QBMP system is the formation of an Appeals Committee to whom farmers and milk collection centers are able to lodge complaints and resolve disputes. The members of the Appeals Committee, not more than 3 to 5 persons, would be elected representatives from the farmers, CBEs and an appointee of the processor. Preferably, the committee chairman should be impartial and not connected to any of the stakeholders.

The Committee Secretary receives and submitted complaints and appeals from the stakeholders, calls for meetings and produces the minutes. The committee chairman can call any farmer, milk tester, transporter, milk handler to attend meetings to give evidence when complaints are reviewed. The appeals committee should meet every two months in order to listen to and respond to complaints from farmers and CBEs.

27. Conclusions and Implementation

The role and performance of the Milk Quality Committee and its members is critical to the success of the system.

1. Form a MQC from the stakeholders to administer the system. Committee members to be nominated from farmers, milk collection center and processors.

2. MQC elects a chairman.
3. The MQC appoints an Appeals Committee as a sub-committee reporting to the MCQ.
4. The Appeals Committee draws up a written procedure for processing appeals.
5. The MQC, in consultation with the processor and the milk collection center management selects the test parameters to be used in the payment system.
6. The MQC designs the payment system and the administration framework, data recording and reporting systems. They set the payment bands, the bonus and deduction levels and the prize / deduction amounts.
7. The farmers are informed that milk samples will be taken once a week for testing for the purposes of a survey, for the next 3 months, but there will be no changes to the current operations and milk payments.
8. In order to establish baselines and ranges for each of the parameters, a confidential trial run is begun, observed and monitored by the MQC. From the results, payment bands are established and financial projections calculated to establish actual estimated payments.
9. Hold stakeholder meetings where the data from the baseline survey is presented and the design plan for the system is presented to the farmers.
10. The MQC responds to the feedback by modifying and adjusting the design plan where necessary.
11. The modified design plan is presented to the stakeholders and agreement to implement a trial is reached.
12. The system is applied as a trial for 3 to 6 months, during which time the farmers are paid the usual price, while the data collected is used to make adjustments to the payment system.
13. Hold a workshop to present the data and financial consequences to the stakeholders.
14. SNV provides support for general implementation.