

**Promoting uptake of new institutional approaches and appropriate technology to transform informal milk markets in the ASARECA region:
Process, achievements and lessons learnt**

L. Kurwijila and A. Omore

Synthesis report

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ECAPAPA-ILRI PROJECT ON RATIONALISATION AND HARMONISATION OF DAIRY POLICIES, REGULATIONS AND STANDARDS IN EASTERN AFRICA – PHASE II: DIALOGUE AND ACTION ON TRAINING AND CERTIFICATION OF INFORMAL MILK TRADERS

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Acronyms and Abbreviations

ASARECA	Association for Agricultural Research in Eastern and Central Africa
ADS	Agricultural Development Strategy
BDS	Business Development Service
CBOs	Community Based Organisations
COMESA	Common Market for Eastern and Southern Africa
DDA	Dairy Development Authority Uganda
EAC	East African Community
ECAPAPA	Eastern and Central Africa Programme for Policy Analysis
GHPs	Good Hygienic Practices
ILRI	International Livestock Research Institute
KDB	Kenya Dairy Board
MCC	Milk Cooling Centre
NGO	Non Governmental Organisation
NRP	National Resource Person
PRSP	Poverty Reduction Strategy Paper
RRPs	Regional Resource Persons
SACCOS	Savings and Credit Co-operative Society
SITE	Strengthening Informal Sector Training and Enterprises
SME	Small and Medium Enterprises
SUA	Sokoine University of Agriculture
TDB	Tanzania Dairy Board
UNDATA	Uganda National Dairy Traders Association
USAID	United States Agency for International Development

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Executive summary

1. This report summarises the process, achievements and lessons learnt from the ECAPAPA-ILRI Phase II project on Promoting uptake of new institutional approaches and appropriate technology to transform informal (“raw or traditional”) milk markets and integrate them into domestic and regional supply chains in the ASARECA Region. This was the *dialogue and action* phase following the *data gathering and analysis* conducted under Phase I of the project.
2. The rationale for this work is the recognition that:
 - a. Small-scale milk traders dominate milk supply in the eastern and central Africa region, where they supply over 85% of marketed milk that often reaches the consumer prior to pasteurization. They flourish because they are favoured by current trends in supply and consumption of dairy products, which is mainly driven by cost considerations and traditional tastes
 - b. The quality of milk traded in raw milk markets which is a concern at the moment, can be improved. This can be achieved through training and licensing of informal traders, while can improve quality of raw milk, and allow “bridging the gap” with formal traders
 - c. Training and licensing could contribute to the evolution of informal markets towards formal, and “bridging the gap”
 - d. Incorporation of a BDS approach and a quality assurance scheme supervised by regulatory authorities makes the implementation of the strategy feasible, by overcoming current capacity constraints within national dairy development boards and allowing them to concentrate on supervising the scheme
 - e. Endorsement of a common strategy among counterpart regulators would contribute to greater access to quality milk within and across national borders
 - f. Many regulatory authorities could begin to implement this strategy, others need strengthening first
3. Standardisation of curriculum for training of informal milk traders in participating countries of Kenya, Tanzania Uganda and Rwanda would contribute to a harmonised policy change that allows the certification of informal milk traders following a standardised training programme of various carders operating in the informal dairy market chain.
4. The objective of this phase of the work was to develop generic training guides that would form the basis for dialogue and reaching of regional agreements on training and certification. This was achieved through a consultative process involving National Resource Persons (NRPs) and dairy sub-sector regulators in each participating country under the overall coordination by a Regional Resource Person (RRP) and consultants based at ILRI. This team of experts undertook the following tasks:
 - i. Developed appropriate national guidelines by national consultants in Tanzania, Kenya, Uganda and Rwanda;
 - ii. Consolidated common issues from the national guidelines into a generic manual for training of marginalized but majority small-scale traders in milk quality control;

- iii. Defined common minimum standards for competence in hygienic milk handling and equipment necessary for cross-border trade by small traders;
 - iv. Based on the above and a related consultant report on innovative approaches and processes for business development services (BDS) opportunities in the region, facilitated the development of a generic work plan for improved service delivery and quality assurance in the milk marketing chain.
- 5. The opportunities for improving training in dairy technology for small scale milk traders in each country (as was recommended under Phase I) have been documented. It was established that in all countries, training was not a pre-requisite for anyone to be licensed to operate as a milk trader in the informal sector. On the other hand studies in Kenya had shown that training coupled with use of more hygienic metal containers helped improve the microbiological quality of milk handled by informal milk traders.
- 6. After establishing training and competence needs for each cadre of dairy chain operators, the following harmonised six training modules have been developed by the team of experts and later discussed and endorsed for use in training and certification by dairy sub-sector regulators in Kenya, Tanzania, Uganda and Rwanda:
 - i. Module 1 - Hygienic milk production: a training guide for farm level workers in Eastern Africa. 28 pages.
 - ii. Module 2 - Hygienic milk collection and testing: a training guide for milk collection centre operators in Eastern Africa. 28 pages.
 - iii. Module 3 - Hygienic milk handling and transportation: a training guide for milk transporters in Eastern Africa. 32 pages.
 - iv. Module 4 - Hygienic milk trading: a training guide for small scale milk traders in Eastern Africa. 32 pages.
 - v. Module 5 - Hygienic milk processing: a training guide for small scale milk processors in Eastern Africa. 40 pages.
 - vi. Module 6 - Hygienic milk marketing and dairy business management: a training guide for dairy farmers, milk traders, transporters and processors in Eastern Africa. 28 pages.
- 7. Each of the above modules includes a training curriculum to be followed in conducting the training. In addition, two trainer guides with more elaborate information have been developed for the trainers:
 - i. Vol. 1: Hygienic milk handling, processing and marketing: Reference guide for training and certification of small scale milk traders in Eastern Africa. 74 pages
 - ii. Vol. 2: Hygienic milk handling, processing and marketing: Training guide for delivery of training for small-scale milk traders in Eastern Africa. 25 pages.
- 8. Lessons learnt from this project include: the importance of using science based evidence to influence policy on informal milk markets in East Africa; peer pressure as an important driver of change among informal milk traders in Uganda; the importance of facilitated dialogue and learning from experiences in

neighbouring countries by regulatory authorities as a basis for achieving harmonised policies. A memorandum of understanding agreed by dairy sub-sector regulators in Rwanda, Kenya, Tanzania and Uganda to apply these training guides in regulating dairy sectors and facilitating cross-border recognition of certified traders is evidence of the commitment to the harmonised policy.

9. The BDS market assessments to identify opportunities for implementing a training and certification scheme in each of the above countries noted that as of now, **BDS may only be viable in certain locations with high market access**. To expand the services, the assessment recommended various approaches to stimulate BDS demand, strengthen BDS supply and regulatory support services. Where the BDS approach was found to be viable at present, it is **recommended** that follow-up actions be undertaken to **pilot test the concept of training and certification of informal milk traders by involving BDS providers in each of the participating countries**. This is in light of the limited capacity of the regulatory authorities to effectively provide the needed services directly. The following specific actions need to be undertaken to ensure the success of the pilot.
 - i. Printing of adequate copies of the approved generic guides for the piloting
 - ii. Hold national consultation forums with key potential BDS providers, development partners, policy makers in the livestock sector, farmers and processors' associations, and informal milk traders in individual countries
 - iii. Adapt guides to local needs including **translation into local languages**
 - iv. Conduct training of trainers courses for potential BDS providers and their accreditation
 - v. Pilot BDS provision of each of the six training modules
 - vi. **Monitoring and evaluation of the viability** of the provision of training and certification as a BDS service.
10. At an appropriate stage and lapse of time, an assessment of the impact of the policy changes should be **quantified** in terms of the **distributional impacts** on the welfare of producers, traders and consumers.

Structure of the report

The report is divided into 6 chapters. Chapter 1 is an introduction that gives the background of the work and the context. Chapter 2 highlights the methodologies and processes which were used in implementing the work towards achieving the objectives of the Phase II. Chapter 3 highlights the achievements made. Chapter 4 summarises the outcomes of a lesson-learning session conducted at a meeting with dairy sub-sector regulators. Chapter 5 gives an outline of future action plan for piloting of improved service delivery and quality assurance in the informal milk marketing chain. Conclusions and recommendations are presented in Chapter 6.

Chapter 1. Introduction

1.1 Background and context

Since 2002 the Eastern and Central Africa Programme for Agricultural Policy Analysis (ECAPAPA) and the International Livestock Research Institute (ILRI) embarked on a programme on **“Rationalisation and Harmonisation of Policies and Standards in Dairy Industry in Eastern Africa”**. Phase I dealt with data gathering and synthesis, which partly formed the basis for a meeting of dairy industry stakeholders from within the East African community (EAC) and the Common Market for Eastern and Southern Africa (COMESA) member states in September 2004. In view of the fact that informal milk traders handle over 80% of milk marketed in the EAC and COMESA member states, it was recommended that efforts be undertaken in the region to assist informal sector stakeholders acquire the necessary skills and knowledge to handle milk as hygienically as possible as a way of safeguarding public health as well as to enable them to be legally recognised and licensed to conduct their businesses within and across borders.

ECAPAPA and ILRI took up the challenge of spearheading this process and developed Phase II of the Dairy Policy Harmonisation Project with a focus on promoting dialogue and action, primarily to address the issue of training for certification of informal milk traders so that they can begin to participate in dairy markets in a manner that is acceptable to dairy industry regulatory authorities and consumers in respect to quality and safety standards of traded milk. Under this phase, dairy industry experts from Kenya, Tanzania, Uganda and Rwanda were brought together to develop training programmes that would enhance the competence of informal milk traders in hygienic milk handling, marketing and small scale processing.

The implementation of this phase was undertaken by a team of dairy industry specialists from Kenya, Tanzania, Uganda and Rwanda under supervision by ILRI. This report gives a brief overview of the process, achievements and lessons that can be learnt from the approach that was used towards achieving the project’s objectives.

The overall objective of the work by the consultant was to promote the uptake of new institutional approaches and appropriate technology to transform informal milk markets and integrate them into domestic and regional supply chains in the ASARECA Region focusing on training and certification of informal milk traders through business development services.

The specific tasks were to:

- i. Develop appropriate national guidelines by national consultants in Tanzania, Kenya, Uganda and Rwanda;
- ii. Consolidate common issues from the national guidelines into generic manual for training of marginalised but majority small-scale traders in milk quality control;
- iii. Define common minimum standards for competence in hygienic milk handling and equipment necessary for cross-border trade by small traders;
- iv. Based on the above and a related consultant report on innovative approaches and processes for business development services (BDS) opportunities in the region, facilitated the development of a generic work

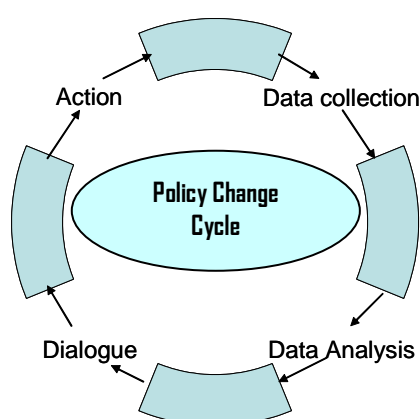
plan for improved service delivery and quality assurance in the milk marketing chain;

- v. Summarise the process, achievements and lessons in a brief synthesis report.

Chapter 2: Methodology

2.1 Approach

The work was carried out in four countries, namely, Kenya, Tanzania, Uganda and Rwanda. A policy change cycle approach was used. The first phase involved data collection and analysis and subsequently this was followed up by dialogue and action phase. The first phase was conducted in 2004 and involved a comprehensive review of policies, rules and regulations affecting the performance of the dairy sub-sectors in five selected countries in the region and documented factors limiting domestic and cross-border movement of dairy inputs and products. During 2005, a second phase that aimed to promote dialogue and action among scientists and dairy sector development and regulatory agencies to realize pro-poor institutional reforms in milk marketing by small-scale milk traders in the region, was initiated.



The dialogue was promoted by engaging national experts with experience in dairy technology and training, to collect and collate the needed background information in each participating country, and comparing the information across countries in regular meetings. The experts worked in close consultation with the national dairy regulatory authorities to define minimum requirements for competence and hygienic handling of milk, for inclusion in milk training guidelines and curricula. This information formed the basis for developing a harmonized generic guide and curriculum for certification of small milk traders that would in turn be tailored to specific national needs without altering the minimum competence requirements agreed upon. A key objective was the cross-border recognition of the certification issued by counterpart regulatory authorities which would promote greater market access. The over-arching aim was that the generic training materials would be availed for adaptation and adoption by other ASARECA countries not directly participating in the initial exercise.

In order to achieve a more sustainable training programme, a private-public sector partnership between business development services (BDS) providers and regulatory authorities was envisaged to be a central component of a work plan to institute the proposed policy and technological changes. This was in light of the limited capacity of the regulatory authorities to effectively provide the needed services directly, but to instead limit their role to facilitating the provision of the services.

From the regulatory viewpoint, the adoption of the approach of training and certification of informal milk traders for purposes of integrating rather than alienating them in dairy markets is a major policy change. The dialogue phase brought all the regulatory authorities into the discussion. A workshop to this effect that was attended by heads of dairy regulatory agencies and key experts from Kenya, Uganda,

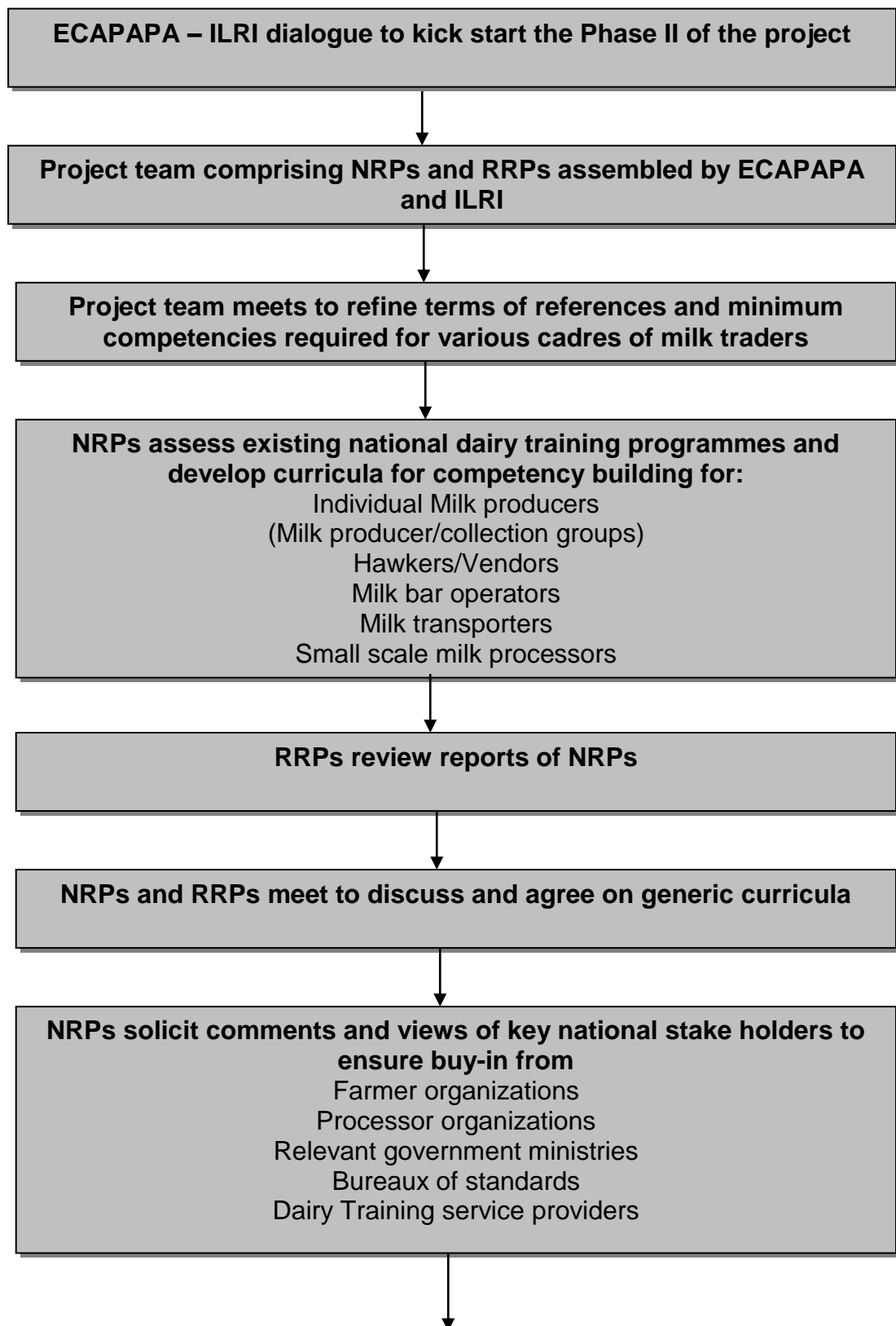
Tanzania and Rwanda took place in Nairobi in February 2006 Nairobi. The objective of the workshop was to:

- i. Discuss regional generic training guidelines, curricula and minimum competency requirements for hygienic milk handling and obtain further comments from dairy sub-sector regulators in the region.
- ii. Endorse the materials as a basis for certification of small-scale milk traders in the region.
- iii. Draw lessons from the process and related on-going policy and institutional changes in dairy sub-sectors in the region
- iv. Facilitate dialogue and development of modalities for co-operation between regulatory authorities of Eastern African countries

At the above workshop, a decision was taken by the regulators to form an Eastern Africa Dairy Regulators' Association Council (EADRAC) to provide the mechanism for following up issues raised in harmonisation of dairy policies in the region. A memorandum of understanding (MoU) that was recommended as a basis for the interaction in the Council was drafted shortly thereafter and signed at another meeting convened in Dar es Salaam in September 2006.

2.2 The process and envisaged outcomes

The training and certification policy dialogue was conducted through a series of programmed steps as follows.





Chapter 3: Summary of activities and achievements

3.1 Analysis of current practices for training and certification of informal dairy chain operators

An analysis of the current practices for training and certification of informal dairy chain operators in the four countries by the NRPs showed that some training is carried out for small-scale dairy farmers by NGOs such as the Heifer in Trust schemes while the training of other cadres is done on an ad-hoc basis. While there are standards for training and certification in post secondary school technical training institutions under government departments responsible for livestock development, there is no standard curriculum or monitoring and evaluation of the informal sector operators. In all countries, training and certification is currently not a pre-requisite for licensing of informal milk traders by regulatory authorities. The only requirement is payment of applicable licensing fees. Current legislation in Tanzania, Kenya and Uganda provide for registration and/or licensing of dairy industry stakeholders. Table 1 summarises the current practices and proposals for making training and certification mandatory for informal milk traders so as to improve quality and assist in the gradual transformation of the informal to formal sector.

Table1. Summary of types of current training and certification of dairy industry stakeholders in Tanzania, Kenya, Uganda and Rwanda

Type of cadre	Tanzania	Kenya	Uganda	Rwanda
Individual farmers	Aspiring farmers under HIT scheme receive two weeks training in dairy husbandry No training for traditional cattle keepers Objective: Develop necessary knowledge and skills in dairy farming; Certification: none Licensing: None Registration: currently none; provided for under new Legislation	Farmers attend short course at farmers training centers: No training for traditional cattle keepers Objective: competence building Certification: none. Commercial farmers employ trained personnel Licensing: None Registration: None	Aspiring farmers under HPI-HIT scheme receive two weeks training in dairy husbandry. No training for traditional cattle keepers Objective of dairy farmer training: Competency building Certification: none Registration: None	None
	Proposal: Farm level milkers and milk handlers to undergo 2-3 day outreach training in milking and milk hygiene and receive certificate of competence after satisfying a practical test given by an accredited BDS provider			
S/Help Farmer groups/ Coops/ CBOs	Training given to operate HIT scheme and to collect and market milk from members Certification: Certificate of participation Registration: Coops, CBO/NGO by Ministry	Training given in dairy husbandry, milk handling, group management Certification: Certificate of participation Registration: Coops, S/H groups, CBO, SACCOS under various government departments (social services,	Training given in dairy husbandry, milk handling, group management Certification: Certificate of participation Registration: Coops, associations,	None

	of Home Affairs Licensing: None by TDB Registration: Provided for under new legislation	cooperatives; home affairs) Licensing: KDB licence for operating MCC	(Ministry of Trade) CBOs Registered by DDA Licence for MCC by DDA	
	Proposal: Make the employment of a person who has been trained in hygienic milk handling and testing a pre-requisite for registration and licensing of Milk collection Centres by dairy regulatory Authorities. Develop check list for licensing form (adapt that from KDB)			
Hawkers/ Vendors	No prior training needed Licensed by district/town councils Levy collected by local councils Registration: None by TDB currently but provided for under new legislation	No prior training needed Not licensed No cess /levy collected Traders Outlawed!	No prior training needed Not licensed Levy collected by but Outlawed!	
	Proposal: Make 4-5 days training in milk hygienic milk handling and use of approved containers necessary for licensing. Certificate of competency be given by the BDS provider upon satisfying both theoretical and hands-on evaluation			
Milk transporter s	Specialised milk transporters not widespread in Tanzania. No statutory requirement for prior training	Widespread in Kenya, bulk of KDB's licensing portfolio. Prior training not mandatory. Have to meet specified criteria before licensing <i>Ad hoc</i> training undertaken; no specific curriculum	Licensed by DDA. Training not prerequisite for licensing	
	Proposal: Make "on site" training on hygienic milk handling and transportation necessary for licensing. The training would be spread over one –two weeks, divided into 2-3 hrs sessions/units per day to fit in transporters daily work schedules. Certificate of competency be given by the BDS provider upon satisfying both theoretical and hands-on evaluation.			
Milk bar operators	Training not requirement. Licensing by Local council after satisfying public health requirements	Training not prerequisite for licensing Training given by KDB for competency building Registration and licensing by KDB. Not defined but subjected to code of hygiene during licensing	Training not prerequisite for licensing Training given by DDA for competency building Registration and licensing by DDA. Statutory definition available-basically milk selling outlet	
	Proposal: Define a standard for milk bar; what it should entail in terms of products, activities that can take place, e.g., level or extent of processing, where not available (e.g. Tanzania, Kenya). Make training of personnel in milk bar/milk cooler/freezer operations a necessary pre-requisite for licensing. The 5-day (40			

	hrs) module may be spread over two to three weeks divided into 2-3 hour sessions per day. Certificate of competency be given by the BDS provider upon satisfying both theoretical and hands-on evaluation			
Small scale processors	Training not a prerequisite for licensing Training under special programmes sponsored by NGO (cf. Ondakuu's NRP report). No specific curriculum	Training not a prerequisite for licensing Training under special programmes sponsored by KDB, Ministry NGO s (cf. Cherono's NRP report) No specific curriculum DTI Naivasha has 6 specific modules since 1997.	Training not a prerequisite for licensing Few training under special programmes (Land O'Lakes see report) No specific curriculum Entebbe dairy School being refurbished	
	Proposal; Make training of processing personnel pre-requisite for licensing. For supervisors. Require processors to employ operational personnel who have undertaken basic tailor made training for specific products they are employed to process. (Buttermaking, cheese making, fermented milk, liquid milk etc) which would lead to certification as Competent Buttermakers, Cheese maker, Milk processor, Ice cream maker etc) see for example 5-day DTI Naivasha modules on cheese, Butter, Cultured products. Products such as cheese may require longer residential training (e.g. 4 weeks) coupled with industrial attachments (1-2 months) leading to "Certified Cheese Maker" qualifications.			

3.2 Identification/definition of key milk value chain operators/players

The study team met twice in Kampala Uganda and once in Dar-es-Salaam, Tanzania to develop and agree on minimum competencies of various carders of milk value chain. The following six groups of key players were identified.

- 1) Individual farmers/farm level worker owning/handling at least one cow and producing milk for the market
- 2) Self-help groups/Farmer groups/Coops/CBOs operating milk collection and/or cooling centres
- 3) Hawkers or milk vendors
- 4) Milk transporters
- 5) Milk bar /Milk cooler operators
- 6) Small scale milk processors

3.3 Development of key minimum competencies required of each carder for production of hygienic and safe milk

Cadre	Minimum areas of competencies required
1. Individual farmers/farm level worker owning/handling at least one cow and producing milk for the market	<ul style="list-style-type: none"> • How to produce clean milk on the farm • How to handle milk in accordance with good hygienic practices (GHPs) • Procedures for carrying out basic milk quality tests
2. S/Help Farmer groups/Coops/CBOs operating milk collection and/or cooling centres	<ul style="list-style-type: none"> • Hygienic milk production • Hygienic milk handling • Milk quality control and testing • Hygienic milk storage, preservation and transportation • Maintenance of milk handling and cooling equipment
3. Hawkers or milk vendors	<ul style="list-style-type: none"> • Hygienic milk production • Hygienic milk handling • Milk quality control and testing • Hygienic milk storage, preservation and transportation • Maintenance of milk handling and cooling equipment
4. Milk transporters	<ul style="list-style-type: none"> • Hygienic milk production • Hygienic milk handling • Milk quality control and testing • Hygienic milk storage, preservation and transportation • Maintenance of milk handling and cooling equipment
5. Milk bar /cooler operators	<ul style="list-style-type: none"> • Hygienic milk production • Hygienic milk handling • Milk quality control and testing • Hygienic milk storage, preservation and transportation • Maintenance of milk handling and cooling equipment
6. Small scale milk processors	<ul style="list-style-type: none"> • Hygienic milk production • Hygienic milk handling • Milk quality control and testing • Milk quality grading and payment systems • Hygienic milk storage, preservation and processing/packing • Maintenance of milk handling and cooling equipment • Dairy effluent management systems • Code of hygienic practice • Hygienic processing of specific dairy products (according to need)

3.4 Development of training curriculum for above carders and competencies

3.4.1 Farm level workers

The farm level worker should be able to perform the following tasks:

1. Feed dairy animals adequately with the right type of feeds at the right time
2. Milk cows hygienically
3. Handle and store milk hygienically
4. Observe withdrawal periods for cows on treatment
5. Be able to screen cows for mastitis
6. Keep records and manage dairying as a profitable business
7. Observe dairy regulations and good milk production practices

To become competent farm level workers need to master the following subject matter content:

1. Dairy cattle feeding
2. Attributes of good quality milk and factors affecting its quality and safety
3. Sources of milk contamination, and how to minimise it
4. Essential elements of personal and equipment hygiene
5. Udder health, mastitis and environmental hygiene
6. Cleaning, sanitization and storage of milk utensils,
7. Milk quality tests (organoleptic tests, lactometer reading, clot on boil test, alcohol test)
8. Quality and financial record keeping,
9. Regulatory requirements, for hygienic milk production and handling on the farm

The proposed training programme for this cadre of dairy chain operators is shown in Appendix Table 1.

3.4.2. Milk Collection/cooling centre (MCC) operators

There is no pre-requisite training level of formal education necessary to enter into the milk trade (Cooler & Freezer) but one should be able to demonstrate competence in milk hygienic handling and ensure milk safety.

Therefore the Cooler / freezer operators should be able to perform the following tasks:

1. Distinguish between good and poor quality milk
2. Maintain good personal hygiene
3. Clean and sanitise dairy equipment and premises
4. Maintain and operate milk cooling machines
5. Maintain and operate milk handling equipment
6. Carry out basic milk quality tests
7. Follow good hygienic practices
8. Maintain the quality of milk by proper storage, use of appropriate equipment and approved milk preservation methods
9. Comply with regulatory requirements

To become competent MCC operators, the following subject content need to be mastered:

1. Characteristics of good quality milk
2. Factors affecting milk quality and how to maintain quality during milking, storage and transportation
3. Techniques for carrying out basic milk quality tests (organoleptic, clot-on-boiling and alcohol tests) and milk sampling.
4. Characteristics of good milk handling equipment
5. Procedures for cleaning and sanitation of milk handling equipment
6. Requirements for dairy (location, design, waste disposal)
7. How to take care of milk storage and dispensing equipment: troubleshooting and basic maintenance
8. Provisions of dairy regulations, environmental regulations
9. Basic dairy record-keeping and business management

The necessary training programme is shown in Appendix Table 2.

3.4.3 Milk transporters

There is an emerging group of milk traders who are becoming specialised milk transporters, especially in Kenya and increasingly so in Uganda and Tanzania as well. Milk transporters need to have the following competencies:

1. Carry out basic quality tests on milk
2. Distinguish between poor and good quality milk
3. Transport milk in appropriate containers and in a timely manner
4. Deliver high quality milk from the milk collection centres outlets and dairy factories in the urban areas
5. Operate milk transport business in compliance with regulations and good hygienic practices
6. Keep records and operate transport as a profitable business

To become competent milk transporters, the following subject content need to be mastered:

1. Knowledge on approved design of transport vehicles and milk equipment
2. How to take care of transport vehicles
3. Factors affecting milk quality and how to maintain quality during transportation
4. Milk sampling
5. Characteristics of good quality milk
6. Basic quality tests (organoleptic, clot on boiling and alcohol test)
7. Cleaning and sanitation of milk handling equipment
8. Provisions of dairy regulations, traffic and road safety provisions and environmental regulations
9. Good business practice (Milk deliveries and financial records)

The above knowledge and skills may be imparted in 1-2 day short residential or outreach training programme

The necessary training programme is shown in Appendix Table 3.

3.4.4 Itinerant milk traders or vendors

Small milk traders and vendors operate between remote farmers and milk collection points or cooling centres. Some supply milk directly to consumers in urban centres. A milk trader must be able to:

1. Distinguish between poor quality milk and good quality milk
2. Use appropriate equipment and deliver milk timely
3. Clean and sanitize milk handling vessels adequately
4. Conduct simple quality tests on milk
5. Observe the legal regulations regarding hygienic handling of milk including use of appropriate equipment, and absence of added water and antibiotic residues in milk
6. Keep simple financial and milk records

To have the above competence, a milk trader needs to be knowledgeable on the following:

1. Characteristics of good quality raw milk

2. Factors influencing the quality and safety of raw milk
3. Simple milk testing techniques
4. Legal requirements and standards on milk handling and hygiene
5. Cleaning and sanitation of milk storage vessels
6. Dairy and financial record keeping

Knowledge on the above subjects can be imparted in 1-2 day short course residential or outreach training programme.

The necessary training programme is shown in Appendix Table 4.

3.4.5 Small-scale milk processors

Small scale dairy processors should be able to:

1. Perform basic raw milk quality tests
2. Perform basic quality tests on various types of dairy products
3. Distinguish between poor and good quality milk
4. Handle and process milk hygienically
5. Maintain and operate processing equipment
6. Practice good hygienic practices including personal hygiene and good manufacturing practices
7. Produce wholesome and safe dairy products that meet set standards for quality and safety
8. Keep good records and be knowledgeable in basic dairy accounting

For small scale dairy processors to develop minimum competencies to handle and process milk safely, they need to be knowledgeable and skilled in the following;

1. Milk quality control and testing
2. Factors that influence the quality and safety of milk and dairy products
3. Good hygienic practices during handling, transportation and processing of milk
4. Hygienic processing of specific dairy products
5. Cleaning, sanitation and preventive maintenance of dairy processing equipment
6. Quality control and testing of dairy products, including written protocol for product recall
7. Personnel hygiene and code of hygienic practices
8. Dairy records and accounting

These topics can be covered in 1-2 day short course, residential or outreach training programme, which may be tailored for specific dairy products.

The necessary training programme is shown in Appendix Table 5.

3.4.6 Dairy business management for small scale dairy farmers, milk traders and processors

All dairy chain business operators need to have the following competencies

1. Basic marketing and business management
2. Business plan preparations
3. Marketing and distribution skills and consumer care

4. Keeping of dairy records

To be competent in the above skills, all dairy chain operators need to master the following:

1. Fundamentals of marketing and business management
2. Fundamentals of business planning
3. Marketing fundamentals
4. Essential financial and dairy records

The necessary training programme is shown in Appendix Table 6.

Based on the above areas of competency for each cadre, training curricula were developed for each cadre as shown in Appendix 1 to 6.

3.5 Generic training guides

Based on the above areas of competence, six guides were developed by each national resource person. These were then synthesised by the Regional Resource persons (RRP) into six generic training guides (see Appendix 2a– 2f). These are:

Module 1: Hygienic milk production (for farm level workers)

Module 2: Hygienic milk collection and testing (for milk collection/cooling centre operators)

Module 3: Hygienic milk handling and transportation (for milk transporters)

Module 4: Hygienic milk trading (for Small-scale milk traders)

Module 5: Hygienic small scale milk processing (for small-scale processors)

Module 6: Fundamentals of marketing and dairy business management (for all dairy chain actors)

The above modules have been approved by dairy regulatory authorities for certification of informal milk traders who successfully undertake the prescribed training and follow the approved code of hygienic practices. They may be adapted to each country's specific situation and circumstances. They are designed to ensure that dairy chain operatives have the minimum competences required to undertake hygienic milk handling and marketing while guaranteeing quality and safety.

3.6 Development of generic training of trainers guides

Two generic guides for training of dairy advisory service providers and trainers so as to enable them acquire the necessary competence to train/advise:

- a) Milk producer groups in hygienic milk handling on the farm
- b) Milk transporters in hygienic milk transportation business practices
- c) Small scale traders in hygienic milk handling and marketing
- d) Milk bar/parlour/kiosk operators and retailers in hygienic milk handling and profitable milk bar operation and retailing.
- e) Small-scale processors in hygienic and profitable small-scale milk processing

- f) All small-scale dairy industry operators on basic and essential regulatory procedures, standards and regulations governing the technical and business operations in the dairy industry.
- g) All small-scale dairy chain operators on milk marketing and business planning.

To be able to deliver on the above core competence outcomes, trainers would require knowledge and understanding on:

- a) Milk quality management at the production farm, milk quality management at farmers' group owned milk collection/cooling centres
- b) Milk quality and management during milk transportation and small scale milk trade.
- c) Appropriate technologies for small scale milk processing and preservation
- d) Appropriate record keeping and business management for small scale milk traders, transporters and processors.
- e) Code of hygienic practices and regulations governing milk handling, transportation and processing.

The developed Trainers guides are given as Appendix 3a and 3b.

3.7 Proposed training and certification arrangements

In line with current legislation in respective countries, the dairy regulatory authorities are empowered to register and licence dairy industry stakeholders operating in the formal sector. At the same time quality improvement in the dairy value chain is also a primary responsibility of the regulatory authorities, which include the Dairy Boards, and Government Ministry responsible for Livestock development. Hence, in order to improve and nurture the transformation of the informal value chain operators, licensing and registration should be accompanied by training and certification of the various cadres. The provision of this service should not be confined to public sector dairy training institutions alone. To be more sustainable and reach as many people as possible, the involvement of private Business development service providers (BDS) would be worthwhile. Their involvement could involve training of trainers courses where competence to provide such services is lacking followed by accreditation by regulatory bodies i.e. the national Dairy Boards/Development Authorities.

The milk quality assurance scheme to be facilitated by the regulatory authority through privately provided business services would involve the following:

The BDS provider:

- Provides training and other services to milk traders on milk safety and quality control and hygienic handling
- Issues certificates of competence to trained traders
- Reports his/her activities to the regulatory authority

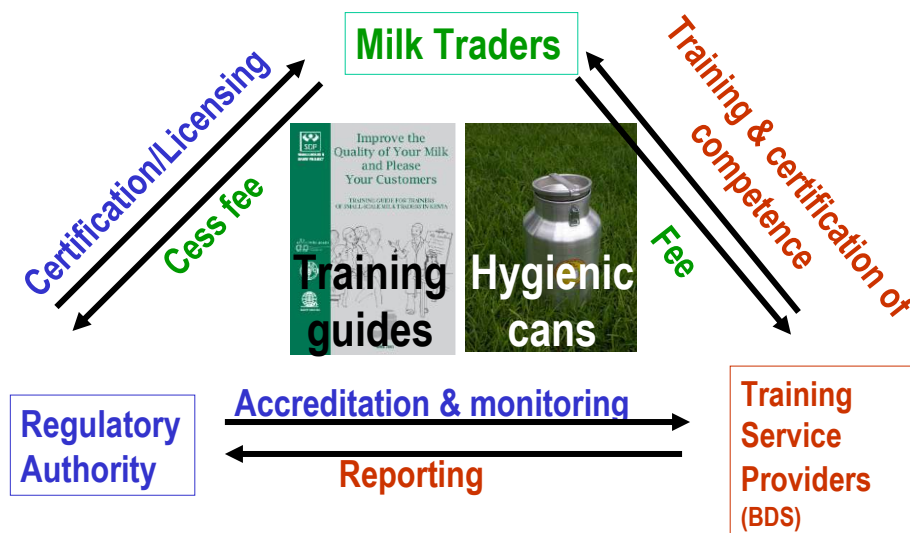
The milk traders:

- Pays cess fee to the regulatory authority upon showing a certificate of competence
- Conducts his/her business within norms accepted and approved by regulatory authority

The regulatory authority:

- Accredits BDS providers based on agreed minimum standards of competence for trainers
- Issues licences to trained traders based on the evidence of a certificate of competence
- Monitors compliance of accredited BDS providers to approved trainers competence level
- Monitors compliance of certified milk traders to approved minimum standards for milk handling. Fig 1 shows the proposed arrangements

Schematic Representation of a Quality Assurance Scheme Involving Business Development Services (BDS)



Adapted from Omore, 2005.

Chapter 4: Lessons learnt

The outcome of the lesson learning session conducted during the last consultative meeting of the ECAPAPA team with dairy regulatory authorities from Kenya, Tanzania, Uganda and Rwanda revealed a number of lessons and experiences that are driving policy changes regarding informal dairy markets in East Africa during the last 10 years. In particular, the following were noted:

- a) The macro economic policies changes (privatization, trade liberalization) that have reduced direct government involvement in dairy marketing and promoted the participation of the private sector have spurred the dairy policy changes through the **proactive engagement of different stakeholders to improve and transform informal markets**. Elements that have been at the forefront of this proactive engagement include:
 - i. Small-scale farmers
 - ii. Stakeholder associations
 - iii. Small-scale traders
 - iv. Central government/regulatory authorities
 - v. Processors
 - vi. Consumers
 - vii. Researchers and
 - viii. NGOs
- b) Key influences and events that have led to or facilitated proactive engagement of key stakeholders include
 - i. Overarching government strategies for poverty reduction
 - ii. Lobbying by farmers
 - iii. Lobbying by traders
 - iv. Lobbying by formal milk processors against informal sector actors
 - v. Research to improve milk safety
 - vi. Research showing social benefits of informal milk markets
 - vii. General realisation that informal sector is important and should be addressed
 - viii. Consumers and traders kept doing the same thing even under difficult circumstances and challenges.
 - ix. Specific government policy on engaging the informal sector
 - x. Observing experiences in neighbouring countries

Among the above drivers of change, the following have had profound influence on attitudinal and policy change towards the informal sector:

i) **The general realization that informal sector is important and should be addressed rather than ignored or excluded**

Although the general realisation that that the informal sector is important, and should be addressed, has been there for some time, but change was resisted because of a number of factors:

- o Lack of awareness of ways of actually engaging with the informal sector
- o Technocrats' orthodox approaches to milk production and marketing
- o Genuine concern about public health risks

Percent milk marketed informally in selected countries in the region

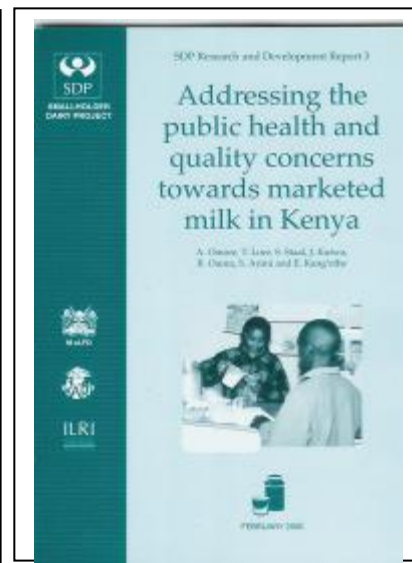
Country	Percent
Kenya	86
Tanzania	95
Uganda	90
Rwanda	90
Ethiopia	95
Malawi	95
Zambia	90

Source, A. Omore, 2006

ii) Research showing the social benefits of informal markets and on technologies and practices that can enhance food safety,

In recent years, there has been a lot of research work on informal dairy markets conducted by ILRI and partners in the eastern Africa Region (e.g., Omore et al., 2003; 2004; 2005).

Research findings from such studies may be important, but they have to link with appropriate actors to advocate on the basis of the findings, before changes can take place. As a result of the intensive discussion and sharing of results such as those shown in Boxes 1 and two below, the policy makers now appreciate the positive role informal dairy market agents play in linking farmers to milk consumers without necessarily endangering the health of the latter.



Box 1: Proportion of unacceptable milk samples from informal milk traders

Quality criteria	Proportion above acceptable limit (%)			Public health implications
	Kenya (SDP, 2004)	Tanzania (Omore et al, 2004)	Ghana (Omore et al, 2004)	
Adulteration with added water	10	20-60	37	Farm-market chain critical control point. In conflict with public interest and regulators
Coliform counts	52	55-58	23-27	Inactivated by boiling, pasteurisation; indicates poor hygiene; recontamination of heated ready to eat products
Prevalence of antimicrobial drug residues	6	35-40	35	Farm level critical control point. Not removed by pasteurization
Prevalence of <i>Brucella</i> antibodies	5	20-23	22-29	<i>B. abortus</i> destroyed by pasteurisation; may survive milk fermentation (pH >4.2)
Prevalence of <i>Mycobacterium bovis</i>	0	0	0	Inactivated by pasteurisation/boiling; survive milk fermentation (pH>4.2)
Mycobacteria other than tubercle bacilli (MOTTs)	n.r.	10	Not investigated	Inactivated by pasteurisation/boiling, recontamination
Prevalence of haemorrhagic E.Coli 0157:H7	<1	0.24	<1	Isolates have so far been from raw milk samples

An important underlying factor to the positive changes in mindsets is the value of evidence based knowledge in influencing policy changes. In this case the risk analysis studies on milk-borne public health risks from milk markets in Kenya and Tanzania have been critical. This shows the benefits of integrating research with development projects.

- Box 2**
- 96 -100% milk consumers boil milk
 - >50 of pasteurized milk at point of sales exceed official standard of 30,000 c.f.u/ml> poor storage conditions
 - Antimicrobial residues present above MRLs in 8.2% of pasteurized milk and 15% in milk from rural households
 - Antibodies for brucella present in both pasteurized milk and raw milk samples
 - Milk in clean metal containers bacteriologically better than from plastic containers

iii) Observing experiences in neighbouring countries

Observation of experiences in neighbouring countries, especially the way traders in Kenya had been engaged for training, helped catalyse the change. Specific government policies varied between the different countries, and actual engagement with the informal sector reflected this.

One of the experiences that is positively influencing adoption of 'good practices' is Uganda's experience in improving quality in its informal milk markets after the dairy sector was liberalized. Prior to the establishment of the Dairy Development Authority (DDA) in 1998, milk quality control among small scale traders and regulatory systems tailored for their needs were non-existent and raw milk was commonly handled in plastic containers and heated by open-pan boiling, often under unhygienic conditions. Following appropriate sensitization and training by the DDA, informal traders jacketed batch pasteurizers to replace the open-pan boiling system. Plastic containers for handling milk have increasingly been replaced with metal containers, thus improving milk quality. One of the key factors contributing towards this



Fig.; Unhygienic open pan boiling of milk



Fig 3. Hygienic water bath heating of milk

high level of quality compliance among informal traders within the relatively short span of DDA's existence has been its adoption of a "peer pressure" approach to sensitize groups of traders to join training programmes, with rewards for attendance. The traders now regard DDA as partners working for their good, as long as they adhere to the set code of hygienic practice. This progress forms a good basis for further dissemination and uptake of appropriate milk handling

technology among other informal sector cadres and offers vital lessons for other countries to adopt.

iv) Overarching pro-poor government strategies

In recent years there has been a general policy shift towards supporting poverty reduction strategies in most sub-Saharan countries. These include the Poverty Eradication Action Plan in Uganda, the Economic Recovery Strategy for Wealth and Employment Creation in Kenya, and the Poverty Reduction Strategy Paper (PRSP), the Agricultural Sector Development Strategy (ASDS) in Tanzania). These national strategies have helped the focus on small-scale agricultural product operations and employment issues, together with the issue of poor consumers' access to affordable food and nutrition security. However, this also needed a mechanism to make it realistic, which the research and experiences in other countries helped to provide.

Box 3:
The positive development towards transformation of the informal dairy sector in Uganda is providing an important lesson that other countries in the region are showing interest to emulate.

The positive development towards transformation of the informal dairy sector in Uganda is providing an important lesson that other countries in the region and are showing eagerness to emulate. In Tanzania the newly created Tanzania dairy Board has a place for representation of Milk traders on the Board of Directors, provided they have a national association of milk traders. This is yet to happen but shows the government policy of transformation of the informal business across all sectors of the economy.

v) Lobbying by informal milk traders

Lobbying by traders had been identified as an important influence, yet on the whole, informal sector players were poorly organised, and lacked a mechanism for their voice to be heard. On the other hand, lobbying by formal processors against alleged unfair competition posed by informal traders had the opposite effect of highlighting the plight of informal sector actors and the important role they play in linking poor rural milk producers and poor urban consumers!. The economic returns in dairy trade provided a strong incentive for informal actors to apply peer pressure on colleagues to adapt technologies and practices recommended by regulatory authorities and researchers and form associations. This has been particularly evident in Uganda and to some extent in Kenya and Tanzania.

Box 4:
Following appropriate sensitization and training by the DDA, informal traders have formed groups and acquired hygienic water jacketed batch pasteurizers. Peer pressure was successfully applied leading to widespread

vi) Engaging the regulatory authorities

Bringing on board the regulatory authorities to discuss the concept of training and certification and accreditation of BDS providers has shown that involving policy makers can bring about policy changes more quickly than through formal government policy making machinery.

Box 5
Engaging regulatory authorities in policy dialogues helped change mindset of policy makers more quickly than formal government policy

The engagement of top-level regulatory stakeholders in developing informal milk markets through a more effective quality assurance scheme also indicates a willingness to transform the sector. This is particularly evidenced by the action taken by KDB to include the project's outputs in its recently released Strategic Plan to 2009. Already, the KDB has partnered with a local NGO to implement a quality assurance scheme based on the institutional framework outlined here. This noteworthy attitudinal change being witnessed among the top-level staff at KDB is encouraging but still needs to trickle down to the level of field staff, some of whom still carry out their activities with an "anti-raw milk marketing" mindset. This pilot project is being monitored through qualitative and quantitative approaches to evaluate both technical and behavioral changes among project implementers and boundary partners, through Outcome Mapping (Earl et al., 2001) to learn lessons that would inform the development of generic work plans for the other countries in the region.

c) Influence on regional harmonisation policies:

ECAPAPA's **Rationalisation and Harmonisation of Policies and Standards in Dairy Industry in Eastern Africa**" Phase I programme dealt with harmonization and rationalization of milk and dairy products standards within Eastern Africa targeted and engaged mainly engaged the formal sector processors. The interest of the formal processing sector, regulators and standards agencies is often limited to product microbial compositional specifications, processes and procedures for product manufacture and quality control and testing. Yet, in the informal sector, the lack of training is one major factor leading to lack of the necessary knowledge and skills in hygienic milk handling and processing or milk and dairy products to the required standards. Hence the need for standardising training curriculum for this level of training cannot be overemphasised. Hence phase II of the ECAPAPA programme on rationalisation and harmonisation of policies and standards in Eastern Africa focused on developing and recognising common levels of training and certification for small scale traders and accreditation of BDS providers for dairy training and certification. The process outlined in Section 2.2 provided room for dialogue and engagement of key stakeholders at all levels. At the end of the day, the regulatory authorities were unanimous in endorsing the standardised curricula for use in their respective countries.

Regular meetings by those involved have provided a useful forum for learning from each other's experiences in streamlining the activities of informal milk markets. However, a very important catalyst has been the process supported by ECAPAPA. Experiences from other countries need to be observed, or reported on, before they are likely to be acted upon. The ECAPAPA initiative had exposed the regulators from the different East African countries to the situations in their neighbouring countries, as well as comprehensive reports on their own country. Whilst participants had been aware of all these issues to a large extent, the ability to obtain comprehensive reports, and then have facilitated processes for discussing these with their peers from neighbouring countries, enabled progress to be made which would have been very difficult without this support. It also enabled the development of a curriculum for training that was acceptable across the different countries.

Therefore, the major influences that have lead to the agreement to recognise common training standards for small scale traders were:

- Realisation of country-to-country variances
- Recognition of regional cooperation and integration

- Lack of standardised training curricula at national level
- ECAPAPA project, which has facilitated exchange of ideas and experiences in other countries and the development of common training curricula.
- Acceptance of the fact that unregulated cross-border dairy trade is on-going and is likely to continue hence the need to legitimise and facilitate control of these trade activities.

The influence already identified as “**Observing experiences in neighbouring countries**”, which had been discussed above, was very relevant here. When such experiences are observed, good practices and successful engagement is likely to be replicated, and unsuccessful initiatives dropped. This inevitably leads towards similar initiatives occurring, and pressures for similar policies to emerge in countries with similar issues and circumstances.

Specifically, Kenya’s proactive engagement to train and licence small scale traders provided a specific model around which harmonisation and rationalisation of policy could form

Box 6
Specifically, Kenya’s proactive engagement to train and licence small scale traders provided a specific model around which harmonisation and rationalisation of policy could form

d) Further policy changes and the way forward

Since the uptake of the quality assurance scheme depends on active participation of traders and regulatory authorities, the current consultation with them will be extended to meetings among them and exposure to promising pilot projects in the region. This is expected to make them more willing to openly engage in activities geared towards the development of informal milk markets. Further changes towards harmonized and rationalized dairy policy can be expected in the short to medium term if the following action lines are implemented:

1. The incorporation of the harmonised training guides in individual countries’ work plans. This was agreed by participants from all countries. The agreement at the current meeting to have harmonised training curricula and guides was a big step forward towards this.
2. The bodies that should be responsible for taking this forward were the national dairy boards. These bodies should take the lead in implementing training.
3. However, funding of training was raised as an issue. Payment for training by the traders themselves would be the ideal situation, and this would have to be the medium to longer term aim. But initially there would be need for some support of training costs. This may be difficult within existing budget limitations.
4. A suggestion from Uganda’s representatives was that the Uganda National Dairy Traders’ Association (UNDATA) might be a source of funding for this training.
5. A specific issue of quality control at borders was raised by the Rwandan representative. He expected quality control procedures at the borders to be improved in the near future. However there is a general feeling among dairy regulators that for zoosanitary reasons, raw milk trade across borders should not be encouraged, although an evidence based opinion on this is still required. An alternative is cross border transportation of pasteurised milk in

bulk for onward re-pasteurisation and retail packaging in the recipient country. These issues are still under discussion.

Chapter 5: Outcome of BDS market assessment and suggested work plan to facilitate piloting of improved service delivery and quality assurance in milk marketing chains

The BDS market assessments to identify opportunities for implementing a training and certification scheme in each of the countries noted that as of now, BDS may only be viable in certain locations with high market access. To expand the services, various approaches to stimulate BDS demand, strengthen BDS supply and regulatory support services are needed (Box 7).

Box 7.	Possible interventions for developing the DBDS market
Area of intervention	What needs to be done
1. Stimulate DBDS demand,	<ol style="list-style-type: none"> 1. Raise awareness of the potential clients <ul style="list-style-type: none"> ~ On the value of DBDS in their respective dairy enterprises ~ On the availability of the services i.e. where to get them, ~ On the regulations that require them to use the DBDS, 2. Raise awareness of consumers on milk quality and why they should buy only from certified sources. 3. Establish/ reinforce laws and regulations that stimulate demand for DBDS 4. Develop DBDS packages that are appropriate, relevant, affordable and available. 5. Make the difference between those demanded/utilized the DBDS from those who haven't (promote and give identity to the DBDS users for increased recognition and profit)
2. Strengthen DBDS supply,	<ol style="list-style-type: none"> 1. Develop a pool of qualified and accredited DBDS providers among potential clients and other dairy stakeholders who could outsource /contract them 2. Develop packages with appropriate tools and methods. 3. Make the DBDS Providers easily accessible by strategically distributing them geographically. 4. Monitor providers' performance and act accordingly 5. Ensure creativity in delivery mechanisms with flexibility in responding to client needs and circumstances. 6. Facilitate networking, experience sharing and technical complementarity among Providers (encourage them to form and association)
3. Strengthen regulatory functions.	<ol style="list-style-type: none"> 1. Accredite qualified DBDS providers 2. Harmonize DBDS provision with other stakeholders, 3. Promote DBDS packages and the providers, 4. Reduce bureaucracy in licensing, 5. Monitor performance of both users ad providers and act accordingly, 6. Tie DBDS utilization to licensing.

Source: Mugittu, V., (2006)

Where the BDS approach was found to be viable at present, it is recommended that follow-up actions be undertaken to pilot test the concept of training and certification of informal milk traders by involving BDS providers in each of the participating countries. Activities that should precede a pilot exercise on training and certification of informal milk traders are:

- 1) Printing of copies of the generic guides already approved by regulators in the region. Further tailoring or adaptation of the guides to

- suit specific circumstances may be needed in some cases e.g., translation
- 2) Conducting national consultations forum with key potential BDS providers, development partners, ministries responsible for livestock development, farmers and processors associations, informal milk traders in individual countries
 - 3) Conducting training of trainers courses for potential BDS providers and their accreditation
 - 4) Piloting of BDS provision of each of the six modules
 - 5) Monitoring and evaluation of the impact of training and certification on milk trade practices and milk quality

The objectives of each activity and key players are outlined in the table below.

Activity	Objective	Persons responsible	Technical support
1. Printing of copies of the approved generic guides in English	Make guides available in each country	ECAPAPA-ILRI	-
2. Conducting national consultations forum	Sensitisation and buy-in by key stakeholders	National Regulatory Authorities	ECAPAPA/ILRI/NRP
3. Adaptation of guides to local needs including translation into local languages	Tailor guides to local needs	National Dairy Authorities	ECAPAPA/ILRI/NRP
4. Conducting Training of Trainers Course for potential BDS providers and their accreditation	Creating a critical mass of BDS providers	National Dairy Authorities	ECAPAPA/ILRI/NRP/RRP
5. Piloting of BDS provision of each of the six modules	Testing of suitability of modules, capacity of BDS providers	National Dairy Authorities	NRP/RRP
6. Monitoring and evaluation	Evaluating and documenting impact of Training and Certification of Informal milk traders on milk quality and handling practices	National Dairy Authorities	ECAPAPA/ILRI/NRP/RRP

Chapter 6: Conclusions and Recommendations

The development of training guides for training and certification of informal milk traders has been implemented through considerable team-work between national resources persons and regional resource persons working under. The developed guides offer a standard curriculum for quality improvement through training and certification of informal milk traders in East Africa.

In order to test the applicability of the developed training modules it is important that pilot phase of the institutional approach to training and certification be executed in each participating country. This should start with a baseline study on practices and quality of milk in the informal sector followed by training with regular monitoring and evaluation of changes in practices and quality of milk handled by trained versus untrained milk chain actors.

Further, an assessment of the impact of the policy changes on the welfare of producers, traders and consumers would be useful in quantifying the benefits of the un-written (change of mindsets) and written policy changes.

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APPENDICES

Table 1: Training curriculum and minimum competencies for farm-level workers

Target Group	Course Title	Type of course & location ¹	Course units (sessions)	Subunits	Objectives (Competency sought)	Course Sessions	Duration		Training method/Materials	Evaluation	Award
							Theory	Practical			
1. Farm-level workers (milkers, handlers)	Hygienic Milk production	Residential/on-site/outreach	Milk productions	1. Hygienic milk production	Milkers and milk handlers knowledgeable and skilled in production of safe and clean milk	Factors influencing milk quality Feeding Animal health Milking practices	1 hour		Lectures - Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Animal and udder health - Zoonoses - mastitis Hygienic milking	45 min				
						Animal and udder health - Zoonoses - mastitis	45 min	2 hours			
				2 Hygienic Milk handling	Milkers and milk handlers knowledgeable and skilled in hygienic milk handling	Factors contributing to milk spoilage	½ hour		Lectures - Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	PAS S OR FAIL
						Types of milk handling & storage equipment	½ hour				
						Cleaning and sanitation agents	½ hour				
						Cleaning & sanitation of equipment	½ hour	1 hour			
				3. BASIC MILK QUALITY CONTROL AND TESTING	Milkers and milk handlers knowledgeable on basic milk quality tests and reasons for raw milk testing	Sight and smell (organoleptic) - Alcohol - Clot on boiling - Lactometer - Temperature measurement	1 hour	3 hours	Lecture Discussion Demonstration Hands-on testing	End of course theoretical written or oral test End of course practical test fail	Pass or fail
							5 hrs	5 hrs	End of course theoretical/oral (1/2 hour) and practical (1 hour) test	Certificate in basic hygienic milking & milk handling	

¹ Residential courses are carried out at training institution/farmer centers for the entire duration of the course; on-site training involves shorter training sessions of 2-3 hours per day at a farmer's premises/community center over a period of 1-2 weeks to cover the 40-hour module. Outreach training involves BDS training provider conducting training sessions at or near clients' location for 1-3 days on continuous basis.

Table 2: Training curriculum and minimum competencies for milk collection centre operators											
Target Group	Course Title	Type of course & location ²	Course units (sessions)	Subunits	Objectives (Competency sought)	Course Sessions	Duration		Training method/Materials	Evaluation	Award
							Theory	Practical			
1. Milk collection center operators	Hygienic milk production, handling and testing	Residential/on-site/outreach	Milk production	1. Hygienic milk production	Milk collection center operators knowledgeable and skilled in hygienic milk production.	Factors influencing milk quality Feeding Animal health Milking practices	1 hour		Lectures -Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Animal and udder health - Zoonoses - mastitis Hygienic milking	45 min				
						Animal and udder health - Zoonoses - mastitis	45 min	2 hours			
				2 Hygienic Milk handling	Milk collection center operators knowledgeable and skilled in hygienic milk handling	Factors contributing to milk spoilage	½ hour		Lectures -Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	PASS OR FAIL
						Types of milk handling & storage equipment	½ hour				
						Cleaning and sanitation agents	½ hour				
						Cleaning & sanitation of equipment	½ hour	1 hour			
				3. MILK QUALITY CONTROL AND TESTING	Milk collection center operators knowledgeable and skilled in milk quality control and testing.	Sight and smell (organoleptic) - Alcohol - Clot on boiling - Lactometer - Temperature measurement	1 hour	3 hours	Lecture Discussion Demonstration Hands-on testing	End of course theoretical written or oral test End of course practical test fail	Pass or fail
				4. Milk quality grading and payment systems	MILK COLLECTION CENTER OPERATORS KNOWLEDGEABLE AND SKILLED IN MILK PAYMENT SYSTEMS.	- Resazurin test - Butterfat test - Weighing and recording - Grading and payment	1 hour	3 hours	Lecture Discussion Demonstration Overhead projector Flip chart Chalk board Felt pens Etc.	End of course theoretical written or oral test End of course practical test fail	Pass or fail
							6 hours	9 hours	End of course theoretical (1/2 hour) and practical (1 hour) test	Certificate in basic milk quality control and testing	

² Residential courses are carried out at training institution/farmer centers for the entire duration of the course; on-site training involves shorter training sessions of 2-3 hours per day at a farmer's premises/community center over a period of 1-2 weeks to cover the 40-hour module. Outreach training involves BDS training provider conducting training sessions at or near clients' location for 1-3 days on continuous basis.

Table 3: Training curriculum and minimum competencies for milk transporters												
Target Group	Course Title	Type of course & location ³	Course units (sessions)	Subunits	Objectives (Competency sought)	Course Sessions		Duration		Training method/Materials	Evaluation	Award
								Theory	Practical			
Milk transporters	Hygienic milk handling and transportation	On-site	1. Milk production	1.1 Hygienic milk production	1.1 MILK TRANSPORTERS KNOWLEDGE ABLE ON FACTORS INFLUENCING QUALITY OF MILK AT FARM LEVEL	Factors influencing milk quality Feeding Animal health Milking practices	1 hour		Lectures -Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	Pass or fail	
						Animal and udder health - Zoonoses - mastitis	45 min					
						Hygienic milking	45 min	2 hours				
				2 Hygienic Milk handling	Milk transporters knowledgeable and skilled in hygienic milk handling	Factors contributing to milk spoilage	½ hour		Lectures -Discussions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	PASS OR FAIL	
						Types of milk handling & storage equipment	½ hour					
						Cleaning and sanitation agents	½ hour					
						Cleaning & sanitation of equipment	½ hour	1 hour				
				3. MILK QUALITY CONTROL AND TESTING	Milk transporters knowledgeable and skilled in milk quality control and testing.	Sight and smell (organoleptic) - Alcohol - Clot on boiling - Lactometer - Temperature measurement	1 hour	3 hours	Lecture Discussion Demonstration Hands-on testing	End of course theoretical written or oral test End of course practical test fail	Pass or fail	
				4. Hygienic milk storage, preservation and transportation	MILK TRANSPORTERS KNOWLEDGE ABLE ON VARIOUS HYGIENIC MILK STORAGE, PRESERVATION AND TRANSPORTATION METHODS	Appropriate milk storage vessels	½ hour		Lecture Discussion Demonstration Overhead projector Flip chart Chalk board Felt pens Etc.	End of course theoretical written or oral test End of course practical test fail	Pass or fail	
						Appropriate milk transportation equipment	½ hour					
						Cleaning and sanitation of milk transportation equipment	½ hour	2 hours				
						Appropriate milk preservation methods	½ hour	2 hours				
				5. Maintenance of milk handling and cooling equipment	Milk transporters knowledgeable on maintenance of milk coolers, milk handling equipment and transportation carriers	-Maintenance of milk coolers	½ hour		Lecture Discussion Demonstration Overhead projector Flip chart Chalk board Felt pens Etc.	course theoretical written or oral test End of course practical test fail	Pass or fail	
						Characteristics and maintenance of milk cans and bulk tanks	½ hour					
						Importance of carrier maintenance	½ hour					
						Legal requirements for milk transportation vessels and carriers	½ hour					
							10 hours	10 hours	End of course theoretical (1/2 hour) and practical (1 hour) test	Certificate of Achievement in basic hygienic milk handling and transportation		

³ Residential courses are carried out at training institution/farmer centers for the entire duration of the course; on-site training involves shorter training sessions of 2-3 hours per day at a farmer's premises/community center over a period of 1-2 weeks to cover the 20-hour module. Outreach training involves BDS training provider conducting training sessions at or near clients' location for 1-3 days on continuous basis.

Target Group	Course Title	Type of course & location ⁴	Course units (sessions)	Subunits	Objectives (Competency sought)	Course Sessions	Duration		Training method/Materials	Evaluation	Award
							Theory	Practical			
1. Small-scale milk traders	Hygienic milk handling and transportation	On-site	Milk production	1. Hygienic milk production	Small-scale milk traders knowledgeable on factors influencing quality of milk at farm level.	Factors influencing milk quality Feeding Animal health Milking practices	1 hour		Lectures -Discussions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Animal and udder health - Zoonoses - mastitis	45 min				
						Hygienic milking	45 min	2 hours			
				2 Hygienic Milk handling	Small-scale milk traders knowledgeable and skilled in hygienic milk handling	Factors contributing to milk spoilage	½ hour		Lectures -Discussions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Types of milk handling & storage equipment	½ hour				
						Cleaning and sanitation agents	½ hour				
						Cleaning & sanitation of equipment	½ hour	1 hour			
				3. Milk quality control and testing	Milk transporters knowledgeable and skilled in milk quality control and testing.	Sight and smell (organoleptic) - Alcohol - Clot on boiling - Lactometer - Temperature measurement	1 hour	3 hours	Lecture Discussion Demonstration Hands-on testing	End of course theoretical written or oral test End of course practical test fail	Pass or fail
				4. Hygienic milk storage, preservation and transportation	Small-scale milk traders knowledgeable on various hygienic milk storage, preservation and transportation methods	Appropriate milk storage vessels	½ hour		Lecture Discussion Demonstration Overhead projector Flip chart Chalk board Felt pens Etc.	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Appropriate milk transportation equipment	½ hour				
						Cleaning and sanitation of milk transportation equipment	½ hour	2 hours			
						Appropriate milk preservation methods	½ hour	2 hours			
				5. Maintenance of milk handling and cooling equipment	Milk transporters knowledgeable on maintenance of milk coolers, milk handling equipment and transportation carriers	-Maintenance of milk coolers	½ hour		Lecture Discussion Demonstration Overhead projector Flip chart Chalk board Felt pens Etc.	course theoretical written or oral test End of course practical test fail	Pass or fail
						Characteristics and maintenance of milk containers	½ hour				
						Importance of carrier maintenance	½ hour				
						Legal requirements for milk transportation vessels	½ hour				
							8 hrs	10 hrs	End of course theoretical (1/2 hr) and practical (1 hr) test	Certificate in basic hygienic milk handling and transportation	

⁴ Residential courses are carried out at training institution/farmer centers for the entire duration of the course; on-site training involves shorter training sessions of 2-3 hours per day at a farmer's premises/community center over a period of 1-2 weeks to cover the 20-hour module. Outreach training involves BDS training provider conducting training sessions at or near clients' location for 1-3 days on continuous basis.

Table 5: Training curriculum and minimum competencies for small-scale milk processors											
Target Group	Course Title	Type of course & location ⁵	Course units (sessions)	Subunits	Objectives (Competency sought)	Course Sessions	Duration		Training method/Materials	Evaluation	Award
							Theory	Practical			
Small-scale milk processors	Hygienic milk handling and processing ⁶	Residential/on-site/outreach	Milk production	1. Hygienic milk production	Small-scale milk processors knowledgeable on factors influencing quality of milk at farm level.	Factors influencing milk quality Feeding Animal health Milking practices	1 hour		Lectures -Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Animal and udder health - Zoonoses - mastitis	45 min				
						Hygienic milking	45 min	2 hours			
				2 Hygienic Milk handling	Small-scale milk processors knowledgeable and skilled in hygienic milk handling	Factors contributing to milk spoilage	½ hour		Lectures -Discussions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	PASS OR FAIL
						Types of milk handling & storage equipment	½ hour				
						Cleaning and sanitation agents	½ hour				
						Cleaning & sanitation of equipment	½ hour	1 hour			
				3. Milk quality control and testing	Small-scale milk processors knowledgeable and skilled in milk quality control and testing.	- Sight and smell (organoleptic) - Alcohol - Clot on boiling - Lactometer - Temperature measurement inhibitor test	1 hour	3 hours	Lecture Discussion Demonstration Hands-on testing	End of course theoretical written or oral test End of course practical test fail	Pass or fail
				4. Milk quality grading and payment systems	Small-scale milk processors knowledgeable and skilled in milk quality grading and payment.	- Resazurin test/methylene blue dye reduction test - Butterfat test	1 hour	3 hours	Lecture Discussion Demonstration Hands-on testing	End of course theoretical written or oral test End of course practical test fail	Pass or fail
				5. Hygienic milk storage, preservation, transportation and processing/packaging	Small-scale milk processors knowledgeable on various hygienic milk storage, preservation and transportation methods	-Appropriate milk storage vessels	½ hour		Lecture Discussion Demonstration Overhead projector Flip chart Chalk board Felt pens Etc.	course theoretical written or oral test End of course practical test fail	Pass or fail
						Appropriate milk transportation equipment	½ hour				
						Cleaning and sanitation of milk handling	½ hour				

⁵ Residential courses are carried out at training institution/farmer centers for the entire duration of the course; on-site training involves shorter training sessions of 2-3 hours per day at a farmer's premises/community center over a period of 1-2 weeks to cover the 40-hour module. Outreach training involves BDS training provider conducting training sessions at or near clients' location for 1-3 days on continuous basis.

⁶ Training on processing of specific dairy products may be provided by the BDS training provider on request. See examples of DTI Naivasha 5-day training modules in Appendix....

			Cleaning and sanitation of milk handling, transportation and processing/packaging equipment	½ hour				
			Appropriate milk preservation methods	½ hour				
	6. Maintenance of milk handling and cooling equipment	Small-scale milk processors knowledgeable on maintenance of milk coolers, milk handling equipment, transportation carriers and processing/packaging equipment	Maintenance of milk coolers	½ hour				
			Characteristics and maintenance of milk handling/processing equipment	½ hour				
			Importance of milk carrier maintenance	½ hour				
			Legal requirements for milk transportation vessels and carriers	½ hour				
	7. Dairy effluent management systems	Small-scale milk processors knowledgeable and skilled in environmental sanitation and dairy waste management	Types of dairy waste	½ hour		Lecture Discussion		
			Dairy effluent disposal systems, recycling and utilisation	½ hour				
			Municipal regulations on food industry waste management	½ hour				
	8. Code of hygienic practices	Small-scale milk processors knowledgeable about code of hygienic practices and Good Manufacturing Practices (GMP)	Dairy premises, siting and location	½ hour		Lecture Discussion		
			Personnel hygiene	½ hour				
			Good Manufacturing Practices	½ hour				
	9. Hygienic processing of specific dairy products	Small-scale milk processors skilled in hygienic production of specific dairy products	Theory of procedure for production of specific dairy product	1 hour				
			Practical production of specific dairy product		4 hrs			
				13 hours	15 hours	End of course theoretical (1 hour) and practical (1 hour) test	Certificate in basic hygienic milk handling, transportation and processing	

Note: Make training of processing personnel a pre-requisite for licensing. For supervisors formal dairy certificate/diploma training is essential.

Require processors to employ operational personnel who have undertaken basic tailor made training for specific products they are employed to process (Butter making, Cheese making, Fermented milk, Liquid

milk etc) which would lead to certification as Competent Butter makers, Cheese maker, Milk processor, Ice Cream maker etc) see for example 5 day DTI Naivasha modules on cheese, Butter, Cultured products. Products such as Cheese may require longer residential training (e.g. 4 weeks) coupled with industrial attachments (1-2 months) leading to “Certified Cheese Maker” qualifications

Table 6: Training curriculum on dairy business management for small-scale dairy farmers, milk traders, transporters and processors

Target Group	Course Title	Type of course & location ⁷	Course units (sessions)	Subunits	Objectives (Competency sought)	Course Sessions	Duration		Training method/Materials	Evaluation	Award
							Theory	Practical			
Small-scale farmers, milk traders, transporters, processors	Fundamentals of marketing and dairy business management	Residential/on-site/outreach	Feasibility studies and business plan preparation	1. Feasibility study	Dairy operators knowledgeable on fundamentals of feasibility study preparation	Types of businesses (sole proprietor, cooperative society, partnership, limited company)	1 hour		Lectures -Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Principles of conducting a feasibility study	1 hour				
				2. Business plan preparation	Dairy operators knowledgeable on fundamentals of business plan preparation	Basic elements of a business plan	½ hour		Lectures -Discussions -Questions & answers Participatory adult learning techniques	End of course theoretical written or oral test End of course practical test fail	PASS OR FAIL
						Organizational plan	½ hour				
						Management plan	½ hour				
						Financial plan	½ hour				
						Marketing plan	½ hour				
				3. Distribution and retailing of dairy products	Dairy operators knowledgeable on costing and pricing, distribution and retailing of dairy products	Costing and pricing of dairy products	1 hour		Lecture Discussion Demonstration Hands-on testing	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Marketing skills	½ hour				
						Distribution skills	½ hour				
				4. Record keeping and credit management	Dairy operators knowledgeable and skilled in record keeping and credit management	Types of records: • Farm records • MCC records • Milk transporter records • Milk trader records • Milk processor records • Milk distributor/retailer records	2 hours		Lecture Discussion Demonstration Overhead projector Flip chart Chalk board Felt pens Etc.	End of course theoretical written or oral test End of course practical test fail	Pass or fail
						Credit management	1 hour				
							9hours	8 hours	End of course theoretical (1 hour) and practical (1 hour) test	Certificate in basic marketing and dairy business management	

⁷ Residential courses are carried out at training institution/farmer centers for the entire duration of the course; on-site training involves shorter training sessions of 2-3 hours per day at a farmer's premises/community center over a period of 1-2 weeks to cover the 40-hour module. Outreach training involves BDS training provider conducting training sessions at or near clients' location for 1-3 days on continuous basis.