SNV KENYA / NETHERLANDS DEVELOPMENT ORGANIZATION

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Dairy Sector Policy Study and Capacity Needs Assessment of Stakeholder Associations

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Submitted by:

PPD Consultants Ltd,
3rd floor, Bishops Garden Towers,
P.O. Box 47972-00100
Nairobi, Kenya.
Tel: 2733441, 2733438
Fax: 2733448
Email: info@ppdconsult.com
Website: www.ppdconsult.com

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ABBREVIATIONS

AFA	Agricultural and Fisheries Authority Act, 2012
AI	Artificial Insemination
AKEFEMA	Association of Kenyan Feed Manufacturers
ASDS	Agricultural Sector Development Strategy
BDS	Business Development Services
BOP	Base of Pyramid
BSMDP	Business Service Market Development Project
CAADP	Comprehensive Africa Agricultural Development Programme
CBEs	Collection and Bulking Enterprises
COMESA	Common Markets for Eastern and Southern Africa
DFID	Department for International Development
DSA	Dairy Standards Agency
EAC	East Africa Community
FCS	Farmers' Co-operative Society
GDP	Gross Domestic Product
ICT	Information Communication Technology
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
JKUAT	Jomo Kenyatta University college of Agriculture and Technology
KAGRC	Kenya Animal Genetic Resource Centre
KARI	Kenya Agricultural Research Institute
KDB	Kenya Dairy Board
KDFF	Kenya Dairy Farmers Federation
KDPA	Kenya Dairy Processors Association
KEBS	Kenya Bureau of Standards
KENDAPO	Kenya Dairy Producers Organization
KENFAP	Kenya National Federation of Agricultural Producers
KEVEVAPI	Kenya Veterinary Vaccines Production Institute
KLBO	Kenya Livestock Breeders Organization
KMDP	Kenya Market-led Program
KTDA	Kenya Tea Development Agency
MDGs	Millennium Development Goals
MLD	Ministry of Livestock Development
MPO	Milk producer organizations
MTP	Medium Term Plan
New KCC	Kenya Co-operative Creameries
NGOs	Non-governmental organizations
SA	South Africa
SAMPO	South Africa Milk Processors Organizations
SNV	SNV Netherlands Development Organization
USAID	United States Agency for International Development

SUMMARY ON EMERGING ISSUES AND RECOMMENDATIONS FOR CHANGE

This policy study identifies opportunities and strategies that could upscale the dairy sector in Kenya to capitalize on the market opportunities in the domestic market, and to become an important player in the regional and global markets.
Opportunities exist due to expanded market access, a growing middle class, a tradition of dairy farming and a relatively well-developed production, processing and marketing infrastructure if compared with other SSA countries. Challenges however exist and these hinder the transitioning of the dairy sector from its start-up phase to further growth and maturity, which goes hand in hand with enhanced productivity, efficiency, value addition and lower cost price of milk both at the production side and the consumption end.

The report is structured as follows. Chapter 1 gives an introduction to this study.
Opportunities and challenges of the dairy sector are reviewed in Chapters 2 -7.
In chapter 9 the major emerging issues that constrain growth and competitiveness of the dairy sector are discussed. Chapter 10 gives recommendations on policy, regulatory and institutional reforms.
This is followed by Chapters 11 and 12 in which projects are identified and described that could be taken-up by the Kenya Market-led Dairy Program of SNV Netherlands Development Organisation.

This section of the report – the Executive Summary - gives a condensed overview of emerging issues and recommendations as portrayed in Chapters 9 and 10.

Emerging issues for a competitive dairy sector

The emerging issues highlighted and discussed in Chapter 9 can be summarized as follows. For more details on analysis and justification the reader is advised to visit chapter 9.

- The fragmented nature of the dairy sector constrains its growths and competitiveness. This applies to both the supply side (smallholder production system) and the marketing side, i.e. hawkers and traders diverging milk to the raw milk market.'

- The diversity of production systems calls for a differentiated sector development strategy. Subsistence farmers require poverty reduction interventions. This is the role of community based organisations, pro-poor oriented NGOs and government. This segment will not upscale development of dairy to global benchmarks, but may still play an important role for food security at the sub-national level.

- In the medium and long term a sustainable dairy sector is anchored on a commercial herd owned by dairy entrepreneurs, who are willing and able to invest and specialize in dairy. This means that sector policies and institutional frameworks will change to support this business orientation. It is also where economic and private sector development oriented NGOs should anchor their interventions.

- The current oligopolistic nature of dairy processing is unsustainable and the inward looking nature of this segment creates unhealthy competition. This could account for the dominance of

the few players who control the formal market channel. In efficient and competitive agricultural value chains, companies with less than 70% capacity utilization would be out of business.

- The existence of a large raw milk market equally undermines the proper functioning of the market, as it operates under different conditions as the formal market. It does not pay VAT, company tax, cess, levies, PAYE for its workers and so on. It perpetuates fragmentation of supply chains and a large predominantly low-quality liquid milk-driven dairy sub-sector. It is a sub-sector that does not structurally invest in development of the supply chain for enhanced milk quality and productivity, or in value addition of products at the consumer-end.
  As much as the phasing out of this marketing channel is a delicate issue and requires a balanced set of policies and strategies to fill the vacuum when it ceases to exist, it should be taken up urgently and diligently.

- There has been a systemic weakness in the organization and development of the supply chain, where CBEs and processors have concentrated on growing milk volumes through adding more farmers and cows – and expanding geographical areas of operation and costs of collection – rather than increasing volumes through increased productivity from existing farms, and enhancing the quality of milk.

- It seems appropriate for farmers' owned dairy societies (Dairy Hubs, CBEs) to concentrate on supply chain development through provision of services and inputs to member farmers, including training and extension, for enhanced productivity. Few have shown to have the capacity to go into processing and compete in the market, with the exception of Githunguri Dairies.

- Similarly, there are limits to processors' engagement at the lower end of the value chain. Indeed, the operations at processing level should move towards more value addition, market diversification and market development. This is also the optimal interface between producers and strategic global investors (e.g. Nestle, Danone, Parmalat or Friesland Campina). This approach holds the potential for a growth-oriented sector, building on and taking advantage of the potential in the regional and global markets.

- The dairy sector has not taken (full) advantage of the market opportunities in the domestic, regional and global markets. Expanded regional and global market access is premised on high quality of milk and milk products. Kenya needs to improve the quality of marketed milk starting with the quality of raw milk. This will be critical if the dairy sector in Kenya is to realize its market potential.

- The policy and regulatory framework for the dairy sector are outdated and inadequate. The challenges at producer level, particularly low genetic stock, low quality and high cost of feeds and forages and weak - and in most cases non-existent - training and extension services, means that growth of the sector is hindered at this initial part of the value chain. The current policy and regulatory framework and weak implementation of existing laws and regulations - e.g. to curb the raw milk market - hinder the growth of an otherwise dynamic sector.

- The liberalization of the dairy sector in the 1990s disrupted the previous role of government particularly that of Kenya Dairy Board and government Extension and AI-services. Whilst the

private sector was expected to take on more responsibility for the industry, this transition was not effectively managed. The result is that public sector institutions are underfunded and the private sector players are not sufficiently supported to take on the new role. Private sector associations are therefore weak and poorly organized and lack any sense of a shared vision for the sector. These poorly planned and governed institutional changes undermine the transformation and growth of the sector.

- Statistics on the dairy industry are inadequate and do not inspire confidence in sector planning. Planning for the transformation of the dairy sector requires reliable data. This is not the case and current statistics on total milk production and livestock numbers are not reliable.

Recommendations on policy, regulatory and institutional reforms for the dairy sector

Chapter 10 gives suggestions and ideas for reforms to transition the dairy sector into a regional and eventually global market player. The recommendations focus on the policy, regulatory and institutional framework.

- The starting point in managing change is to create a shared and inspirational vision of the future of the industry. The Kenyan dairy industry is currently in a position where processors have low capacity utilization and a production segment (farmers) that cannot meet the demand due to systemic barriers to productivity, as discussed. We now have a situation where the farmer and final consumer are dissatisfied with the pricing system, which points at a dysfunctional sector industry. This structure is a barrier to sector productivity and competitiveness and calls for a shared vision to address it and take the industry to the next level. The need to rally the stakeholders around an inspirational and shared vision is clear. Facilitating this engagement is an intensive process which will focus on:

    - ✓ The profile of the sector in the next ten to thirty years;
    - ✓ The drivers of transformation;
    - ✓ Resource mobilization including technical support services;
    - ✓ The appropriate co-ordination mechanism to anchor sector transformation.

- Reforming the sector needs to re-define the roles of public and private sectors. Public institutions in the dairy sector should be accorded autonomy to discharge their mandate and work towards strong public-private governance structures with delegated mandates for policy development and enforcement, as well as for training and skill development, assuring structural engagement of private sector stakeholders rather than piecemeal ad-hoc consultations. They should also be adequately funded to implement policies.

- While agricultural and livestock policy will be formulated at national level, implementation is the role of the county governments. This constitutional dispensation is now evolving. The sector stakeholders should take advantage of this development orientation to advance the transformation of the industry. This entails engaging the county governments in different milk sheds to integrate the sector strongly in county development plans and to mobilize resources for implementation of plans

- The role of Kenya Dairy Board should be re-defined to be in-line with the needs of the liberalized sector. In particular, KDB should focus more on regulation and enforcement of safety and quality standards in dairy products. The Dairy Board should also facilitate sector development through research and knowledge dissemination.

- The development of the industry is properly the role of the private sector. To effectively discharge this role, the private sector should be supported to re-organize itself through an appropriate Sector Institution, bringing together all industry associations to work on a common vision and program for the dairy sector.

- The issue of training and skill development for the dairy value chain should be addressed vigorously and the public and the private sector should jointly develop mechanisms for co-financing and managing commercially driven training institutions with satellite Practical Dairy Training Centers across the major milk sheds in the country. This is how the Dairy Training Institute in Naivasha should be reformed.

- It is recommended that the industry establishes a Dairy Sector Institution along the lines of "milk South Africa" and the "South Africa Standards Agency", or the Dutch system of Productschappen. The latter is a private sector driven organization with public and private tasks and unites all stakeholders in the dairy industry through representation in its Board. It is partly funded by Government and partly through levies/cess paid by the dairy stakeholders.

- The design and establishment of such an Institution should go parallel to the review of roles, mandate and financing of KDB. KDB should focus on regulation and enforcement and its funding should be through The National Treasury. A Dairy Sector Institution as referred to above should be mandated to levy the sector.

- A useful concept or tool for designing reforms and developing a common vision for the dairy sector is the concept of the Dairy Sector Life Cycle. This would propagate to benchmark the Kenyan dairy sector with other countries in a more historic cyclic perspective. The Dairy Sector Life Cycle in the Netherlands or NW-Europe for example shows trends and indicators on how the dairy sector transitioned from a fragmented localized industry to a consolidated national, international and eventually global player. Each Life Cycle Phase was characterized by a specific set of policies, institutions and division of roles between stakeholders (public and private) that assured the transitioning from Start-up Phase to Growth Phase and Maturity.
  One striking feature of the Dairy Sector Life Cycle in the Netherlands is that Government in particular invested strongly in research, training and skill development, next to creating innovative and inclusive **sector** institutions.

- The centrality of the dairy hub as the focal point for milk collection/ bulking and the provider of inputs and services is now recognized and should be anchored in sector policy. The case for clustering chilling hubs into cluster organizations has been made. Leveraging on economies of scale that are inherent in cluster organizations and mobilizing knowledge and market infrastructure to access wider markets, clusters can be viable platforms for sector growth and competitiveness.

- Many development initiatives in the dairy sector are un-coordinated. The result is duplicated effort and waste of scarce resources. The low growth in sector development could be attributed to this unfocused approach to sector development support.

- Credible dairy sector strategies should be based on accurate data and information. The point has been made that the current data could be outdated. We recommend that a comprehensive survey of the sector should be the basis for the sector growth strategies. Investors in the sector rely on available data. Attracting strategic investors in the sector, and this is necessary to transform the industry, should be based on accurate information. The KDB or the new organization Maziwa Kenya should spearhead this process.

1 INTRODUCTION AND BACKGROUND

1.1 Dairy Policy and Stakeholder Study

The dairy industry in Kenya accounts for 3.5 per cent of GDP[1]. It constitutes 40 per cent of the livestock GDP. In the last 8 years, the sector growth rate has been estimated at 4-5 per cent per annum and now stands at 5.0 billion litres per annum[2]. The sector is predominantly smallholder driven. It is estimated that smallholder farmers, owning less than three cows, produce 80 per cent of milk in Kenya. Various estimates put the number of households involved in the sector at 700,000. Considering that the sector employs a large number of women and youth, it has the potential to substantially reduce poverty, particularly in the rural areas. In addition, the sector contributes to nutritional and food security enhancement in the country. It is therefore an important sector in pro-poor economic and social development.

The centrality of the dairy industry as a vehicle for grassroots and national economic development, employment creation and food security, has attracted the attention of SNV Netherlands Development Organization (SNV). SNV is a not for profit international development organization that provides capacity development services to over 2,500 organizations in over 36 countries globally. The objective of this engagement is to positively impact upon local economies and inclusive socio-economic development.
In this respect, SNV has launched the Kenya Market-led Dairy Program, a collaborative initiative between dairy stakeholders to stimulate the growth of the dairy sector in Kenya.

The Kenya Market-led Dairy Program (KMDP) is a 4.5 year program funded by the Embassy of the Kingdom of the Netherlands. The overall goal of KMDP is to contribute to the development of a vibrant dairy sector in collaboration with players in the sector value chain.
The development objective is to contribute to a more efficient, effective and inclusive dairy value chain in collaboration with private sector players and key public sector organizations with the mandate for the development of the sector.

In this respect, the program will work in the dairy value chain with dairy societies or CBEs (milk Collection and Bulking Enterprises), processors, input suppliers and service providers. KMDP will seek to promote inclusiveness and sustainability in value chain operations.

Related objectives of KMDP are to address systemic issues both through engagement with sector institutions – with the aim to seek improvement in the enabling environment through policy influence - and through innovative pilots with the private sector, addressing issues like skill development and transfer, milk quality, seasonality and cost price of milk supply; the latter in particular with a focus on feed and forage.
Having regard to the holistic approach to the development of the dairy sector, KMDP has also sponsored related consultancies in feed and fodder sub-sector study, quality based milk payment system, vocational skills development and Base of Pyramid (BOP) business models. The outputs of these consultancies have, to a limited extent, been taken into account in developing policy briefs and capacity needs assessment of the sector associations.

[1] Economic survey (various issues)
[2] Kenya Dairy Board

1.2 The Objectives of the Study

The objectives of the study on policy and stakeholder capacity needs are two:

- To study the policy, regulatory and institutional framework for the dairy sector with a view to identifying issues that hamper or promote the growth of the dairy sector in Kenya; and
- To map the main stakeholder institutions, particularly private sector associations and assess their capacity to play a supportive role in the growth of a dynamic sector.

The underlying operational philosophy of this study is to yield information and insights, that could help improve the productivity and competitiveness of the dairy sector in Kenya. This is a Vision 2030 imperative. The study will therefore seek to explore and identify:

(i) Policy and regulatory issues that either promote or hinder the growth of the sector. Related to this is the identification of systemic issues, particularly milk quality, seasonality of the milk supply, high cost of production, informal market channels and implications thereof to sector development; skills gap in sector operations; and low level of innovation in the sector;

(ii) Stakeholders active in the sector. Sector stakeholders drive the growth of the industry. These include regulatory agencies (Kenya Dairy Board), line ministry (Department of Livestock Development), farmers and processors, associations (e.g. Kenya Dairy Farmers Federation, Kenya Dairy Processors Association), co-operative societies and development partners. Relevant issues in this respect are the performance of the policy and regulatory agencies from the perspective of industry players, challenges of diverse sector value chain actors and their expectations from the regulatory framework in the sector, particularly the reforms and consolidation of agricultural related laws and institutions, and the role of different players and associations in driving the sector forward.

This policy study has been participatory. Interviews and discussions were held with sector stakeholders. These include individual farmers, bulking/chilling hubs operators, logistic providers and processors. The list of people and institutions interviewed is included in Appendix 4**.**
In these consultations, different regions of the country were reached. Milk sheds visited include the North Rift, the South Rift, Nyandarua, Nyeri and Meru/Embu. In addition to one-on-one discussions with chilling hub managers and processors, focus group discussions were held with farmers and farmer groups. Similar interviews were held with development partners active in the sector (East Africa Dairy Development Program; Heifer International) and public agencies with the mandate for sector development (Kenya Dairy Board and Kenya Animal Genetic Resources Center).

To complement these consultations three categories of semi-structured questionnaires were designed and distributed throughout the milksheds and among processors. A total of 50 questionnaires were returned which constitute 14 percent response rate. There was limited response from dairy processors. While this sample frame could be considered low in terms of sector population, it nevertheless validates the information obtained through individual interviews and group discussions. To this extent, therefore, the information obtained through these multiple approach is considered adequate for the purpose of this study. It will be noted that the preliminary findings of the study were presented to diverse stakeholders in an Inception Workshop on November 27, 2012, in Nairobi. The outcome of this workshop was important in guiding the study process. The final draft report was validated in the stakeholder workshop held on May 9, 2013, in Nairobi.

1.3 The Structure of the Final Report

This report is structured into twelve sections as follows:

(i) Introduction and background (this section) which introduces the study as a component of KMDP and underlines the importance of the dairy sector in national development.

(ii) The dairy sector in the context of national economic development objectives.

(iii) Industry structure and value chain actors.

(iv) Productivity, competitiveness and market potential.

(v) Investment opportunities in the sector, targeting drivers of sector growth and competitiveness.

(vi) Policy and regulatory framework for a growth-oriented sector.

(vii) Reforms in the institutional framework for the dairy sector.

(viii) Capacity building needs of dairy sector stakeholder institutions and associations.

(ix) Emerging issues for a competitive sector in which key reform imperatives are identified and addressed.

(x) Recommendations on policy, regulatory and institutional reforms for the dairy sector.

(xi) Identified projects to be implemented under KMDP's Implementation Phase.

(xii) Policy briefs in support of evidence-based dairy sector advocacy.

2 THE DAIRY SECTOR IN THE CONTEXT OF NATIONAL DEVELOPMENT

Kenya aspires to be a middle income country enjoying a high quality of life by 2030 (*Vision 2030*). Agriculture is among the six priority sectors that will drive this vision. Other priority sectors are tourism, wholesale and retail, manufacturing, financial services and business process outsourcing.

The goal of the agricultural sector is the attainment of food security and increased incomes through value addition by in-country processing of primary agricultural and livestock products. The dairy sector is an important sub-sector, contributing in excess of 40 percent of livestock GDP. Among the agricultural sector flagship projects identified in the Medium Term Plan of Vision 2030 (MTP: 2008-2012) are the enactment of the consolidated agricultural reform laws; and the development of a land use master plan. Supportive initiatives identified to drive the sector and which are relevant to the dairy sector, are: strengthening of the agricultural research systems; improved extension services; promotion of exports; and reforms and transformation of sector institutions, including those in the co-operative sector.

The Agricultural Sector Development Strategy (2010-2020) is the development framework for the growth of the agricultural sector. Six broad interventions are structured into the ASDS. These will uplift the sector growth rate to 7 percent per annum, in the medium term. These interventions are: increasing the productivity, commercialization and competitiveness of the sector; promoting private sector investments and participation; promoting sustainable land use and natural resource management; reforming and improving the delivery of agricultural services and research; increasing market access and trade; and ensuring efficient co-ordination and implementation of sector development projects.

The six priority interventions designed into ASDS are aligned to Africa's aspiration for a food secure Continent. The "***Maputo Declaration of 2003***" underpins Africa governments' commitment to invest a minimum of 10 percent of public expenditure in agriculture. Within the framework of the Comprehensive Africa Agricultural Development Programme (CAADP), to which Kenya is a signatory, African governments committed to the reversal of the decline in Africa agriculture. Improving agriculture will require five key initiatives. These are:

(i) extending the area under sustainable land management and reliable water control systems;
(ii) improving rural infrastructure and trade related capacities for market access;
(iii) increasing food supply and reducing hunger;
(iv) improving agricultural research, technology dissemination and adoption;
(v) improving responses to disasters and **e**mergencies.

Agriculture is also an important driver of Millennium Development Goals (MDGs), particularly MDG 1 (viz. halving by 2015, the proportion of those suffering from extreme poverty and hunger). Agriculture-led economic growth and improved nutrition will contribute to the achievement of MDG 1.

The Kenya Constitution, 2010, defines the roles of the National and the County governments in the devolved governance system. Whilst the national government is responsible for policy formulation and co-ordination of policy implementation, the county governments will be responsible for policy

implementation. The implementation of growth strategies for crop and livestock husbandry has been devolved to county governments. The dairy sector should therefore seek to be strongly embedded in the economic development plans of county governments. This strategy will provide traction for sector transformation.

The context developed in this section has major and dynamic implications for a growth-oriented dairy sector. In discussing the policy, regulatory and institutional framework for the sector, it will be necessary to place into context the enabling economic and social framework, especially those related to a competitive dairy sector. The subsequent sections of this report will detail the productivity and competitiveness imperatives that will inform reforms in the sector. Inevitably, institutions will have to adjust to be relevant in the evolving policy context.

3 INDUSTRY STRUCTURE AND VALUE CHAIN ACTORS

3.1 Industry Structure

In discussing the status and future of the dairy industry, different stakeholders were of the view that current data on production, processing capacity and marketing channels, could be inaccurate. The impact of post-election violence on the dairy herd and smallholder dairy activities, for example, could be understated. Yet, effective forward planning, particularly with regard to private sector investments, depends on accurate data. Other sector aspects especially cost and productivity benchmarks are necessary to stimulate sector exports. Provision of accurate data and industry benchmarking with global markets is an important role of the Kenya Dairy Board. The Board was therefore urged to deal with this challenge as a matter of urgency.

It is estimated that 32 per cent of milk marketed is sold through the formal (processed) channels. The balance is sold in raw form (cold channel) or consumed on-farm. Unprocessed milk raises concerns, primarily due to low and unsafe standards of hygiene. The raw milk and processed milk channels have implications for policy intervention. Unlike the formal channel, the informal channel operates outside the legal framework and does not pay tax and levies/cess. To this extent, and for other reasons explained in this report, therefore, the informal channel distorts the business environment for the dairy industry.

In 2010, there were 27 processors, 64 mini dairies, 74 cottage industries and 1,138 milk bars. The main milk processors, in order of processing capacity are New KCC, Brookside, Githunguri Dairy, Buzeki and Sameer. It is estimated that the three largest processors account for 85 per cent of the industry market share. This market concentration tends to undermine sector competition and this trend is on the increase with Brookside recently having acquired a majority share in Buzeki (source Standard Media).

There is a mismatch between production and processing, depending on seasonal outputs. During the rainy season, "flush" milk production exceeds the capacity of processors. Conversely, during the dry season, the reduced output leads to low capacity utilization by processors. There is a move by the larger processors towards increasing the UHT and "powder" producing capacity to allow storage of milk output during the "flush" season. Powder would be re-converted to liquid milk during the dry season (or exported). This in turn would stabilize demand and supply equations, with benefits to both producers and processors. The New KCC operates powder processing facilities. It is understood that Brookside is in the process of installing a similar facility. Other processors could follow suit.

The dairy industry has potential for export. The demand for Kenya dairy products within the Eastern and Southern Africa region is estimated at 2.0 million tonnes. Other potential markets are in the Middle-East. In Kenya, consumption is estimated at 145 litres per person per year. The World Health Organization recommends consumption of 200 litres per day. Kenya's consumption is therefore far from meeting the WHO recommended national demand. This picture indicates the huge potential in the dairy sector. The main country that competes for the regional market, South Africa, has 300 processors. But in Kenya the market is concentrated in the hands of three main processors taking 85 per cent of the market share of processed milk.

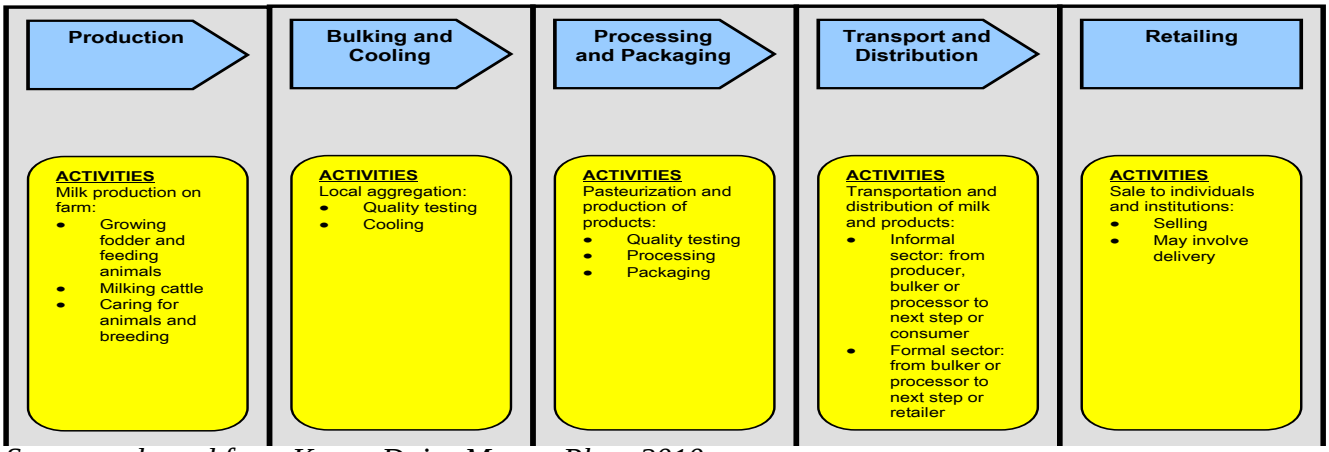
3.2 Actors in the Dairy Value Chain

The major direct market players in the dairy value chain are farmers, CBEs or dairy hubs, traders/hawkers, transporters, processors, retailers and milk bars (both for processed and raw milk) and consumers, all being part of the vertical chain that channels milk from "grass to glass".

In addition the sector depends and provides livelihood to dairy value chain "supporters", i.e. input suppliers and service providers: livestock breeders, artificial inseminators, animal health service practitioners, animal feed manufacturers and stockists, dairy training centers, and so on.

Third are the value chain "enablers" such as industry associations, government departments and agencies and development partners (donors, NGOs).

Figure 3.1: The dairy value chain in Kenya



Source: adopted from Kenya Dairy Master Plan, 2010

3.3 The Milk Market (raw and processed chain)

It is estimated that 55% of the milk produced by small-scale and large scale producers directly enters the consumer market in some form or the other. The other 45% is used for home consumption, sales to neighbors and feeding of calves.

Out of the marketed milk, an estimated 60-70% is sold through the raw milk channel. Either as warm or as chilled milk, when it passes through a farmers owned chilling hub. An estimated 60% of the milk from farmers owned bulking and chilling hubs (dairy societies or farmers owned companies) is sold to processors and 40% to traders, institutions (schools, restaurants, etc.) or milk bars.
The informal or raw milk market thus derives milk from farmers both through the warm (unchilled) chain, and through the chilled chain.

Processors buy an estimated 30-40% of marketed milk and also use a variety of milk sourcing method. They buy directly from farmers through their own chilling plants in the major milk sheds,

from traders or agents who collect milk on their behalf, and from farmers' owned dairy societies or dairy hubs.
Customers of the "raw milk "chain include public and private institutions in milk producing areas such as schools, hospitals, restaurants and milk bars. It is estimated that 60-70% % of milk that reaches the market, is sold through this channel.

Doubtless the raw milk chain cannot form the basis for the industry to grow into the next level.
Value addition and therefore increased processing holds the key to growth. However phasing out of the raw milk market is a delicate issue.
The impact of the raw milk chain on the overall market needs to be assessed from both a market and quality perspective. For instance, in regions where dairy farming has only recently emerged as a potential source of earning a livelihood, there are no bulkers, coolers or processors. Accordingly, only entrepreneurs in the raw milk chain can encourage production beyond household requirements.
Field interviews suggest that the raw milk market has provided incentives for increasing production, rather than hindered the growth of the sector.

Raising entry barriers for players in the raw milk market will provide short term access to "cheap" milk for the processors who will then be able to run their operations more efficient at full capacity.
However, concerns of processors not being able to accept all milk due to banning the raw milk chain overnight seem valid. As is the oligopolistic nature and lack of competition of the processing industry that is not an incentive for passing on profitability gains to others in the value chain, viz. farmers and consumers. This could then in turn very well lead to denying low income consumers of access to affordable milk and milk products.

The phasing out of the raw milk market therefore requires a shared vision amongst the stakeholders in the sector, and a balanced set of policies and strategies. However, this needs to be addressed urgently and diligently, as the raw milk market is not a growth model for the dairy sector. In the long run, the existence of a large raw milk market undermines the proper functioning of the market as it disturbs the notion of level playing field. It does not pay VAT, company tax, cess, levies, PAYE for its workers and so on. It perpetuates fragmentation of supply chains and a large predominantly low-quality liquid milk-driven dairy sub-sector. It is a sub-sector that does not structurally invest in development of the supply chain for enhanced milk quality and productivity, or in value addition of products at the consumer-end.

4 PRODUCTIVITY, COMPETITIVENESS AND MARKET POTENTIAL

4.1 Factors Affecting Productivity at Farm Level

The main sources of productivity in milk production include technical progress, notably in feeding and breeding and improvements in animal husbandry practices. This is key for enhancing competitiveness of the dairy value chain.
Other factors affecting competitiveness along the value chain include logistics and cold chain management, processing technology, technical and managerial skills. Some of the factors affecting productivity along the value chain are discussed below:

4.1.1 Animal Feeds

There are several manufacturers of animal feeds in the market producing and marketing various brands. Well established producers include Unga Feeds and Sigma Feeds. A number of bulking and chilling hubs have started or are in the processes of manufacturing their own feeds.
Feed manufacturers are registered with the Association of Kenyan Feed Manufacturers (AKEFEMA). Although standards for feed quality, established by the Kenya Bureau of Standards (KEBS) exist, feed quality is low and inconsistent, varying from one manufacturer to another and one season to the other. This is attributed to factors such as variability of access to key inputs such as cotton seed cake, which has to be imported from Tanzania and Uganda.

Feed concentrates is a major item in the budget of dairy farmers, especially those practicing intensive production methods. It is noteworthy however that world feed prices have been increasing over the years, and since July 2012 have been higher than the equivalent price of milk.
Year round access to quality pasture and forage is the key to unlock the potential of Kenya's dairy herd. In particular investments and innovations are required for developing on-farm and commercial supply chains of energy and protein rich fodder crops like fodder maize, sorghum and high protein grasses and Lucerne, supplemented by hay that is already marketed at a large scale.

4.1.2 Breeds

Although several local and improved breeds are available in the market, majority of the smallholder dairy producers keep cross breeds between local and imported animals. The Kenya Livestock Breeders Association (KLBO) is the organization that manages the breed history through registration in the stud book. But registration is voluntary, and mostly restricted to descendants of former settlers in the Rift Valley region. Accordingly, not all high yielding bulls have a documented history. Documenting the history of bulls enables their owners to charge premium prices for heifers.

The Kenya Animal Genetic Resource Centre (KAGRC), formerly CAIS, is mandated to produce, preserve animal genetic material and rear breeding bulls for provision of high quality disease free semen for international and international markets. Local demand is currently estimated at 1,000,000 straws per year. KAGRC produces about 500,000 straws and private traders import another 250,000, leaving a deficit of 250,000 straws. KAGRC distributes its subsidized semen through a network of 40 local distributors at a price range of Sh200-Sh400 per straw, depending on the bull quality. Based on its higher volume and concentration, the quality of local semen compares favorably with imported varieties. The demand for local semen is higher than the supply. Semen is imported from countries

such as the USA, Denmark, Germany, Netherlands Australia, Italy, Turkey, and India by companies such as Worldwide Sires, ABS TCM, Coopers/CRV and TWIGA.

Upgrading the traditional breeds to pedigree status through the traditional A.I cycle takes about eight years. Alternatives could be used to shorten the period for upgrading including the use of "sexed" semen or embryo transfer "technology". But the success rate of these technologies is relatively low, with that of embryo technology varying between 15-30 per cent and costing between Sh.25,000 to Sh. 35,000 per set. Moreover, while embryo transfer technologies are fairly advanced in the United States and are increasingly used by commercial breeding companies, their use in Europe is controversial, particularly after the impact of the outbreak of the mad cow disease in 2001. In the short term, therefore, stock upgrading may have to wait for the regular cycle as these technologies are perfected. In the meantime, however, stricter enforcement of quality and performance standards for A.I services so as to increase their reliability may dissuade farmers from resorting to the use of bulls. The Directorate of Veterinary services should enforce quality standards for imported semen and enforce regulations governing provision of A.I services.

4.1.3 Artificial Insemination (A.I) Services

A.I services are mainly provided by private technicians and technologists. A.I services cost farmers between Sh.600 and Sh.3000, depending on region; and were considered "expensive" and unreliable. They were more expensive in semi-zero and zero grazing areas. They were considered unreliable since farmers did not get the heifers that they expected. In addition, the failure rate of the insemination was high. This had led some small scale farmers to resume the use of bulls as these were considered less expensive and more "reliable".

4.1.4 Milk Yields

About 80 per cent of milk is produced by small scale producers. Production by small scale producers averages 8 litres per cow, while that of medium and large scale farmers averages 25 litres per cow. Average production per cow was similar across the different milk producing regions. The gender and level of formal education of producers did not appear to be significant factors in determining milk yields. However, producers in the 46-55 age groups had average yields of 13 litres per cow per day. This was higher than that of producers in the other age groups. Moreover, this category of farmers planned to invest on average more than Sh. 300,000 in various dairy production equipment. Farmers over 55 years of age planned to invest even more, an average of Sh. 381,111, reflecting a greater degree of optimism about the return on investments on dairy farming than the younger farmers.

However, differences emerged with regards to purchase of additional dairy cattle, with those whose education was above primary school level indicating a willingness to purchase over 2 cows. Respondent who had not completed high school education indicated a greater willingness to invest money in dairy equipment as a productivity improvement strategy. An interesting finding was that dairy farmers below 30 years of age, including those with tertiary education, had the lowest production per cow.

Planned purchase of additional cattle was the same across the three regions (2 additional cattle per farmer). However, differences were noted when planned level of investment in additional dairy farming equipment was considered, with farmers from the central Kenya zone recording the largest amount (an average of Kshs 390,526 per farmer); and the North Rift region zone recording the lowest amount (an average of Kshs 177,038). This demonstrates greater optimism in the future of

dairy farming amongst respondents from Central Kenya than in the Rift Valley. It should also be noted that the oldest and most productive dairy farmers (as measured by litres produced per cow) were located in the Central Kenya zone, probably reflecting more experience in dairy activities. Separately, dairy bulkers from Central Kenya indicated that they planned to increase their capacity to handle and process milk from farmers in their catchment areas.

Production by small scale producers varies with the weather, sometimes dropping by as much as 50 per cent during the dry season. For instance, in the Siongiroi chilling hub, peak production in June 2012 was 56,748 litres. At the time of this study (dry season), production was 27,874 litres, a difference of 51 per cent. In Tanykina, peak production in the previous year was 33,000 and 21,000 at the time of this study, a difference of 36 per cent. It is noteworthy that in the Siongiroi chilling hub area, peak production in 1998 was estimated at 80,000 litres per day. This would appear to demonstrate that potential for increasing production exists.

4.1.4 Quality of Milk

The main components of raw milk in declining order are: water (main), milk solids, solids-not-fat, milk sugar or lactose, fat, protein and ash or minerals. The constituents vary with genetic breed and the environment (interval between milking, stage of lactation, age, feeding habits practiced, animal health practices and completeness of milking).

The quality of milk refers to milk that is free from pathogenic bacteria and harmful substances, sediment and extraneous substances, is of good flavor, with normal composition, adequate in keeping quality and low in bacterial counts. Main factors that determine the quality of milk include microbial results such as somatic cell counts and bacteria contents. However, other factors such as added water and solids, percentage of fat and protein, as well as antibiotics and pesticide residues, are important to producers, processors and consumers as well. While manufacturers of milk powder are interested in raw milk with high protein content, cheese manufacturers on their part are interested in the fat, protein and casein contents of the milk.

Breeds such as Jersey have a better conversion rate (produce more butterfat but less volume milk), while Friesian and Aryshire produce more volume but less butter fat content. Unprocessed milk is considered a wholesome food product while most processed milk (pasteurized and homogenized) is considered less wholesome since some ingredients have been removed to make value added products such as cheese, butter and ghee.

Quality affects both the processed and cold channel chains. However, the cold channel chain is associated with more issues than the processed one. Although standards for milk and milk products exist in the legal framework, low quality milk/milk products continue to find their way to consumers, largely due to low compliance by processors and traders; and poor enforcement of regulations by those charged with enforcement. While consumer awareness of the standards as well as the health effects of low quality milk, it is, likely that human as well as technical capacity to enforce the standards is lacking. Moreover, due to technical and cost issues, consumers are unable to seek legal redress where necessary.

Extension staff from chilling hubs and the co-operative groups train their producers on animal husbandry and milk handling issues. Although this has improved milk handling at household level, quality issues still abound due to poor animal husbandry practices as well as poor handling during transportation of the raw milk. Nevertheless, the main processors contended that the quality of milk is not a major issue in the industry, since they were still selling ghee and UHT in regional markets.

In order to encourage consumption of milk and milk products, there is need to sensitize consumers on the nutritional, quality and hygiene aspects of milk in general and cold channel milk in particular. This should include appropriate measures that need to be taken at household, transport and processor levels to maintain quality milk (cold chain and processed) standards. However, increased availability of quality wholesome pasteurized milk at affordable prices would increase consumption of quality milk. This may be done through investment in pasteurization at bulking/cooling levels.

4.1.5 Productivity Trends in Milk Production

Low milk production is due to a number of factors. For most small-scale farmers, the cost of animal feeds is beyond their financial capacity. Moreover, the quality of the dairy cows that they keep is of a relatively poor quality. The cost of upgrade and or getting pure breeds is relatively high and AI services are unreliable. Animal husbandry practices though improving are still poor by international standards. Finally, most small-scale producers do not have a commercial orientation to dairy farming. Production per cow per day falls during the dry season as cows lack adequate water, feed and fodder.

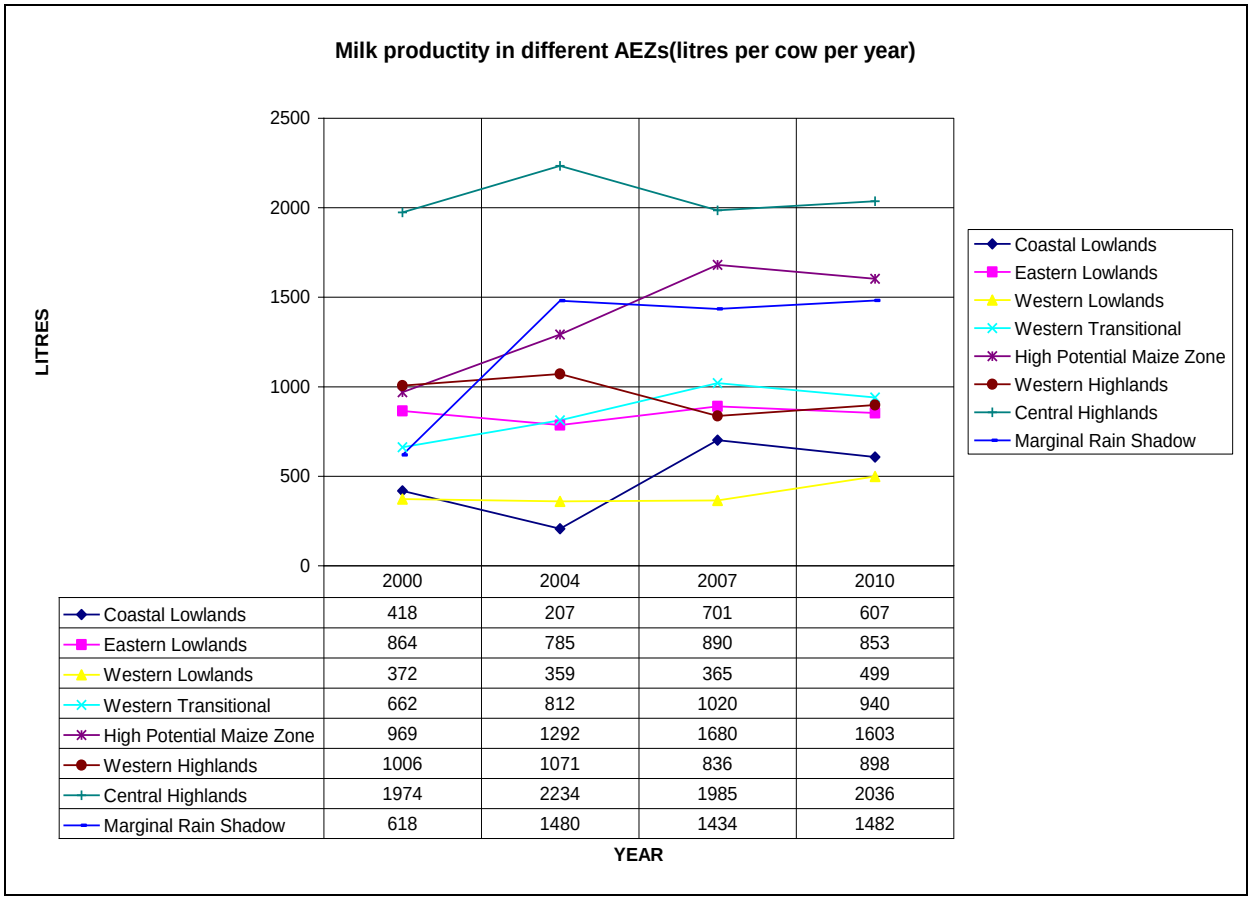
Nevertheless, studies indicate that over the last decade, milk productivity in terms of litres produced per cow has been increasing. Between 2000 and 2010, productivity gradually increased, except for the period following the post election violence in 2008. In a study on dairy productivity in eight agro ecological zones, (Wambugu et al: 2011) concluded that among the major milk producing zones in Kenya, milk productivity in the period was highest in the central Highlands and the high potential maize zones. The AEZs and districts in the survey are shown in table 4.1 below while productivity trends by AEZ are shown in **figure 4.1** below:

Table 4.1: Distribution of sampled households by district and agro-ecological zone

Agro Ecological Zone	Districts in Sample
Coastal Lowlands	Kilifi, Kwale
Eastern Lowlands Kilifi, Kwale	Kilifi, Kwale
Western Lowlands	Kisumu, Siaya
Western Transitional	Bungoma (lower elevation), Kakamega (lower elevation)
Western Highlands	Vihiga, Kisii
Central Highlands	Nyeri, Muranga, Meru
High-Potential Maize Zone	Kakamega (upper elevation), Bungoma (upper elevation) Trans Nzoia, Uasin Gishu, Bomet, Nakuru, Narok
Marginal Rain Shadow	Laikipia

*Source: Stella Wambugu, L.Kirimi and J. Opiyo (2011): Productivity trends and performance of dairy farming in Kenya, Tegemeo Institute of Agricultural Policy and Development, WPS 43/2011(adapted**).***

Figure 4.1: Change in milk productivity per cow between 2000 and 2010 in different Agro Ecological Zones.



	2000	2004	2007	2010
Coastal Lowlands	418	207	701	607
Eastern Lowlands	864	785	890	853
Western Lowlands	372	359	365	499
Western Transitional	662	812	1020	940
High Potential Maize Zone	969	1292	1680	1603
Western Highlands	1006	1071	836	898
Central Highlands	1974	2234	1985	2036
Marginal Rain Shadow	618	1480	1434	1482

Source: Data used adopted from Stella Wambugu et al (2011)

These trends suggest that small scale producers have the potential to increase productivity (in terms of liters per cow per day). It is plausible that other things being equal (availability of fodder, stable markets and feed prices), up to twenty percent of existing small scale producers can transform into medium scale producers (in terms of milk volumes), especially in the intensive production zones.

4.1.6 Stabilizing Milk Production

The main factors determining milk production during the dry season are reduced access to fodder, pasture and water. It is estimated that increased access to quality fodder and adequate water during the dry season may reduce fluctuations in milk production by up to 80 per cent, everything else remaining the same. Ultimately, however, only sustained investment in the production of quality fodder, pasture and water will provide a lasting solution.

4.1.7 Increasing Farm Level Production and Productivity

Increasing milk output requires both production and productivity increases. This is a major challenge given the fact that the proportion of total production from medium and large scale producers, who have more potential to use new production technologies, is estimated at less than twenty percent. The immediate short to medium term challenge is to increase productivity with what is available in terms

of herds and farm land. In the long term, and in order to sustainably supply increased volumes, it may be necessary to adopt a deliberate strategy of opening up other regions for dairy production.

It has been demonstrated that it is possible to increase milk production without necessarily increasing the size of the dairy herd. By improving husbandry practices, breeds and feeding in the Netherlands dairy farmers were able to reduce the dairy population by half while raising productivity by 100% in a time span of 30 years (1980-2010). During the same period, the dairy population in Kenya increased from 2.4 million to 3.4 million animals while productivity increased marginally from 1, 440 liters per cow per year to 1,800 litres per cow per year. In the current context, milk productivity may be increased through any or a combination of the following:

- improved feeding (especially forage) and animal health practices
- improved herd fertility and reducing lactation intervals
- improving the genetic base of the current herd
- improved animal husbandry skills of farmers

The chilling hub approach has potential to increase production through the methods listed above. It can offer economies of scale in bulk procurement of production inputs regulate the quality of inputs used (including A.I services) and provide extension services to farmers in best practice animal husbandry practices.

4.2 Factors Affecting Competitiveness

These include costs of farm level production, transport, processing and marketing. They are briefly discussed below.

4.2.1 Cost of Milk Production

The cost of production differs by type of production method used and the level of mechanization adopted in the production process. In general, costs are higher for intensive production methods (zero grazing) than for extensive (semi-zero grazing and free range (Wambugu et al: 2011). For most small scale producers, the average cost of production was estimated at Ksh 22.50 per liter. Medium scale producers had lower production costs, estimated at sh.20 per liter.
Key to reducing cost of milk production is quality (preserved) fodder.

4.2.2 Cost of Transport

The cost of transport is dictated by type of road infrastructure, mode of transport and owner of transport facility. Most of the milk is produced in the rural areas where roads are unpaved and dusty. Transport may be privately owned where a number of producers hire a transporter; or bulker/ processor provided, where the bulker/processor collects milk from a central collection point and deducts these costs from individual producers; or owned by the producer, in which case, the producer transports the milk to the bulking or processing centre. For small scale producers, milk is put in plastic or aluminum cans for transport. Major modes of transport to the collection centres are usually bicycles and motor bicycles; while transport to bulking and processing centres is by pickup vans and refrigerated trucks. Most processors collect milk from the bulking centres and transport it to their processing plants. The cost of transport to the bulking centers varies from KSh 1.50 per liter (when bulker collects) to Sh.3.00 per liter (when independent transporters were contracted). It is estimated that, transport takes up to 8 per cent of milk revenues.

4.2.3 Energy Costs

The main sources of energy used by bulkers/chillers and processors are electricity from the national grid and diesel generators. Because electricity from the national grid is unreliable, chillers and bulkers extensively used generators. While the cost of electricity from the national grid was estimated to take up about 4.4 per cent of gross revenues, this increased to about 10 per cent when the cost of using the generator was taken into account. The feasibility of using solar coolers to reduce costs was being explored by some cooling hubs.

4.2.4 Profit Margins

Farmers

At the producer level, profit margins differ by type of production system, type of dairy breed and the type of marketing method adopted. However, the main variable determining profit efficiency in dairy farming in Kenya is the cost of feed. It is estimated to take up to 60% of total production costs. Other major costs are direct labour (27%), transport to the market and water. The profitability of dairy farming is determined by several variables, including net farm income (NFI) per owner, rate of return on farm assets (ROA) at the farm level, and the ratio of value added to sales, ratio of value added to workers and ratio of value added to plants at the producer level.

Studies indicate that gross margin rates are relatively higher for extensive than intensive production systems. Gross margin rates are about 15 per cent of total revenue in intensive production systems and 30 per cent of total revenue for extensive production system. Studies show that gross margins per cow/per liter in extensive production systems are 1.7 times higher than in intensive production systems. The gross margin is about 10 and 19 per cent respectively, of the selling price for intensive and extensive production systems.

Producers selling to bulking agents such as cooperatives and bulking/chilling hubs received a lower price (Sh.28-30) than those selling to cash based traders. Most processors purchased milk from the chilling hubs at between of KSh 30-33.The hubs deducted transport and management fees of between Sh. 2.00-3.80. On the other hand cash based traders bought milk at Sh.30-40 per liter, depending on the proximity of the milking shed to main urban areas, such as Nairobi. Cash based traders sold milk to institutions and milk bars, averaging 50-100 liters a day for small traders to 500 liters for milk bars.

Producers take the largest share of revenue from milk sales in the cold channel chain while processors take the largest share of the revenue in the producer- bulking/chilling hub-processor channel chain. At the current prices of sh.28 per liter offered in the producer- bulking/chilling hub-processor channel, it was estimated that a producer needed to sell at least 6 litres per day to break even. But at an average price of Sh.35 per liter being offered in the cold channel, a producer needed to sell 5 litres to break even. Nevertheless, it was estimated that a dairy farmer selling through the producer- bulking/chilling hub-processor channel required 6-7 milking cows to make a financial profit.

However, it transpired that the additional cash paid by informal traders became less attractive to producers when the bulking/chilling hubs introduced additional services, especially financial. Interestingly, co-operative societies in India (similar to cooperative based bulking/chilling hubs) pay producers on a weekly basis, while traders (our cash based trade equivalent) pay producers on a daily basis.

Chilling hubs

Chilling hubs bought milk from several fragmented producers, bulked and chilled it. Some of them also bought from co-operative societies. They sold their milk to larger processors but some were also engaged in limited processing (homogenization and pasteurization) and the manufacture of fermented products. Many of the bulking hubs provided integrated business services to farmers: veterinary and A.I. services, animal feeds, financial and human health services.

Chilling hubs deducted an average of Sh 2.60 per liter of milk bulked. The cost of running a hub depends on the volume of milk sales and the number and type of embedded services. Running costs for dairy activities were estimated to range from 10 per cent of total revenue for experienced and better managed hubs to 65 per cent for newly established and less efficient ones.

Processors

Profits at the processor level differ by distance from milk collection and distribution hub, processing technology, range of products, the markets for the products and the efficiency of the management processes. Most processors collected chilled milk from co-operatives/chilling hubs and large farmers. Some also had their own dairy farms. Payment for collected milk is made on a monthly basis.

Value addition is relatively weak and the product range is narrow. Most of the processed milk is in the liquid pasteurized category. There is some limited .production of yoghurts, butter, creams, cheese and UHT products. During the dry period, decreased volumes of milk intake lead to lower capacity utilization at both the chilling hub and processor level. Cost of production is affected by high-energy costs, outdated machinery and equipment and poor road infrastructure (logistics) .The retail price of pasteurized milk is similar across all the main processors.

Some new entrants to the market such as Buzeki and Sameer have introduced new processing and packaging technologies that increase the shelf life of liquid milk and reduce the cost of packaging and transport. Brookside dairy has also invested in milk drying/ powder processing technologies.

The high costs of production at producer and processor levels affect profit margins. Low profit margins provide limited incentive to invest new production, transport or packaging technologies. The narrow product range in illustrates the low level of value addition. All these undermine competitiveness of the sector. There is need to invest in newer energy efficient technologies in order to reduce production costs and become more competitive.

4.3 Supply and Demand

The economic growth rate of 10 per cent envisaged in Kenya's Vision 2030 together with the growing urbanization and population growth are good indicators for attaining a per capita milk consumption of 220 litres by 2030. Some estimates put per capita milk consumption in Kenya at 145 litres, one of the highest in Africa (ILRI, 2007).

The Dairy Masterplan also projects the milk supply at increasing rates of medium and high growth rates as shown in table 4.1 below. These projections show a deficit of 31.8% to 43.5% for medium growth rate in supply and a deficit of 16.8% to 32.8% for a high growth rate in milk supply. Therefore satisfying the targeted 220 liters per capita milk consumption by 2030 requires sustained higher growth rates, above 3 per cent.

Table 4.1 Milk supply projections at varying rates of growth (2005-2030)

Year	Milk projection (000) at varying moderate growt		Milk projection (000) at varying high growth rates	
	Milk (000)	Growth rate (%/y)	Milk (000)	Growth rate (%/y)
2005	2650	2	2782	3
2010	3071	3	3385	4
2015	3736	4	4320	5
2020	4769	5	5781	6
2025	6382	6	8108	7
2030	8092	7	10621	8

Source: Kenya dairy Masterplan

Kenya has recently become a net exporter of milk products, mostly to EAC members. With improvements in quality, access to other COMESA member countries could increase. The projected demand for milk from 3.3 billion litres in 2005 to 12.8 billion litres by 2030 are based on increasing urbanization and accompanying increase in per capita milk consumption from an estimated 91.4 litres in 2005 increasing to 220 litres by 2030. Using these projections, and in order to meet local demand, annual milk productivity per cow would have to increase from 5% per annum in 2010 to 12 % in 2030, at an annual herd growth rate of about 5% .
The projected demand estimates are shown in **table 4.2a** below.

Table 4.2a: Projected demand estimates and per capita consumption (2005-2030) adopted from the National dairy master plan.

Year	Human population		Milk demand		Per capita milk consumption	
	People	Rate %*	(Litres)	Rate %*	(Litres)	Rate %*
2005	36,097,000	2.60*	3,299,266,000	8.13	91.4	5.54*
2010	40,483,000	2.32	4,500,000,000	5.84	111.0	3.85
2015	45,513,400	2.37	6,430,593,195	7.40	141.0	4.92
2020	49,705,400	1.78	8,448,150,000	5.61	170.0	3.77
2025	53,897,400	1.63	10,556,587,691	4.56	196.0	2.88
2030	58,089,400	1.53	12,760,000,000	3.86	220.0	2.32

** Average annual growth rate calculated for 5 year intervals of 2005 to 2010; 2011-2015, 2016-2020, 2021-2025 and 2025 to 2030*

Therefore, in order to strengthen the dairy sector to meet growing domestic demand and compete in the region, there is need to promote profitable production of quality milk at farm level and a more efficient movement of milk volumes between farmers and processors.

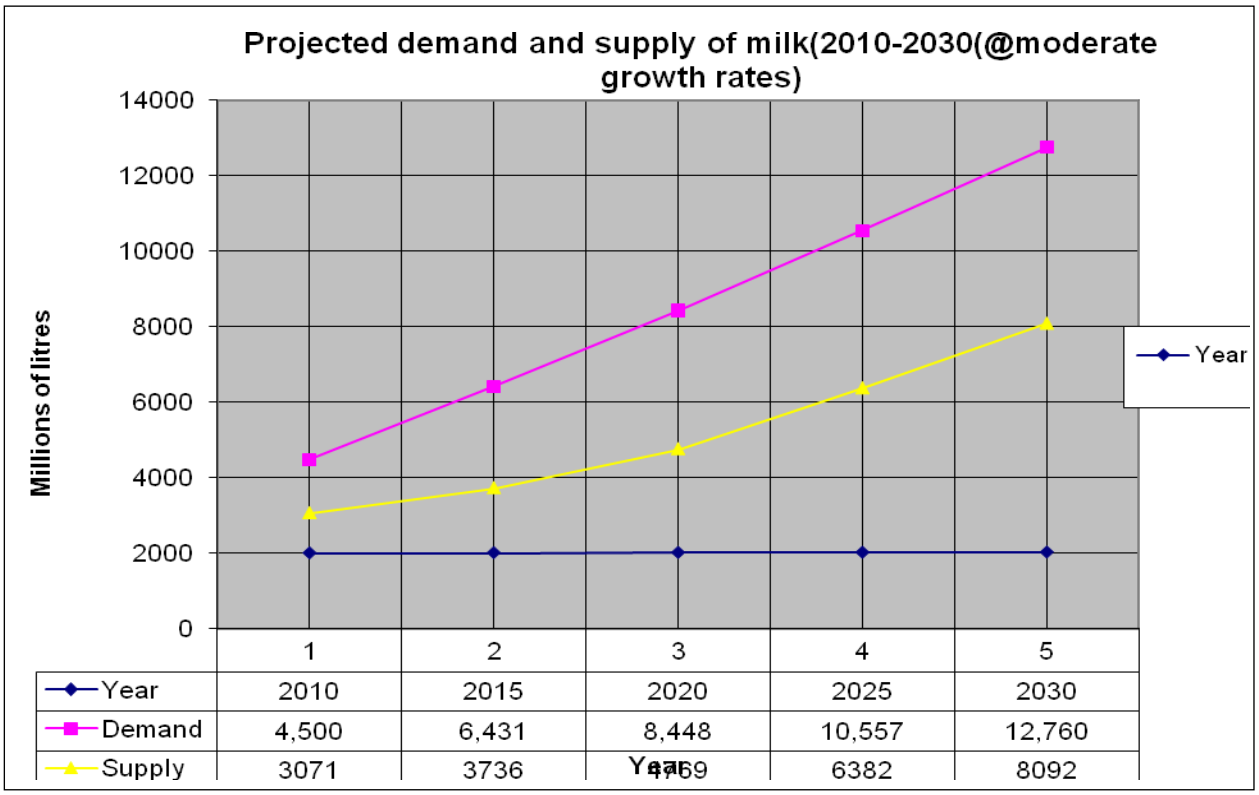
This would lead to higher levels of processor plant capacity utilization and lower consumer prices. Assuming moderate growth rates, the Kenya Dairy Masterplan projected the milk supply to be 2.71billion litres in 2005 rising to 8.1 billion litres by 2030.These projections were based on growth projections of 2 per cent per year in 2005, increasing to 7 per cent per year by 2030.The projected supply estimates are shown in table 4.2b below and illustrated in figure 4.2 below.

Table 4.2b: Projected supply estimates and at various growth rate (2005-2030); adopted from the National dairy master plan

Year	Milk projection (000) at varying moderate growth rates		Milk projection (000) at varying high growth rate	
	Milk (000)	Growth rate (%/y)	Milk (000)	Growth rate (%/y)
2005	2650	2	2782	3
2010	3071	3	3385	4
2015	3736	4	4320	5
2020	4769	5	5781	6
2025	6382	6	8108	7
2030	8092	7	10621	8

Source: Kenya Dairy Masterplan

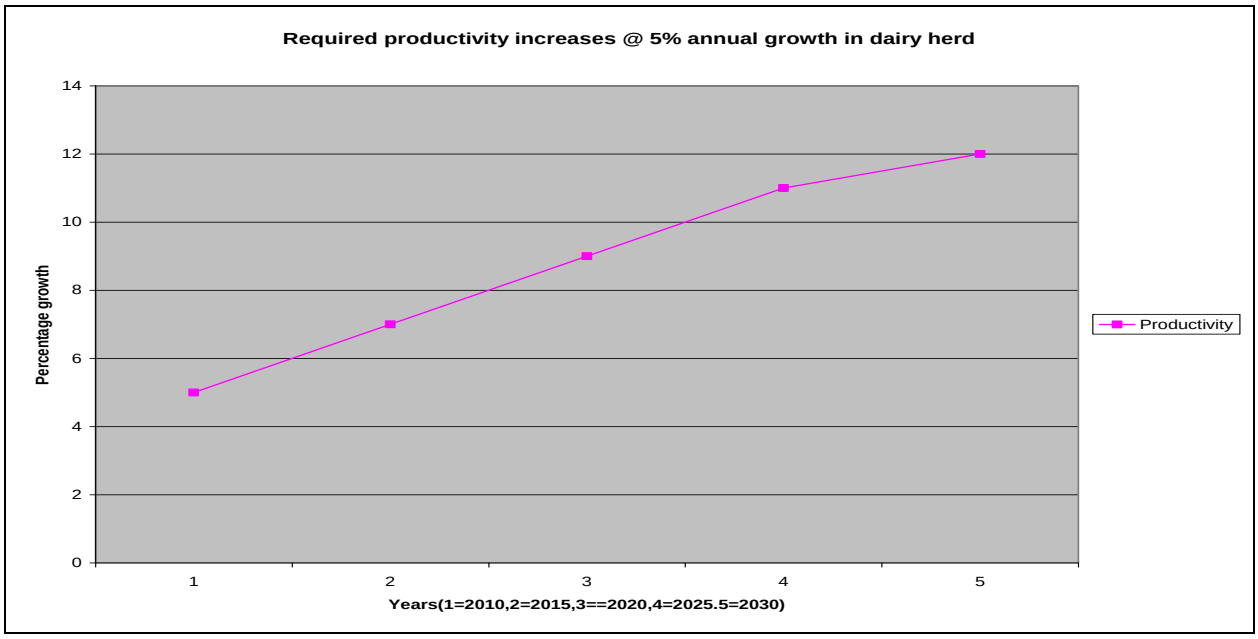
Figure 4.2 .Projected demand and supply estimates (2010-2030)



Source: Adopted from the Kenya Dairy Master Plan 2010

In order to meet demand projections, annual milk productivity per cow would have to increase from 5 per cent per annum in 2010 to 12 per cent per annum in 2030, at an annual herd growth rate of about 5 per cent. Assuming an annual increase in herd size of, say 5 per cent, productivity per cow per day would have to increase from the current estimated 8 litres to 12 litres by 2030, in order to match demand estimates. These projections are shown in **table 4.2a** and in **figure 4.3** below.

Figure 4.3: Projected rate of productivity increase for milk required to match demand and supply (2010-2030)



The demand for milk is expected to rise with urbanization and economic development. As more people are lifted out of poverty into the middle class, more milk and milk products will be demanded. Paradoxically, as more people are lifted out of poverty and into the middle class, fewer people will be left in the rural areas where dairy activities are carried out. Moreover, with the reduced focus on vocational education, the bulk of youth have little or no knowledge of dairy activities. With rising population, land is becoming smaller in size and more fragmented. With more urbanization and fewer people with dairy skills, the cost of labour for dairy production will go up. This poses challenges for dairying activities in general and increasing milk production in particular.

4.4 Market Access

New Zealand is the world's largest exporter of milk products. New Zealand and Australia are projected to remain the most important milk exporters having more than 40 per cent share of the global export market, followed by EU countries and the USA. For Kenya, potential markets include most of sub Sahara Africa and Asia. Globally, the milk market is huge and growing, partly fuelled by the demands of "westernization" of developing countries' diets as well as growing incomes in the developing world.

4.4.1 Global Trade

Globally, only 62 per cent of world production is delivered to milk processors, 38 per cent is sold informally or consumed on farm. Due to continued high demand for dairy products, the dairy sector is expected to continue experiencing high prices for the period up to 2020.However, this s likely to be tempered by rising costs of production especially from feed prices.

The main milk producing countries are India followed by the USA, Pakistan, China and Brazil, while the top 5 milk processing countries are the USA followed by Germany, China, France and India. Global production is projected to rise by 153 metric tons by 2020. Seventy three per cent of this is expected to come from developing countries, principally India and China, which are jointly projected to account for 38 per cent of this growth. The share of developed country production is projected to fall below 50 per cent and the share of milking animals by 10 per cent. During the same period, increased production from the developing world will be fuelled by a 30 per cent increase in animals. Still, the share of milk in developing countries is projected at a meager 4%. These differences are mainly caused by the huge differences in milk productivity per animal in developed and developing countries. The average projected growth rate of milk production over the period is expected to be 1.9 per cent. The 20 largest milk producers and their production in 2011 are shown in **table 4.4** below.

Table 4.4: Milk production 2012, energy corrected milk (ECM) (top 20, millions of Tons)

1.	India	137.5	11	The Netherlands	12.7
2.	USA	84.3	12	Turkey	12.2
3.	Pakistan	41.6	13	Poland	12.0
4.	China	33.9	14	Argentina	11.4
5.	Brazil	32.0	15	Italy	11.3
6.	Germany	31.1	16	Mexico	11.1
7.	Russian Federation	30.1	17	Ukraine	10.2
8.	France	25.2	18	Australia	9.8
9.	New Zealand	21.3	19	Iran	9.8
10.	United Kingdom	14.1	20	Canada	8.9

The main milk importing countries are the Russian Federation, Algeria, China, Japan, Saudi Arabia, Mexico and Indonesia. They are projected to continue accounting for less than 50 per cent of the world market.

By 2020, global consumption in developing countries is projected to rise by 30 per cent and only modestly in developed countries; the key driver of this growth is expected to be urbanization and increasing incomes. Strong demand is projected to continue in Russia and South East Asia with imports of powder milk from China increasing. The main consumer nations of the world are shown in table 4.5 below.

Table 4.5: Top world milk consumers, million of Tons, 2009

1	India	80.49	11	Japan	9.85
2	China	38.89	12	Argentina	8.67
3	Pakistan	27.63	13	Spain	7
4	Russia	24.29	14	Sudan	7
5	Brazil	23.59	15	USA	6.43
6	France	16.98	16	Romania	5.17
7	Italy	15.1	17	Colombia	5.1
8	UK	14.92	18	Austria	4.98
9	Mexico	12	19	Iran	4.49
10	Turkey	10.1			

4.4.2 Projected Consumption and Demand in Africa, 2011-2020

By 2020, milk production is projected to rise from 33,878 Kilotons in 2010 to 46,889 kilotons. The greatest increase is expected to be in sub Sahara Africa (29,953 KT) and to a limited extent North Africa at 16,937 KT. Between 2011 and 2020, growth in milk production is expected to grow by an average 2.83 per cent in Africa, with growth in SSA projected at 2.94 per cent and growth in North Africa averaging 2.62 per cent. South Africa has the lowest production growth projections at 0.99 per cent in the period. African countries are projected to import 596 KT by 2020 and export 8 KT in the same period[3].

During the same period, production of whole milk powder in Africa is projected to fall from 36 KT in 2010 to 32 KT in 2020. But in SSA, it is projected to rise from 6 KT to 16 KT in 2020.The decline in whole milk powder production is mainly attributed to projected decrease in production in Egypt. At the same time, consumption of whole milk powder in Africa is projected to grow from 528 KT in 2010 to 630 KT by 2020. The largest growth increase in per capita consumption is projected to be in South Africa at 4.50 per cent. The excess demand for whole milk powder as well as milk products over production will have to be met from imports.

Imports of whole milk powder into Africa are projected to rise from 519 KT (2010) to 607 KT by 2020.During the 2011-2020 period, export growth in whole milk powder in Africa is projected to be negative (-0.65), decreasing from 27 KT in 2010 to 9 KT by 2020.This is in sharp contrast to the average growth of 10.06 per cent in the 2001-2010 period.

African countries are projected to import 596 KT of milk and 607 KT of whole milk powder by 2020. Kenya can take advantage of the demand for milk in North and sub Sahara Africa to increase trade in milk. However, subsidized milk exports from the EU would pose a challenge to exports to North Africa. In the short run, however, Kenya can focus on exporting milk to its neighbors and the COMESA market. To increase trade in dairy products, therefore, Kenya would have to increase its share of milk production and of value added products. This calls for a reorientation in both the production systems and the processing of milk in the country.

[3] *OECD-FAO Agricultural outlook 2011-2020; dairy, chapter 9*

5 INVESTING IN THE FUTURE OF THE DAIRY INDUSTRY

To strengthen the dairy sector to meet growing domestic demand and to compete regionally will call for new and increased investments in the sector as well as a sustainable investment model. The investment model should allow for increased productivity and profitability of the sector. To enhance the viability of the sector, there is need to promote profitable production of high quality milk at farm level and a more efficient movement of volumes of milk between farmers and processors leading to higher levels of processor plant capacity utilization and lower consumer prices. Below we profile the status of key investments in the dairy sector across the value chain.

5.1 Status of Investment in the Dairy Sector

Farmers

The Kenya dairy sector is considered a vibrant and dynamic industry due to the substantial investments made over the years in the value chain. The highest investment in the value chain is by the small holder's dairy farmers who together account for 80% of the milk produced. The smallholder milk farmers are characterised by the lack of adequate resources and dairy management knowledge to profitably and successfully engage in sustainable dairy farming. Access to quality feeds, veterinary services, artificial insemination services, extension services and access to credit are the common challenges that face smallholder milk producers.

During our field visits we observed that though there is increased production of milk at the farm level, there is no corresponding investments to sustain such production as farmers view the dairy business as not profitable. Most notable was that the yield per animal and efficiency in dairy farming is very low and many farmers do not have the necessary technical skills to be successful dairy farmers. On average, farmers produce 5 litres per day per animal, which is not sufficient production at the current prices to break even.

However, we visited one co-operative society that is spearheading a program dubbed *Maziwa 365*, where farmers are clustered in groups of 10, to act as peer supporters to each other, and aim at each producing 10 litres of milk per day for 365 days. The groups compete amongst each other and those that excel become the role models for the others; and the best practices are disseminated to the groups. The groups are also provided with extension services to inculcate good animal husbandry to boost production and efficiency.

The target is for each group of ten to deliver a minimum of 100 litres of milk per day and with a target of 300 groups, (equivalent to 3,000 farmers), achieve an additional 30,000 litres per day from the groups. The overall goal is to boost production to 140,000 per day in the next three years within the milk shed captive area. This is a program that can be replicated in other areas and supported with some embedded technical assistance. This program can be used as a catalyst to upscale smallholder farmers into the missing middle category.

Whilst majority of smallholder farmers would like to increase the level of milk production per animal per day, they are constrained by various factors including:

(i) Skills and knowledge. Lack of skills and knowledge of best practice dairy farming for smallholders.

(ii) Poor animal genetics. Most farmers have been trying to improve the genetics through the use of A.I. but this takes a long time to attain the desired results. Also farmers are also complaining that AI is having a high failure rate which becomes very expensive to the farmer. The failure rate could be attributed to poor quality semen or from poor feeding practices.
(iii) High prices of heifers. On average a good heifer costs upward of Sh. 80,000 to Sh. 200,000. This is a prohibitive price that is beyond the reach of most farmers.
(iv) Unstable milk production during dry season due to shortage of fodder.
(v) High costs of feed. Generally, farmers expressed a view that the cost of feed is very high and also raised questions on the feed quality.
(vi) Low milk prices. Most farmers consider the current milk prices to be low compared to the cost of production. It has also been found that milk volumes respond positively to an increase in price but when the volumes start to increase in response to price the milk prices are brought down. Essentially the farmer is a price taker due to the oligopolistic nature of the milk market.
(vii) Poor infrastructure. Dairy farming is predominantly practiced in the rural areas. It is in these areas that the infrastructure especially the road network is poor. With a poor road infrastructure, transportation becomes difficult and a lot of milk is wasted at farm level. Lack of electricity is also another major problem in the rural areas and this makes it difficult to invest in cooling facilities that generally run on electricity.
(viii) Inadequate financial services. There is a gap in financing farmer level activities with very few financial players supporting farmers. Banks such as Equity, K-REP and Cooperative Bank are some of the few institutions that have now developed products for this.

The constraints highlighted above inhibit the growth of the sector and discourage investment. Therefore sustainable investments in the dairy must of necessity address productivity improvement at the farm level.

Cooling and bulking

To have a successful dairy sector, an efficient cold chain is essential. It is estimated that lack of proper cooling and bulking facilities results in 40 per cent waste of the raw milk produced. Very few farmers have invested in cooling facilities at the farm level. However, there exist cooling and bulking facilities predominantly owned by the cooperative societies and major milk processors.

Cooperatives, who dominate the bulking and cooling services, often have serious governance and efficiency problems. During the field visits, it was also observed that the growth of the cooling and bulking facilities is constrained by a multiplicity of licensing, cess and levies from various government entities. Most chilling hubs did not see a corresponding identifiable benefit accruing to them from such levies.

In an effort by farmer cooperatives to respond to the needs of members, most of them have upgraded the chilling plants to business hubs by embedding other value added services. This presents a window of opportunity for industry growth because it creates a sustainable and a bankable business model that upscale farmers' capacity to produce more milk of high quality, consistently. In return, this assures the processors a stable supply of milk and enables them to plan optimal capacity utilization. To enhance the cold chain most chilling hubs are investing in satellite cooling tanks to preserve the quality of milk as well as bring services closer to the farmers.

Processors

Kenya has at least 27 registered processors, most of which serve a limited geographical area. The total installed daily capacity is approximately 3 million litres per day; average intake is at 1.5 million/day. The major players in the industry are New KCC, Brookside, Buzeki and Githunguri. Most of these processors predominantly process milk with limited value added products. However, a few smaller processors are specializing in value added products like Happy Cow, Browns Cheese, Eldoville and Bio Foods (cheeses and high end yoghurts).

Due to present market limitations and customers preference for raw milk, the plant utilization in the existing processing plants is currently at an average of 50 per cent. This unutilized capacity results in a high unit cost of processed milk and is a contributor to the perceived high price of processed milk. Therefore, increasing milk throughput in the processing factories is possible without substantial investments in additional processing capacity. An increase in milk throughput will impact on the unit cost of production thereby reducing the price of milk. It has already been demonstrated by Githunguri Dairies Limited that a reduction in the retail price of processed milk increases the consumption of processed milk significantly.

New investments in the dairy sector must be structured in ways that boost the productivity and efficiency of the sector to ensure that the retail price of milk goes down and consumption of processed milk goes up.

Transport and logistics

The investment in transport and logistics (farm-cooling-processor-consumer) seems to be the weakest link in the value chain. The investment is haphazard and it is a mixture of all manner of transport systems. This is also the point, where many middlemen take the opportunity to do business, and in many cases, cost of transport between farm and collection point/dairy cooperative/ dairy processor buying point is high, averaging between Sh. 1.50-3.00 per litre. Players in the formal milk market are disadvantaged compared to the informal players who do not incur these costs. Except for the major processors who have invested in cooling tankers, others generally transport the milk outside the cold chain and this encourages the use of preservatives and adulteration. For distribution of milk to consumers most processors use a combination of own and hired transport. A business model that embeds transport and logistics services in the dairy sector will be necessary to increase efficiency and productivity in the value chain.

Feeds

The sector in Kenya has not invested sufficiently in setting up local supply chains for the feed industry and fodder supply. Hence, the animal feed industry relies on low quality/inconsistent and largely imported by-products. The high price of manufactured feeds is a deterrent to farmers in adopting optimal feeding practices. During the field visits farmers were generally unhappy with the quality of feeds as different lots of feed produce different results pointing to a lack of standards. This area of feed standards and pricing could be one of the areas that can be managed by the Chilling Hub Clusters.

Commercialisation of the fodder supply chain (preserved fodders) and investment in grasslands for fresh grass and hay making, maize silage and other investments in protein rich forages are in an infancy stage, hence the low access and availability of fodder in the dry seasons. This causes a general low milk production and high production costs compounded by sharp seasonal fluctuations in some of Kenya's major milk sheds.

During our field visit we observed a classic case of strategic partnership where Ndumberi FCS and Nyala FCS have incorporated a company for hay and forage production, which has leased 1,200 acres of land in Laikipia County to plant hay for sale to its member farmers. Ndumberi FCS reported sales from August 2012 – March 2013 of 55,000 bales (each 16 kg) to its farmers, thereby stabilizing seasonal fluctuation in production to an important extent. These types of initiative could be very well handled by the proposed cluster model.

5.2 Key Areas of Investment

Investments in the dairy sector have been constrained in part by the weather-based fluctuation of the industry and the unstable relationship between processors and milk producers. Instability in the market place stifles investment, innovation, productivity and profitability on both sides, and creates uncertainty and conflict. Therefore to spur investments in the dairy sector will require a new paradigm, away from the usual subsistence and survival mode to a more sustainable business mode. Key investment areas include:

(i) On-farm productivity improvement through improved genetic resources, on-farm technology improvements, improved feeding systems and enhanced extension services, herd improvement (genetic). Investment activities should also include feed mills, stores for fodder storage, A.I. services and semen refrigeration, agency banking etc.
Most of the farmers interviewed during field visits indicated the willingness to invest outright in animals with improved genetics, as the process of breed upgrading takes on average 8 years to attain a pure breed. Farmers were also keen to investment in mechanized systems especially acquisition of chaff cutters and other implements as well as investment in development of proper cow sheds and feed storage.

On average most farmers estimated an on-farm investment of approximately Sh. 240,000 including a heifer estimated at Sh. 100,000. Simple calculation indicates that at an estimated profit margin of 20% (Sh. 6) per liter will take a farmer producing 5 liters/day 8,000 days or 22 years to recoup this investment. This means that unless there are direct interventions/ subsidies at this level it will almost be impossible for such investments to be done. However, when factoring in the sales of heifers and assuming on average a farmer will get two heifers every three years which can be sold at an average price of Sh. 40,000 each, the payback period reduces drastically to 6 years which is reasonable implying that sale of heifers is a major boost to dairy farming profitability. However if productivity at the farm level increases to 10 litres per day per animal and sale of heifers remains the same the payback period reduces to 4.5 years which would make dairy farming a very attractive business venture. To get to 10 litres per day per animal requires a combination of breed improvement and proper feeding practices.

Therefore efforts must be put in place to bring down the cost of high quality semen, so that smallholders can afford to use A.I. and improve the genetic potential of their animals. During our interview at KAGRC, we were informed of high incidences of poor quality semen in circulation and this was attributed mainly to inability to regulate and control the semen supply chain.
Efficiency of A.I. can be increased by improving farmers' ability to recognize correct breeding times and improved skills of inseminators. Recently the embryonic transfer technology has been introduced as faster way of genetic improvement. However the success rate has been low and its cost prohibitive and its full adoption may require government subsidy. As further test are done on

this technology and its success rate enhance this could become part of a future solution for genetic improvement.

(ii) Improved transport cooling and bulking facilities, through investment in motorized transport (tractors and pick-up vans), satellite and on farm cooling tanks, chilling plants in milk surplus districts, and refrigerated trucks for bulk transport of milk to the main processing facilities. It is estimated that lack of proper cooling and bulking facilities results in 40 per cent waste of raw milk produced. The promotion of business services embedded on a 'chilling hub' (Technoserve and ABS: DFID – BSMDP Dairy BDS project) has resulted in reduction of milk losses by 90 per cent in dairy cooperative societies (August 2005). This level of gains makes a good case for enhanced investments in cooling and bulking.

Out of the ten chilling and cooling plants we visited only one was operating below the break-even level of 6,000 litres per day (Heifer International). Majority were operating above 20,000 litres per day and had proposals for investment to double their daily capacity. This assumed increased production at farm level and a higher market uptake for the milk.

(iii) Investments in modernization and rehabilitation for new technology uptake, expansion to cope with increased supply, expansion of product range especially powder, UHT and other value added products. We noted that most processors can increase the milk throughput in the processing factories without substantial investments in additional processing capacity. An increase in milk throughput will impact on the unit cost of production thereby reducing the price of milk. Therefore new investments in the dairy sector must be structured in ways that boost the productivity and efficiency of the sector, to ensure that the retail price of milk goes down and consumption of processed milk goes up.

However, during our field visits we observed that certain processors are using obsolete technology thereby incurring high production and energy costs. A case can therefore be made for plant modernization and technological improvements at the processing level. We observed e.g. that Brookside is in the process of completing a Sh. 4 billion milk powder plant and Meru Central is in the process of increasing the production of its UHT milk. New KCC is also in the process of replacing its Eldoret Milk Powder plant after the current one blew up. Nonetheless, investments at New KCC are minimal as the company is awaiting privatization.

There are also opportunities for the processors to invest in market development through promotion activities, market diversification and products development to tap into the regional and global markets

(iv) Credit facilities to support industry working capital needs at all stages of the value chain. This would also be extended to support services providers (feed merchants and health service providers). The dairy sector has been supported with financial services at different levels. The dairy farmer generally gets supported through the cooperative society by assessing services in advance and paying for them on a check off system.

As banks become more knowledgeable about the risks and opportunities in the dairy sector, they are increasingly lending to the sector. Several banks have come forward to finance dairy investments. Banks lend in those areas of the value chain that have the most banking potential thereby increasing investment in the sector. It will be important to identify the less bankable parts of the value chain, such as the dairy feed sector, and concentrate support to improve bankability in those parts to further develop the dairy industry.

5.3 The Chilling and Business Hub as a Driver for Growth

The transformation of chilling plants to business hubs is a game changer because it creates a sustainable and a bankable business model that upscales farmers' capacity to produce more milk of high quality consistently. This assures the processors of a stable supply of milk and enables them to plan optimal capacity utilization. The hubs enable producers to bulk and chill milk as well as consolidate their needs for services and goods, thereby making it more efficient for the private sector to engage with smallholders. Through a "check off system," farmers are supplied with feed and AI and veterinary services, and pay for those services by deducting it from farmers' milk proceeds.
In the Chilling and Business Hub Model, market development is entrusted to the processor. The processor then invests, on basis of quality and quantity guarantees, in domestic and regional market development.

To upscale the financial performance of a hub, there is need to consider consolidation of various hubs into a cluster. The cluster would focus on common user services that can benefit from economies of scale. During our field visits and interviews with milk hubs, they were much attracted to the cluster concept and were willing to take it forward. This could be an initiative to be supported by KMDP. Some of the common user services that can be handled at a cluster level include:

(i) Price negotiations
(ii) Bulk purchasing of feeds and other agro-vet products. Some chilling hubs have invested in feed mills and with a cluster model economies of scale as well as hub profitability can be enhanced;
(iii) Bulk storage of feeds and other products;
(iv) Veterinary, AI and extension services;
(v) Financial services;
(vi) Shared services including management, accounting and ICT etc.

Leadership and management is especially important, considering that the cluster will be an amalgamation of operations of various dairy co-operatives involved in running chilling and business hubs. The cluster can utilize a common IT platform bringing together the operations of various chilling hubs as a key management tool.

We also observed that a few of the chilling hubs intended to upscale their services into milk processing. Those that have done it are having difficulty penetrating the market as the well established processors are heavily entrenched. It is also true that the chilling hubs low level processing capacity makes them less attractive to top notch marketing executives; and lack the financial muscle to invest in product promotion and advertising.

In view of the above, there is a case to be made for the chilling hub to disengage from processing, and specialize in providing support services to the farmers to increase production and make raw milk available to processors who have capacity to invest in marketing. Where they need to get into processing, partnerships or franchise models with established processors could be considered and encouraged. These partnerships could focus on distributing processed milk at regional level in line with the new county devolved governments. Larger processors could move towards new product development and focus on the export market.

The chilling and business hub is therefore an innovative business model that enables a profitable farmer owned and operated agribusiness, to transform a rural community into an economic pole for development. The hub should be the vehicle through which investment in the dairy industry should be anchored.

5.4 Benefits of the Chilling and Business Hub

(i) Improved on-farm productivity leading to increased farmer income;
(ii) enables farmers to manage this income without resort to cash transactions, thus facilitating savings;
(iii) Reduced waste on-farm and in transport and bulking stages due to improved handling infrastructure. This will further add to the income of the farmer;
(iv) provides essential services for milk production and other farming activities (farm inputs, animal health and veterinary services, AI, farm extension and training);
(v) Improved quality of milk due to controlled production systems, handling and traceability requirements. This will translate into reduced deterioration of milk at the Chilling Hub leading to high quality processing. This has a positive impact on promotion of exports to the regional markets;
(vi) Facilitates access to additional services through financial intermediation (school fees, financial services).

5.5 Characteristics of the Chilling Business Hub

Essential characteristics of the chilling and business hub are:

(i) **A critical mass of members**. For the hub to be effective, a large membership base of smallholder dairy farmers is required. Supply contracts with members can then be entered into, guaranteeing them a set price for milk delivered in certain quantities. A supply contract with smallholder farmers will build trust in the model and ensure dairy farmers an outlet for their milk in periods of surplus production.

(ii) **Milk transport.** The hub would be responsible for organizing the transportation of raw milk from dairy farmers and delivering it to its cooling centres for bulking and cooling. The transportation of chilled milk to dairy processors for pasteurization or milk traders for sale to consumers could also be organized by the enterprise. Transportation services could also be extended to ensure the collection of milk produced in the evening, which has been estimated to be 70 per cent of that produced in the morning. Such an initiative would go a long way to reduce spoilage, increase milk quality and help build farmer loyalty to the cooling centre. A proper transport system would reduce the price of transportation and lower the costs of milk for the final consumer.

(iii) **Stable milk price.** The success of the hub, and the minimization of the seasonal flush, is hinged on the successful application of a milk payment system that encourages dairy farmers to deliver a constant supply of raw milk throughout the year. Such a payment system should ensure that farmers receive a minimum amount during periods of surplus supply, and a bonus for regular delivery during periods of shortage.

(iv) **Quality controls**. The hub is a key player in the enhancement and enforcement of quality checks and controls at farm level and cooling centre level. This would include: education of dairy farmers in the observance of proper hygiene in the handling of milk, provision of detergents and metal milk cans at reasonable prices, or on credit, to ensure that milk to be transported is of an acceptable quality, and on-farm testing of raw milk to ensure its quality.

(v) **Service model**. The more developed hub provides a portfolio of services such feeds, fodder bank, veterinary drugs, credit through check off system, training and extension, and sometimes AI services.

(vi) **Leadership and management**. The leadership and management of the hub are critical for its successful operation.

6 POLICY AND REGULATORY FRAMEWORK FOR A GROWTH SECTOR

This section responds to the issues and challenges of the dairy sector discussed earlier. There are two aspects to the market access opportunities and the potential for the dairy sector to benefit from an expanded domestic, regional and global market. These are: (a) a stable and sustained supply to the target markets, and (b) market promotion into the target markets.

Kenya can hardly meet her own milk demand. This is due to a rising population, rising incomes (middle level) and increasing urbanization. Domestic demand projections are presented in the Dairy Masterplan and are reproduced in this report. Regional and global opportunities have been addressed as well.

The point has been made that the dairy industry as currently constituted is unlikely to upscale to the next level. The vision is for a globally competitive dairy industry. Considering that 80 percent of producers are small scale farmers, owning less than 3 cows with a yield of 5-10 litres per day, it is unlikely that this category of farmers can adequately invest, in the medium term, in productivity improvement. A high quality pedigree animal costs upwards of Sh. 120,000. From a business perspective, and given current production levels and further taking into account variable costs (feed, A.I., etc), investment at this level cannot make economic sense. The option is to gradually upgrade the genetic make-up of the local animal through artificial insemination. It takes 7-8 years to achieve a reasonable level of productivity.

This is not the way to upscale the sector. Related to the genetic makeup of smallholder animals, the efficiency and effectiveness of A.I. services is low. Repeats in A.I. services are high. Alternative technology (embryo transfer) is costly and beyond the means of the smallholder farmer. This analysis, which has been presented in earlier sections of this report, would indicate a radical shift in the policy framework for the industry.

6.1 Segmented Approach to Sector Development

The discussions above indicate the need to segment the dairy sector to allow a more focused growth strategy. This should recognize that the smallholder farmers account for 80 per cent of production. This is the pillar of the industry as currently structured.

This notwithstanding, it should be possible to segregate the "livelihood" dairy category from the smallholder dairy farmer who has commercial aspirations. In effect, therefore, the sector can be categorized into three: livelihood dairy; smallholder dairy farmer; and middle category and large scale farmer. These categories are now discussed.

(i) Livelihood dairy farmers. This category owns less than 3 cows, with a yield of 5-10 litres per cow. This farmer is unable to invest in feeds and technology due to limited financial resources. From a commercial perspective, this category cannot aspire to drive the industry to the next level. But, from a poverty reduction perspective, particularly food security and nutrition, this category can benefit from donor support, particularly those donors whose core mandate is poverty alleviation and improved livelihoods. There should not be any pretence however that the profit motive will propel the growth of this segment.

(ii) Smallholder dairy farmers, owning 4 to 10 cows and producing less than 50 litres per day. This category will need direct and subsidized products and services. This includes subsidized procurement of pedigree cows, support to accessing new technology (embryo transfer); and subsidized AI services. This approach was the traditional role of government. A rethink in policy is necessary. Government currently supports agriculture with subsidized fertilizers and other inputs like seeds. In addition, government has written off debt incurred in the coffee and sugar sectors. In fisheries development, government has subsidized investment in fish ponds, equipment and extension services. It is acknowledged that the dairy sector is important in terms of food security and nutrition. There is merit in affirmative drive for the stimulation of the dairy sector, at least in the next 10 years. This proposal is not unique. India and New Zealand have taken these bold moves to upscale their dairy sectors.

For the smallholder dairy farmer to uplift production to 10 – 15 litres per cow per day, certain conditions must apply. Subsidized services must be available, as discussed above and investment in technologies must be supported by a strong extension services outreach. This is necessary so as to attract younger farmers into the sector. It will be noted that the more "successful" farmers in this category (5-10 litres/cow/day) are in the age bracket: 46-55 years. This would indicate the need to renew the production base in the industry. It will also be noted that youth and education do not necessarily translate into more production. Young people are not attracted to the traditional agriculture. This also applies to the dairy sector. Youth (15-35 years) account for 36 per cent of the population. Unemployment in the same category is 63 per cent[4]. Attracting youth into the dairy sector will require innovative approaches. The Medium Term Plan 2014-2018 (under preparation) recognizes this fact. Proposed interventions include training youth in new farming technologies, value addition and new systems of managing the sector. In this connection, *cluster development strategy will be promoted to facilitate the holistic development of the sector*[5]. In subsequent sections, we have recommended a "cluster approach" as a viable strategy in the development of the dairy sector, particularly, in the smallholder segment.

(iii) Medium and large scale farmers: this category constitutes approximately 20 per cent of the dairy sector. It has the capacity to grow the sector and should, in the long term, be expected to anchor the dairy industry. This segment responds favorably to policy and fiscal incentives.

To benefit from these incentives, this segment needs to embrace policy advocacy. This calls for strong sector associations, which currently is not the case. In the initial stages, therefore, this segment can be supported to articulate a common vision of the dairy sector, and to develop a strategy of uplifting the productivity and competitiveness of the sector.

In the medium term this segment would be expected to enjoy the subsidized services advocated for the smallholder category. In the long term however, the dairy sector will be expected to be fully commercialized. This is the route taken by dairy sectors in Australia and New Zealand. It would be expected that, in the longer term (10-20 years), the industry will consolidate in favor of this category. This move will be anchored on technology adoption, value addition, mechanization and better sector organization (cluster organizations and sector associations).

Incidents of this category of dairy farmers shifting from dairy to fodder farming were noted. Large scale farmers were reducing their herd. This indicates that there are challenges in the sector. The high cost and poor quality of feeds was frequently mentioned. The fact that the formal

[4] Kenya Integrated Household Budget Survey, 2006

[5] MTP: 2013-2018 (Concept notes)

processing sector is oligopolistic means that farmers have limited influence in setting prices of milk produced. It is unlikely that strong competition in the processing sector will be realized in the medium term, noting that three main processors account for 85 per cent of this market segment and that current processing capacity utilization is estimated at 40-50 percent. However this may change with investments into the sector by multinationals such as Nestle, Danone or Friesland Campina.

We are in a position where processors have low capacity utilization and a production segment (farmers) that cannot meet the demand due to systemic barriers to productivity, as discussed. We now have a situation where the farmer and final consumer are dissatisfied with the pricing system, which points at a dysfunctional sector industry. This position is made worse by the seasonal variability of milk production. During "flush" period, the farmer suffers waste and low prices. It does not follow that the consumer benefits from low prices in a manner commensurate with the reduction in farm-gate prices. This structure is therefore a barrier to sector productivity and competitiveness.

6.2 Reforming the Policy and Regulatory Framework for the Dairy Sector

6.2.1 The Legal Framework

The legal framework for the dairy sector is the **Dairy Industry Act (Cap 336) of 1958,** last revised in 1984. This Act mandates the Kenya Dairy Board to, among other functions, organize, regulate, develop the efficient production, marketing, distribution and supply of dairy produce; improve quality of dairy produce; promote market research in relation to dairy produce; and promote private sector participation in the dairy sector.

The Veterinary Surgeons Act (Cap 366) and the Kenya Veterinary Board also established under this Act, mandates the Veterinary Department of the Ministry of Livestock Development to control and manage animal related diseases and vectors. The Board controls and regulates the Professional Conduct of Veterinary Practitioners.

Recent reforms in the agricultural sector have consolidated the legal framework for the sector. The **Agriculture, Fisheries and Food Authority Act, 2013**, provides for the consolidation of laws on the regulation and promotion of agriculture generally, provide for the establishment of the Agriculture, Fisheries and Food Authority; and makes provision for the respective roles of the national and county governments in agricultural development.

Related laws are **The Crops Act, 2013**, which seeks to consolidate and repeal various statutes relating to crops; and provide for the growth and development of agricultural crops. This Act provides for the repeal of ***Crop Production and Livestock Act, Cap 321 of 1926***. It would appear from this scenario that a livestock development specific legislation will have to be developed.

Livestock research has been consolidated into the **Kenya Agricultural Research Act, 2012.** This Act establishes the Kenya Agricultural Research Institute whose role is to promote, streamline, co-ordinate and regulate research in crops, livestock, marine and fisheries, genetic resources and biotechnology in Kenya; expedite equitable access to research information, resources and technology; and promotes the application of research findings and technology in the field of agriculture.

The Kenya Agricultural Research Act, 2012 establishes a number of Research Institutes, among which is the **Livestock Research Institute.** The functions of the institute include identification of

production, policy, market, processing and utilization constraints in the fields of agriculture, livestock, water and environment and propose appropriate research programs; and dissemination, in collaboration with other relevant agencies, appropriate systems of mechanization and technology options to improve agricultural production and provide answers to foreseeable problems facing crops and livestock production; collaborate with the extension and education services and other organizations, agencies and institutions, including schools and universities, public or private, to disseminate research results and technologies.

Other laws that govern the sector are **the Standards Act, Cap 496,** under which milk and milk products are regulated, the **Foods, Drugs and Chemical Substance Act, Cap 254** which regulates the safety of food and food products and the **Public Health Act, Cap 242** which regulates the health and safety of dairy stock, dairies, milk-shops and milk vessels.

While there is need to reform the policy and legal framework to reflect the changed paradigm, as discussed in this section, there is also the critical need to enhance compliance with the appropriate laws and regulations. There is a common perception within the dairy sector that existing laws, particularly those concerned with safety of milk (raw milk) and quality of milk, are not effectively enforced. Laws and regulations, when these are enacted, should be complied with.

6.2.2 The Policy Framework

The last major attempt at reforming the policy on livestock (and dairy) development was in 2008. **The National Livestock Policy (Sessional Paper No 2 of 2008)** and the related **Livestock Development Bill (2008)** are major reform proposals in the policy and legal framework for the livestock sector and dairy sub-sector. The policy reforms proposed aim at:

- improving the existing breeds;
- establishing a co-ordinate mechanism for self-sustaining breeding programs;
- regulating breeding services particularly in view of the liberalization of livestock breeding services;
- diversifying the feed base through use of alternative sources of energy and protein;
- strengthening the livestock research and extension services.

The National Livestock Policy (2008) is still in draft form. This is the fate of earlier attempts at sector reforms. Examples of attempts to reform dairy sector policies are: draft Dairy Development Policy, 2000; and draft Dairy Policy, 2006.

Kenya National Dairy Masterplan (2010) presents a comprehensive attempt at the reform of the dairy sector. Key objectives are aimed at transforming the sector into a competitive industry in line with Vision 2030. These are to: improve the productivity and competitiveness of Kenya's dairy sector and dairy products; positively contribute to improved livelihoods of the small-scale producer; increase domestic consumption; transform the dairy industry into a net exporter of dairy animals and their products; maximize dairy exports in the regional and global markets; and re-orient milk processing toward long life dairy products.

The Vision of the dairy industry is to: ***transform milk production and trade into an innovative and commercially oriented and globally competitive dairy value chain by 2030*.** The policy and legal framework for the sector should be guided by this Vision. This means that the policy and legal regime

must address the emerging challenges discussed in the preceding section and also stimulate the growth and competitiveness of the sector.

Neither the National Livestock Policy nor the National Dairy Masterplan has been supported by robust implementation. Challenges of limited funds and technical resources are always mentioned. But the challenge is larger than this. For a start and despite views to the contrary, the vision of the sector is not shared within the sector. This could be due to inadequate consultations in the formulation process, or limited awareness creation. This arises partly from limited resources including funds. But most fundamentally, the challenge of the changed economic environment, particularly liberalization and the presumed private sector participation, have not been understood. This calls for a paradigm change in the way the sector is understood and regulated. The structure of the industry, both public and private, has remained unchanged.

6.2.3 Devolved Governance and the Dairy Sector

The Constitution of Kenya 2010, introduced fundamental reforms in the governance of the country. In particular, agriculture and livestock development are now the responsibility of the county governments; while policy development and implementation co-ordination remain the responsibility of the national government. This re-alignment in the roles of national and devolved governments means that the current policy and legal framework should change to reflect the new paradigm.

The county governments have power to regulate products within their jurisdictions. This framework will replace the Local Government Act, Cap 265, which regulates markets under the Public Health Acts and other food related legislation. This Act has since been repealed and will be replaced by county specific legislation. Within the legal framework for the dairy sector should be considered the permits and levies charged by local authorities and central government. The producers pay a levy of cents 20 per litres sold while the processors also pay an equivalent amount to the Kenya Dairy Board. There is agreement among producers, traders and processors that the system of permits and cess negatively impact the development of the sector. As a regulator, Kenya Dairy Board should be funded by the exchequer, not through industry levies. The regulatory and developmental role of KDB creates a conflict of interest. This should be addressed. Under the institutional framework for the sector, a proposal has been made to restructure the role of KDB to focus more sharply on regulation and compliance.

7 REFORMS IN THE INSTITUTIONAL FRAMEWORK FOR THE DAIRY SECTOR

7.1 Public Sector Institutions

The Department of Livestock Development is the apex body department of public sector institutions in the dairy sector. In line with the reform in the public sector that has defined the last two decades, the department has re-defined its role as the regulation of the livestock sector, policy formulation and policy co-ordination. In this paradigm, the traditional role of government in supporting livestock development through extension services and marketing has reduced.

The private sector was expected to take on this role as a business opportunity. The government is still engaged in livestock research (KARI, KEVEVAPI) and this role will continue. As noted in the earlier sections, the private sector role in extension services is weak and this has negatively affected the sector development, particularly in dairy. The Kenya Dairy Board is the government agency with the regulatory mandate in the dairy sector. The enabling legislation is the Dairy Industry Act of 1958. The Board is also mandated to develop the sector through training and technical support. Capacity constraints, both technical and financial, have hampered the service provision by the Dairy Board.

7.1.1 Reforming the Kenya Dairy Board

During our field study, and as also confirmed in the study questionnaire, we noted that the role of the Board in discharging its mandate is weak. Indeed, there was a perception from industry players that the role of the Board need to change. Developing the dairy sector and also regulating it, is inherently contradictory. This conflict in the mandate of the Board is a major constraint in its service delivery role. The key role of the Board should be to ensure that not only are standards of hygiene observed in milk handling throughout the dairy industry value chain, but that the quality of milk marketed meets minimum safety standards. The licensing of small scale traders and milk bar operators, for example, should be strictly supervised to ensure adherence to minimum standards of food safety. The weak role of the Board is attributed to the inadequacy in capacity to discharge this mandate.

While government should facilitate sector growth through fiscal incentives and enabling environment, including information gathering and dissemination, the development of the sector is the role of the private sector. While government can support industry promotion globally through trade advisory, information dissemination and bilateral and multilateral trade negotiations, market access and trade promotion is the role of the industry. This includes improvement in the quality of milk and other dairy products. Self-regulation is an important approach to industry development. This is acknowledged in the Dairy Masterplan. The points made above indicate the need to **restructure the role of the Kenya Dairy Board** to be an effective regulatory institution ensuring a level playing field in the industry.

7.1.2 Enhancing private sector participation

The National Livestock Policy proposes the involvement of the private sector in livestock breeding alongside Kenya Animal Genetic Resources Centre (KAGRC). Indeed, a few private sector players have been licensed to engage in commercial livestock breeding.

Two issues arise: (a) the engagement of the private sector in commercial breeding requires strict regulation to ensure that genetic materials supplied to farmers are of high quality, and (b) that genetic

defects are not transferred into the national dairy herd. The other issue arising is the nature of competition between private sector breeders and a public funded (subsidized) agency (KAGRC). This creates uneven playing field which could undermine the success of the private sector.
While KAGRC should retain its current role in the medium term, the role of this important institution, in the long run, should be to maintain the country's genetic stock and to work with the research institutions to upgrade breeding technology for onward transfer to the dairy farmers. It is also necessary to ensure that KAGRC supports the smallholder farmers as part of the subsidy package to this sector segment. This need has been presented in this report.

The Kenya Livestock Breeders Association maintains the Kenya Stud Book, the registration of dairy herd pedigree. Registration ensures traceability of the animal pedigree and increases the market appeal of the relevant animal, thus enhancing its market price. Registration is voluntary. Other industry players at this level are the Livestock Recording Centre and other Breed Associations (Friesian, Ayrshire). The National Livestock Policy proposes the establishment of a "***central organization charged with the responsibility of developing and coordinating self-sustaining breeding programs".*** The need for breed registration is recognized. However, private sector registration is seen to present a conflict of interest between those who register and those who breed. The case for a neutral registration process has been advocated in the course of this study. This will be the more critical when the private sector engagement in the breeding business takes traction.

In the event, it is proposed that animal registration, which should be encouraged as part of the dairy herd improvement, should be the responsibility of the Kenya Dairy Board. This will tie-up with the regulatory mandate of the Board. It will be noted that this arrangement and the need to re-define the role of the public agencies, particularly regarding the private sector engagement in animal breeding, will require an appropriate legal framework.

7.2 Private Sector Associations

The dairy processors are organized under the Kenya Dairy Processors Association (KDPA). The focus of the association is to safeguard the interests of the processors, sometimes against the interest of farmers and consumers. There is no evidence that KDPA is focused on sector development, for example, the development and improvement of quality standards in dairy products.

The Dairy Traders Association (DTA) lobbies for the interest of dairy traders who largely operate in the raw milk market. A sector vision is equally lacking.

The producers share a multiplicity of associations. These include: Kenya Livestock Breeders Organization (KLBO), Kenya Dairy Producers Organization (KENDAPO), Kenya National Federation of Agricultural Producers (KENFAP), Kenya Dairy Farmers Federation (KDFF). There is no evidence, especially from smallholder farmers, that the role of these associations has benefited the sector. In fact, most farmers are not members of association and could not even remember the name of any. There is need to rationalize the producer associations to be effective advocates of the sector. This process will be facilitated, probably by the existing associations with the help of the Kenya Dairy Board or the development partners.

An important private sector association in the industry is the Association of Kenya Animal Feed Manufacturers (AKFEMA). Registered under the Societies Act (Section 10), the mandate of

AKEFEMA is to coordinate and promote self-regulation in feeds quality and advocate enabling environment for their members. However, also AKEFEMA is weak, lacks funding and a mandate to levy the industry and is more a members' defense mechanism rather than a forward looking industry association that could spur development in of the sub-sector.

The common denominator in all industry associations is their weak institutional capacity and single issue/members' interest rather than sector development. In most cases, they depend on the goodwill and support of donors (KDFF, KENFAP) or government including the KDB (KLBO, AKEFEMA, KENDAPO, DTA and KDPA). Examples are secretarial services provided to KDPA and KENDAPO by KDB, government grants to KLBO and secretarial support to AKEFEMA by the Ministry of Livestock Development.

The lack of a common vision for the sector lies at the root of this challenge. The oligopolistic nature of the processors and the consequent rivalry in the marketplace, would account for the weak capacity of KDPA, for example. Most sector associations are inward looking, being pre-occupied with sub-sector interests at the expense of the total sector. The sector liberalization in the 1990s did not take into account the need to facilitate the management of change (paradigm shift) to align the policy and regularly framework to the new paradigm. This challenge has not been addressed.

The root of this seems that there is an institutional vacuum between government as the regulator and industry associations that only represent a specific set of stakeholders with a single interest. In actual practice, and this accounts for most agricultural sub sectors in Kenya, there are no **sector institutions** that are made up of various stakeholder groups in a sector. In case of the dairy sector, an institution that includes farmers, transporters, traders, processors, workers, consumers, animal feed and AI service providers.

7.3 The Co-operative Sector

The co-operative sector is a major player in the dairy sector. Most chilling hubs in different milk sheds are owned by co-operative societies, sometimes with support from development partners (e.g. Siogiroi, Kabiyet and Tanykina). Success has been achieved where development partners have supported investment in chilling hubs. There are fears within the chilling hubs that on repayment of loans extended to them, and which is the basis of representation of development partners in the management of the hub, the governance challenges associated with farmer owned enterprises and cooperatives could emerge. This could jeopardize the sustainability of the chilling hubs.
It will be noted that the EADD supported chilling hubs are established as private companies, under the Companies Act, Cap 486. This "hybrid" model (farmers' owned milk collection and bulking enterprises and development partner) has been successful in mobilizing sector productivity.

The co-operative sector has undergone reforms. The Co-operative Act of 2004 has introduced reforms aimed at improving the governance of the co-operative societies. Annual audits have further enhanced the governance in the sector. Successful models exist (e.g. Muki Farmers Co-operative Society and others) but there is debate as to which is more sustainable: the hybrid model or the "fully" co-operative model. Evidence would indicate that a purely co-operative model could be unsustainable, given the history of the co-operative movement in the country. Both the hybrid and fully co-operative models require a dominant player for sustainability (Siogiroi and Muki). What is clear is that a chilling hub or a processing unit should be established as a private entity where farmers are

shareholder. This is necessary to ensure that management of the facility is based on private sector model. The co-operative model would be inhibitive in that it does not allow flexibility in business decision making and the re-investment of profits. However this does not imply that chilling hubs can or should not be "farmer owned".

7.4 Development Partners in the Dairy Sector

The dairy sector has benefited from support by development partners. EADD, the East Africa Dairy Development Program funded by the Bill and Melinda Gates Foundation, has invested in chilling hubs in diverse milk sheds (North and South Rift, Ol Kalou, Nyeri and others). This investment is supported by field based technical services. Other development partners in the sector are: United States Agency for International Development (USAID) – Kenya Dairy Sector Competitiveness Program, International Fund for Agricultural Development (IFAD) – Smallholder Dairy Commercialization Project (SDCP); and SNV Netherlands Organization (SNV) – Kenya Market-led Dairy Program.

In assessing the role of development partners in the dairy sector, it is necessary to differentiate the core mandate of these players. Most international and local NGOs define their mandate as poverty alleviation and improved livelihoods. The benchmark for these NGOs is the MDGs, particularly, MDG 1 (halving the number of people in extreme poverty by 50 per cent by 2015).

There are those NGOs and development partners who now advocate and support the business - oriented model of development. This model recognizes that the poor also engage in the markets, for example the Making Markets Work for the Poor concept (MMW4P). The approach is therefore empowering the poor and vulnerable to engage with, and benefit from, the markets in which they seek to engage. This model seeks to engage with the private sector to empower the poor to be part of sector value chains, ensuring sustainability of development interventions.
This categorization of development partners leads to certain conclusions. Those poverty-oriented development partners should continue their support to the subsistence category of dairy farmers. The empowerment and business sustainability development partners, including NGOs, should focus on the growth-oriented segments of the dairy sector. Specifically, these are business-oriented smallholder farmers and the middle category and the large scale farmers.

In all cases, however, support by the development partners should not distort the market. Market distortion could undermine sector development. At the poverty alleviation level, support could target extension services, especially training and information dissemination. Subsidized services as earlier proposed should apply across the sector segments, until such a time that these become unnecessary.
At the business empowerment and private sector engagement, donor support should target systematic challenges in the value chain. Specific interventions could support capacity in sector institutions, both public and private. Additionally, development partners can support policy and regulatory reforms of sector frameworks to enhance performance. The interface between national and county governments, and how this impacts on the development of the sector, could benefit from development partners' support.

In all cases, however, donor interventions should be co-ordinated to avoid duplication and waste. This has been the case in the sector. The result is minimal impact. This co-ordination, which should

be the responsibility of the Kenya Dairy Board, could be anchored on the common vision of the dairy sector, as already recommended.

7.5 Cluster Development Strategy

Government has adopted the **Cluster Development Strategy** as a competitive strategy. A cluster is a collaborative initiative which links specialized firms (Dairy Enterprise Model) located within a geographical area with linkages to suppliers, supporting organizations and knowledge institutions. Firms in a cluster benefit from common assets (natural resources, infrastructure development, both physical and market information) and access to specialized and qualified workforce.
This "triple helix" allows the cluster to innovate and grow. Irrespective of the business model in different milk sheds, the need for extension services and business management skills are acute.

On-farm productivity, quality improvement and value addition depend on knowledge dissemination in the sector, particularly the smallholder segment. Considering that extension services in the industry have not matched the industry needs, due mainly to industry liberalization in the 90s, substantial investment in technical and financial resources will be necessary to uplift the sector.
The development partners have responded to this need through targeted projects. It will be necessary to mobilize additional resources to address this challenge. A related challenge, and this has been referred to in the previous paragraph as well, is the need to coordinate and harmonize development projects in the sector. This is necessary to avoid duplication of resources and enhance cost-effectiveness in sector investments.

Different clusters have been identified. Among these are: tea, horticulture, tourism, livestock (beef) and the dairy sector. The dairy sector clusters are located in Uasin Gishu (North Rift) and Nakuru/Nyahururu corridor. These are the major producers of milk and have already evolved clusters within the chilling hub. Upscaling these two areas into clusters would be a natural progression.

The point has been made in this report that there are limits in upscaling the chilling hub into a processor. Processing and marketing require specialized skills that are not available to the hubs, in the medium term. The strategy should be to upgrade the chilling hub to embed benefits to members (feeds, finance, AI). There is a limit, however, to the capacity of individual chilling hubs to carry the technical and financial load that comes with embedded services.
A cost-effective approach is the cluster organization which would access inputs and markets on the basis of economies of scale. Benefits would therefore accrue to smallholder farmers in higher returns on their investment. This model would replicate the Kenya Tea Development Agency. The latter takes on management responsibility for a fee (3 per cent of revenue), to manage 54 factory units (the hubs) and to market the processed tea. The difference is that cluster organizations would cater to a defined milk shed (North Rift) and will therefore be a regional organization, much closer to the farmers than is the case with KTDA.

In **Table 7.1** we present the status and challenges in the policy, regulatory and institutional frame-work for the dairy sector; and recommend reform measures that could stimulate the transformation of the industry.

Table 7.1: Policy, regulatory and institutional reforms in the dairy sector

No	Strategic issue	Current policy, regulatory and institutional framework	Challenges in the current framework	Proposed reforms in policy, regulatory and institutional framework
1	***Expand market opportunities for dairy sector*** Baseline: (i) Low milk production which does not meet domestic demand (ii) Low productivity and competitiveness along the value chain; (iii) Low quality of milk; (iv) Low value addition and limited range of milk products	(i) The Dairy Industry Act, Cap 336 of 1958 (revised in 1984)	(i) The Act has not evolved to respond to economic liberalization and the expanded role of the private sector	(i) Review the Act to provide enabling environment for private sector to thrive; (ii) Review the law to position the private sector as the driver of sector growth.
		(ii) The Standard Act, Cap 496	(i) The Standards Act is not enforced, especially in the raw milk segment	(i) Enforce compliance
		(iii) The Foods, Drugs and Chemical Substance Act, Cap 254	(i) Weak enforcement of the law	(i) Provide resources to enforce compliance (ii) Sensitize consumers and producers on the need to enhance the quality and safety of milk
		(iv) The Public Health Act, Cap 242	(i) Weak enforcement of the law	(i) Enforce compliance
		(v) The National Livestock Policy (Sessional paper No. 2 or 2008)	(i) The policy has not been enacted into law	(i) Strongly advocate, through business associations, for the enactment of law to anchor the policy
		(vi) The National Dairy Masterplan, 2010	(i) The Masterplan lacks shared vision of the future of the industry; (ii) Technical and financial resources constraints hinder policy implementation	(i) Lobby, through sector business associations, for enactment of the legal framework to anchor the Masterplan; (ii) Facilitate participatory consensus on the shared vision of the dairy industry (iii) Facilitate dissemination of the Masterplan (iv) Provide technical and financial resources to public and private sector institutions in support of policy implementation
2	***Improve productivity and competitiveness of the dairy sector*** Baseline: (i) Low productivity along the value chain (ii) Excessive regulation (iii) A large raw milk segment;	(i) The Dairy Industry Act, Cap 336 of 1958 (revised in 1984)	(i) There is conflict in the roles of KDB as a regulator and a driver of sector development (ii) KDB lacks technical and financial resources to facilitate sector development	(i) Restructure KDB to focus on regulation and play the key role of the facilitator in sector development (enabling environment, information and data dissemination (ii) Provide KDB with adequate resources to play its role
		(ii) The National Livestock Policy (Session Paper No.2 of 2008)	(i) The policy has not been adopted by parliament	(i) Lobby for policy enactment into law

	(iv) 80 per cent of milk is produced by smallholders farmers (v) Three large processors control 85 per cent of the processed milk segment	(iii) The Kenya Dairy Masterplan, 2010	(i) The Masterplan has not been adopted by dairy stakeholders as the basis for sector development (ii) The Masterplan lacks resources for implementation	(i) Develop a shared vision of the sector growth around the Masterplan (ii) Provide adequate resources for implementation (iii) Lobby for targeted subsidies in the dairy sector (iv) Promote and support a segmented strategy for sector development (livelihoods, smallholders, middle and large scale categories (v) Adopt the cluster strategy in selected milk sheds to improve productivity and competitiveness of the sector
		(iv) Constitution of Kenya, 2010	(i) The Constitution of Kenya, 2010 is under implementation. It provides that agricultural development (including the dairy sector) is the responsibility of county governments	(i) Mobilize and support targeted investments in the dairy sector in identified counties and milk sheds
3	***Reform sector institutions to stimulate productivity and competitiveness*** Baseline: (i) Public institutions are not adequately resourced to execute their mandate (ii) Private sector associations are weak in sector advocacy	(i) Ministry of Livestock Development (ii) The Kenya Dairy Board (iii) Kenya Livestock Research Institute (iv) Kenya Animal Genetic Resource Centre	(i) Weak focus on sector productivity and competitiveness (ii) Poorly defined role of the private sector as the engine of growth which hinder advocacy (KENDAP, KDFF) (iii) Inward looking nature of sector associations (lack of a broad vision of the sector growth) (iv) Weak technical and financial resources to execute mandate	(i) Develop a shared vision of the dairy sector (linked to Vision 2030) (ii) Restructure public institutions to respond to the new growth oriented environment in which the private sector is the engine of growth (iii) Strengthen the voice of the private sector in the governance of public institutions
		(v) Private sector associations (KLBO, KENDAPO, KDFF, KDPA, AKEFEMA, Co-operative units)	(i) Weak capacity (technical and financial) to advocate policy changes (ii) Overlapping mandate	(i) Support sector stakeholders to articulate a common vision of the dairy sector (ii) Facilitate private sector associations to develop strategies and structures to drive sector growth

Source: Dairy sector policy study PPD

8 CAPACITY BUILDING NEEDS OF DAIRY SECTOR STAKEHOLDER INSTITUTIONS

An important output of this study is the mapping of the main stakeholders for the purpose of assessing their capacity needs. The important players have been identified in the previous section. These include the Ministry of Livestock Development, the Kenya Dairy Board, Kenya Animal Genetic Resource Centre, Kenya Agricultural Research Institute (Livestock Centre Naivasha), and the Dairy Training Institute, Naivasha.
The public institutions have clearly defined mandates and resources (technical and financial). Their common complaint is low funding. While this could be true, shortage of resources is also a factor of how the organization understands its mandate. It is proposed that the greater challenge is the inability to clearly articulate institutional mandate in context of economic liberalization and private sector participation. This paradigm shift requires facilitation and support. The development partners could support this change process, re-defining the role and responsibility of public sector institutions in the changing environment.

Changes in policy, legal and institutional framework also require support. Private sector associations have not demonstrated the depth and skills necessary to play a meaningful role in sector development. The processors association (KDPA) still depends on office facilities from the Kenya Dairy Board. KENDAPO is similarly supported by the Board. The KDFF is supported by the EADD. Kenya Livestock Breeders Organization (KLBO) has shown resilience, mainly due to a long history and tradition which includes the maintenance of the Kenya Stud Book KLBO has in the past received operational grant from Government. In recent times, this has dried up. The organization needs support in identifying new sources of funds.

The co-operative movement has benefited from support by the Ministry of Co-operatives and Marketing. The reforms that have been spearheaded by the Ministry have improved sector governance. Governance training has been provided in the sector through the Co-operative College of Kenya. The latter is now a constituent college of JKUAT and could therefore be diverted from the traditional mandate. This will weaken the movement.

In summary, capacity of both public and private sector institutions is weak. The challenge of private sector associations is greater. Capacity building support should be prioritized. Capacity needs of these associations can be classified as follows:

(i) Institutional rationalization to create a lean and effective structure. This is more so with regard to producer associations;
(ii) Organizational development to create lean and effective organizations;
(iii) Governance and management skills development to ensure sustainability of the associations;
(iv) Resource mobilization skills and strategies to diversify funding base;
(v) Advocacy and influencing skills to create enabling environment for the sector.

In **table 8.1**, we present the mandate, strength and challenges of dairy sector institutions and the recommended capacity building interventions.

Table 8.1: Capacity building needs of selected private sector associations

No	Association	Mandate	Strengths	Challenges	Capacity needs
1	Kenya Livestock Breeders Organization (KLBO)	Registration of dairy pedigree herd (maintains Kenya Stud Book) Advocates a favourable policy for dairy animal breeders	(i) A long history of existence and mandate execution (herd registration) (ii) Rudimentary institutional capacity (staff) to implement mandate	(i) Limited resources (relies on government grant which was not forthcoming in 2012) (ii) Low membership base, hence limited resources	(i) Resources mobilization (strategies and skills) (ii) Promotion of herd registration (iii) Improved technical and financial capacity
2	Kenya Dairy Producers Organization (KENDAPO)	Advocating interests of dairy producers	(i) Has a legal existence with a clear mandate (ii) Accepted in a few milksheds (North Rift and Nyeri) as a legitimate voice of dairy producers	(i) Weak institutional capacity (relies on administrative support from KDB) (ii) Lack of advocacy skills and systems (iii) Low financial base due to limited membership	(i) Resource mobilization (ii) Membership drive (iii) Technical capacity for evidence based advocacy
3	Kenya Dairy Processors Associations (KDPA)	Promoting the interests of dairy processors	(i) Has a legitimate membership base (ii) Advocates the interests of members on common concerns (milk shortage)	(i) Weak institutional capacity (relies on secretarial services from KDB) (ii) Limited membership base (basically the 5 large processors) (iii) Inward looking in advocacy (does not promote common concerns of the sector)	(i) Increase membership base (membership drive) (ii) Improve technical and financial capacity (iii) Support articulation of a common vision of the dairy industry (iv) Promote sector self-regulation
4	Association of Kenya Feeds Manufacturers (AKEFEMA)	Advocates enabling environment for members and promotes self-regulation on quality feeds	(i) Has legal existence and a clear mandate (ii) Has a sizable membership base	(i) Weak institutional and technical capacity (relies on MLD for administrative support) (ii) Has not achieved self-regulation in QA. Quality of feeds is a recurrent complaint of producers	(i) Improve institutional capacity (ii) Enforce self-regulation in feeds (iii) Mobilize operational resources
5	Co-operative Units	Improved income of members through pooling of resources	(i) Co-ops are regulated under the Co-operative Act, 2004 (ii) Resource mobilization has the potential to improve livelihoods of smallholders. (iii) Co-operatives have a long history of rural development and can promote the growth of the dairy sector	(i) Governance challenges exist and these hinder sector development (ii) Technical and financial base of these Units is weak and this constraints their outreach	(i) Support leadership & governance interventions in the sector (ii) Promote efficiency in production value chain (iii) Support linkages between Units to create synergy in sector development (Co-operative Unions , clusters)
6	Chilling Hubs	Interface between small-scale	(i) Have a legal mandate	(i) Chilling Hubs are a new innovation	(i) Support the continued evolution of

		dairy producers and the markets (processors)	under the Companies Act, Cap 486 (ii) Have demonstrated resilience as viable vehicles for the sector development (iii) Have promoted production and productivity in difference milksheds	which is still to evolve (ii) CH are donor promoted and supported. They are yet to institutionalize sustainable management and governance systems	Chilling Hubs (ii) Support the provision of embedded services through the CH (AI, feeds, drugs) (iii) Promote Clusters among different CHs to improve productivity in the value chain (iv) Attract strategic investors into the chilling hubs to enhance productivity and value addition

Source: Dairy sector policy study PPP

9. EMERGING ISSUES FOR A COMPETITIVE DAIRY SECTOR

This policy study identifies opportunities that could upscale the dairy sector in Kenya to be an important player in the regional and global markets. These include expanded market access, a large and growing middle class, a tradition of dairy farming, a relatively well-developed production, processing and marketing infrastructure, and a policy, legal and institutional framework which – if reformed – could anchor sector transformation.
Challenges however exist and these have hindered the growth and competitiveness of the industry. Among these are a fragmented value chain which negatively affects sector productivity; a weak policy and regulatory framework which is not aligned to the needs of a dynamic sector; under-resourced sector institutions, particularly public agencies and private sector associations, and inadequate data and information on which to base sector plans and investments.
These concerns, opportunities and recommendations are discussed hereunder.

9.1 The fragmented Structure of the Dairy Sector

The fragmented structure of the dairy sector constrains its growth and competitiveness. The dairy sector in Kenya is fragmented both at the milk production and the milk marketing level.
At the production stage of the value chain, different categories of dairy farmers have been identified, viz. subsistence farmers, smallholder business-oriented farmers and the middle and large scale farmers. However 80% of the milk produced is from smallholder farmers owning less than 3 cows with an average productivity of 8 liters per cow (Tegemeo). This overwhelming low skilled, low investment and low productivity smallholder dairy sector constrains growth and competitiveness of the Kenyan dairy sector.
The marketing structure is characterized by the dominance of the informal market channels. At 70 percent of the marketed milk, the informal sector in Kenya compares to 11 per cent in South Africa. A large informal market segment creates distortions in the market place. This negatively impacts sector.

The diversity of production systems calls for a differentiated sector development strategy. Subsistence farmers require poverty reduction interventions. This is the role of the community based organizations, pro-poor oriented non-governmental organizations and government. This segment will not upscale development of the dairy sector to global benchmarks, but may still play an important role for food security at household level.

In the medium and long term, a sustainable dairy sector will be anchored on a commercial herd owned and managed by dairy entrepreneurs who are willing and able to invest and specialize on dairy. This means that sector policies and institutional frameworks will change to support this business orientation. It is also where the private sector-development oriented non-governmental organisations should anchor their activities.
Productivity improvement through genetic upgrading, technical support services and improved feeds are important aspects of sector transformation. This approach will call for the consolidation of the fragmented production systems, including community dairy farming, where feasible;

adoption of cluster strategies to create economies of scale in operations; and implementation of differentiated fiscal and policy incentives to support the development of a competitive sector.

9.2 The Oligopolistic Nature of Dairy Processing and the Large Raw Milk Market

The current oligopolistic nature of the dairy processing is unsustainable and the inward looking nature of this segment creates unhealthy competition. This could account for the dominance of the few players who control the formal market channel. Companies that are still profitable at 50% capacity use would be out of business in markets and value chains that are highly competitive and transparent.

Unhealthy competition however exists at two levels. The existence of a large raw milk market equally undermines the proper functioning of the market, as it operates under different conditions than the formal market. It does not pay VAT, company tax, cess, levies, PAYE for its workers and so on. It perpetuates the fragmentation of supply chains and a large predominantly low-quality liquid milk-driven dairy sub-sector. It does not invest in sustained development of the supply chain for enhanced milk quality and productivity, and in value addition of products at the consumers-end.

Yet simply banning the raw milk market in the absence of a competitive processing industry that is able to accept all milk in the market and pay farmers a competitive price, is not a solution either in the short run. This needs careful balancing of policies and strategies for phasing out the raw milk market, to avoid a surge in total milk production and affordable milk products for lower income consumers.

The combined oligopolistic nature of the processing industry and the presence of a large raw milk market, create a seriously disturbed playing field and undermines the orderly growth of the sector. There is need for a level playing field in the dairy value chain and enhanced competition in the formal segment, which are a critical success factors in sector development.

9.3 The Interface at the Dairy Hubs or CBEs (Collection and Bulking Enterprises)

The question arises as to what should be the limits of activities by different players in the sector. Should farmer organizations, for example chilling hubs, upscale to processing? There are indications, and this point has been made in this report, that upscaling to processing and marketing at the farmers' unit level encounters challenges of governance, management and marketing skills. Those farmer organizations which have attempted to move up the value chain have encountered these challenges (Limuru and Lari Farmers Alliances).

It seems therefore more appropriate for CBEs to concentrate on supply chain development through provision of services and inputs to member farmers, including training and extension, for enhanced productivity.

This has been a systemic weakness in the organization and development of the supply chain, where CBEs and processors have concentrated on growing milk volumes through adding more farmers and cows – and expanding geographical operations – rather than increasing volumes through increased farm productivity. Considering that three processors (Brookside, New KCC and Githunguri) account for 85 percent of the processed milk channel, there is also low incentive for processors to invest in downstream activities (producers and chilling hubs). The strategy of processors has been focused on "chasing milk and farmers" rather than growing productivity.

Similarly, there are limits to processors' engagement at the lower end of the value chain. Where should the interface between farmers and processors be economically optimal? From empirical evidence, it would appear that the chilling hub, or a similar structure, provides the optimal equilibrium for the interface between production and marketing. Indeed, the operations at processing level should move towards more value addition, market diversification and market development. This is also the optimal interface between producers and strategic global investors (e.g. Nestle, Danone, Parmalat, Friesland Campina). This approach holds the potential for a growth-oriented sector, building on and taking advantage of the potential in the regional and global markets.

9.4 Capitalizing on Opportunities in Domestic, Regional and Global Markets

The dairy sector has not taken (full) advantage of the market opportunities in the domestic, regional and global markets.

It has been demonstrated that the dairy sector in Kenya has not exploited the available domestic demand. Similarly, the sector has not taken advantage of the regional markets, notwithstanding the economic integration opportunities in East Africa Community and COMESA. The tripartite regional arrangements involving EAC, COMESA and SADC add to the increased opportunities in expanded regional trade. The demand for milk and milk products in East and Central Africa region has been estimated to be in excess of 2.0 million tons per annum. While the validity of these figures needs to be assured, the fact is that the regional and global demand to Kenya milk and milk products is substantial. The Middle East and the Gulf States, in particular, offer great potential for Kenya dairy exports.

Expanded regional and global market access is premised on high quality of milk and milk products. Kenya needs to improve the quality of marketed milk, starting with the quality of raw milk. This will be critical if the dairy sector in Kenya is to realize its market access potential. South Africa again offers an example of what is possible through the Dairy Standards and Agency (DSA). DSA is a stakeholder owned and driven organization dedicated to promotion of and compliance with milk standards and other dairy products set standards. Established in 2002, DSA objectives are to promote compliance with food safety and metrology standards, to increase the market for milk and other dairy products, to improve the international competitiveness of SA dairy industry, and to empower previously disadvantage people.

9.5 Inadequate Institutional Framework for Dairy Sector Governance

The policy and regulatory framework for the dairy sector is outdated and inadequate. The challenges at producer level, particularly low genetic stock, low quality and high cost of feeds and forages and weak and in most cases non-existent training and extension services, means that growth of the sector is hindered at this initial part of the value chain. The current policy and regulatory framework and weak implementation of existing laws and regulations - e.g. to curb the raw milk market - hinder the growth of an otherwise dynamic sector.

The liberalization of the dairy sector in the 1990s disrupted the previous role of government particularly that of Kenya Dairy Board and government extension and AI-services. Whilst the private sector was expected to take on more responsibility for the sector this transition was not effectively managed. The result is that public sector institutions are underfunded and the private

sector players are not sufficiently supported to take on the new role. Private sector associations are therefore weak and poorly organized. These poorly planned and governed institutional changes undermine the transformation and growth of the sector.

9.6 Inadequate Information and Data on the Dairy Industry

Information and data on the dairy industry is inadequate and does not inspire confidence in sector planning. Planning for the transformation of the dairy sector requires reliable data. This is not the case. While production is estimated at 5.0 billion liters per annum (2012), the processed milk is estimated at 600 million liters per annum. Considering that according to government statistics an estimated 50% of all milk produced is marketed and the processed segment is estimated at 25-30 percent of the marketed milk, it is obvious that the balance of milk (1.75 billion liters) cannot all be accounted for through the informal segment. The size of the informal market segment and statistics for total milk production are likely to be over-estimated.

The number of dairy cows is estimated at 3.5 million (Dairy Masterplan). Assuming lactation herd at 60 per cent, the potential output at 8 liters per day is 6.1 billion liters. This is clearly not correct. The Kenya Bureau of Statistics on the other hand - through the Population Census Survey, extrapolates total production figures of cow milk at a maximum of 3.5 billion liters.
The imperative for the upscaling of the dairy sector is a comprehensive survey of all aspects of the industry. This is a pre-requisite to the formulation of a shared vision for sector growth and development.

9.7 Lack of a shared Vision

The Kenyan dairy industry is in a position where processors have low capacity utilization and a production segment (farmers) that cannot meet the demand due to systemic barriers to productivity, as discussed. We now have a situation where the farmer and final consumer are dissatisfied with the pricing system, which points at a dysfunctional sector industry. This position is made worse by the seasonal variability of milk production. During “flush” period, the farmer suffers waste or low prices. It does not follow that the consumer benefits from low prices in a manner commensurate with the reduction in farm-gate prices. This structure is therefore a barrier to sector productivity and competitiveness and calls for a shared vision to address it and take the industry to the next level.

The Kenya dairy sector has not developed a shared vision of the industry, hence the persistence of a fragmented, low productivity-high cost production system and the vacuum in the institutional framework for sector governance. There is no answer to the question: Where do we want to take the industry in the next 10 years? Yet, the development and adoption of a shared vision of the industry by all stakeholders (farmers, processors, retailers, feed manufacturers, AI service providers, training institutions, government departments and so on), is the starting point in up-scaling the sector.

The example of South Africa is illustrative of this point. The Milk Producers Organization (MPO) and the Milk Processors Organization (SAMPO) came together, to create a shared vision of their dairy sector. The objective is to promote the South African dairy industry. To carry the

vision forward, the sector in 2002 established Milk South Africa (Milk S.A.), a non-profit organization which is the trustee of the dairy sector vision. Through participatory processes and structures, Milk South Africa creates passion and commitment to achieve defined goals for the sector.

10. RECOMMENDATIONS ON THE POLICY, REGULATORY AND INSTITUTIONAL REFORMS FOR THE DAIRY SECTOR

In this section we present our suggestions and ideas on the reforms that could help transform the dairy sector into a regional and global market player. The recommendations will focus on policy, regulatory and institutional framework and respond to the terms of reference for this study.

10.1 Develop an Inspirational and shared Vision of the Dairy Sector

The starting point in managing change is to create a shared and inspirational vision of the future of the industry. According to the National Dairy Masterplan the vision of the dairy industry is – or should be - to create a commercial and globally competitive value chain by 2030. This vision needs however re-validation and ownership by dairy stakeholders, particularly the smallholder farmers and processors. In view of the fragmented structure of the industry, and the substantial reforms in the policy framework that are required to drive the sector to the next level, the need to rally the stakeholders around an inspirational and shared vision is clear. Facilitating this engagement is an intensive process which will focus on:

- *The profile of the sector in the next ten to thirty years*. This includes to draw-up a masterplan on how to transition the dairy sector from its start-up phase (after the collapse of the sector in the mid-nineties) to a growth and maturity phase (see the dairy sector life cycle concept below);
- *The drivers of transformation*. These include policy and regulatory reforms, institutional restructuring and capacity building of sector institutions;
- *Resource mobilization* including technical support services;
- *The appropriate co-ordination mechanism to anchor sector transformation*. An important innovation in this respect is to lobby for adoption of the dairy industry as an important vision 2030 flagship project. This approach could mobilize support from the Vision 2030 Delivery Secretariat and position the sector at the heart of investment promotion.

10.2 Review and Reform the current Policy and Regulatory Framework for the Dairy Sector

This reform will need to re-define the role of public and private sectors in the growth and competitiveness of the industry. It will entrench the vision of the sector in development strategies, strengthen and deepen private investments and re-design the regulatory framework to create enabling environment for sector growth and competitiveness.

Public institutions in the dairy sector should be accorded autonomy to discharge their mandate and work towards strong public-private governance structures with delegated mandates for policy development and enforcement, as well as for training and skill development, assuring structural engagement of private sector stakeholders, rather than piecemeal ad-hoc consultations. They should also be adequately funded to implement policies. An important aspect of policy and regulatory reforms is to clarify the limits of the mandate of public institutions which also have a commercial role, for example, KAGRC.

10.3 Support the Dairy Sector to benefit from the Devolved Governance System

While agricultural and livestock policy will be formulated at national level, implementation is the role of the county governments. This constitutional dispensation is now evolving. The sector stakeholders should take advantage of this development orientation to advance the transformation of the industry. This entails engaging the county governments in different milk sheds to integrate the sector strongly in county development plans and to mobilize resources for plans implementation.

10.4 Reform/re-define the Roles of Kenya Dairy Board and Private Sector Associations

The role of Kenya Dairy Board should be re-defined to be in-line with the needs of the liberalized sector. In particular, KDB could focus more on regulation and enforcement of safety and quality standards in dairy products. The Dairy Board should also facilitate sector development through research and knowledge dissemination.
The development of the sector is properly the role of the private sector. To effectively discharge this role, the private sector should be supported to re-organize itself through appropriate sector associations. In particular, there is need to create a mechanism to develop and sustain domestic, regional and global markets for Kenya dairy products. This will require development and adherence to high quality standards in milk products; and a high degree of self-regulation and knowledge and skill development.

The issue of training and skill development for the dairy value chain should be addressed vigorously and the public and the private sector should jointly develop mechanisms for co-financing and managing commercially driven training institutions like the Dairy Training Institute with satellite Practical Dairy Training Centers across the major milk sheds in the country.

It is recommended that the industry establishes a sector-wide development organization along the lines of "milk South Africa"; and "South Africa Standards Agency". For cost-effectiveness, the Kenya mechanism should be anchored in one organization, say Maziwa Kenya. Current cess which currently funds the operations KDB should be re-directed to this organization. The funding of KDB should thereafter be through The National Treasury. This is the best practice.

Alternatively, a similar model developed in the Netherlands could be borrowed from, viz. Productschap Zuivel (or the Dutch Dairy Board). This institution was created in 1956 as a statutory body with delegated regulatory powers, but is private sector driven. Within the Board of Productschap Zuivel, all stakeholders in the dairy sector are represented and united with a common vision. It has two main sets of tasks and sources of funding (a) delegated implement-tation of government policies and regulation and (b) autonomous tasks for sector development. Productschap Zuivel has over the years been appropriately funded by government to fulfill both tasks, next to having the mandate to levy the sector for additional funding. Appendix 1 (http://www.prodzuivel.nl/Engels/DutchDairyBoard2009.pdf) contains an overview of the legal status, composition of the Board, the functions, mandate and the financing the Dutch Productschap Zuivel.

10.5 Adopt The Dairy Sector Life Cycle Concept

A useful tool for developing a vision and strategy for institutional reforms to govern and develop the dairy industry, and the roles of the public and the private sector, could be to use the Dairy Sector Life Cycle concept (see Appendix 2). This concept looks at the historic and cyclic development of a dairy sector over a large number of years and describes major trends in the role of government and the private sector that governed and triggered structural change and growth, next to identifying technological breakthroughs that enhanced efficiency and competitiveness.

An example of the Dairy Sector Life Cycle of NW-Europe/the Netherlands is presented in Appendix 2 showing how it transitioned from a fragmented localized industry into a consolidated national, international and eventually global player. Each Life Cycle Phase was characterized by a specific set of policies, institutions and division of roles between stakeholders (public and private) that assured the transition from Start-up Phase to Growth Phase and Maturity.
Similarly, a Dairy Life Cycle System study and benchmark could be done with other countries like South Africa, India or Zimbabwe (just to mention a few countries that might be more comparable with the Kenya situation).

Acknowledging the fact that there are similarities but also many differences in development stage and the national and international contexts between Kenya "now" and The Netherlands "then", the value is in the concept or the tool. The tool allows for more systemic thinking on the appropriate measures and strategies to deploy in the Kenyan situation of "today" and where to go "tomorrow".
As for the NW Europe Dairy Sector Life Cycle, transition from one phase to the next one, took place in a relatively linear step-by-step process, with little interference from "outside" and pre-empting sharp population growth and paralleled with the creation of non-agricultural employment due to industrialization. The Kenyan situation however should be viewed and understood against the context of a global economy, the presence of robust (inter-) national investors/players, a different technology level and a different path of population growth and non-agricultural employment creation. In addition there is segmentation in the sector and "modern mechanized and commercialized dairy farming, processing and retailing" exists next to "smallholder production systems, cottage industries and milk bars".

This therefore seems to be a more complex and challenging environment to plan for sector development with – perhaps at first notice - limited value to benchmark the two Life Cycles and borrowing from it. However, there are lessons to be learned on trends and strategies to transition from fragmentation to consolidation, increased productivity and efficiency, cost price reduction and enhanced food security and food safety, and so on.
It is in particular instructive to analyse the role of government and private institutions in governing the sector and creating a conducive enabling environment for sector investment and growth. The Growth Phase of the Dutch dairy sector was characterized by heavy Government involvement and funding in policy development/regulation, as well as economic development of the sector (notably in applied-research, education and skill development). Only during the last 15 years of the Maturity Phase, government is retreating and shifting responsibilities for sector development to the private sector.

The Kenya dairy sector is certainly not yet in this Maturity Phase, rather it sits with one leg (80% smallholders) in the Start-up Phase and another – smaller leg – in the Growth Phase (commercial dairy farmers and processers). It therefore needs adequate engagement of Kenya government to create and fund robust sector institutions, unifying all stakeholders in the production column or value chain, and giving these institutions sufficient funding and mandate to perform their duties and become integral part of policy making. A striking trend or feature of the Dairy Sector Life Cycle in the Netherlands shows that Government in particular invested strongly in research, training and skill development, next to creating innovative and inclusive **sector** institutions.

10.6 Institutionalize the Chilling Hub and Cluster Strategy in Sector Development

The chilling hub is the focal point in farmer interface with the market. This is also the focal point for sector support (extension services, AI and disease control). This centrality of the hub is now recognized and should be anchored in sector policy. This is important considering that the chilling hub could also be the interface between producers and non-traditional investors (e.g. Nestle, Danone or other global players). This plurality of investors is necessary to inject competition at the market level of the value chain.

The case for clustering chilling hubs into cluster organizations has been made. Leveraging on economies of scale that are inherent in cluster organizations and mobilizing knowledge and market infrastructure to access wider markets, clusters can be viable platforms for sector growth and competitiveness.

10.7 Effectively Co-ordinate Development Interventions in the Sector

Many development initiatives in the dairy sector are un-coordinated. The result is duplicated effort and waste of scarce resources. The low growth in sector development could be attributed to this unfocused approach to sector development support.

Development co-ordination at sector level will be challenged by the devolved governance system, particularly considering that milk sheds could transcend different counties. The role of KDB in facilitating this co-ordination and mobilizing development support on the basis of clearly defined priorities will be important.

The linkage in research and extension is weak. On-farm technology transfer is hampered by weak extension services. This is a recurring problem in agricultural sector development, including the dairy sector. The co-ordination mechanism for the dairy sector should develop strong linkages between research and on-farm extension services.

10.8 Update Information and Data on the Dairy Sector

Credible dairy sector strategies should be based on accurate data and information. The point has been made that the current data could be outdated. Attempts are being made to update information on the sector. A "patchwork" of survey, targeting different milk sheds can only be sub-optimal.

We recommend that a comprehensive survey of the sector should be the basis for the sector growth strategies. Investors in the sector rely on available data. Attracting strategic investors in the sector, and this is necessary to transform the industry, should be based on accurate information. The KDB or the new organization Maziwa Kenya should spearhead this process.

11. IDENTIFIED PROJECTS TO BE IMPLEMENTED UNDER THE KENYA MARKET-LED DAIRY PROGRAM

Based on the study outputs and discussions detailed in the preceding sections - and taking into account stakeholder inputs through facilitated workshops - we have prioritized three projects that could inform future interventions by SNV in the KMDP's Implementation Phase.

The basis of these recommendations is the need to transform the sector into a (globally) competitive industry in line with vision 2030. This transformation will require that the sector stakeholders have a common and shared vision of the future of the industry.

Development of a common and shared vision of the dairy industry is the crucial starting point in this respect. This is a key and cost-effective role that KMDP can play, with the attendant sector transformation imprint.

Other proposed projects will build on the vision of the sector. The transition envisaged in the common vision will require targeted facilitation. The institutions in the sector will be the primary drivers of industry transformation. The role of Kenya Dairy Board, as reformed, will be crucial in this process and so will the role of private sector institutions. The recommended capacity building projects should be seen in this light. The recommended pilot on the cluster development strategy should be seen as an innovative approach to enhance the role of the chilling hubs. This is an institutional development intervention.

These recommendations are now discussed.

11.1 Facilitate Development of an inspirational, shared Vision of the Dairy Industry

This is where it starts. In absence of a common vision, both government and development partners' interventions are sub-optimal. Leveraging resources from different sources, including government, development partners, and the private sector, KMDP could support the development of this important vision. The outcome will be a vision strategy and a policy and/or institutional framework for a growth-oriented sector. The development of the sector should be primarily private sector-owned and driven but with sufficient government support, both in terms of delegated mandate and funding. To co-ordinate this development will require an industry owned organization, "**Maziwa Kenya**". Maziwa Kenya will champion the development of the sector, both locally and abroad. It is an important output of the sector vision.

11.2 Support Capacity Building of Industry Associations/Institutions

This will entail the rationalization of existing associations, especially producer associations, and identifying through a participatory process the associations that merit support. There is evidence that a reduction in the number of industry associations, and their amalgamation in a sector institution, could create an effective advocacy framework.

One of the identified associations that would merit support could be KLBO. This long standing organization has the challenge of supporting the expanded private sector participation in the sector. Support can build on what the organization has built over the long history. The registration role has been taken to KDB in the study recommendations. Managing this transition and working with KDB to build a strong foundation for a dynamic sector requires support.

The need to develop a sector-wide development support mechanism has been recommended. This is a new venture and may require facilitated support. Support to this new organization will be easier to facilitate if the existing associations take ownership of this initiative. The sequencing or organizational development support to sector associations may have to be managed. It should be possible, however, and based on a shared vision of the dairy sector, to develop programmes of support to these institutions in tandem.

11.3 Facilitate the Development of pilot-Cluster organization in identified Milk Sheds

Potential clusters have been identified in the North Rift, Meru and Nakuru/Nyahururu milk corridors. A pilot project can be implemented in one or more of these milk sheds. Objective criteria should be developed to guide this process. An important consideration should be the potential to upscale production and productivity; and to attract private investments into the cluster. Clusters should develop organically. Current evolving clusters should therefore receive priority in the selection process.

11.4 Support Practical Dairy Training for the Sector

To achieve the dairy sector development goals of Vision 2030, there is need to develop appropriate human resources with requisite skills to accelerate the development of the industry, from production level, collection and bulking, transporting and processing, to marketing and distribution. The Dairy Master Plan, the draft Dairy Industry Policy (DIP) and the corresponding Dairy Bill acknowledge the shortcomings in human resources and the need for quality training.

This was confirmed by a recent study commissioned by SNV and partners (LNA - Labour-market Needs Assessment). Institutions like the Dairy Training Institute in Naivasha which has a national mandate to train for the dairy sector stakeholders, have been left to wither and the state of operations at the centre is in sharp contrast with the vibrancy in the dairy sector value chain.

This study advises SNV to give sector support to review policies and strategies on modalities and programmes for skill development in the dairy sector, thereby mobilizing support from Government and the private sector, as well as from the development partners. The ultimate goal should be to develop a system of satellite Practical Dairy Training Centres across the major milk sheds that are centrally led by an institution (or institutions) that has the (semi) autonomy, is private sector driven and is commercially-oriented, in order to sustaining itself and invest in the type of facilities and expertise that is required to transition the sector to the next phase.

In order to respond to the market needs, the Ministry of Livestock Development prepared in 2012 a strategic plan for transformation of DT. In addition the Ministry initiated the process of changing DTI into a Semi-Autonomous Government Agency (SAGA), in order to provide a legal framework for efficient running and management of training programmes carried out by the institute. In addition SNV and partners compiled a Status Report for DTI's Transition which contains a diagnostics review and a road map for the transitioning of the institute.
These important first steps offer great opportunities for the industry, government and DTI to revive the institute and SNV/KMDP is advised to (further) fully support this process.

12. POLICY BRIEFS

As indicated in the introductory part of this report, an important output of the policy study is the preparation of policy briefs in key-interventions that could inform advocacy on the development of the dairy industry. Three policy briefs have been developed and are presented in this section.

These briefs focus on:

(i) Developing an inspirational and shared vision of the dairy industry and proposing appropriate sector institution(s) to anchor this vision. This is the basis of the sector transformation.

(ii) A new development paradigm: using the cluster development approach to reform Kenya's dairy sector. This brief presents the cluster approach as a competitive strategy in the dairy industry.

(iii) Business advocacy in the dairy sector through building capacity of membership organizations in the dairy industry. This brief makes the case for supporting capacity building of producer related dairy sector organizations.

(iv) Public-Private partnerships for revitalization of practical dairy training models and institutions. This brief presents the case for support to the transition and innovation of the national Dairy Training Institute.

The policy briefs are directed at stakeholders in the dairy sector. The stakeholders must come together to agree on the transformational path for the industry in line with the aspirations of Vision 2030.

Government, particularly the Department of Livestock Development and the Kenya Dairy Board are expected to lead in sector development. It would be expected therefore, that the Kenya Dairy Board - with support of the Department of Livestock Development and the Ministry of Agriculture - generally, should champion resource mobilization to support capacity building in sector associations. The Board has played this role before. A much more vigorous approach is now required in view of the transitional development dynamics in the country.

While SNV Netherlands Development Organization has expressed willingness to support demand-driven initiatives at sector level, other development partners could join in this venture. A focused approach is, however, necessary to avoid duplication of effort.

Appendix 1: Outline of Dutch Productschap Zuivel

To be attached

http://www.prodzuivel.nl/Engels/DutchDairyBoard2009.pdf

Appendix 2: The Dairy Sector Life Cycle in NW-Europe/The Netherlands

1. Dairy sector developmental phases – The Life Cycle Concept

Global trends show that sustained economic growth rates and the emergence of a robust middle class, is accompanied by an increased demand for and use of (processed) dairy and other animal products. This trend is clearly visible in Kenya and other East African countries, and notably in Kenya the dairy industry is in a vibrant and dynamic growth path.
Perspectives are good for further growth of the Kenyan dairy industry however there is need for policies and interventions that lead to a more sustainable scenario for enhanced production and productivity, skilled employment and safe, nutritious and added-value products for both the domestic and export markets.

The following sub-studies and reports address a number of issues related to feed and fodder, which are crucial of a reliable supply of milk over the entire year, higher productivity per animal and reduction of milk production cost at the farm level. The feed sector should however not be looked at in isolation and the systemic issues that hamper the feed and fodder sub-sectors, are exemplary for - and intertwined with - the state of affairs and growth path of the entire dairy sector. As much as the feed sector impacts upon the dairy (or livestock) sector's competitiveness and growth, the feed sector equally depends on the strength and growth rate of the dairy sector as the buyer of dairy meals, concentrates and forage, for its own growth path.

Therefore this part of the feed and fodder study looks at a higher level of analysis, and looks at the dairy sector as the unit of analysis and system that drives the "industry" of input suppliers and service providers.

There are many others issues that affect the operations and the competitiveness of the dairy industry apart from feed and fodder, such as knowledge and skills of farmers, organisation of the supply chain (cooperatives, processors, hawkers), cold chain and logistics, milk quality and QA systems, consumer preferences and satisfaction (the market), policies at national level and vision and capacity of institutions to govern the sector. Numerous bottlenecks have been identified in sector analyses that hinder industry development and just as many (part-)solutions have been proposed, described and prioritized. Stakeholders have been distinguished who could initiate or accelerate interventions and development.

Looking at the numerous bottlenecks and possible solutions, the major question is which factor(s) will have the highest leverage on the development and modernization of the Kenyan dairy sector. In the next chapters the authors will try to answer this question from a managerial or business point of view. The life cycle concept of the development of the dairy sector in North-Western Europe, and in particular in the Netherlands, is used to underpin and analyse the actual and future challenges and threats.

Every company, business group or sector passes through several clearly distinguished phases of development. Figure 1 gives a schematic presentation of these phases, which is often referred to as the business life cycle.

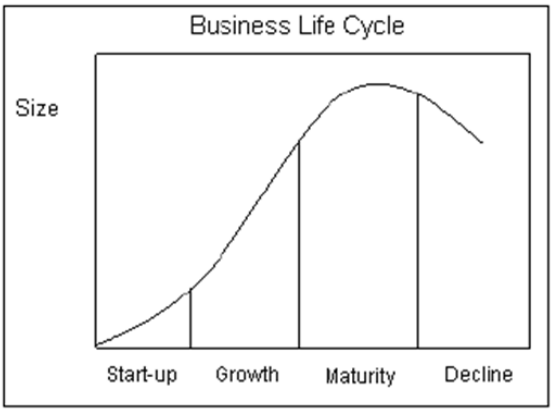


Figure 1 Schematic presentation of the business life cycle

In the pages below the business life cycle concept is used to describe and classify the developmental phases of a dairy sector. With this tool insights and recommendations for sector governance and priority interventions can be arrived at, which also have a bearing on the feed and forage sub-sectors.

2. Dairy sector development in North-Western Europe

The following gives a short history of the characteristics and trends of the structure of the dairy sector structure in the Netherlands and North-Western Europe.

1850-1950: Start-up Phase (farmer and processor driven)

Smallholder farming systems

During this period the population in North-Western Europe (Great Britain, France, Germany, Belgium and The Netherlands) doubled or even tripled in some regions. As a result the demand for food and employment increased. In 1850 The Netherlands had predominantly a smallholder mixed farming system where food and milk produced was mainly for own use. Excess milk was processed at the farm into butter and cheese and sold in cities or exported to England and Germany. Educational level of the farmers was low and land ownership was characterized by family smallholding. The supply chain was highly fragmented and product standardization was absent.

Producer organisations

Around 1880 The Netherlands was hit by an "agricultural crisis", largely as a side effect of increased production in - and imports of - grain from America and Russia. In addition farmers were exposed to fierce competition, due to increased milk production and high quality cheese and butter production in neighbouring European countries like Denmark.

The increased competition necessitated the dairy sector in The Netherlands to invest in higher productivity optimize and to re-organize butter and cheese production in centralised factories, using standardized production methods and benefiting from economies of scale. This was initially organised by private milk processing companies, which were however over time replaced by farmer cooperatives. These early farmer cooperatives operated in relatively small milk sheds comparable to District level in Kenya and successfully organised members' own-milk processing and marketing of end-products for regional and (inter-)national markets.

Because of the success of milk and butter cooperatives, and to further strengthen their position, farmers established other cooperatives for input and services provision such as for insurances, credit (see SACCOs in Kenya), AI services, bulk purchase of feeds and minerals, feed manufacturing and analytical services. In 1938 there were almost 1,400 cooperatives in the Netherlands with more than 160,000 members as reflected in Table 1. Total population in 1893 was 4.5 million against 9 million in 1940.

Table 1 Number of cooperatives and its members in 1893 – 1938 (The Netherlands)

Year	No of coops	Cooperative members	Total Population
1893	138	6,980	4.5 million
1904	855	56,192	
1920	1,014	119,768	
1938	1,376	163,794	9.0 million

In 1930 farmer organizations initiated the establishment of Central Laboratories for Soil, Plant, Feed and Milk Testing, due to the strongly felt need to have reliable and actual data to optimize farm management, crop yields and milk production.

Increased milk production and farm structure

In 1900 milk production was about 2,500 litres per cow but this increased to 4,000 litres per cow in 1950 thanks to breeding activities. Only 2-12 % of the agricultural land was used for fodder crops like legumes and sugar beets and the increase in milk production was importantly based on a fast growing compounded feed and concentrates supply chain.

Around 1920 the number of cows varied from as low as 15 to 96 per 100 ha for all soil types in the Netherlands.

In 1950 still more than 75% of the agricultural farms were smallholder family farms and the number of people working in agriculture was 27%. For comparison: in 1850 this percentage was 52 % for England.

1950-1980: the Growth Phase (high government involvement and investment)

Government policy

In this period the Dutch government policy was geared to ensure national food security and to enhance trade and export of (processed) agricultural products to other European states.

In 1952 the Netherlands contributed to the set-up of the precursors of the European Community together with France, Germany, Italy, Belgium and Luxembourg. Finally in 1967 the European Community was established.

Among others, one of the activities of the European Community was the development of a Common Agricultural Policy (CAP). The CAP goals were to create higher efficiency and productivity in the agricultural/food value chains, to ensure a fair standard of living to the agricultural community, to stabilize markets and to assure the availability of food supplies to EU consumers at reasonable price.

Incentives for farmers to invest in higher production were provided through a system of high base prices of agricultural products combined with import protection and export support.

In the Netherlands this resulted in high government and private investments in innovation and technology development for food production. Large government funding was made available for research (Wageningen University), collecting and publishing sector statistics and economic performance indicators (LEI), practical training centres & farmers extension services (DLV, PTC+, HAS) and so on.

Alongside the Dutch government also financed an ambitious and successful programme for land consolidation to create larger farms and economically viable agricultural production units.

Impact on the dairy sector

The effect of this conducive agricultural government policy is exemplified by the statistics provided in Table 2.a. The number of farms decreased considerably, but the number of cows as well as milk production increased. Moreover the production of fodder - especially maize silage – gained importance and pasture was partly turned into arable land for fodder maize cultivation.

Feeding rations of cows were highly optimized and consisted of an optimum ration of grass, maize silage and concentrates. Feed manufacturing cooperatives were established and cooperatives across the chain (milk processing, insurances, credit, AI services and so on) consolidated and merged into larger more efficient and financially robust entities.

Mixed farming systems disappeared and were replaced by highly efficient, specialized and mechanized dairy farms.

Table 2.a Characteristics of the dairy sector in the Netherlands during 1950-1980

				Fodder		
Year	Number of dairy farms	Number of cows x1000	Milk-Production Litre x1000	Grassland x1000ha	Maize x1000ha	Clover x1000ha
1950	216,000	1,518	4,766	1,317	-	24
1960	200,000	1,628	6,068	1,327	-	10
1970	131,000	1,896	7,748	1,334	6	6
1980	87,000	2,356	11,510	1,198	139	2

Table 2.b Effect of introducing milk quota by the EU and other structural adjustments 1990-2010

1990	65,000	1,878	10,766	1,096	202	6
2000	30,000	1,504	10,734	1,010	205	7
2010	17,500	1,479	11,626	951	231	6

In the 1970s the European Union designed policies to speed up the structural adjustment of the European farming sector. In 1972 legislation was passed to modernise farms, to promote professional training and to “rejuvenate” the agricultural workforce by encouraging older farmers to take early retirement. In 1979 a “co-responsibility” levy was introduced in the dairy sector requiring farmers to pay a penalty for serious over-production in order to stabilize prices. All these policy measures helped to re-structure the dairy sector and the larger agricultural sector.

Product Boards

In 1948 the Dutch government approved the Act on Public Law Organisations, which are comparable to the system of Product Boards in other countries. A Public Law Organisation is an association of producers and entrepreneurs in the same production or value chain, which are involved in the creation of the same end-product (from raw material to end product).

As such Product Boards have a broader scope and membership than industry associations, for example it would typically have representatives in the board or governing council from various industry associations (e.g. dairy farmers associations, processor associations, feed manufacturing associations, breeders association, workers unions and representatives from relevant government departments.)

The Product Boards played a crucial role in governing and developing the many agricultural sub-sectors in the Netherlands The main objective of the creation of these Product Boards was to allow private sector stakeholders operating in the same product chain, to establish a policy lobbying platform and be part of policy development, to delegate implementation of government policy and regulatory framework, to introduce self-control mechanisms and introduction of voluntary standards and codes of conduct, to set up training and research for the sector, and to promote all other interests deemed necessary for the proper governance and development of the sector.

In 1960 there the Netherlands had almost 50 Public Law Organisations or Product Boards, most of them in the agricultural sector. Important for the dairy sector are the Dutch Dairy Board (Productschap Zuivel) and the Product Board Animal Feed (Productschap Diervoeder).
These Product Boards:

- have a mandatory membership from stakeholders across the sector including representatives of government departments;
- can put out binding conditions to their members;
- collect levies and cess from their members for financing part of the Boards activities;
- receive government funding for implementation of both public and autonomous tasks.

The Boards have two main sets of tasks:

- Governmental tasks: execution of governmental tasks at request of the government (usually Ministry of Agriculture), and
- Autonomous tasks: execution of autonomous tasks for the development and competitive-ness of the sector.

Table 3 Examples of the functions and tasks of Product Boards in the Netherlands

Governmental Tasks	**Autonomous Tasks**
Execution of European legislation	Collective promotion
Import and export legislation	Education
Milk quotas	Sector research (statistical, market)
European aid/support	Technical product development and innovation
Common market regulations	Plant and animal diseases
Breeding	Labour market regulation
Execution CAP	Advice and cooperatives
Development of further legislations	Advocacy
	Support services

From 1980 onwards (Maturity Phase)
Improvement entrepreneurship, e.g. Certification, Quality systems, Chain Management, Labels/Branding, CSR

1980-now: the Maturity Phase (market stabilization, chain management and diminishing direct government investments after mid-nineties)

Scaling up and productivity growth of dairy farms

In 1984 the European Community implemented a milk quota system for its member States, which put a ceiling on milk production per country. As a result the total number of cows decreased drastically in The Netherlands from 1980 onwards (see Table 2.b above). For example the number of cows in 2000 almost equalled the number of cows in 1950.

However, milk production in 2000 was more than 100% higher than in 1950. In 1950 and 2010 the average milk production per cow was 3,980 and 8,100 litres respectively. Due to e.g. improved breeding practices and enhanced production and preservation of high quality fodder crops and use of concentrates, maximum milk production per animal increased to as high as 12,000 litres/year.

Also the number of dairy farms reduced sharply during this period (1980: 87,000 and 2000: 30,000). This trend continued after 2000 as in 2010 the number of dairy farms had reduced to 17,500. At the same time the scale of the remaining dairy farms increased as the average number of cows rose from 51 in 2000 to 79 in 2011. Average production per farm was 670,000 litres per year in 2010 (total 11.7 billion litres).

During this period great improvements were steps forward were made in forage production and preservation, which had a significant impact on lowering the cost price of milk. Forages like fodder beets and hay, were replaced by grass silage and maize silage with much higher protein and energy content. This also contributed to higher stability of milk supply across the year. Much attention is paid by the farmers to optimization of the ensilage process and a quick and reliable determination of the concentrate and fodder quality through feed and fodder analysis.

Farm management practices improved significantly over this period due to a base of well-trained and highly skilled dairy farmers, who manage their highly capitalized farms purely as businesses enterprises.

Certification and chain management

In the 1990-ties the agriculture and the feed & food sectors in the Netherlands and other parts of Europe, were confronted with food scandals related to heavy metal pollution, mycotoxins, dioxins and pesticides in raw materials and end products.

This triggered a strong and powerful consumer awareness and lobby for food safety, followed by animal welfare and attention to care for the environment. This in turn created a strong and lasting awareness and concern within retail chains and food processors (as well as insurance companies), of the legal implications and damage that can be done to their brand and profitability (also in terms of claims for damages). Food safety, animal welfare and responsible use of the environment became increasingly important societal and political issues and agricultural value chain operators were forced to structurally review sustainability of their operations. This in particular also led to systemic changes in the feed sector.

Product Boards like the Animal Feed Board responded to this by the development and introduction of self-regulation and certification systems, quality assurance systems (HACCP, ISO, BRC, etc.), labels and branding, chain management and so on. Examples are e.g. the Integral Chain Control system (IKB) of the Board for Cattle and Meat and the Board of Poultry and Eggs for eggs, turkey, cattle, chicken, pigs and veal.
The IKB system guarantees the quality of the end-product from "grass to glass" and from "feed to fork" encompassing uniform standards, product labelling and stringent protocols for raw material and end product sampling and analysis. Tracking and tracing systems were developed to control the entire production column, from the origin of the product, the production and processing methods to handling, storage and distribution.

Farmers producing according to this IKB system are obliged to purchase feed/concentrates from feed companies working under GMP+ (Good Manufacturing Managing Practices; including ISO 9001 and HACCP; See also Appendix 2). Although compliance to IKB is not mandatory by Law, farmers who do not comply with the IKB system, in practice have no outlet for their farm produce to milk or meat processors, as most of the retailers demand IKB compliance of the products sold to consumers.
In addition to these generic systems put in place and adopted by the Product Boards, there are also (eco)labels of private companies. E.g. milk processors in the Netherlands have their own OCM (Organisation Certifications Dairy Farms) organized by Qlip.

One of the results of these developments was further consolidation in the agricultural sector and crowding-out of producers, processors and input and service providers that were not able or willing to comply.

Structure of the cooperative sector
Also the number of cooperatives in the agriculture sector decreased due to this consolidation process which was witnessed by a large series of mergers both in the cooperative sector and private operated firms. This was triggered by the need for economies of scale to be able to compete in the market and to counterbalance powerful food processing companies and retail chains.
As a result many of the cooperatives have developed into semi-corporate business organisations run by professionals and highly skilled staff. Some have oligopolistic characteristics as was witnessed by the recent merger between the two largest milk processing cooperatives in the Netherlands, Friesland Dairy and Campina who – as "Friesland Campina" have an annual milk intake of 10 billion litres from 13,000 highly specialised and capitalized dairy farms. This is close to 90% of total milk production in the Netherlands.
Some of the cooperatives have matured and grown into global players with international interests and investments. Examples are (again) Friesland Campina with milk processing factories in Nigeria, Vietnam and Indonesia and an annual turnover of EUR 190 million, Rabobank being the largest agri-business bank in Europe, CEHAVE (feed manufacturing) with factories in Eastern Europe, VION being one of the largest meat processors in Europe (factories in UK) and - in the flower sector - Flora Holland with the largest flower auction in the world. Involvement in the day-to-day running of these "corporate cooperatives" is limited, although farmers are still represented in the board of many of these organisations.

Restructuring of research, practical training and farmer extension services
From approximately 1995 onwards the Dutch government initiated a process of retreating from direct investments and funding to many of the earlier government induced and established institutions. This phase is characterized by a restructuring of the financial and management models of agricultural

research, academic and practical training, and farmer extension. Most of the institutions operating in this field were (semi-)privatised and responsibility for the upkeep of services and its financing is now largely the responsibility of the value chain actors themselves, with the challenge to operate according a (more) commercially driven business model on cost recovery basis.

Restructuring of Product Boards

Equally in 2010, the Dutch Government reviewed the activities, operations, mandates and financial contributions to the Product Boards. It concluded that the Act originating from 1948 should be changed. The current position of government is that the public tasks of the Boards (to implement government policy and regulation) should be continued and (partly) paid by government. However the autonomous tasks shall be carried out by business groups themselves, without involvement and financing by the government. At this moment the process of reduction of Product Board tasks has started. However, it is not clear yet how all autonomous tasks will be filled in and financed in the near future.

Restructering of quota system and export subsidies

In 2014 a new EU Agricultural Policy framework will be implemented which will reduce import restrictions and export subsidies for the dairy sector. In April 2015 the milk quota system will be abolished. This liberalization of the market will give more opportunities for dairy farms to expand herds and volumes – provided the availability of land and compliance with environmental policies. These will certainly put a new ceiling on growth. EU and Dutch dairy farmers will also be more exposed to international competition, however at the same time global demand for milk and milk products is expected to show sustained growth.

Table 4 gives a summary-overview of trends and indicators of the dairy sector life cycle phases as discussed above.

Table 4 Trends and indicators of the dairy sector life cycle phases: start up, growth and maturity phase in the Netherlands

Phase	Trends and indicators
"Start-up phase" 1850 - 1950	• Low number of cows per hectare • Low milk production per cow • Low acreage per farm • Employment: high labour input per ha • Mainly family farms with mixed farming systems (dairy next to production of food and fodder crops and other small livestock like pigs and poultry). • Production for own use or sub-national scale, fragmentation of markets and supply chain • Processing of excess milk mainly on-farm • Production increase oriented: more farmers/more cows • Low educational level of farmers • Start-up of cooperatives (production, finance, insurance, processing) • Cost price of milk is relatively high, limited fodder production • Minor contribution to GDP • Restricted or limited government intervention

"Growth phase" 1950 - 1980	• (Inter-)nationally orientation • Scaling/specialisation/intensification • Organised milk processing, defragmentation of supply chain • Productivity increase oriented • Efficiency oriented • Mechanization level increases • Outflow of agricultural labour to agricultural support services and other economic sectors • Strong growth of cooperative sector • High government policy intervention and funding for research, knowledge development and other enabling environment issues.
"Maturity phase" 1980 - now	• (Inter-)national/global orientation • High consolidation of production and scaling up of dairy farms • Productivity, efficiency, cost price and commercial driven • Breakthrough in fodder production • Well-educated farmer base • Chain management, high attention for quality issues, food safety • Growing attention for animal welfare and environment • High contribution to GDP • Retreating government, increased sector self-control, financing

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Appendix 4: List of People Consulted

No	Name	Organization	Contact
1.	Anton Jansen	SNV	0719-343308
2.	Rose Karuri	SNV	0722835765
3.	Luke Kessei	Department of Livestock Development	0721-475111
4.	Machira Gichohi	Kenya Dairy Board	0722 700717
5.	Moses Nyabila	EADD	0722-765566
6.	Alex Kirui	Heifer International	0721-664611
7.	Justus Kiago	Department of Co-op Development and Marketing	0721-470038
8.	Festus Kaburu	KDFF	0720-907458
9.	David Maina	SNV	0733-608035
10.	Daisy Bii	EADDP-Heifer	0720-972833
11.	Dr. Philip K. Cherono	KDB	0725-702595
12.	Rose Karuri	SNV	0722-835765
13.	Winnie Mailu	SNV	0722-856783
14.	John Macharia	SNV	0723-466964
15.	Mary Njuguna Kimwadu	SNV	0733794232
16.	Helen C. Too	Tetra Park	0721-497740
17.	Crispin Mwatate	Heifer International	0722-837161
18.	Ezekiel G. Muiruri	Kenya Livestock producers Assoc.	0725-933914
19.	Joseph Maina Ngumi	NATTET	0722-237181
20.	Dr. Rawlynce Bett	KDFF	0726-681441
21.	Dominic Menjo	NKCC	0723-777502
22.	Samuel M. Mumo	Kinangop Dairies	050 51515
23.	Fredirick M Muriithi	Mukurinwe – ini W. Dairy	0726724519
24.	Gerald Warui	Mukurinwe – ini W. Dairy	0722396334
25.	Dr. H. K Wamukuru	KAGRC	0722870231
26.	Michael B. Kibiego	Small-scale Dairy Commercialization Project IFAD	07220652687
27.	Humphry Khakula	District Dairy Development Officer	0722664823
28.	Dr. Vitoria Kyalo	Kenya Livestock Breeders Organization (KLBO) Kenya Stud Book	0721986969
29.	Dr. S. K. Muthui	Menengai Agro Vet, Nakuru	0722808701
30.	Andrew Kimaiyo	Buzeki Dairies	
31.	Francis Wachira	Kirima Dairy Project	0721836187
32.	Okinyi	Siogiroi	0735521706
33.	Rotich	SS Farmer (siogiroi)	
34.	Joseph Chemwoa and 5 others	North Rift Farmers Union	
35.	Philip K. Pyeko	New KCC, Eldoret	
36.	Samson Too	New KCC, Eldoret	0722341651
37.	Jeremiah Ruto	Tankiria Dairy Ltd	
38.	Cosma Lagat	Kabiyet Dairy Ltd	
39.	Peter Lelei	KENDAPO	
40.	John Gethi	Brookside Dairies	0735222264
41.	Dr. K. Langat	New KCC, NBI	0703 478 469
42.	Joseph M. Ndegwa	Future Focus Development	0733858953
43.	Eng. Isaack Langat	Farmland Investments	0723782367

44.	Pauline N. Mbondo	Smallholder Commercialization Programme (IFAD)	0720 918 977
45.	Mlika Wanjiku Thiong'o	Manager, Tulaga Farmers Cooperative Society	0710646943
46.	Samuel Mutunga Mumo	Quality Control manager - Tulaga Farmers Cooperative Society	
47.	Joseph Nganga,	Tulaga farmers	
48.	Dominic Kinyua,		
49.	Julius Kariuki,		
50.	John Githuku,		
51.	Naomi Kinuthia,	Tulaga Farmers	
52.	John Munga		
53.	James Njihia,		
54.	Simon Githinji,	Tulaga farmers	
55.	Patrick Gachiri,		
56.	Leah Wachera		
57.	Ernst Nyaga	Chief Accountant - Muki Farmers Co-operative	
58.	Dr. James Maiteri	Muki Farmers Co-operative	
59.	James Mwiti	Nyala Co-operative Society	
60.	George Muita	Plant Manager Kieni Dairy Products Ltd	
61.	Gerald Warui	Co-ordinator Mukurweini Wakulima Dairy Ltd	
62.	M Muriithi	Accountant Mukurweini Wakulima Dairy Ltd	
63.	Nancy Wambui	Mukurweini Wakulima Dairy Ltd farmers	
64.	John Githinji,		
65.	John Muriithi,		
66.	Cecilia Nyawira,		
67.	Cyrus Wanjohi		
68.	Dr. Mutua/Dorcas	Meru Central Dairy Cooperative Union Ltd	
69.	Joseph Gikunda	Nkuene Farmers Society	