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Gender assessment of dairy value chains: evidence from **Kenya**

Gerald Katothya

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IAKIB Cooperative board member and manager of the Milk Bar Gicumbi Byumba sector Ngondore road in Kenya.
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Preface

Milk and dairy production are crucial for the daily food security of rural families throughout the world. They are a vital source of nutrition and provide important livelihood opportunities for dairy farmers, processors, transporters, retailers and other actors in the dairy value chain. Women play a significant role in activities related to animal husbandry and dairy production, but their participation is commonly concentrated at the production level, in less profitable activities than those of men. They often remain excluded from the decision-making processes and governance structures of dairy value chains. Few national dairy policies or programmes adopt a gender perspective when defining their strategies. Consequently, women and girls tend to benefit much less from livestock and dairy value chains than men do.

Governments and development practitioners need up-to-date information about the different roles, responsibilities, needs and constraints of women and men involved in the dairy sector in order to inform policies and interventions that contribute to inclusive and gender-sensitive value chain development.

The Social Policies and Rural Institutions (ESP) and Animal Production and Health Divisions (AGAH) of the Food and Agriculture Organization of the United Nations (FAO), in collaboration with the FAO Representation in Kenya, decided to undertake a detailed gender assessment of the dairy value chains in selected sites of the country. The resulting publication draws on the evidence gathered through fieldwork and the review of specialized background documentation, which yielded a comprehensive overview of the gender issues in dairy value chains in the counties of Kiambu, Nandi and Bungoma.

The report is an important step towards a deepened comprehension of gender issues in dairy value chains in the Kenyan context. It provides country-specific recommendations for Kenya, which also feed into a more general knowledge base on how to develop gender-sensitive dairy value chains, thereby contributing to the ultimate goal of closing the gender gap in the agricultural sector.

This report is part of a series of country assessments:

- Gender assessment of dairy value chains: evidence from Ethiopia
- Gender assessment of dairy value chains: evidence from Rwanda
- Empowering women in Afghanistan: reducing gender gaps through integrated dairy schemes.

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The study was carried out in consultation with the FAO Representation in Kenya under the direct supervision of Regina Laub, Senior Officer (ESP), Raffaele Mattioli, Senior Officer (AGAH) and Anni McLeod (International Consultant). Francesca Distefano and Alejandra Safa, Gender and Development Consultants (ESP), provided valuable inputs throughout the study and Rosa Capuzzolo (ESP) provided significant administrative support.

In Kenya, the assignment was facilitated by Robert Allport, FAO Representative (FAO Kenya), Ms Alice Jesse, Administrative Assistant (FAO Kenya) and Sub-County Livestock Production Officers Robert Wakoli (Nandi), Soita Musundi (Bungoma) and John Njoroge (Kiambu).

The author would like to acknowledge the time and effort contributed by the many individuals and organizations consulted in Kenya and the information and guidance provided by FAO in Rome and Kenya.

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Executive summary

This report presents the findings from a study on the gender and socio-economic aspects of Kenyan dairy value chains supplied by smallholder producers. The aim of the study was to assess the extent to which gender equality is built into the development of dairy value chains in specific sites in Kenya and to formulate recommendations accordingly for practitioners and policy-makers on how best to design and implement a gender-inclusive dairy development programme. The study does not focus on the performance of the value chains per se, but on the aspects in which gender inequalities can be reduced. It also does not focus explicitly on the issue of youths.

At the macro level, the report broadly reviews policies, laws, institutional mechanisms and programmes defining the gender and socio-economic context in Kenya. More specifically, it reviews the history of, and trends in, dairy enterprise development in the country over the last 30 years through gender lenses. It also profiles leading dairy producing communities in the country, which guided the purposive selection of three sites for field survey (micro-level analysis).

The three field sites were located in Kiambu, Nandi and Bungoma Counties. Kiambu County in the high-potential central highlands of Kenya was selected because of its community's long history in dairy production and marketing. Its proximity to Nairobi city and suburbs, which provides a lucrative market for milk and products, was another consideration. The Kikuyu community, where women are considered relatively empowered, was also a factor that determined the selection. Nandi County was selected to represent the Rift Valley region, the leading region in dairy production and an area where a number of prominent animal diseases are still negatively affecting the dairy sector. Nandi is a traditional livestock-keeping area transitioning from an extensive to a semi-intensive dairy production system. Its proximity to milk-deficit areas in the adjacent western Kenya region and local demand created within the labour-intensive tea estates were other relevant factors. The third study site, Bungoma County in western Kenya, although classified as having medium potential for dairy production, was considered an emerging region for dairy commercialization. Kiambu has been less influenced by donor-funded dairy development programmes than Nandi and Bungoma.

Data sources included a literature review of relevant studies and reports, interviews with key informants, both at the national and micro levels, focus group discussions (FGDs) and household interviews with different actors representing all functions and support services in the value chains.

The macro-level review finds mixed results regarding Kenya's gender and socio-economic context. Positive trends include the country's sustained positive GDP growth in the last six years, its recent upgrade to a lower middle-income status country, the enactment of a new constitution that is viewed as proffering better prospects in gender and socio-economic equity, and the overall Vision 2030 guiding the long-term development framework. Two global gender indices show that Kenya has shown improvement in the ranking of the key gender indicators: the global Gender Gap Index of 2014, which ranked Kenya 37 out of 145 with a score of 0.726, which improved in 2015 to rank 48 with a score of 0.719; and the Gender Inequality Index of 2014, with a score of 0.548, an improvement from 0.682 in 2000. Progress is also reported in innovative mobile phone-based, pro-poor financial services, improvements in basic health, education, and infant and maternal mortality, as well as increased public investments in social services. The sustained dominance of the agricultural sector's contribution to national GDP is notable, with the dairy sector making a significant 3.5–3.8 percent contribution.

Nevertheless, Kenya still remains within the league of poor nations, facing high rates

of unemployment (12.7 percent), poverty (46 percent), as well as other forms of gender and socio-economic disparities. There are wide disparities in poverty incidence between urban areas (33.7 percent) and rural areas (49 percent) as well as a wide variation across counties, which is more severe among female-headed households, rural women and pastoralists. In the political sphere, women's representation has greatly improved since the new constitution. It falls short, however, of the set constitutional quota and also compares poorly with neighbours. The need to generate economic growth that is inclusive and equitable presents another important challenge to policy-makers.

Historically, the prevailing state-driven, socio-economic policies have influenced the general developments in the dairy sector, while demand patterns have dictated the structure of the dairy industry. A dual system has co-existed in Kenya's dairy industry since independence, featuring traditional and commercial models in both dairy production and marketing. On the supply side of the traditional model is the dominant small-scale family farms accounting for over 80 percent of milk produced. On the demand side, the informal market system accounts for over 70 percent of marketed milk. The supply side of the commercial model consists in small-, medium-, and large-scale business-oriented farms; the demand side consists in over 28 registered milk processors.

The roles played by men and women in the dairy value chain are influenced by the gender division of labour and therefore tend to vary depending on the prevailing milk production and marketing systems. Under the traditional production system, women contribute most of labour in dairy production, and contributed even more under intensified small-scale operations. The informality governing livestock property rights in African societies rendered ownership and control of dairy cattle and products complex concepts. This study finds that women mostly managed the cows but did not own them. Under commercial intensified production systems, labour tends to shift towards hired workers, a phenomenon previously thought to reduce the burden of labour on female members of the household. However, this study reveals a new dimension, that even with hired workers, women (wives) take on a supervisory role, which requires constant presence at the farm to guide and motivate the often unreliable male farm workers. Investing in labour-saving or -easing technologies such as piped water, milking and fodder processing machinery, well-fenced grazing paddocks, farm structures (milking parlour), and tools such as gumboots, solar torches and dust coats was exceptionally highlighted by female farmers as critical in not only easing their work, but also attracting and retaining farm workers. Other studies observe that women from commercialized systems provide more labour than those from non-commercialized households. These findings suggest that intensification and commercialization of dairy tends to increase women's workload and to shift dairy income from women's control, which is likely to result in less spending on food and household wellbeing.

The review of secondary sources revealed that there are limited documented analyses on the gendered effects and impacts of the different trends marking the development of the dairy industry in Kenya. For example, the effects of the liberalization of livestock services and the dramatic collapse of the Kenya Creameries Cooperative (KCC) on women seem not to have been documented. It also finds that the institutional framework guiding the dairy industry is generally gender-neutral.

The Kenyan dairy value chains are relatively short and can broadly be categorized into cold or pasteurized (formal) and warm or unpasteurized (informal) supply chains. These chains differ in terms of size, geographical distribution, degree of licensing, relative rewards, quality perceptions and long-term potential. The field survey reveals that: (i) the unpasteurized chain dominates, handling over 70 percent of milk marketed; (ii) women's participation is highest at the production node; (iii) at the milk traders' node, women operate at a smaller scale and experience more severe challenges related to access to capital, improved technology, information, and mobility than their male counterparts; (iv) the milk transportation service is almost exclusively reserved for male youth; (v) employment at Milk Collection Centres (MCCs) is also male-dominated, especially in management

and field-related operations; (vi) women dominate in the four MCCs' membership ranging from 51 to 75 percent but make up less than one-third membership in the boards; (vii) there are few women who own dairy support services businesses such as agrovet stores; and (viii) most agrovet stores prefer to employ young women as store attendants. According to a literature review, the leading dairy processors are unlikely to have gender and inclusiveness policies guiding both their milk supply and employment strategies. A recent assessment reports a high male-to-female ratio (8:2) in employment opportunities in three sampled processors in Kenya.

Analysis of the sampled value chains in the three sites indicates different scenarios regarding the flow of revenue along the chains. Under processor-oriented chains, processors realize the biggest share of revenue per litre of fresh milk (45–47 percent), followed by producers (32–38 percent), while MCCs realize a meagre 3–7 percent. Under the milk dispensing technology linked to supermarkets (such as in Kiambu), producers realize the biggest share of revenue (58 percent), followed by the supermarkets (23 percent) and the MCC (12 percent). Under the informal milk traders' system, milk traders (in Nandi) and producers (in Kiambu) realize the biggest share of revenue, at 54 percent and 74 percent, respectively. In all cases, MCCs realize the lowest share of revenue yet they are crucial in linking women dairy producers to milk markets and for accessing a range of interlocking dairy inputs and services, and thus their profitability is important. Increasing volumes of milk bulked and managing debt obligations are the major factors influencing their financial health. There are minimal value-addition activities at the producer, trader and MCC levels. Simple enterprise budget analysis conducted revealed that dairy was one of the most significant sources of income for the interviewed households.

Other benefits for individuals and households engaged in dairying enterprises are: exposure to leadership; improved access to financial services (payments accounts, savings and credit); access to value chain services; increased recognition of women as dairy managers; and the increasing ability to join dairy POs and participate in dairy meetings and training. As regards constraints faced, labour intensity and inadequate feed resources are the major considerations in expanding dairy production enterprises. According to female respondents, access to labour-saving technologies would go far in easing the workload they endure. Although there were no evident differences between male and female dairy cattle owners in their knowledge of illnesses and animal diseases, animal health care roles seem gendered. Male paravets with limited skills on how to target women as clients of animal health services dominate service provision. Women as leading managers of milk income face the immediate impact of sick lactating cows. Access to animal health services through a check-off/credit payment system facilitated by dairy POs is therefore a major relief to women.

The different influences of dairy development programmes on governance, scalability and participation, and on the roles and responsibilities of the different actors in the value chain were discernible in the three communities studied. The study reveals a hybrid of governance mechanisms, which implies that multiple points of interventions and strategies would be required to render the chains more gender-inclusive. Overall, the influence of dairy development programmes on the participation and roles of women and men is mixed. The older programmes seem to have been more gender-blind than the most recent ones. Institutional commitment on gender equality from donor and implementing organizations is key factor determining the extent of gender sensitivity of a dairy development programme. The emerging field-level methodologies, tools and expertise in integrating gender and inclusiveness in agricultural value chains is a promising trend.

Recognizing the gender knowledge gap (practical tools and expertise) between policy and field-level interventions, the assessment makes the following specific recommendations on how best to design and implement a gender-inclusive dairy development programme:

- Target POs as 'new spaces' for transforming community and household gender norms.

- Focus on access to labour-saving technologies and farm structures and tools.
- Tailor entrepreneurial development interventions to women-led dairy enterprises.
- Strengthen the capacity of value chain enablers on gender-inclusive value chains.
- Target other value chain partners (i.e. target interventions beyond the milk producers' node).
- Sell the business case of gender-inclusive supply chain development to milk processors.
- Strengthen the farm to MCC milk transportation link as a key strategy in ensuring that women access milk markets and that MCCs attain financial viability.

About the author

Gerald Katothya is an independent consultant and doctoral student with qualifications in agricultural extension, gender and development studies. He has extensive experience in producer organizations and inclusive agricultural value chains. He served as a Programme Officer for the Swedish Cooperative Centre's Agricultural Development Programme – East Africa, and a Regional Gender Advisor at Heifer international (East Africa Dairy Development Program).

Abbreviations and acronyms

AfDB	African Development Bank
AGM	Annual General Meeting
AI	Artificial insemination
ASDS	Agricultural Sector Development Strategy
ASDSP	Agricultural Sector Development Support Programme
BDS	Business development services
DFC	Dairy Farmers' Cooperative
EADD	East Africa Dairy Development (Programme)
FAO	Food Agricultural Organization of the United Nations
FGD	focus group discussions
GDP	Gross domestic product
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
KANU	Kenya African National Union
KAVES	Kenya Agricultural Value Enterprise Project
KCC	Kenya Creameries Cooperative
KDB	Kenya Dairy Board
KDFF	Kenya Dairy Farmers' Federation
KNBS	Kenya National Bureau of Statistics
KDFF	Kenya Dairy Farmers' Federation
KNDMP	Kenya National Dairy Master Plan
KMDP	Kenya Market-led Dairy Development Programme
KES	Kenya shilling
LDFC	Lessos Dairy Farmers' Cooperative
MoALF	Ministry of Agriculture, Fisheries and Livestock
MCC	Milk Collection Centre
MDP	Ministry of Devolution and Planning
MTU	Mobile Training Unit – TechnoServe
MYWO	Maendeleo ya wanawake (Kenyan National Women's Organization)
NADAFA	Naitiri Dairy Farmers' Cooperative
NRM	Natural Resources Management
NGEC	National Gender and Equality Commission
PKF	Pannell Keer Forster
PO	Producer organization
SACCO	Savings and Credit Cooperative
SDCP	Smallholder Dairy Competitiveness Project
SDP	Smallholder Dairy Project
SNV	Netherlands Development Organization
SSMT	Small-scale milk trader
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
USAID	United States Agency for International Development

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Chapter 1

Introduction

FAO has a long history of working in small-holder dairy development and has learned that well-designed dairy development programmes can improve the incomes and nutrition of poor households and provide employment in milk processing and marketing (Dugdill *et al.*, 2013). Demand for dairy products has grown steadily and continues to grow, particularly in the urban centres of developing countries (McLeod, 2014). Small-scale dairy production is considered beneficial to women and children as well as men. Milk sales provide regular income that is often accessible to women, while dairy products can be important in diversifying the diets of poor people, in particular, children above the age of 12 months and undernourished pregnant women (Weaver *et al.*, 2014).

However, reviews of evidence on the importance of livestock for women have argued that even though two-thirds of the world's poor livestock keepers are rural women, limited research has been conducted in recent years on their roles in livestock keeping and the opportunities livestock-related interventions could offer them (Kristjanson *et al.*, 2014). Some published literature is available on gender and livestock ownership. For example, livestock has been described as an asset that women can sometimes acquire or control more easily than land or other physical or financial assets (Rubin, Tezera and Caldwell, 2010). However, the relative informality of livestock property rights can be disadvantageous to them when their ownership

of animals is challenged. It is also more common for women to own livestock jointly with men than to have sole ownership, according to a recent survey in seven countries (Johnson *et al.*, 2015). Income from livestock can be advantageous to women even if they do not solely own the animals; participation in a dairy value chain programme in Bangladesh increased the value of assets jointly owned by women and men, and gave women a wider range of options in saving or accessing credit (Quisumbing *et al.*, 2013).

This report is one of four studies commissioned by FAO to review the gender and socio-economic aspects of dairy value chains supplied by small-holder producers.¹ The objective of the present study is to assess the extent to which gender equality can be built into the development of dairy value chains in Kenya and to formulate recommendations accordingly. The analysis assesses women's and men's roles and responsibilities, and their different needs, constraints and challenges along selected dairy value chains. Also, it identifies the contributing factors to reversing gender inequalities, and draws some general guidelines on how to design and implement gender-inclusive dairy value chain development.

The assessment was conducted by a national consultant under the overall supervision of an international consultant and the FAO ESP team in Rome, and with the collaboration of the FAO Representation Office in Kenya.

¹ A 2013 study in Afghanistan is reported in FAO (2015). Subsequently, FAO commissioned three further studies, in Ethiopia, Kenya (reported here) and Rwanda.

Chapter 2

Methodology

2.1 SCOPE

The aim of the study was to assess the extent to which gender equality can be built into the development of dairy value chains in Kenya and to suggest general guidelines for implementing a gender-inclusive dairy value chain. It examines several aspects of dairy value chains, namely structure, governance, valueadding and profitability. However, the intention of this analysis is not to evaluate the performance of the value chains, but rather, to investigate the conditions that are necessary to provide equal opportunities for women and men to engage in and benefit from dairy value chain development.

The study used a literature review to provide a broader picture of dairy development and the economic, social and gender context in which it takes place. It draws information from previous descriptions and evaluations of dairy value chains and dairy development projects, as well as field work conducted in Kenya.

2.2 ANALYTICAL FRAMEWORK

Since the study is concerned with gender issues within the value chains, the conceptual framework draws from and combines two types of analysis: value chain analysis and gender analysis. Value chain analysis is concerned with the effective and efficient functioning of value chains and their potential to provide profit to those who participate, while gender analysis is concerned with the extent to which men and women have equal access and control over resources and assets, voice and agency, and/or have equal opportunities to attain their chosen life outcomes. In this study, gender analysis considered the factors within the value chain and in the wider environment that affect the extent to which both men and women can participate in and benefit from the operation of dairy value chains. Combining the two, gender analysis provided a context and cultural reference in which to situate value chain analysis.

The framework was constructed with reference to sources on value chain approaches and analyses; sources dealing with gender analysis; and sources describing ways to combine the two.² It also draws on experiences gained in another FAO study in Afghanistan (FAO, 2015). It is intended to be comprehensive but also straightforward in order to be applied within a limited time and across a range of local situations.

The framework focuses on three aspects of the value chains:

- structure, by considering both the functional links and the supporting inputs and services (such as animal health services, extension advice and drug and feed supplies);
- the flow of values along the chains and the distribution of income among actors;
- governance of the chains, i.e. the way that actors and institutions drive their operation.

It also considers gender issues, defined as access and control over resources and assets, voice and agency, at three levels:

- the micro level, which focuses on individuals, households and local communities; women's and men's roles and responsibilities, and how they are affected;
- the meso level, which focuses on institutions and services, who has access to them, and how they cater to the needs of women and men.
- the macro level, which focuses on national policies and plans, the economy and social issues; and how women and men are affected.

² See Kaplinsky and Morris, 2003; Bolwig *et al.*, 2008; Mayoux and Mackie, 2007; Quisumbing *et al.*, 2013; ILO, 2009; Vanderschaeghe and Lindo, 2008; Riisgaard *et al.*, 2010; FAO, 2001).

2.3 DATA AND INFORMATION GATHERING

The study reviewed literature on smallholder dairy development and associated gender issues, interviewed key stakeholders from government institutions and donor agencies, conducted focus group discussions (FGDs) in three selected communities, and interviewed households and individuals participating in the dairy value chains.

The literature review was the starting point of the analysis. Available published and grey literature was scanned for information on all topics identified. The review was the main source of information on the following topics, although not limited to:

- macro-level information on policies, laws, economic, social and gender indicators, production and consumption of dairy products;
- a history of dairy development programmes and projects, their reviews, and their approach to gender-equality.

The review also provided information on the location of dairy producers, which was required for the selection of communities where focus group interviews were to be carried out.

The study emphasized depth rather than breadth of coverage, and therefore took more of a qualitative than a quantitative approach to data gathering. Field work was used to obtain details on topics that have not been well covered in the literature and to listen to the stories of women and men involved in dairy value chains within the limited time available. Three communities were chosen to represent a range of experiences with and lessons learned from smallholder dairying relevant to the study.

The following were general principles in choosing study sites:

- **Recognizable dairy value chains.** Since the study focused on recognizable dairy value chains, production and processing and/or sale of dairy products had to take place on separate premises.
- **Geographical representativeness:** The study reflects the concentration of dairy value chain development within the country, with an appropriate balance of peri-urban and rural study sites, so as to capture the different demand patterns, availability of feed resources, access to animal health services and cultural norms.
- **Cultural representativeness:** The sample covers communities/households from a range

of ethnic groups participating in dairy value chains, recognizing that gender norms can be affected by ethnic group.

At each selected study site, discussions and interviews with local male and female value chain players were held, based on their function in the dairy value chain. Interviewees included producers, transporters, traders, local processors (including dairy cooperatives and milk collection centres), and support and service providers. At each site, a mixed sex FGD group was held to map the local value chains and initiate preliminary analysis. These were followed by separate FGDs with male and female value chain actors for more detailed analysis on: (i) the participation and roles of men and women; (ii) the benefits to men and women; and (iii) constraints as perceived by men and women actors.

A total of 85 value chain actors participated in the nine FGDs held. Females represented 44 percent of all the FGD participants and 39 percent of participants in the mixed sex FGDs. Annexes 1 and 2 present an analysis of participants/respondents based on sex and link or position in the value chain. The majority of FGDs participants were producers (35 percent), with women dominating at 60 percent. There were no women participants in the milk transporter value chain link because this function is male-dominated.

In addition to FGDs, at each community, the aim was to conduct 8–10 household or individual interviews with men and women involved in the different nodes of the value chains. Household and individual interviews were held with 26 respondents, of whom females constituted 35 percent (Annex 2). The decision to hold a household or individual interview depended on who was involved in the activity in question. Interviews held with service providers focused on demand for services, profitability and the participation of women and men in these business opportunities. Interviews with dairy producers focused on profitability and other benefits to dairy cattle, constraints to dairy cattle keeping, and the participation of men and women at the household level. For dairy processing plants, interviews looked at the size of the business, the role in the dairy value chain, and participation of men and women in ownership, employment, management and leadership.

Key informant interviews were also held at the local level; they represented public institutions such as the county governments, private

sector players such as dairy cooperatives, service providers, and donor-funded dairy development programmes (see Annex 2).

2.4 DATA ANALYSIS

Data from literature review generated background information on the gender-related dairy development context in Kenya. It also generated preliminary information and showed gaps regarding gender equality issues related to benefits and constraints along the dairy value chain, value chain governance and scalability of dairy development.

Several qualitative and quantitative analyses were conducted, which included: gendered value chain maps for each of the three survey sites; a description of the survey sites with respect to the pre-set selection criteria; analyses on flow and share of revenue per litre of fresh milk across the different value chains and supply channels; analyses on the roles played by women and men at the different value chain links (including support services); analyses on participation/composition of women and men at different nodes of the value chains; gendered analyses on benefits accrued and constraints faced by women from the different value chains/communities and along value chain nodes; an analysis of enterprise budgets to determine profitability of different enterprises along the value chains; brief cases studies that were deemed appropriate; and a synthesis on overall benefits to women in three value chains by generating a value chain empowerment diamond.

2.5 REPORT OUTLINE

The subsequent chapters provide the findings of this study (chapter 3), followed by chapter 4 on conclusions and recommendations, and finally, chapter 5, which presents important considerations for gender-inclusive dairy value chain development.

Chapter 3

Findings

3.1 DAIRY DEVELOPMENT CONTEXT

3.1.1 Economic, social, gender and institutional context

Situated on the equator on Africa's east coast, Kenya occupies 580 367 km², 25 percent of which is arable land. Its population is estimated at 44 million people. Over 70 percent are estimated to live in rural areas, 80 percent of whom are engaged in agriculture, where women make the biggest contribution. Vision 2030 is the country's overall long-term development framework. Launched in 2007, the framework aspires to transform Kenya into an industrialized, middle-income country by 2030, providing a high quality of life to all citizens. The Vision is anchored in three pillars: economic, social, and political governance. The economic pillar aims to achieve and sustain an economic growth rate of 10 percent per annum. Agriculture is a key sector under the economic pillar in addition to tourism, trade, manufacturing and business processes outsourcing. Under the social pillar, equity in gender, youth and vulnerable groups is among the priority areas (Government of Kenya, launched in 2007).

Kenya's economy

Kenya's 50 years of post-independence era is marked by mixed experiences in terms of political and economic performance. From the post-independence period to the mid-1970s, there was an initial phase of rapid growth followed by stagnation until the turn of the century, when a modest growth was witnessed for over a decade (AfDB, 2014). Most recently, Kenya moved from the World Bank's low income list to the lower middle-income bracket, with an average per capita income of \$1 269. This occurred after rebasing the national accounting system in 2013,³ which also

propelled it to the 9th and 4th largest economy in Africa and sub-Saharan Africa (SSA), respectively (KNBS, 2014). Although Kenya has sustained a positive GDP growth rate as shown by an average linear growth rate of 5.5 percent in the last six years (2009–2014), it remains within the league of poor nations, facing high rates of unemployment (12.7 percent) and poverty (46 percent), as well as other forms of gender and socio-economic disparities. It is worth noting that the 5.5 percent average growth rate has remained below the average of most East African countries and below its own target of 10 percent (AfDB, 2014; Odero and Reeves, 2014).

For the last five years, agriculture (including forestry and fishing) has sustained its dominance as a sector by contributing on average 26 percent of GDP growth from 2010–2014. Kenya's private sector is considered vibrant, contributing 97 percent of GDP and 80 percent of formal employment (AfDB 2014; Odero and Reeves, 2014). According to the Central Bank of Kenya (CBK, 2014) and the African Development Bank (AfDB, 2014), Kenya's financial services sector is highly developed, especially with a number of mobile phone-based money payment, banking and lending innovations that have expanded financial services access, especially for the poor.

The overarching challenges facing Kenya's economic prospects are: (i) how to generate economic growth that is more inclusive and equitable in order to tackle poverty and the disparities across the country; (ii) how to strengthen the private sector as the main engine of more inclusive and equitable economic growth; and (iii) how to achieve the above by stimulating a conducive business environment and enhancing the skills of the workforce to respond to labour demands of an emerging transforming economy (AfDB 2014; Odero and Reeves, 2014). Insecurity and terrorism threats, corruption and inadequate infrastructure are other outstanding challenges.

³ Rebasing the national accounts series entails replacing the old base year used for compiling the constant price estimates with a new and more recent base year (KNBS, 2014).

Political and institutional context

On the political front, the new 2010 Constitution provides for a shift in governance, from a centralized to a devolved but unitary system whereby legislative and executive functions are shared at two levels; the national and the 47 devolved county governments. In both cases, the Executive plans and implements programmes while the legislature adopts laws (national and local [county], respectively) and exercises oversight responsibilities. In 2013, women constituted about 21 percent in the bicameral parliament compared to 10 percent in 2007, a major and historical gain in women's political representation. However, this progress falls short of the constitutional quota of no less than one-third and compares poorly with neighbouring countries.

The judiciary has also undergone a series of reforms, such as the creation of a Supreme Court and fresh vetting of judicial officials. Other reforms have seen several independent constitutional commissions formed, mandated to provide checks and balances on the executive and legislature. These include the National Gender and Equality Commission (NGEC), a permanent commission charged with, *inter alia*, monitoring, facilitating and advising on the integration of equality in policies, laws and administrative regulations in public and private institutions (National Council of Law Reporting, 2011).

Social and human development

Kenya has recorded improvements in some key social indicators since the start of the millennium, which include life expectancy, access to basic health and education services, and above all, the human development index. The under-five mortality rate has declined from 74 deaths per 1 000 in 2008/09 to 54 deaths in 2013/14, while the total fertility rate has declined from 4.6 in 2009 to 3.9 in 2014 (UNDP, 2015a). Under access to basic education, the completion and transition rates from primary to secondary education have improved, although there are disparities across the country. Maternal mortality and prevalence of malaria are also reported to have declined (AfDB, 2014; Odero and Reeves, 2014; Government of Kenya, 2015).

Unemployment is a critical development challenge, estimated at 12.7 percent, of which youth (15–34 years) constitute 80 percent. Unemployment is largely an urban phenomenon, while underemployment is more manifest in rural areas where the unemployed engage in family farms

and related enterprises. Gaps in skills sets and mismatch with demands in emerging markets have been highlighted as major challenges. Kenya's poverty rate is estimated at 46 percent but with alarming disparities between rural areas (49.1 percent) and urban areas (33.7 percent), as well as a wide variation across counties, which is more severe among women, especially in rural areas and pastoralists (AfDB, 2014; Odero and Reeves, 2014; MDP, 2015).

Regarding social protection, over the past five years, the Kenyan Government has increased its efforts and investments in social services to improve the welfare of the population. Targeted programmes include: cash transfers for orphans and vulnerable children, the elderly and disabled persons, and a food and nutrition programme for people living with HIV/AIDS. In addition, the National Social Security Fund and the National Hospital Insurance Fund schemes, previously only accessible to the formally employed, are now open to those in informal employment such as dairy farmers (Economic Survey 2015).

Gender equality

According to the Global Gender Gap Index (2015), in 2015, Kenya dropped from 37th position in 2014 to the 48th position out of 145 countries with an equality score of 0.719. The ranking represents an overall improvement in all components (economy, education, health and politics) since 2006 (World Economic Forum, 2015). Also, according to the Human Development Report 2015, Kenya's Gender Development Index (GDI) score was 0.913 in 2014 with females having a higher life expectancy rate (63.4 years) than males (59.9 years) but a lower performance in schooling. The report also shows recorded improvements in the Gender Inequality Index (GII), from a score of 0.682 in 2000 to 0.548 in 2014. Overall, these improvements are attributed to an improved maternal mortality rate and changes in women's participation in politics. Other gender equality challenges include: the entrenched patriarchal culture in most communities, which also perpetuates and reinforces negative practices such gender-based violence, early marriage for girls, and customary practices on property ownership and inheritance that favour males. In addition, inadequate expertise in the public and private sector constrain the ability to address gender concerns (UNDP, 2015b; MDP, 2015).

Generally, Kenya has made remarkable progress since the 1995's Fourth World Conference on Women in Beijing, China in regard to reform-

ing laws, policies, institutional mechanisms and programmes for the advancement of gender equality and women's empowerment. In the run-up to multiparty democracy and the millennium, the long-term ruling political party, the Kenya African National Union (KANU), co-opted *Maendeleo ya wanawake* (MYWO), the national women's organization, as the women's wing. MYWO's close connection with KANU is observed to have disempowered the evolution process of progressive women's organizations, and stigmatized and ruined the image of MYWO even after KANU severed the links in the post-multiparty political era. This environment provided an opportunity for a new and more vibrant women's movement and for many women's organizations to lobby for advancement of women's welfare (MDP, 2015; ADfB, 2007). In 2000, the Government developed the *National Gender and Development Policy*, which provided the State with a framework to reduce gender inequalities in the country. In 2004, the National Commission on Gender and Development Act was enacted, and the 1976 Women's Bureau in the Ministry of Culture and Social Services elevated into a department. The Women's Bureau was created to provide self-help aid to women, especially rural women, in closing the gender inequality gap in the agrarian sector. A gender mainstreaming implementation plan of action was drafted in 2007, recommending, among other things, the creation of gender focal persons in each ministry. Since then, the presence of a gender division or department has been a key feature in ministries coordinating other related functions such as social services, sports, youth, culture and child development. The mandate of the department or division has been to coordinate mainstreaming of gender in national development. The national gender machinery has also benefitted extensively from non-governmental institutions and bilateral and multilateral donor-funded programmes as well as from a robust local women's movement. Their activities are noted to have been scaled up during the liberalization era (ADfB, 2007).

These efforts have yielded some tangible results, such as mainstreaming gender in the Vision 2030, in which several socio-economic development programmes have been formulated to empower women and increase their participation in all sectors. These include the Women and Youth Enterprise (WEF) funds. The WEF has benefitted over one million women who accessed credit amounting to \$50 million and at an impressive repayment rate of 89 percent by 2014 (MDP, 2015). Although

the Fund has expanded outreach by opening offices across all the 290 constituencies, it is not clear how rural women have fared in accessing these services. Other results are the gains in reforming the constitutional and legal frameworks for the protection and promotion of women's human rights. The Constitution of Kenya 2010 is seen as the single most important step in entrenching gender equality in Kenya's political and economic agenda. It includes an affirmative action policy in the public sector and the creation of NGENC as an independent constitutional commission. In 2013, a Gender Directorate was created and is under the new Ministry of Devolution and Planning.

Despite these indications of progress, a recent review commissioned by the Gender Directorate (MDP 2015) on the implementation of the Beijing Platform Plan for Action concludes that tangible benefits for the majority of women in Kenya are yet to be realized, especially in rural areas. It further notes that absolute poverty is higher among women than men in both urban and rural areas, at 50 and 46 percent, respectively. It shows huge disparities in favour of men in wage employment across key sectors of the Kenyan economy. According to a review of NGENC activities, the Commission is yet to broaden its focus and strategies to key sectors of the Kenyan economy, such as the agricultural sector, where rural women are heavily involved in agricultural production, processing and marketing.

Value chain development and institutional framework

Although the agricultural sector is the dominant contributor to the national GDP, Kenya's participation in global value chains has for many years been restricted to the provision of raw materials. The sector has been recognized as key under the economic pillar in the Vision 2030 framework. It is anticipated to shift its role from subsistence and self-sufficiency in food production to wealth and employment creation. To guide this transformation, the Agricultural Sector Development Strategy 2010–2020 (ASDS 2010) was formulated. Within the ASDS 2010 is a profound recognition of the need to revive cooperatives and farmer unions. To support the implementation of the strategy, an Agricultural Sector Development Support Programme (ASDSP, 2014) was formulated, implemented by the Government and interested development partners, with the Swedish Government taking a lead. The purpose of the programme is to increase equitable income,

employment and food security of male and female target groups as a result of improved production and productivity in the rural smallholder farm and off-farm sectors. The programme has embraced the value chain development approach and prioritized gender, social inclusion and environmental resilience as major outcome areas. Poultry and dairy are some of the high priority value chains that the programme has selected (ASDSP, 2014). However, a recent mid-term review recommends that the programme intensify the integration of outcomes on gender and social inclusion. It also notes that enormous technical assistance is needed to strengthen the institutional capacities of implementing partners in integrating inclusion within a value chain approach (Chipeta *et al.*, 2015).

The institutional framework for the dairy sector in Kenya is mainly anchored in the Ministry of Agriculture, Fisheries and Livestock (MoALF), the Kenya Dairy Board (KDB), the Kenya Agricultural and Livestock Research Organization (KALRO) and the Kenya Animal and Genetic Resources Centre (KAGRC). There is an elaborate legal framework, including: the Dairy Industry Act, Cap. 336; the Standards Act, Cap. 496; the Public Health Act, Cap. 242; the Food, Drugs and Chemical Substances Act, Cap. 254; and the Veterinary Surgeons Act, Cap. 366. However, these institutional and legal frameworks do not pay sufficient attention to gender issues. The Kenya Constitution (2010) devolved the responsibility of implementation of dairy development policies to the county governments while the national government retains the responsibility to set the overall policy framework. On the producers' side, there are a number of producer organizations (POs) that represent dairy farmers from grassroots and middle level to the national level. These include the Kenya Dairy Farmers' Federation (KDFF), the Kenya Dairy Producer Organization (KENDAPO) and the Kenya National Farmers' Federation (KENAFF). At the primary level, dairy cooperatives and groups are a major player supporting most small-scale dairy producers. The over 28 dairy processors are organized under the relatively new Kenya Dairy Processors' Association, which is more focused on members' interests than a shared vision for the dairy industry (Makoni *et al.* 2014; PPD Consultants, 2013). The commercial animal feeds and fodder suppliers have also recently organized themselves under the Association of Kenya Animal Feed Manufacturers (AKEFEMA). Most of the private sector actors are represented in the KDB Board, except the informal milk traders.

3.1.2 The history of dairy development

Within SSA, the Kenyan dairy sector takes the lead in many areas. The dairy cattle herd, estimated at over five million, represents 75 percent of the herd in Eastern and Southern Africa regions (FAO, 2011). The per capita milk consumption rate of over 100 litres per year⁴ puts Kenya at the top of the list among developing countries globally. Milk-based enterprises are estimated to support almost two million households (USAID, 2012); this includes an estimated over one million smallholder farms with an average of three dairy cows (KNDMP, 2010). Others are directly employed in dairy processing, distribution and marketing, and/or indirectly employed within the sector as input suppliers, business development services (BDS) providers, milk traders and farm labour (USAID, 2012). According to a study by the Smallholder Dairy Project (SDP), in 2008, the industry employed approximately 84 000 people full-time (Staal *et al.*, 2008). At the farm level, it estimates that for every 1 000 litres of milk produced daily, the dairy activities generate 23 full-time jobs for the self-employed, 50 permanent full-time jobs for employees and three full-time casual labour jobs, for a total of 77 full-time jobs (Staal *et al.*, 2008). At over five billion litres of milk produced in 2012, Kenya is among the leading producers in Africa. The Kenyan dairy sector has been described as a long-term success story, a classic new agriculture case, characterized as smallholder-based, private sector-integrated and commercially oriented, and with wide pro-poor benefits (Ngigi, 2005; Leksomo *et al.*, 2006). Due to a growing population and middle-income class, both domestically and in the region, the sector is projected to experience an even more promising future.

Pre and immediate post-independence era

The general development of the sector has largely been driven by the prevailing government socio-economic policies (FAO, 2011), while the structure of the dairy industry is largely dictated by demand patterns (Omore and Baker, 2011). During the pre-independence era (from early 1900s to 1963), the sector was initiated and sustained by colonial white settler farmers, operating large-scale farms in the high potential highlands of Kenya. The farms were commercially oriented befitting a formal dairy industry structure. The

⁴ Based on FAOSTAT food supply figures, accessed December 2015.

colonial government established support institutions to develop the expanding export-oriented dairy industry such as veterinary laboratory and research stations, Kenya Creameries Cooperative (KCC), Central Artificial Insemination Services (CAIS) and the Kenya Dairy Board (KDB) (FAO, 2011; KNDMP, 2010; Staal *et al.*, 2008).

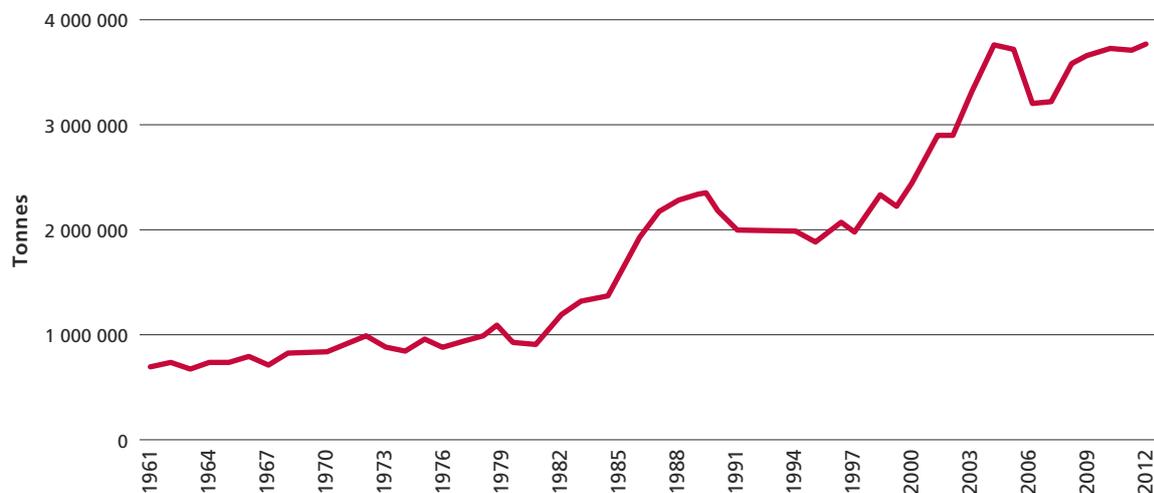
The post-independence era, from 1963–1980s, saw significant changes in the dairy sector. Immediate post-independence era policies saw the sector rapidly shift towards domination by smallholders. The shift to smallholder-dominated production systems was driven by the Government’s goal of self-sufficiency in dairy products and the quest to stimulate rural development, and augmented by donor-supported dairy development programmes aimed at poverty alleviation (Staal *et al.*, 2008; KNDMP, 2010). In 1964, KCC abolished the milk quota system that favoured large-scale farmers and engaged in state-subsidized rapid expansions to accommodate all raw milk from all farmers. Public-run extension services programmes and highly subsidized input services programmes were rolled out (Atieno and Kanyinga, 2008; Leksomo *et al.*, 2006). Farmers were mobilized into cooperatives as vehicles for exploiting economies of scale and pursuing national development. These measures are associated with the significant increase in milk production, as shown in Figure 1.

The liberalization era

The liberalization policies of the mid-1980s to the mid-1990s led to: the deregulation of feeds

and input prices; the de-control of producer prices; the liberalization of marketing; the Government’s withdrawal from the provision of public services and subsidies; and privatization and reforms in state-owned parastatals. This marked the entry of new market players, mostly private sector investors in the development and delivery of services and inputs, such as feed production, veterinary services, breeding services, as well as milk processors and informal traders. After the withdrawal of subsidies and the monopoly combined with mismanagement, KCC gradually collapsed in 1999 (FAO, 2011; Staal *et al.*, 2008). This gap triggered the proliferation of small-scale milk traders (SSMTs) as well as private processors. The SSMTs operated under constant harassment since KDB did not license their businesses because they were considered informal, while private processors pressured KDB not to support SSMTs because they viewed them as a source of unfair competition. Efforts to change mindsets regarding milk from informal channels were initiated in the mid-1990s by the Smallholder Dairy Project’s (SDP) scientific evidence-based advocacy and policy influence approach. SDP studies suggested that public health risks previously associated with informal milk markets were likely to be exaggerated. However, there are mixed views regarding the effects of these efforts. Proponents feel that it created opportunities for SSMTs to venture into dairy enterprises and improved access to milk by low-income consumers. Opponents see at best mixed outcomes, a

FIGURE 1
Trends in milk production, 1961-2013



Source: FAOSTAT (2015).

particular concern being the difficulty of upscaling the competitiveness of the industry relying on the informal market system (Makoni *et al.*, 2014; Atieno and Kanyinga, 2008).

According to the extensive literature reviewed during this assessment, there is an information gap on the effects and impacts of these trends and changes on women's and men's roles, participation, benefits and constraints in the dairy value chain.

Recent changes in the political context

Recent changes in the political context resulted in another turning point for the dairy industry. In 2003, the 40 years of KANU's rule came to an end, and the National Rainbow Coalition (NARC) Government came to office. The NARC Government instituted strategies to revitalize the agricultural sector and reverse the decline that the sector had been experiencing. Notably, the Economic Recovery Strategy for Employment and Wealth Creation (ERS 2003) and the Strategy for Revitalizing Agriculture (Government of Kenya, 2004) were developed. Guided by these strategies, the state repossessed KCC from a private investor and injected funds to revive its operations; it was then rebranded as New KCC.

Other recent government commitments are the launch of Vision 2030 (Government of Kenya, 2007) and the two implementation instruments for the agricultural sector goals under the Vision 2030 framework – ASDS 2010 and ASDSP 2014. Dairy is one of the priority value chains targeted under ASDSP. Although the programme has embraced the value chain approach and prioritized social inclusion, two major challenges were observed: coordination challenges between the national and county governments; and limited expertise at the field level, not only in the value chain concept and approach, but even more so in integrating gender and inclusiveness objectives (personal observation based on interviews with officers in Nandi, Bungoma and Kiambu, September/October 2015).

Recent policies and frameworks include the Kenya National Dairy Master Plan (KNMDP 2010), the National Livestock Policy (2008), the Kenya Dairy Development Policy (2013) and the Kenya Agricultural and Livestock Research Act (2013) (Republic of Kenya, 2013). However, the national parliament has delayed in endorsing the dairy master plan and the livestock policy. The Constitution of Kenya (2010) has devolved the responsibility for the development of the agricultural and livestock sector to county governments while the national government, repre-

sented by the Ministry of Agriculture, Fisheries and Livestock (MoALF) and the KDB, retain the responsibility to map the policy framework. The fieldwork for this assessment observed that these changes are posing both opportunities for and challenges to the dairy value chain players, and success will much depend on how transitional challenges are addressed.

These latter dairy policies and development frameworks tend to identify gender and youth as cross-cutting objectives to be addressed. However, a closer scrutiny and opinions from experts interviewed for this assessment point to some fundamental concerns. First, the gender and youth issues and aspects are not systematically integrated throughout the documents' chapters, but rather, presented as stand-alone sections. Second, there are no robust guidelines on how to support implementation and monitoring of the plans and policies.

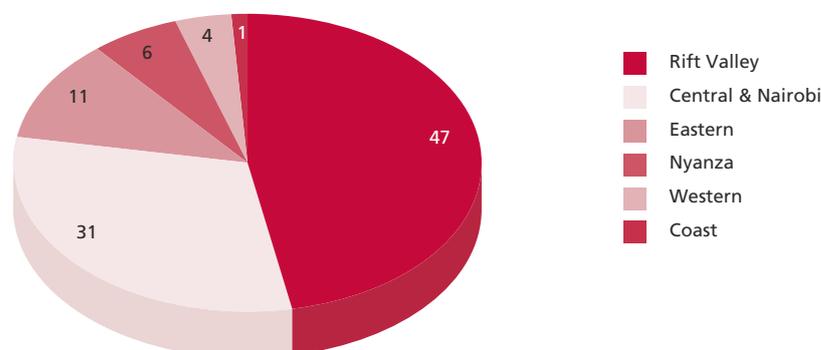
Dairy production zones and systems

By 2012, the dairy cattle population was estimated at five million and production at 5 billion litres (Makoni *et al.*, 2014). Dairy production is concentrated in the highlands and in high to medium potential areas of Kenya. Ranking by the former administrative provinces (regions), Rift Valley (47 percent) leads in dairy production followed by Central combined with Nairobi (31 percent), Eastern (11 percent), Nyanza (6 percent), Western (4 percent) and Coast (1 percent) (Staal *et al.*, 2008).

There are three major production systems in Kenya: zero grazing, semi-zero grazing and extensive grazing systems. Zero- and semi-zero grazing systems are the predominant systems and are extensively practised in the milk sheds found in the Rift Valley, Central and parts of Eastern (Makoni *et al.*, 2014). They are also found to a smaller but growing extent in Eastern (southern parts), Nyanza, Western regions and Coastal lowlands where milk is a high-value commodity since they are milk-deficit regions. Production is dominated by smallholders contributing an estimated 80 percent. A growing group of dairy entrepreneurs with small-, medium-, and large-scale modern dairy farms, estimated at over 2 000 farms is emerging, contributing 20 percent of milk production (SNV, 2013).

The Kenyan dairy sector has demonstrated resilience over the years. Productivity has increased over the last decade due to breed improvements, improved technologies and improved agricultural practices (Makoni *et al.*, 2014). However, several analysts are sceptical of the capability of the cur-

FIGURE 2
Ranking dairy production by regions in Kenya (% contribution)



Sources: Staal *et al.* (2008); Wambugu *et al.* (2011).

rent production systems and structure to meet the projected market demand and opportunities, particularly since dairy production has also been identified as one of the most promising growth areas that can significantly contribute to poverty reduction. Milk consumption is projected to triple under most scenarios in all SSA regions by 2050 (Herrero *et al.*, 2014). However, milk yields per unit are low in the SSA region, even though studies indicated that there would be an increase in productivity at very high resource-efficiency gains through sustainable intensification (Herrero *et al.*, 2014; Majiwa *et al.*, 2013). This would entail increased provision of inputs and other services, appropriate institutional support and markets, all of which are essential to transforming traditional livestock industries into commercial operations.

The Kenya Dairy Master Plan (KNDMP 2010) projects that milk production will increase from the current average of 5 billion litres per year to 12.8 billion litres per year by 2020. To achieve such growth, many experts have advocated for

a significant shift from the traditional model of multi-objective household enterprise to a commercial enterprise model as the best strategy to a competitive, growth oriented industry. The differentiated sector development strategy has been highly recommended as a pathway to upscaling the development of the industry to meet domestic shifts in demand and capture export markets. Under this strategy, pro-poor oriented government and donor programmes are urged to target subsistence-oriented farmers, while private sector-oriented programmes target commercially oriented farms owned by dairy entrepreneurs who are willing to invest and specialize in dairy (Makoni *et al.*, 2014; PPD Consultants, 2013; KNDMP, 2010). Staal *et al.* (2008) argue for a segmented approach that embraces a gradual transformation to a commercial system.

In summary the Kenyan Dairy industry represents a co-existence of a dual system since independence; the traditional and the commercial dairy production and market systems (Table 2).

TABLE 1
An agenda for pro-poor dairy policy and development

Objectives of pro-poor dairy policy and development	Elements of a pro-poor dairy development
<ul style="list-style-type: none"> ▪ Rural and peri-urban employment creation both on farm and along other value chain nodes. ▪ Reliable revenue generation and assets accumulation for resource-poor farmers. ▪ Provision of low costs and safe dairy products to resource-poor consumers. ▪ Dairy cattle-mediated natural resources management and sustainable agricultural practices. ▪ Improved child nutrition in resource-poor households. 	<ul style="list-style-type: none"> ▪ Builds on traditional dairy product consumption preferences while promoting demand for new products. ▪ Supports the evolution of traditional domestic markets, at the same time promoting appropriate formal market development. ▪ Emphasizes and supports the role of smallholder dairy production as a primary means for income generation and of sustaining the intensification of mixed crop-livestock systems.

Source: Adapted from Staal *et al.* (2008).

TABLE 2
Summary characterization of traditional and commercial systems

Traditional system	Commercial system
PRODUCTION	
<ul style="list-style-type: none"> ▪ Over a million multi-objective household enterprises. ▪ 1–3 cows on average on 0.2–3 ha. ▪ Low levels of input use. ▪ Low levels of output (5–10 litres per cow per day). ▪ Account for 80% of milk produced. ▪ Low uptake of technologies. ▪ Large variation in degree of market orientation. ▪ Nutrient deficits in the farm and household. 	<ul style="list-style-type: none"> ▪ Run as single commercial objective enterprises. ▪ Medium-scale farms: 3–49 ha, over 10 cows. ▪ Large-scale farms: over 50 ha, over 30 cows. ▪ Yields: over 10 litres per cow per day. ▪ 20–25 percent of milk produced. ▪ Receptive to new technology and serves as a source of breeding stock. ▪ Higher farm-level investments (including credit). ▪ Higher uptake of inputs.
MARKET	
<ul style="list-style-type: none"> ▪ Referred to as the informal system, it contributes to 80 percent of marketed milk. ▪ It sells raw milk directly to consumers. ▪ There is a low degree of compliance with safety and quality standards. ▪ Market structure is diffused with many small market agents (an estimated 40 000 traders). ▪ The market employs artisanal processing, labour-intensive handling methods ▪ Market sell low-cost products, mostly liquid. ▪ There is great diversity in market behaviour and roles. ▪ Most consumers prefer raw milk and have low awareness on safety and quality standards. ▪ It represents a weak voice and plays a limited role in policy-making. 	<ul style="list-style-type: none"> ▪ It contributes 20–25 percent of marketed milk and 85 percent of total processed milk. ▪ There are over 27 registered processors and capacity of over 3.5 million litres per day. ▪ There is a high degree of compliance with safety and quality standards. ▪ There is a concentrated market structure and relatively few, medium- to large-scale, vertically integrated market agents. ▪ The market employs industrial processing, based on capital-intensive modern technologies. ▪ There are diverse value-added products. ▪ It represents strong voice and plays a major role in sub-sector policy-making.

Sources: Adapted from Staal *et al.* (2008); Government of Kenya (2010); Makoni *et al.* (2014).

Generally, the roles played by men and women in the dairy value chain are influenced by the prevailing milk production and marketing systems, as discussed in the next section.

3.2 BENEFITS AND CONSTRAINTS ALONG THE VALUE CHAIN

3.2.1 Value chain structure and participation

Overview

In Kenya, dairy value chains are relatively short and can be categorized into five types:

- a) processor-oriented chains, which procure their supply of milk from small- and large-scale (commercial) milk producers (formal);
- b) milk collection centre-oriented chains that bulk/aggregate milk from milk producers and market directly to consumers (largely unpasteurized);
- c) milk traders-oriented chains, which deal with largely unpasteurized milk;
- d) direct chains from milk producers to consumers, which are popular with medium- and large-scale farms in urban and peri-urban areas;
- e) Cottage industry-oriented chains, which are common with large-scale farms that have

invested in vertical integration (Makoni *et al.*, 2014; KNDMP, 2010).

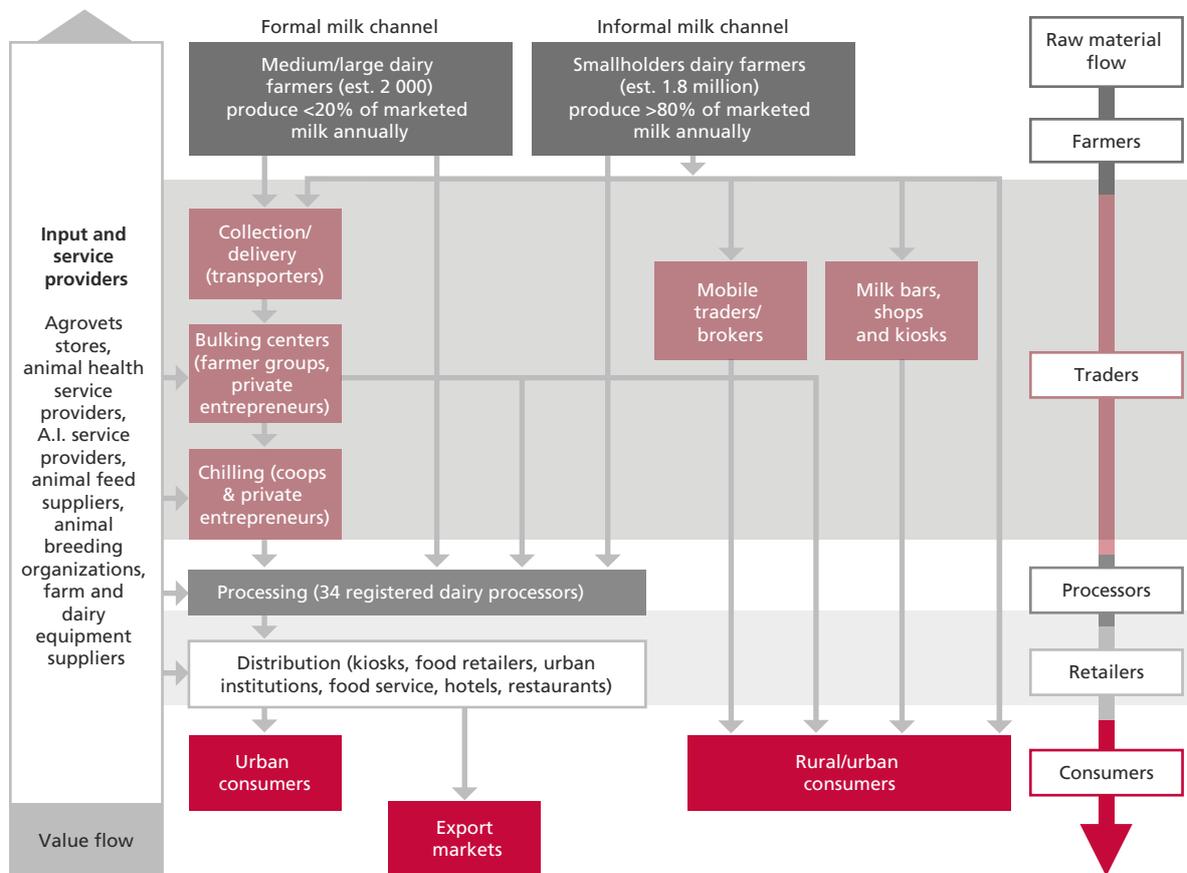
These chains differ in terms of size, geographical distribution, degree of licensing, relative rewards, quality perceptions and long-term potential, but have an important role to play in the Kenyan dairy industry. Supply chains handling unprocessed milk products are categorized as informal and include mobile (itinerant) traders, milk bars and kiosks, brokers and self-help groups. The formal chain includes milk processors, cooperatives, supermarkets, retail shops and kiosks, and milk bars, and any other actor that handles processed milk products (USAID-KAVES, 2014). For a simplified diagram of the value chain, see Figure 3.

Description of study sites and value chain maps

This study reviewed the structure of dairy value chains at each of the three study sites. Background information on each site is provided below. Value chain maps are shown in Figures 4 to 6.

Kiambu County is located in the central highlands of Kenya where 85 percent of households

FIGURE 3
A typical dairy value chain in Kenya



Source: USAID-KAVES, 2014.

are estimated to own dairy cattle (Wambugu *et al.*, 2011). Agriculture is the major economic activity, contributing 17.4 percent of the county population's income. It is the leading sector in terms of employment, food security, income earnings and overall contribution to the socio-economic wellbeing of the people. Coffee and tea are the main cash crops, while beans, maize and Irish potatoes are the main food crops. With respect to livestock, dairy, beef cattle and poultry are the major sources of livelihoods. In 2010, it is estimated that the entire county produced 270 000 litres of milk valued at KES5 billion compared to KES700 million from eggs and 143 million from poultry meat, respectively (ASDSP, 2014). The county has a long history of dairy production and marketing; its proximity to Nairobi city and its suburbs creates a lucrative market for milk and products. The ethnic group Kikuyu is an enterprising community, and women are regarded as relatively empowered (Heyland, 2014).

Nandi County is part of the former rift valley province of Kenya, which is the leading region in dairy production, estimated to control 47 percent of milk produced (Wambugu *et al.*, 2011). Agriculture is the main income earner and driver of the economy, employing 80 percent of the population both directly and indirectly, contributing approximately 50 percent of the county's GDP (ASDSP, 2014). The main cash and food crops cultivated include maize, beans, millet, sorghum, sugarcane, tea, coffee and horticultural crops, depending on the agro-ecological zones. Livestock include dairy and beef cattle, poultry, mutton and beekeeping. Unlike other enterprises, dairy production thrives in all parts of the county. In 2011, the county produced 121 million litres of milk, earning a total of KES3.6 billion (ASDSP, 2014). However, the drier east and northeast parts of the county are infested with tsetse flies, threatening the livestock sector. According to Kenya Tsetse and Trypanosomiasis Eradication Council (Kentec), biting pests can reduce a cow's productivity by between 30 to

40 percent; consequently, the Council has declared tsetse flies a major impediment to increased milk production (Muiruri, 2015)

The county is home to the Nandi community, a sub-tribe under the Kalenjin ethnic group and traditionally a livestock keeping community that has been transitioning to semi-intensive dairy production. The presence of tea estates and proximity to milk-deficit regions in larger western Kenya (Kakamega and Kisumu counties) create a local and regional demand for milk and products.

Bungoma County in the western region of Kenya borders the Republic of Uganda to the north-west and is part of the medium potential regions in dairy production in Kenya. It is predominantly inhabited by the Luhya community. Agriculture is the major occupation and source of income that drives the local economy. Major food crops include maize, beans, finger millet, sweet potatoes, bananas and assorted vegetables, while industrial crops include sugarcane, cotton, coffee, sunflower and tobacco. The main livestock enterprises are cattle, sheep, goats and pigs. Bungoma is the fourth largest producer of maize and beans in Kenya (ASDSP, 2014). It also represents one of the areas earmarked

and targeted by dairy development programmes to stimulate commercialization of dairy production and marketing. It is home to the third oldest milk processing plant in Kenya, Kitinda Dairy Cooperative Union (KDCU) dairy processing plant. The plant was set up with support from the Finnish Government under a programme to demonstrate the role of international aid in technology transfer. However, the plant collapsed in 1995 partially due to the inability to source an adequate supply of milk within the catchment. In the area, there is no significant threat of Tsetse fly infestation; however, the risk persists since the lowlands neighbouring Busia County is reported to face this problem.

The three value chains mapped from these selected communities depict relatively short value chains. In all cases, as in the typical dairy value chain is shown in Figure 3, a formal chain runs alongside a dominating unpasteurized (informal) value chain. The five different types of chain are almost all represented at all sites with the exception of the cottage-based link, which was only found in Kiambu County.

In all cases, the informal channel dominates with over 70 percent of total marketed milk.

TABLE 3
Summary description of selected field survey communities

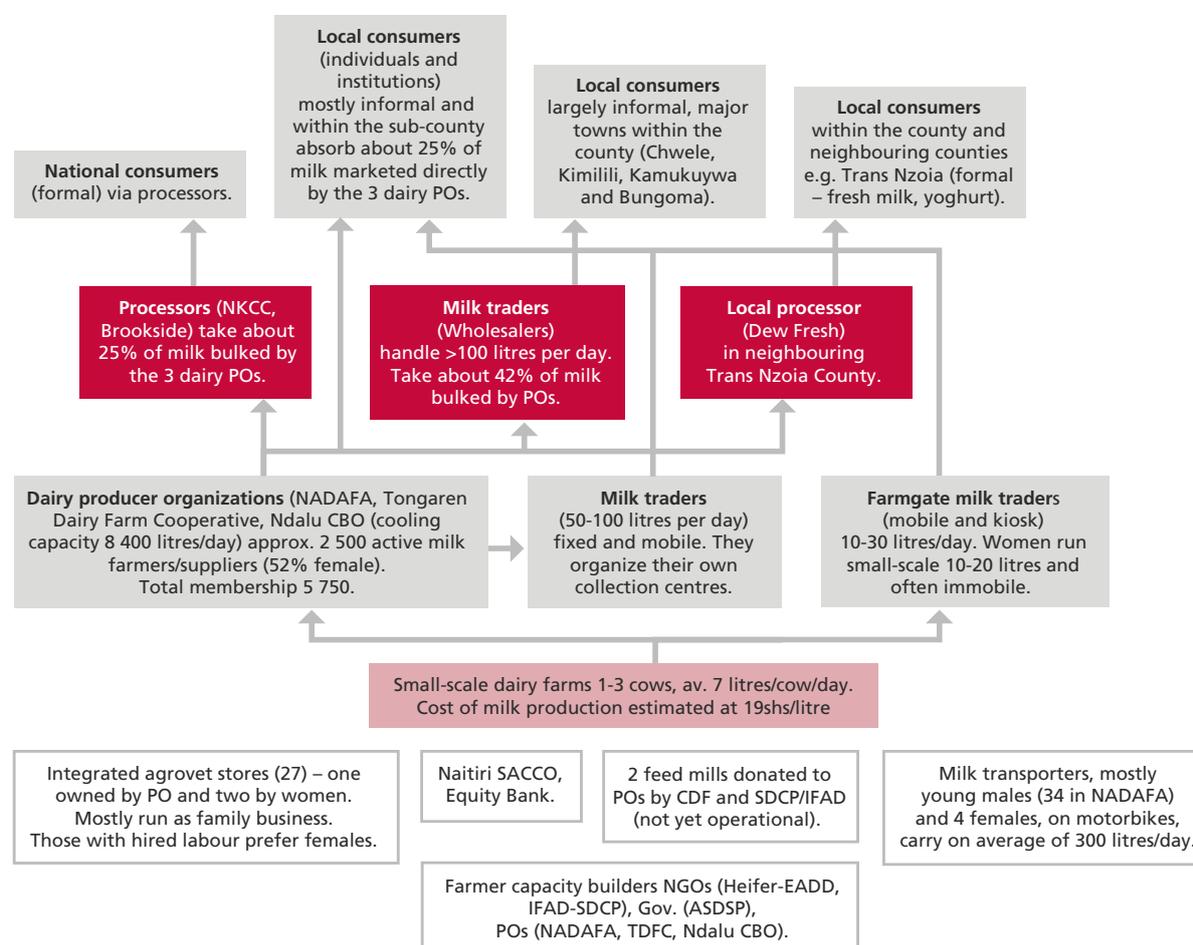
Site	Description specific to the set selection criteria
Kiambu County (Kiambaa)	<ul style="list-style-type: none"> ▪ Peri-urban community in central Kenya and near Nairobi city and its suburbs. ▪ Dominated by the Kikuyu ethnic community where women are considered relatively empowered (Heyland, 2014). ▪ Long history of dairying. ▪ Part of the central highlands of Kenya where 85 percent of households are estimated to own dairy cattle. ▪ Has received less inputs and support from dairy development programmes and projects than the other sites.
Nandi County (Nandi Hills)	<ul style="list-style-type: none"> ▪ Rural-based community, originally pastoral (livestock keepers). ▪ Part of the Rift Valley region of Kenya, the leading region in dairy production (estimated to control 47 percent of milk produced). ▪ Long history of dairying. ▪ Dominated by the Kalenjin ethnic community, transitioning pastoralists where gendered ownership of cattle is regarded as historically complex (Dahl, 1987). ▪ Proximity to milk-deficit areas in western Kenya and the presence of tea estates within stimulate unique demand for milk and products. ▪ Has received considerable inputs and support from dairy development programmes and projects, both public and private. ▪ Has a new Kenya Creameries Cooperative (KCC) factory. ▪ The incidence of tsetse fly is reported in the drier east and northeast parts of the county.
Bungoma County (Tongaren-Naitiri, Ndalua areas)	<ul style="list-style-type: none"> ▪ Rural-based community. ▪ The western part of Kenya borders the Republic of Uganda to the northwest and is part of the medium potential regions in dairy production in Kenya. ▪ Dominated by the Luhya ethnic community, it is not considered particularly enterprising. ▪ Targeted as a new area for upscaling and outscaling dairy commercialization in Kenya by both the Government and donor programmes. ▪ Currently receives and has received considerable inputs and support from the Government and donor-funded dairy development programmes. ▪ Tsetse fly infestation is reported in the lower lands neighbouring Busia County.

Sources: The author, based on qualitative data collected in the study, except where otherwise cited.

Direct sale to individuals and institutional consumers was the most preferred marketing channel by milk producers (but presented limited opportunities), followed by well-paying traders. Direct sales offer relatively higher prices and more flexible payment conditions based on continuous renegotiations. They offer limited opportunities to producers, however, because there are few such clients, especially for producers operating far from shopping centres in largely milk surplus communities. Farmers far from shopping centres and towns are limited to relying on milk transporters/

traders, generally young men, who link them to markets via collective bulking and/or chilling centres managed by POs or run as private enterprises. Large-scale producers in Kiambu prefer the dairy cooperative as opposed to traders, who note that the latter are unable to absorb large volumes although they offer slightly higher prices. Most collection centres do not bulk evening milk, which is mostly designated for household use and is managed by women, who sell the surplus to traders or consumers if available or make traditional products such as sour milk (*mursik*), or ghee.

FIGURE 4
Dairy value chain map – Bungoma County (Tongaren)

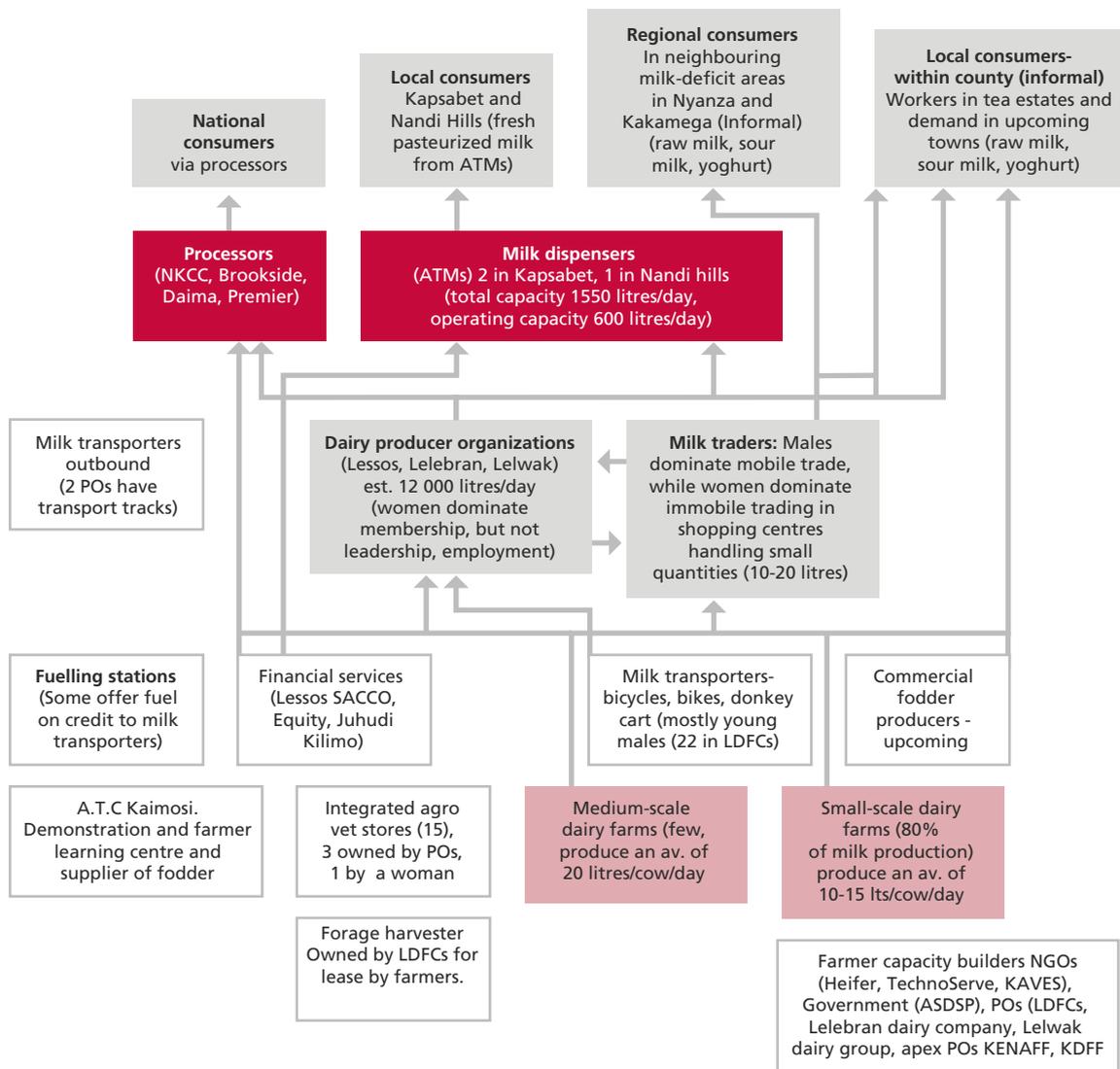


Notes: Naitiri Dairy Farmers' Cooperative Society (NADAFA) has two coolers, an agrovet store and a milk transport van; NKCC has a milk processing factory in the neighbouring Trans Nzoia County-Kitale Town.

PO=Producers Organization; SACCO=Savings and Credit Cooperative Organization; CDF=Constituency Development Fund; Heifer EADD=Heifer International's East Africa Dairy Development Program; IFAD-SDCP=International Fund for Agricultural Development – Smallholder Dairy Competitiveness Project; TDFC=Tongaren Dairy Farmers Cooperative; CBO=community-based organization; ASDSP Programme=Agricultural Sector Development Support Programme.

Source: Analysis of data based on the present assessment.

FIGURE 5
Dairy value chain map Nandi Country (Nandi East)



Notes: PO=producer organization; KAVES=Kenya Agricultural Value Enterprise Project; LDFF=Lessos Dairy Farmers' Cooperative; NKCC=New Kenya Co-operative Creameries; SACCO=Savings and Credit Cooperative Organization; ASDSP=Agricultural Sector Development Support Programme.

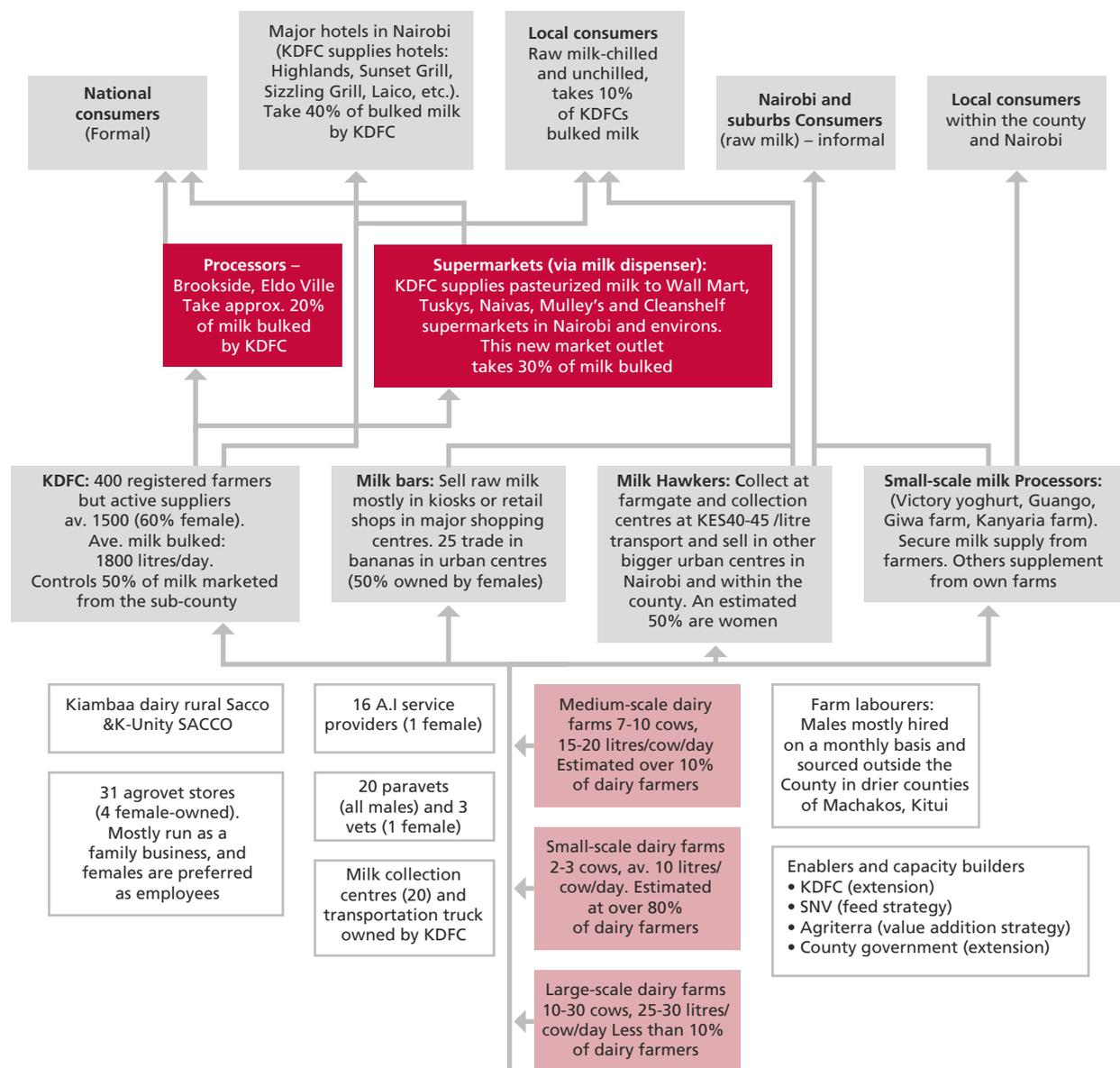
Source: Analysis of data from the present assessment.

Female and male participation at the production node

In all three communities, milk production is traditionally regarded as a women's enterprise to meet household food requirements and as a source of income. As section 3.2.5 will discuss, in general, family members – men, women and children – contribute labour for the success of the enterprise. However, there are workload disparities depending on several factors, including ethnicity, traditional gendered division of labour, production system, and household socio-economic char-

acteristics (Njuki *et al.*, 2011; Njarui *et al.*, 2012). It is further observed from studies that women tend to carry out activities that are performed on a daily basis such as milking, feeding and watering, while men are mainly involved in tasks performed weekly or seasonally such as spraying or planting forage (Njarui *et al.*, 2012). Another pattern is that women tend to be responsible for livestock activities located or performed around the homestead (Maarse, 1995; Njuki *et al.*, 2011). In addition, depending on scale and production system, among other things, family labour may not be adequate

FIGURE 6
Dairy value chain – Kiambu County (Kiambaa)



Note: A.I.=artificial insemination; KDFC=Kiambaa Dairy Farmers' Cooperative Society; SACCO=Savings and Credit Cooperative Organization; SNV=Netherlands Development Organization.

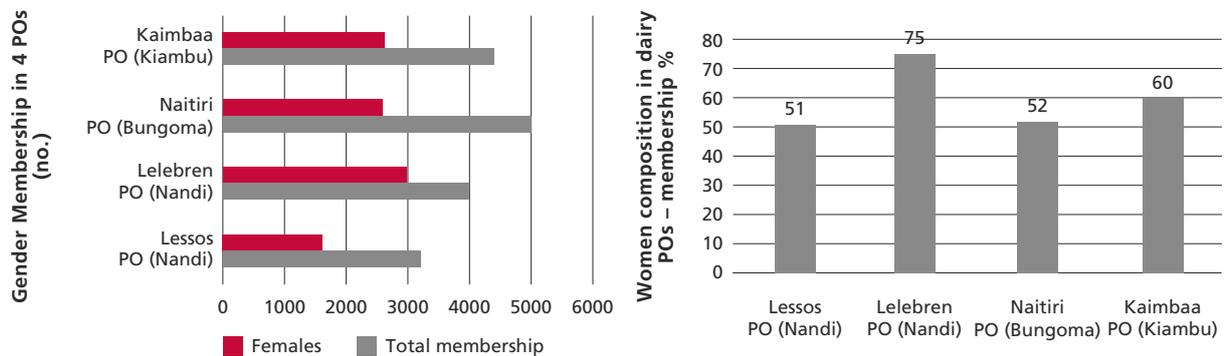
Source: Analysis of data from the present assessment.

to run the dairy production unit. In their studies, Njarui *et al.* (2009) and Njarui *et al.* (2012) found that hired labour contributed about 50 percent and 75 percent of total labour required in running dairy enterprises in rural and peri-urban areas, respectively, of semi-arid Kenya (Machakos and Makueni), while children were found to contribute less than 10 percent.

Findings from the FGDs and interviews under this study confirmed most of these observations.

Overall intensity of labour use was identified as a key consideration in decisions to expand the dairy production enterprise. Women are more involved in daily tasks that are often performed around the homestead, such as feeding, watering and milking, while men are engaged mostly in seasonal tasks such as deworming, spraying, planting forage, harvesting, storing and processing fodder, obtaining inputs from agrovet stores and organizing the provision of animal health services for cattle. An

FIGURE 7
Composition of women in dairy POs – membership



Source: Data based on this assessment.

exception was in Kiambu, where milking is mostly performed by men, mostly hired, who are preferred because they are faster. However, women are mostly responsible for making the necessary preparations, such as warming water required in the milking process, and for supervising workers to ensure compliance with the recommended practices for clean milk production. Involvement of school-going children in dairying activities was observed to be low across the three communities, restricted to weekends and holidays when they assist in different tasks but rarely in milking because they are perceived as inexperienced and therefore inefficient. The FGDs revealed mixed experiences in the selling of milk, where either a woman or man participated depending on intra-household factors, type of market outlet and milk collection and transportation arrangements.

Participation in a dairy PO or cooperatives is seen as crucial not only in facilitating access to milk markets, but also in accessing dairy production and productivity-enhancing services and inputs. In all the communities sampled for this assessment, a dairy PO was identified as a key player in the local dairy value chain. Participation of women as members in the PO was high, dominating over men in all of the four POs (Figure 7).

Male membership in Lessos increased from 36 percent in 2008 to 49 percent in 2015, which shows an increasing interest in dairy as a viable source of income that men can engage in. However, the statistics at the PO level alone may not be a strong indication of women's participation at the farm level in terms of actual activities and decision-making regarding production and marketing of milk. An analysis on women's extent of access and control over dairy production assets requires

insights into intra-household gender relations, especially ownership and decision-making patterns. These concepts proved difficult to measure through FGDs and interviews; it was overly stated during FGDs that the norm was that women managed the cows whereas men owned them. Efforts to further investigate this assertion during household interviews tended to yield 'correct' answers such as shared or joint ownership and control. Anthropological research methods could be more reliable in providing empirical insights in understanding these concepts of joint and/or shared ownership and decision-making (Njuki Jemimah, personal communication, 2015).

According to a recent survey of 300 dairy farmers in western Kenya (Omondi *et al.*, 2014), females are poorly represented and participate less in dairy POs compared to males. It further indicates female-headed dairying households are less likely to register at dairy POs than male-headed dairying households, at 46 and 57 percent, respectively. Also, according to the survey, the actual household member that is registered at the POs is a reflection of its decision-making on the use of services offered by the PO and its capacity to control income accessed through the PO. It concludes that the issue of control of milk income is a strong determining factor in women's registration and participation in a PO.

Female and male participation at milk aggregators/transporters node

In the dairy value chains sampled, milk is transferred through two main channels: from the farm to an MCC or trader (inbound), and from an MCC/trader to processor or retail (outbound). Some milk transporters also serve as milk ven-

dors, aggregating milk from several producers or traders and marketing it in other centres. Outbound transportation is more sophisticated, associated mainly with formal value chains, and mostly uses specialized tankers, which must be licensed by the KDB and can be owned by private entrepreneurs, MCCs and the processors. This node is male-dominated due to the nature of the tasks. The farm to MCC (inbound) transportation is largely populated by male youth riding on bicycles, motorcycles, carts and donkeys, and very few on vans. This survey established that these transporters carry up to 300 litres of milk per day at KES1–2 per litre, requiring two trips if a motorbike is used. The MCCs in Bungoma and Nandi relied on such means for milk collection and transportation to chilling centres. The MCCs contract and assign transporters to a route, are trained in milk handling and are provided with a lactometer to test the milk before aggregating into larger containers. In Kiambu, the MCC runs the milk collection directly using MCC-owned trucks. Financial analysis and interviews with transporters in the two sites indicated that these are low-growth enterprises as they offer limited employment opportunities other than to the owner, and in some cases, a family member (Jacqui, 2015). They played a crucial role in Bungoma and Nandi in linking milk producers to the markets. The 22 transporters contracted by Lessos dairy PO (Nandi) were all males, while in the 34 contracted by Naitiri PO (Bungoma), only four were females, operating on donkeys and carts. Those using motorcycles reported that they supplemented the milk transport business with public transportation during the day and evenings, a business typically referred to as *bodaboda*. In the two cases (Nandi and Bungoma) recorded in detail for the study, it emerged that despite their crucial role in the value chain, they have not attracted much attention and support from dairy programmes.

Under milk trading, this study finds that although women are substantially involved, they tend to operate at a smaller scale and be less mobile than their male counterparts. This is due to limited access to capital, limited mobility and heavy domestic responsibility, because this trade occurs at the peak of domestic chores, in the mornings and evenings. Some of the challenges advanced as common features for female milk entrepreneurs interviewed include limited access to credit facilities, and to use of basic technologies (such as plastic basins and pails to store and cool milk as well as firewood to boil milk) and operat-

ing without licences and away from the shopping centres. Regarding access to credit facilities, FGDs and interviews confirmed that female milk traders relied on informal sources of credit such as friends and families, or milk supply on credit by producers as opposed to male counterparts. They also indicated during their start-up or entry in the milk trade business that they had limited preparation in terms of planning, knowledge and skills, and were more encouraged by the ease of integrating the business operations within demanding domestic chores and the prospect of making an income. Given their limited mobility, female milk traders are also less likely than their male counterparts to attend training aimed at upgrading their technical and business skills required for the milk trading business. A case study presented in section 3.2.5, Box 2, illustrates this situation. Even under male-owned milk trading businesses, especially those operating as licenced enterprises in approved premises, the families manage the businesses and women play a role, often as managers. In Kiambu County, an emerging group of highly enterprising female milk traders has been gaining strength. Taking advantage of their proximity to Nairobi city and suburbs, they aggregate milk and distribute to their retailing business partners across the suburbs of the city, relying on the relatively well-developed public transport (*matatu*) means within the city. However, they use plastic containers that are unauthorized by the KDB and are therefore constantly attempting to evade KDB field enforcement officers. The business requires them to wake up very early, at 3 a.m., to collect milk from their suppliers (milk producers and traders) and often board more than one *matatu* to deliver the milk to the markets. In Bungoma and Nandi, there are limited cases of women owning a transportation means (motorbike) who hire labour to run the transportation business; one interviewee indicated that it was challenging to manage the young men hired for the business, because she had to fire three in one year for suspected cheating. She indicated, however, that the venture was profitable because she could fully repay the loan taken for the motorbike and retain some income at the end of the month.

Female and male participation at the MCC level

The three MCCs surveyed in detail during this assessment are dairy producer organizations. In Nandi and Bungoma, private milk transporters deliver milk to the MCCs and chilling centres, mostly contracted by the POs, and based on the

milk collection routes mapped. Most transporters are male youth due to the physical strength required by the job, especially during rainy seasons. In all the sites, the assessment found that any member of the household or hired worker could deliver the milk to the nearest bulking centre where transporters operated the mini collections. As noted, women dominate the membership in the dairy POs sampled in this assessment and receive milk payments on a monthly basis. Furthermore, in all three sites, advance payments for the sale of milk are possible through linkages to Savings and Credit Cooperatives (SACCOs).

Participation of women at the management and leadership levels at the MCC is limited. In Nandi, Lessos DFC has only one woman on the board of nine members after another woman resigned soon after election, citing pressure on time. In Bungoma, Naitiri Dairy Farmers' Cooperative (NADAFa) has three women on the board of nine members, while one woman sits in the supervisory committee of three members. In Kiambaa Dairy Farmers' Cooperative, one woman sits and chairs the Bboard of nine.

Men dominate employment opportunities across all the POs and all the MCC managers are men. At NADAFa, women make up 23 out of 55 staff members (42 percent), most of whom are milk record clerks (19 out of 39 clerks) and others include one female extension worker out of four, an agrovet stores clerk, a cashier and an accountant. In Lessos Farmers' Dairy Cooperative, female employees are six of the 22 members comprising two agrovet stores clerks, two milk clerks, one extension worker, and one manager for a small satellite cooler. In the two POs, the East Africa Dairy Development (EADD) programme influenced the recruitment of the two female extension workers through grants aimed at strengthening the POs' capacity to coordinate training and extension services. The reasons for the gender disparities in employment opportunities include the nature of MCC's work (loading and offloading milk containers) and the requirements and conditions for fieldwork. Females tend to serve in milk quality checks and recording, agrovet stores and SACCO activities established by the MCCs.

In their immediate plans, two MCCs had proposals to engage in increased value addition through artisanal processing – making yoghurt and sour milk, referred as *mala* – and gradually to modern, small-scale milk processing facilities. This could be one strategy for ensuring that the producers of milk, the majority of whom are

women, can improve their position in the dairy value chain by capturing more value for their produce. The new milk pasteurization and dispenser technology (popularly milk ATMs) is another viable option for providing increased value of milk to producers.

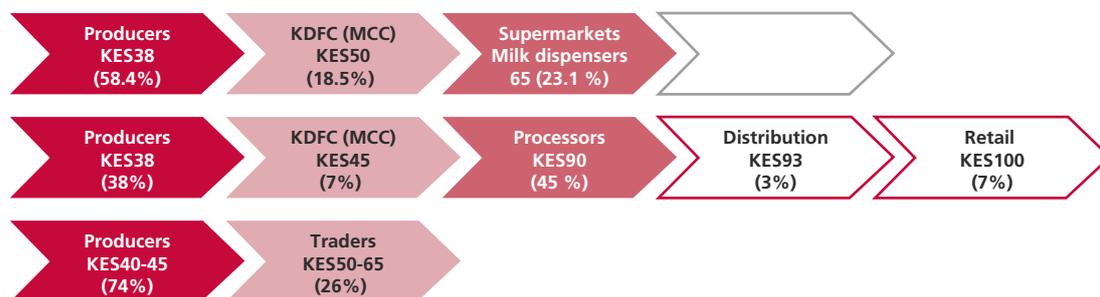
Female and male participation at the processors node

Most milk processors in Kenya are unlikely to have specific gender equality policies. According to an assessment by Pannell Keer Forster (PKF, 2013), only one of three processors had a gender policy. It also found that the gender ratio among employees was 78 percent males to 22 percent females in the three sampled processors. The high male ratio in employment was explained by the fact that most jobs required heavy physical work, while others were field-based and required work at odd hours, as early as 3 a.m. Since these conditions are unfavourable to women, they tend to compete for institutionally based jobs such as laboratory services (PKF, 2013). The assessment also found that 87 percent of employees hired by milk processors had a certificate, 5 percent had a diploma, 7 percent had a degree, and 1 percent had a Master's degree. Of the four large milk processors interviewed during this assessment, only one, a farmer-owned processor, had a documented gender policy due to support from a development programme. They all indicated that their milk procurement departments were aware of the business case of targeting women as a strategy for securing their milk supply bases. However, there were minimal concrete plans to this end.

3.2.2 Profit and value addition

In the three sites, the value chain map revealed that the unpasteurized (informal) milk marketing system dominated, i.e. an estimated 70 percent of total milk marketed, while the pasteurized (formal) system controlled 30 percent. This mirrors the national situation as depicted in much of the available literature. It is estimated that 35 percent of milk produced is consumed at home, and only 65 percent is regarded as the surplus marketed (KNDMP, 2010). FGDs and interviews with milk producing households indicated that most households across all sites retained at least one-third of the milk for household use, including feeding calves. In Kiambu, the new milk dispenser technology seems to have altered the volume of milk flowing through the informal chain. Kiambaa DFCS, which handles an estimated 50 percent of

FIGURE 8
Share of revenue per litre of fresh milk along the value chain – Kiambu



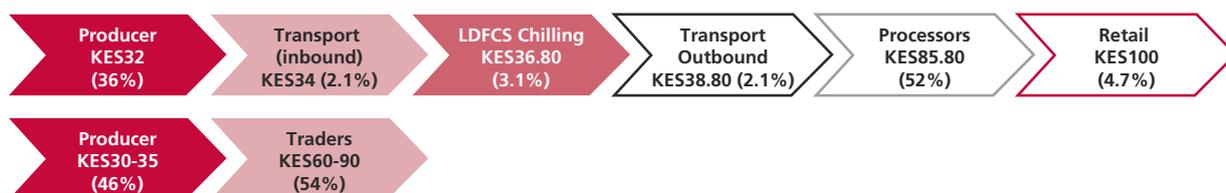
Source: Analysis of data from the present assessment.

milk marketed in the sub-county (i.e. an aggregate of 18 000 litres per day in September 2015) has shifted a significant amount of its milk to the pasteurized milk dispenser technology in partnerships with major supermarkets in Nairobi city. Under this dispenser milk marketing model, milk producers, the majority of whom are women, retain a higher share of revenue per litre of milk than under any other marketing channel in the Kiambaa DFC (Figure 6). This channel commands 30 percent of total milk handled. This implies that in Kiambaa, prior to the new technology,

the informal channel was commanding more than 70 percent.

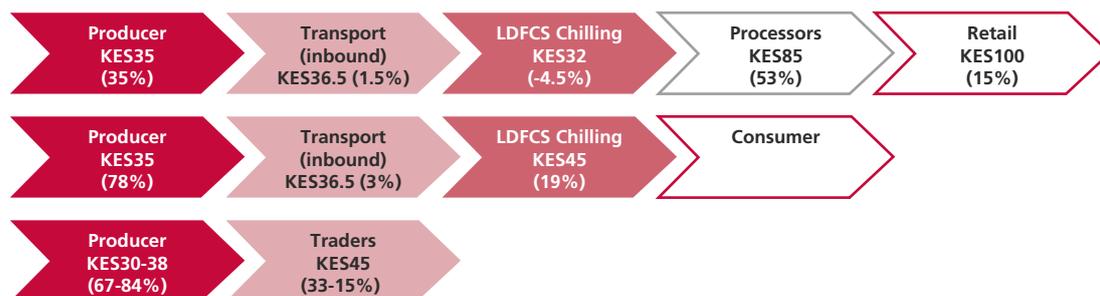
Figures 8, 9 and 10 show the share of revenue along three different value chains based on data from Kiambu, Nandi and Bungoma. In Kiambu (Kiambaa), the formal chain under the new milk dispenser technology, the producer takes the largest share of revenue (58.4 percent) followed by the supermarkets (23.1 percent), while the MCC (Kiambaa Dairy Cooperative) takes the least share (18.5 percent). Under the formal processor-oriented channel, the processors take the largest

FIGURE 9
Share of revenue per litre of fresh milk along the value chain – Nandi



Source: Analysis of data from the present assessment.

FIGURE 10
Share of revenue per litre of fresh milk along the value chain – Bungoma



Source: Analysis of data from the present assessment.

share of revenue (45 percent), followed by the producer (38 percent), the MCC and retailers (both 7 percent), and finally the distributor (3 percent). Under the much shorter informal chain, the producer takes the largest share of revenue (74 percent), while the traders take 26 percent.

In Nandi, the formal chain (processor-oriented) shows a similar pattern, where the processors take the largest share (52 percent), followed by the producer (36 percent), the MCC (Lessos Dairy Cooperative, which combines both chilling and outbound transportation services) (5.2 percent), the retailer (4.7 percent) and finally, the farm-level transporter (inbound) (2.1 percent). Under the informal chain traders take the largest revenue, 54 percent, and the producer takes 46 percent.

In Bungoma, the MCC (NADAFSA) has diversified market outlets in order to attract dairy farmers. MCC operates at a loss for milk channelled through the formal processor outlet. In September 2015, this outlet was offering KES32 per litre of raw milk while NADAFSA had committed to paying farmers KES35. The retailing outlets run by the MCC offset the losses incurred under the processor chain. Under the processor-oriented channel, processors realize the biggest share of revenue (53 percent), followed by farmers (35 percent); under the MCC direct-to-consumers channel, farmers realize the biggest share of revenue (78 percent), followed by the MCC (19 percent).

Comparing the two counties, producers and MCC in Kiambu take a larger share of revenue than those in Nandi under all scenarios. Since MCCs support producers, most of whom are women, in accessing dairy production inputs and services as well as gainful milk markets, strategies to improve the share of revenue at these two links would be instrumental in improving women's position in the dairy value chains. The milk dispenser-supermarket channel in particular appears to be a promising link, as shown by the Kiambu scenario. For Nandi, the MCC under the current scenarios will require bulking and chilling higher volumes of milk in order to generate adequate revenue to meet operational costs and invest in support services for members' benefits.

Kiambu County seems to offer the highest producer-level prices, KES38 per litre to the dairy cooperative and KES40–45 per litre to traders. In Nandi and Bungoma, producer-level prices average KES30–45. The MCCs must pursue multiple market outlets in order to be able to offer attractive prices to milk producers, most of whom are women. They bulk, chill and market to processors

and traders and retail to individuals and institutional consumers.

The flow of value in the formal processing chain seems to align with an earlier analysis by TechnoServe (Ogana, 2006). According to this analysis, processing and packaging takes the largest share of revenue (55 percent), followed by primary production of milk (26 percent), retailing (8 percent) and chilling (3 percent). Overall, transportation takes 8 percent: from the farm to bulking/chilling (3 percent) and from bulking to processing (2 percent) and distribution (3 percent).

Profitability at the production level

At the farm level, profit margins differ by type of production system, dairy cow breed and the market outlet adopted. However, the main variable determining profit efficiency is the cost of feed and labour. Feed is estimated to take up to 60 percent of total production costs. Efforts to obtain enterprise budgets in the present assessment were unsuccessful; although farmers could report yields and milk prices accurately so that it was possible to estimate revenue, they were vague about costs. However, the productivity of smallholder milk production in Kenya has been much studied by others and therefore the results of recent reports are used here to discuss profitability.

Income from milk production is shown in Table 4. The respondents indicated that dairying was the most significant source of income for the interviewed households in all of the three sites.

Whereas gross margin per litre is reported to be relatively higher for extensive than intensive production systems (PPD Consultants, 2013; EADD, 2012), gross margin per dairy cow is likely to be lower under extensive production systems compared to intensive systems. This is because although feed costs are lower for extensive systems and milk prices may be higher, milk yields tend to be significantly lower per cow. Farmers selling through bulking or chilling centres run by POs tend to receive lower prices than those selling directly to traders or consumers (EADD, 2015; PPD Consultants, 2013). EADD's cost of milk production surveys found that the sale of cattle contributes significantly to the profitability of dairy enterprises in Kenya (EADD, 2012). Farmgate milk pricing is complex because of multiple market outlets. With 85 percent of processed milk handled by the top three large processors, farmers who use the formal market outlet are largely price takers (KNDMP, 2010). A study by Mburu *et al.* (2007) in the Kenyan

TABLE 4
Income received from milk sales (KES)

County	Gender of head of household (HH)	HH size (under 18 years)	No. of improved cows	Litres/day (HH)	Marketed litres/day @ KES	Revenue per month	Dairy as a percentage of HH income
Nandi	Single, young female	3 (2)	2	20	15 @ 45	20 250	>90
	Male	5 (3)	3	26	23 @ 33	22 770	90
Kiambu	Male	4	8	95	90 @ 38	102 600	>90
	Female	4	3	35	33 @38	37 620	>75
Bungoma	Male (youth)	2 (3)	4	36	30 @ 30	27 000	> 80
	Female (widow)	16 (7)	2	14	10 @ 30	9 000	> 50

Note: The exchange rate at the time of analysis was US\$1= KES102. Therefore, monthly revenue per household was KES88 (US\$1,005).

Source: Survey interviews.

highlands in 2005 concluded that dairy enterprises were the most important income-generating farming activity in 96 percent of households surveyed in Kiambu. It noted that although some farms register negative gross margins, on average, dairy enterprises returned profits.

A recent analysis by Kenya Agricultural Value Chain Enterprises project (USAID)-KAVES (2014) shows that dairy farming is profitable in Kenya with gross margins per litre from KES19 in Uasin Gishu (similar conditions to Nandi) and KES22 in Bungoma (Table 5). This analysis was based on milk production alone and did not include the sale of calves. Producer gross margins extracted from the KAVES baseline (USAID-KAVES, 2014) indicate that while feeds and labour are major cost items in dairy production, the related animal health services when aggregated make a significant cost item. In Bungoma, the average costs for acaricides, deworming, vaccination and other health services amounted to 27 percent of total costs, while feed amounted to 15 percent, and labour, 49 percent. Given that Bungoma is mainly a semi-intensive to extensive system, a high proportion of the labour costs relate to grazing.

The KAVES study estimated gross margins per animal as well as per litre, and therefore it is possible to extrapolate from their findings to the present study in Bungoma, which was covered by both studies. The present assessment found that herd sizes in Bungoma were two to four animals. Extrapolating from the KAVES estimates per animal would indicate an annual herd revenue of KES96 624 to KES193 248 and herd gross margins of KES66 108 to KES132 216.

Milk production per cow was the lowest in Bungoma, where an improved cow yields

7–10 litres per day and milk prices ranged from KES30 to KES45 per litre, followed by Nandi, where an improved cow was on average producing 10 litres and milk prices ranged from KES30 to KES35. Kiambu reported the highest yields of 10–25 litres per cow among the small-scale commercial producers and also the highest prices of KES38 to KES45, although the intensive means of production implies high costs of milk production. At the producer level, options for improving profitability include intensifying milk production per cow and per household, reducing production costs, accessing the most gainful market outlets, and/or vertically integrating the dairy enterprise through value addition. Women dairy producers face more severe challenges than men in adopting these profitability-enhancing practices. They are marginalized from ownership of land and cattle, the management of dairy cattle and from intra-household decision-making on milk and products, as well as from access to productivity-enhancing inputs, technologies and extension services. Access to credit facilities is another factor advanced that has an influence on the household's ability to invest in dairy production. Hence, women dairy producers require specific forms of support to enter into and benefit from dairy production (Omondi *et al.*, 2014). Another recent study on gender concerns in dairy groups in Kenya (Nyongesa *et al.*, 2016) recommends that in order to improve women's participation in dairy POs, dairy development programmes should invest adequately in understanding the gender dynamics in groups. It also recommends improvements in the delivery of gender-sensitive dairy extension services that incorporate advisory services on value addition, marketing and group dynamics.

TABLE 5
Producer gross margins per cow for selected counties as part of the KAVES baseline survey

County	Uasin Gishu		Meru		Makueni		Bungoma	
Yield (litres/cow/day)	6.0		5.4		5.0		4.8	
Annual yield (l/c)	1 860		1 647		1 424		1 464	
Cost breakdown	KES	% share						
Acaricides	2 394	9	1 253	8	600	5	419	3
Health services	1 888	7	2 408	15	1 512	14	2 650	17
De-worming	1 083	4	382	2	749	7	477	3
Labour	4 840	19	6 000	38	3 000	27	7 500	49
Grown fodder	7 408	28	3 533	22			833	5
Purchased fodder					3 029	27	1 496	10
Insemination	3 560	14	1 120	7	1 100	10	1 337	9
Vaccination	886	3	1 239	8	1 092	10	547	4
Other	4 000	15						
TOTAL COST	26 058		15 936		11 082		15 258	
Cost per litre	14		10		8		10	
Price per litre (1)	33		34		34		32	
Total revenue	61 397		60 939		59 823		48 312	
Gross margin/cow	35 339		45 003		48 741		33 054	
GM/litre	19		24		26		22	
GM/cow in US\$ (2)	346		441		477		324	
GM/litre in US\$ (2)	0.19		0.24		0.25		0.22	

Notes: (1) Analysis in this table only refers to farmers who deliver milk to bulking and cooling plants. The average producer prices were much higher when direct sales to consumers and traders were included. (2) Using the current exchange rate of 1:102.

Source: USAID-KAVES, 2014.

Informal milk traders

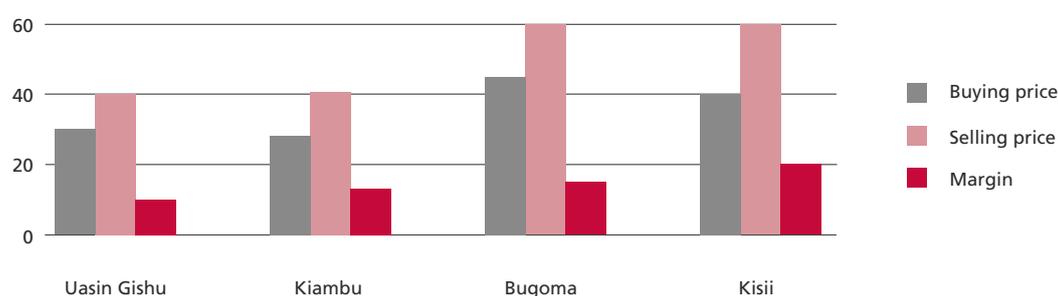
The increased competition for milk marketing functions heralded by liberalization of the dairy sector has led to an increase in employment and business opportunities in small-scale milk enterprises in the informal sector in Kenya (Kiptarus, 2005). An older study (Omoro *et al.*, 1999) found that milk vendors (SSMTs) had increased, the majority handling 50–100 litres per day and the larger ones about 500 litres per day. This business activity enabled them to earn a daily income equal to approximately twice the national average, which was a significant contribution to poverty reduction. A more recent analysis than that of Omoro (USAID-KAVES, 2014) suggests that milk trading continues to be a profitable enterprise. A trader operating on a margin of KES10 per litre, as in Kiambu or Bungoma, and handling 50–100 litres per day could make a profit on sales of KES500–1 000 per day, or KES15 000–30 000 per month, against which

to offset transport costs. This assessment reached similar conclusions, i.e. that milk traders realize a significant share of revenue per litre of milk, considering that their major costs are the costs of milk they procure and transport costs.

An interview with a male trader in Nandi who owned a milk bar provided the following enterprise budget based on approximate estimates of monthly earnings and costs (Table 6). The milk bar has been in operation for only six months but is strategically positioned at the bus stop where commuters buy milk to drink or take home. Although the household owns three dairy cows, the milk trading venture has become their largest source of income.

A female trader interviewed, also in Nandi, has been in business for three years and recently convinced her husband to upgrade her business by investing in new milk dispenser technology in Kapsabet town. She traded 450 litres of milk a day, sourced from her own farm and from 50 farmers

FIGURE 11
Milk traders' margin analysis (KES/litre)



Source: USAID-KAVES, 2014.

from their village. Based on the figures she provided, her enterprise profit in August 2015 was KES356 750 (US\$3 497).

Another female trader operating in Ndal, an upcoming shopping centre in Bungoma, was also interviewed for this assessment (see Table 7 and Box 2). Her business illustrates the small-scale business operations run by capital- and mobility-constrained women. She was trading an average of 20 litres per day in August 2015, buying at KES45 per litre and selling at KES60 per litre, enabling her to make a modest KES9 000 per month in addition to being able to have milk for household consumption.

However, despite the role that the informal milk sector has played in employment creation and poverty reduction, especially considering that it has proven to be a pro-women enterprise (Wanga *et al.*, 2009), the Kenyan Government has been reluctant to legalize it. Omore *et al.* (2004) note that the Government's longstanding, unfavourable policy against informal milk markets due to poor milk handling and health risks is not backed by empirical evidence on milk-borne health risks. Referring to preliminary findings on milk quality and handling by informal milk agents and consumers in central Kenya, Omore *et al.* (2004) opine that there is very low apparent prevalence of zoonotic health hazards in milk from smallholder herds. Wanga *et al.* (2009), in a study of 108 women-owned milk micro-enterprises in Nakuru, Kiambu and Nairobi conclude that the dairy sector offers women many opportunities to operate micro-enterprises and generate cash on a regular basis. The study further finds that women are constrained by poor access to credit facilities and to improved value-addition technologies, as well as the inability to meet required licences fees and recommended operational conditions.

Policy interventions are needed to make improved valued-addition technologies more accessible and affordable to women, as well as efforts to strengthen business extension services that successfully target women entrepreneurs, as discussed in sections 4 and 5. Another recent policy brief advocates for a light-handed approach to government policies on the informal milk marketing system. It calls for an approach that recognizes that the system is a crucial pathway to the long-term vision of formalizing the dairy value chain (Blackmore *et al.*, 2015).

As previously discussed, this assessment found that trading has been largely a male-dominated business, although females are increasingly becoming involved. They are constrained by mobility and domestic responsibility since this trade entails positioning the milk supply in strategic market places and is transacted very early in the morning or evenings when demand for domestic chores is at the peak. The women involved tend to operate at a smaller scale and with less mobility than their male counterparts.

MCC and other chilling enterprises

These enterprises are engaged in aggregating milk from fragmented producers and traders; some sell the bulked milk to larger processors or buyers, or engage in limited processing and manufacture of fermented milk. The profitability of these enterprises depends on the volume of milk, the prices offered by buyers and to farmers, operational costs and the number of in-house BDS services offered (EADD 2013; PPD Consultants, 2013). In addition to operational costs, the capital structure, especially the debt-to-equity ratio, is a major determinant of financial health, combined with management practices and the business model pursued.

TABLE 6
Enterprise budget from a licensed male informal milk trader – Nandi

Revenue per month		(KES)
Milk sales	3 600 litres @ KES100 per litre	360 000
VARIABLE COSTS PER MONTH		
Milk purchase	3 600 litres @ KES33 per litre	118 800
Fuel		15 000
TOTAL		133 800
FIXED COSTS PER MONTH		
Depreciation on compressed container	150 000 over 60 months	2 500
Depreciation on motorcycle purchase	100 000 over 60 months	1 667
Depreciation on purchase of other equipment	50 000 over 60 months	833
Milk bar attendant wages		4 000
TOTAL		9 000
Gross margin (GM) per month		226 200
Enterprise profit per month		217 200
Annual enterprise profit (KES)		2 606 400
Annual enterprise profit (US\$)		25 553

Note: Since the enterprise has been operating for only six months, annual estimates are extrapolations, assuming steady year-round trade.
Source: The present study.

TABLE 7
Enterprise budget for unlicensed informal female milk trader – Bungoma

Revenue per month (KES)		(KES)
Milk sales	600 litres @ KES60 per litre	36 000
VARIABLE COSTS PER MONTH		
Milk purchase	600 litres @ KES45 per litre	27 000
Fuel		0
TOTAL		27 000
Fixed costs per month		0
TOTAL		0
Gross margin per month		9 000
Enterprise profit per month		9 000
Annual enterprise profit (KES)		108 000
Annual enterprise profit (US\$)		1 059

Source: The present study.

All of the five dairy POs interviewed for this assessment procured the bulk of their milk supply (over 80 percent) from their membership of small-scale farmers (mostly women) and supplemented from traders where feasible. To succeed, they also need to organize and coordinate smaller milk collection centres and routes, and often contract

private milk transporters. An evenly thinned milk collection and transportation routing is key to reaching female dairy producers, especially in difficult terrains with poor infrastructure.

Gross margin analysis from two selected MCCs in this assessment confirms another recent study (USAID-KAVES, 2014) that shows that MCCs

and chilling enterprises can be profitable (Table 8). However, profitability depends on a reliable milk supply. Out of the five MCCs interviewed in this assessment, four reported to have made a positive profit in the last financial year, while one did not, owing to debt obligations it is servicing after an ambitious business expansion programme and a decline in milk supply as a result of competition from emerging dairy POs within or close to its catchment area. According to EADD's progress report (EADD 2015), only five out of the 11 (45 percent) dairy POs participating in the programme posted a positive profit in the first half of 2015.

Decisions on the use of milk income

Overall, both male and female FGDs confirmed that women indeed managed income from milk sales. Across the three communities, it was confirmed that the income from milk is relied on to meet a diverse range of financial needs in addition to domestic provisioning. These include school fees, healthcare, loan repayments, contributions to community welfare activities, participation in mer-

ry-go-rounds (informal savings and credit groups) as well as household consumables and assets. Because of the unique ability of dairy production to ensure a regular flow of milk revenue, female respondents indicated that income from milk sales was highly relied on to meet pressing household financial obligations. They further indicated that even when they access to this income, they do not have much leeway in deciding how to spend it. The female FGD in Bungoma summarized the situation: “[Often men don’t even understand how we manage to do so much with so little.” All FGDs confirmed that it was very common for the spouses to regularly discuss the financial priorities to be met by milk income as well as to have some medium-term obligations, such as deductions to repay a loan or contribute to a household kitty. Household interviews did not yield different or deeper insights on these matter. There were common responses such as “we discuss and decide jointly” or “it depends” dominated responses, because participants were reluctant to divulge personal experiences. As discussed in this report, intricate intra-household gender relations data

TABLE 8
Summary gross margin for two selected MCCs – annual performance 2015

Item	MCC 1	MCC 2
ANNUAL REVENUE (2015)		
Milk handled (annual 2015) kg	336 671	2 401 516
Selling price (average) KES	32.44	36.38
Milk sales (KES)	10 921 607	87 367 152
Less Kenya Dairy Board (KDB) cess	65 160.22	446 544.02
Other income (agrovets stores)	4 458 505	1 524 993
Gross revenue	15 314 952.02	88 445 601.06
VARIABLE COSTS		
Milk purchase (buying prices)	30.2	32.56
Payments to farmers	10 167 464.20	78 193 360.96
Carriage inward and outward	0	20 308.08
TOTAL VARIABLE COSTS	10 167 464.20	78 213 669.04
Gross margin per year	5 147 487.82	10 231 932.02
Less: total fixed costs	4 988 482.60	4 840 651.33
Net profit before interest and tax	159 005.22	5 391 280.69
Loan interest	427 650.00	380 897.20
Net profit after interest	-268 644.78	5 010 383.49
Net profit US\$	-2 634	49 121

Source: Present study.

were difficult to generate through the methods applied in this assessment.

In a recent qualitative survey on 300 dairy farming households in Kenya, Omondi *et al.* (2014) reports that female-headed households had a higher probability of intensively participating in dairy PO-run MCCs where they had full control of milk income. The study, however, reports the opposite for females in jointly headed households. The survey concludes that understanding the ‘gender puzzle’ of intra-household distribution of dairy income is critical in identifying interventions that can help women enter and benefit from livestock markets.

3.2.3 Other benefits

Milk as a source of food was the first benefit mentioned in female FGDs and interviews with women, whether dairy producers or milk traders. Another benefit highlighted was the opportunity it gave women to belong to community groups and enhance their social capital. The MCCs and dairy groups provide newer spaces where community members can unconsciously overcome certain cultural norms, where women can learn new ideas together, gain confidence and develop leadership skills. A common theme in female FGDs is that the opportunity to manage income from milk has given them a chance to demonstrate and enhance their management capacities for the betterment of the households. This undertaking has earned them respect and recognition at the household and community levels. In most cases, the women from milk producing households appreciated being responsible for evening milk, noting that they reserved some for household consumption (on average 1–3 litres), made traditional products (e.g. sour milk in Nandi) and sold the rest through traders and/or direct consumers where available. Manure for the kitchen garden (mainly for vegetable growing) was another benefit highlighted by women FGDs.

Males mostly noted other benefits, including the importance of dairy cattle for traditional ceremonies such as paying dowry, strengthening kinship ties by using milk for blessings and cleansing ceremonies, or offering cattle as gifts or fines for reconciliation and forgiveness. However, in Kiambu, the practice of offering dairy cattle as a means of settling dowries was reported to be waning. The FGDs noted that due to diminishing land sizes and the intensive production system, a household needs to make proper plans before acquiring a dairy cow, hence the shift towards

monetizing dowries. Male FGDs recognized or emphasized slightly different benefits such as an easy way of accumulating cattle as assets that are easy to liquidate and of periodically accessing lump sum income. Only in Nandi was owning cattle important for social acceptance within the community and that male heads of rural-based households who did not own cattle were despised. It was not uncommon for them to be leased some cows to manage on behalf of the owner, benefiting from the milk and other by-products such as manure but not the offspring.

In a thesis by Heyland (2014), the empowerment diamond tool on gender equity was used by EADD programme participants, and showed progress in women’s ability to apply leadership skills and become more confident, as well as an increase in female membership in POs, training, employment in diverse positions in the dairy value chain, and in their better knowledge and market information. These findings align with analysis from this assessment (see Table 9). This assessment finds that females engage at different links and activities in the dairy value chains. Although their participation is lower than that of males (except under the production node), women dominated membership in the POs; are represented in the MCC board; participated in training; acted as milk traders and employees in agrovets stores and MCCs; and a few owned dairy input and services enterprises. Notable agency outcomes reported include: exposure to leadership; improved access to financial services (payments accounts, savings and credit); and access to value chain services. Other outcomes were increased recognition of women as dairy managers, who are increasingly allowed to join dairy POs, participate in dairy meetings and training. It should be noted, however, that the findings from this study suggest that women still have a very limited role in the management of POs, a first step for women’s empowerment, as reported by Heyland (2014).

3.2.4 Inputs and services

The EADD baseline survey (2015) identified a range of dairy services offered by the dairy hubs/MCCs regarded as important by the farming households. Respondents identified milk marketing (37 percent), agrovet/feed (22.1 percent), animal health (18.9 percent), artificial insemination (AI) (8 percent) and monetary advances (4.7 percent) as the most important services. Other services were extension and training, the check-off payment system, milk transportation, and savings and credit

TABLE 9
Value chain empowerment diamond from this study

Value chain activities	Agency
<ul style="list-style-type: none"> ▪ Women are extensively and predominantly involved at the production link. ▪ Women dominate membership in the producer organizations (POs) and participate in activities such as training. ▪ Albeit few, women are MCC board members; one chairs the board in Kiambaa DFC. ▪ Although few women are engaged in the farm-MCC milk transportation business, there are signs that the number is increasing. ▪ Women are equally involved in the milk traders link (at each value chain map, 50 percent of milk traders were women although operating at a smaller scale). ▪ Women are engaged in employment opportunities at the MCCs and support services business (agrovet, SACCOS). ▪ Albeit few, women are investing in support services businesses. 	<ul style="list-style-type: none"> ▪ Women are developing leadership skills by participating in both informal (savings and credit) groups and formal POs). ▪ Sustained opportunities for training and innovative community learning programmes (EADD Social Capital Mobilization Model, TechnoServe's audio-visual mobile training unit) are scaling up women's confidence at both household and community-level spaces. ▪ There is an increased ability to access dairy services, especially through the check-off payment, contacts created through training fora, and knowledge acquired. ▪ There is improved access to financial services (mobile money, payment accounts at SACCOS, savings, eligibility for credit, and even financial literacy).
Value chain governance	Structure
<ul style="list-style-type: none"> ▪ By participating in dairy POs, women gain better access to crucial information and knowledge on the dairy enterprise. ▪ Women are enhancing their social capital and facilitating access to dairying services (by sustaining governance mechanisms such as shared norms, democratic decision-making, compliance to rules and standards, and cooperating in strategic alliances brokered through their POs). 	<ul style="list-style-type: none"> ▪ The communities are increasingly approving women's joining dairy POs, own cows, and also to participate in other value chain activities (transport, support services). ▪ Women's demonstrated good management of milk incomes is earning them recognition and respect from family members.

Source: Analysis from this assessment.

schemes. Milk marketing was the most widely used service (23 percent) among the respondents. Reasons advanced for not using services offered by MCCs included higher milk prices offered elsewhere, services located far from the household, and poor quality of services to unfavourable terms. In all cases, the heads of the households made the decisions on whether or not to use the services. Male-headed households constituted 69 percent of the households in the sample.

During this assessment, a similar range of services was identified in the respective value chain maps. They were classified into two types: value chain support services and enabling services. Value chain support services are offered by profit-making value chain players such as feed suppliers, drug shops, veterinarians and paravets, AI service providers and financial services. Enabling services were regarded as largely capacity-building services offered by non-profit making players such as government and donor funded programmes.

In Nandi, although dairy production in the community is more extensive and relatively less input-intensive, several investments in support services can be noted. It was estimated that about 15 integrated agrovet stores were in operation within the Nandi East sub-county: however, only one was identified as owned by a woman; three were owned by two POs; and the rest by men.

They offered a wide range of services – feeds, AI, animal health and advisory services. In terms of employment, most agrovet store owners indicated that they preferred females as sales assistants, citing advantages such as customer care relations, honesty and higher retention. Respondents were, however, afraid that the new regulation by KVB that requires that such stores be managed by a staff member who is qualified and licensed in paraveterinary or veterinary sciences would pose a threat to the preference for employing females. A report by the county livestock department profiling active AI service providers in the county indicated that only three out of 35 practitioners were females. The reasons advanced were entrenched stereotypes, access to capital, the nature of field-work conditions and requirements.

In Bungoma North sub-county, support services are less developed than in Nandi. In terms of animal health services, there is no diagnostic laboratory within the county; the nearest is in Eldoret over 100 km away. The bulk of animal health services are provided by paravets, about 25 (three females) private and five (one female) government paravets were operating within the sub-county. There were two private and one government veterinarians (all males). Most private paravets also run agrovet shops. There are an estimated 27 poorly stocked agrovet stores within the major towns in

the sub-county, three of which were owned by women. There were efforts to establish two feed mills, but under highly subsidized conditions by the Constituency Development Fund (CDF) and the International Fund for Agricultural Development's (IFAD) Smallholder Dairy Competitiveness Project (SDCP). A few farmers (all males) were reported to be taking up feed processing business opportunities by investing in pulverizers and silage-making skills for hire by fellow farmers. Naitiri Dairy Cooperative has recently opened an integrated agrovet store where members, 52 percent women, can access drugs, minerals, concentrates, AI and dairy equipment (such milking and milk cans) on credit or cash terms.

The Kiambu site (Kiambaa) has well-developed support services, including a private diagnostic laboratory run by Norbrook, an animal health products manufacturer and supplier. The Kiambaa Dairy Cooperative has an integrated agrovet store where farmers, most of whom are women (60 percent), can access drugs, clinical advice, AI, minerals and concentrates on a credit or cash basis. In addition, there were an estimated 34 private agrovet stores, four of which were owned by women, largely run as family businesses, and female sales assistants were reportedly preferred to males for employment as attendants. Animal health services are predominantly offered by paravets. An estimated 24 private paravets (all males) were active in the sub-county, and three veterinarians; one female on a private basis and one of the males is the government veterinarian. Out of the 16 active AI service providers, only one is female.

Nandi and Bungoma had more experiences with value chain enablers than Kiambu. Kiambu is considered a classical case study on dairy commercialization, which is private sector-driven. However, the Kiambaa Dairy Cooperative is a major player, doubling up as value chain actor and as an enabler. The cooperative has established a strong dairy extension department currently managed by a registered veterinarian. The Department collaborates with the sub-county livestock production office to run regular farmer extension and training programmes. Although no deliberate strategies to target women dairy farmers for these services are in place, the Department believes that since the majority of their members are female, it automatically targets them. However, this might not be the case since targeting women as clients for extension services requires deliberate efforts to understand their unique conditions and needs. Two Dutch donor agencies, Netherlands Devel-

opment Organization (SNV) and Agriterria, are currently partnering with the cooperative: the former is supporting the implementation of a feed strategy and gender mainstreaming, while the latter is supporting a strategy for the cooperative to gradually invest fully in vertical integration by processing own milk products. The national government's ASDSP programme, which espouses social inclusion in value chain development, is also implemented in the county, with dairy as one of the three priority enterprises.

In Bungoma, dairy development programmes supporting the commercialization of dairy include EADD, KAVES, ASDSP, the Government of Kenya and World Bank's Western Kenya Disaster Mitigation Programme, and SDCP implemented by IFAD and the Government of Kenya. Naitiri Dairy Cooperative has also established an in-house dairy extension department with a graduated grant from EADD, as well as KDFE. In Nandi, programmes include KAVES, EADD, ASDSP, and POs such as Lessos Dairy Cooperative, Leleben Dairy Farmers Company and the Kenya National Federation of Farmers (KENAFF).

Although women are not usually directly denied access to dairy inputs and services, it is well established that they have less access to public and private livestock services than men (World Bank, 2009). Female-specific deficits and institutionally related challenges have been advanced to explain this gap. Women's day-long workload precludes them from engaging in or seeking dairy advisory services while higher illiteracy levels limit the value of written information and communication materials (Miller, 2011). On the institutional front, public and private livestock services providers have exhibited inadequate institutional will and capacity to target women as clients for agricultural advisory services. This assessment confirms that the dairy inputs and services provision sector is male-dominated in Kenya. Yet, some studies have found that female farmers prefer working with female extension agents (Kristjanson *et al.*, 2010). Service providers are technically oriented and have limited skills in how to target and work with female farmers as clients for their services. As Stewart observes (Stewart, 1998, cited in Miller, 2011), the choice of language, time, location and duration effectively prohibit women from participation. Dairy cooperatives and self-help groups are important actors in coordinating farmers' access to livestock information and inputs; women's participation in these groups is thus a viable strategy of enhancing access to inputs and services.

3.2.5 Constraints

The commonly cited constraints by dairy producers in Kenya to sustained production include: inadequate rains for fodder production; competition for land between livestock and crops, especially in the Rift Valley; volatile producer prices; access to credit facilities; demand on family labour; and delayed payments to farmers attributed to delays by processors, who in turn blame delayed payments by supermarkets. Supermarkets have been proliferating, keeping pace with urbanization and taking a big market share in retailing of pasteurized milk and dairy products (SNV, 2013; Gichohi, 2014). This section reviews constraints reported by dairy producers, service providers and informal milk traders, and highlights gender-based constraints.⁵

Impacts on workload

Market-oriented dairy production is labour-intensive, largely because most of the required activities are performed on a daily basis. Generally, family members – men, women and children – contribute labour for the success of the enterprise. However, there are workload disparities depending on several factors, including ethnicity, traditional gendered division of labour, production system, and household socio-economic characteristics (Njuki *et al.*, 2011; Njarui *et al.*, 2012). Studies further observe that women predominate in activities that are performed on a daily basis such as milking, feeding and watering, while men are mainly involved in tasks performed weekly or seasonally such as spraying or planting forage (Njarui *et al.*, 2012).

Another pattern is that women tend to be responsible for livestock activities located or performed around the homestead (Maarse, 1995; Njuki *et al.*, 2011). As noted by Miller (2011), studies on the gendered division of labour, which have not taken into consideration these puzzling patterns, tend to underrate women's participation in livestock production and marketing. In addition, depending on, *inter alia*, the scale and production system, family labour may not be adequate to run the dairy production unit. It emerged from studies by Njarui *et al.* (2009; 2012) that hired labour contributed about 50 percent and 75 percent, respectively, of total labour required in running dairy enterprises in rural and peri-urban areas of semi-arid Kenya (Machakos and Makueni), while children contributed less than 10 percent.

According to the EADD-2 household baseline report (EADD 2015), 71 percent of women are engaged in dairy activities in the Rift Valley (Nandi, Uasin Gishu, Bomet, and Kericho). The dairying households dedicate on average 79 person hours on dairy production activities weekly, with men, women, hired labour and children providing 45 percent, 30 percent, 20 percent and 5 percent of the hours, respectively. In addition, men generally spend more hours on herding and watering animals (EADD, 2015). To mitigate the labour burden in dairying households, the EADD phase 1 programme targeted extension messaging and follow-up on improving dairy productivity and links to on-farm milk collection and transportation (see Box 1).

The FGDs and interviews under this study confirmed the observations of other authors. Overall, intensity of labour use was identified as a key consideration in decisions to expand dairy enterprises. Findings show (Tables 14, 15 and 16) that women are more involved in daily tasks that are often performed around the homestead, such as feeding, watering and milking, while men are engaged mostly in seasonal tasks, such as deworming, spraying, planting forage, harvesting, storing and processing fodder, obtaining inputs from agrovet stores, and arranging for an animal health service provider for his cattle. An exception in Kiambu was that milking is mostly performed by men, mostly hired, who are preferred because they are faster. However, women usually have to make the necessary preparations such as warming water for milking and supervising the workers to ensure recommended practices. Involvement of school-going children in dairying activities was observed to be low across the three communities, restricted to weekends and holidays. The FGDs revealed mixed experiences in selling milk, where either a woman or man participated depending on intra-household factors, type of market outlet, proximity to milk collection and transportation arrangements.

FGDs and interviews with dairy owning households in this study revealed that farmers were more likely to hire farm workers in Kiambu, followed by Bungoma and less likely in Nandi. Also, hired labour costs more in Kiambu than Bungoma and Nandi. In Kiambu, it was estimated at KES4 000 to KES7 000, depending on size of the herd and socio-economic status of the farmer, while respondents in Bungoma and Nandi estimated it at an average of KES3 000 per month. The major challenge with hired labour was availability and reliability, especially in Kiambu, where the young

⁵ GBCs are restrictions on men's or women's access to resources or opportunities that are based on their gender roles or responsibilities (USAID, 2009).

BOX 1

Improving dairy yields while reducing herd size – a solution to labour constraints

To address the undesired outcomes of increased labour demands and disproportionate benefits on women from the introduction of milk chilling plants, the East Africa Dairy Development (EADD) programme intensified support to farmer training and on-farm follow-ups. Dairy producer organizations (POs) were supported to establish extension units that organized farmer training and on-farm follow-ups on adopting recommended dairy production practices to improve yields. Three to four years later, the results of this strategy were experienced. According to the end-of-programme external evaluation findings:

In Kenya, by reducing herd sizes, less time is spent looking for grass for a large herd and less time is spent milking many low yielding cows. Milk volumes have increased and overall dairy labour has decreased. In addition, an increased network of milk transporters and more accessible collection routes have eased women's time burden and access to reliable milk markets MCCs.

Source: Baltenweck and Mutinda (2013).

men in the community shun such menial tasks, and farmers have to source labour from neighbouring semi-arid counties such as Machakos and Kitui. To retain the workers, female FGDs observed the need to invest in labour-saving technologies, especially for preparing feed and watering. They also noted that having hired workers does not necessarily give them more free time to be away from the homestead since they have to supervise and motivate workers and ensure their welfare. Whereas male-only FGDs in Bungoma and Nandi perceived digging of water wells near the homestead as a major effort to reduce labour demands, female-only FGDs noted that drawing the water from the wells using manually operated roped buckets was a tedious task for them. Investment in feed processing technologies was also reported to be very low in Bungoma and Nandi, with very few farms owning pulverizers. Lessos DFC is implementing laudable strategies to address access to labour-saving technologies through the piped water project and the procurement of a forage harvester that farmers can hire, even on credit.

Comments made during household interviews with dairy producers indicate that as dairy production commercializes, the dairy enterprise changes from a traditional farm family business to a more complex business that involves hired non-family labour and an increased use of external inputs. Female dairy managers in such enterprises seemed to have been less prepared than men in terms of knowledge and skills in managing a small business with hired labour. Extension messages and training offered by POs, input suppliers and dairy development programmes seem to target the traditional farm family business model rather than the commercialized system.

The value chain maps developed for each sampled site for this study show that women are involved in other nodes of the value chain beyond the primary production of milk, although they participate less than men. Very few women were involved in collection and milk transportation businesses coordinated by dairy cooperatives. In Nandi, all the 22 milk transporters contracted by Lessos DFC were men, while only four out of the 34 transporters in Naitiri DFC were women. Most of the milk is transported using motorcycles, bicycles and donkey-driven carts. The nature of the service is unattractive to women because it is considered tedious and demands more physical strength, especially during rainy season. It is also undertaken early at dawn when women's domestic responsibilities are the greatest. Women who perform the service mostly use donkeys and carts, which takes longer than motorcycles to deliver milk to collection and chilling centres, which delays delivery and risks milk spoilage or delivery may be rejected since most collection centres have deadlines for delivery. A similar scenario was revealed for women who engage in milk trading; they were observed to operate small-scale businesses with less mobility than men. Male and female milk traders interviewed in Bungoma and Nandi concurred that most women cannot compete with male traders, especially due to two major constraints they face. First, the milk trading/hawking business thrives very early in the morning and late in the evenings; for most women these are the peak hours for other unnegotiable domestic chores such as preparing children for school. Second, mobility is critical to major residential areas within and across major towns, and is most conveniently provided by motorcycles, which women tend not

TABLE 10
Gender roles in dairy production, marketing, and support services – Nandi (Nandi Hills, Lessos)

Men (mostly)	Role	Women (mostly)
PRODUCTION		
<ul style="list-style-type: none"> Own cattle in most cases 	Owns dairy cattle	<ul style="list-style-type: none"> Few own cattle (mostly widows).
<ul style="list-style-type: none"> Keep records. Provide minerals to cows. Sit in cattle dip committees. Deworm and spray animals. Can collect/buy drugs from stores. Bring cattle to graze (50%). Decide on grazing paddocks to use. 	Looks after dairy cattle	<ul style="list-style-type: none"> Assist in administering drugs. Bring to grazing paddocks and watering. Can collect drugs and minerals from stores. Fetch water for cattle dips.
<ul style="list-style-type: none"> Few milk 	Do milking	<ul style="list-style-type: none"> Carry out milking (assisted by workers if any).
<ul style="list-style-type: none"> Decide where to sell morning milk. Some take to collection centres. Some collect payments. 	Sell milk	<ul style="list-style-type: none"> Decide about evening milk. Some take to collection centres. Sell at farmgate. Those registered in MCCs collect payments.
<ul style="list-style-type: none"> Decides about selling. Take to market or deal with buyers. Receive payment. 	Sell calves, heifers, cattle	<ul style="list-style-type: none"> Are consulted. Very few women sell (widows).
<ul style="list-style-type: none"> Some attend (50%). Prefer exchanges visits. 	Attend dairy training/ meetings	<ul style="list-style-type: none"> Some attend (50%). Prefer local training and meetings.
MCC BASE ACTIVITIES		
<ul style="list-style-type: none"> Male youth contracted by MCCs. 	Milk transporters	<ul style="list-style-type: none"> Fewer women are involved
<ul style="list-style-type: none"> Dominate management positions. Dominate roles that require more physical strength. Dominate field-based roles (extension). 	Work at MCC	<ul style="list-style-type: none"> Few work at MCCs – milk clerks, agrovet clerks, Savings and Credit Cooperative (SACCO) managers and satellite cooler managers, and subordinates.
<ul style="list-style-type: none"> Increased from 38% in 2008 to 49% in 2015. 	MCC membership	<ul style="list-style-type: none"> Dominate, at 51%.
<ul style="list-style-type: none"> Dominate, 8 out of 9. 	Leadership at MCC	<ul style="list-style-type: none"> Few, 1 out of 9.
<ul style="list-style-type: none"> Dominate as milk distributors in tea estates and Western Kenya markets. 	Milk trading	<ul style="list-style-type: none"> Dominate small-scale vending at stationery locations in shopping centres.
SUPPORT SERVICES		
<ul style="list-style-type: none"> Dominate business ownership. 	Agrovet, AI, paravets	<ul style="list-style-type: none"> Few own support services business.
<ul style="list-style-type: none"> Dominate as practitioners. 		<ul style="list-style-type: none"> Dominate as employed sales assistants.

Key: Low engagement

Source: The present study.

to own, as well as facing the stereotype that they are not suited to ride them.

Animal health constraints

Livestock diseases are an important constraint to the improvement of livestock production in sub-Saharan Africa. Risks of losses from livestock diseases are a significant barrier to farmers' adopting improved dairy cattle, especially women farmers (Njuki and Mburu, 2013). The liberalization of the animal health care delivery system in Africa has underscored the importance of understanding the roles that different household members play

in safeguarding the health of animals at the farm level. Understanding the social processes within farm households is crucial in designing responsive animal health delivery systems (Curry *et al.*, 1996). Part of this assessment sought to determine *who does what, who controls what, and who decides what within, rather than for, the household* as regards dairy herd health care.

The assessment findings show that animal health care roles are gender-based at the household level (Table 13). Deworming, spraying and dip management are reserved for men, but women play crucial supportive roles that are often invis-

TABLE 11
Gender roles in dairy production, marketing, and support services – Bungoma (Tongaren)

Men (mostly)	Role	Women (mostly)
PRODUCTION		
<ul style="list-style-type: none"> ▪ Own cattle in most cases. 	Owns dairy cattle	<ul style="list-style-type: none"> ▪ <i>Few own (mostly widows, singles).</i>
<ul style="list-style-type: none"> ▪ Decide where to plant fodder. ▪ Plant fodder (mostly napier). ▪ Prepare and preserve feed (have knowledge of feed preservation and mixing). ▪ Some take to grazing. ▪ Some clean the cow shed. ▪ Spray and deworm. ▪ Decide on vaccination (Men more often have access to this information than women). ▪ Knowledgeable about diseases. 	Looks after dairy cattle	<ul style="list-style-type: none"> ▪ Responsible for cutting and chopping fodder and feeding animals. ▪ Take to grazing paddocks and watering. ▪ Clean cow sheds. ▪ Detect signs of sickness or injury in lactating cows.
<ul style="list-style-type: none"> ▪ <i>Rarely milk (unless workers).</i> 	Does the milking	<ul style="list-style-type: none"> ▪ Carry out the milking (assisted by workers if any).
<ul style="list-style-type: none"> ▪ Decide where to sell morning milk. ▪ Some take to collection centres. ▪ Some collect payments. 	Sells milk	<ul style="list-style-type: none"> ▪ Decide on quantities to sell. ▪ Some take to collection centres. ▪ Sell at farmgate. ▪ Those registered in MCCs collect payments (NADAFSA).
<ul style="list-style-type: none"> ▪ Decides about selling. ▪ Take to or contact market. ▪ Receive payment. 	Sells calves, heifers, cattle	<ul style="list-style-type: none"> ▪ <i>Are consulted.</i> ▪ <i>Very few sell (widows).</i>
<ul style="list-style-type: none"> ▪ Poor attendance. 	Attend dairy training/ meetings	<ul style="list-style-type: none"> ▪ Attend local training and meetings.
MCC BASE ACTIVITIES		
<ul style="list-style-type: none"> ▪ Male youth contracted by MCC. 	Milk transporters	<ul style="list-style-type: none"> ▪ <i>Fewer women are involved.</i>
<ul style="list-style-type: none"> ▪ Dominate management positions. ▪ Dominate roles that require more physical strength. ▪ Dominate field-based roles (extension). 	Work at MCC	<ul style="list-style-type: none"> ▪ <i>Few work at MCC (milk clerks, agrovets clerks and subordinates).</i>
<ul style="list-style-type: none"> ▪ average at 48%. 	MCC membership	<ul style="list-style-type: none"> ▪ Dominate, at 52%.
<ul style="list-style-type: none"> ▪ Dominate, 6 out of 9. 	Leadership at MCC	<ul style="list-style-type: none"> ▪ <i>Few, 3 out of 9.</i>
<ul style="list-style-type: none"> ▪ Dominate as milk distributors in neighbouring milk deficit centres (Kamukuywa, Kiminini, Bungoma). 	Milk trading	<ul style="list-style-type: none"> ▪ Dominate small-scale vending at stationary locations in shopping centres.
SUPPORT SERVICES		
<ul style="list-style-type: none"> ▪ Dominate business ownership. 	Agrovets, AI, paravets	<ul style="list-style-type: none"> ▪ <i>Few own support services business.</i>
<ul style="list-style-type: none"> ▪ Dominate as practitioners. 		<ul style="list-style-type: none"> ▪ Dominate as employed sales assistants.

Key: Low engagement

Source: The present study.

ible. Women are leaders in implementing crucial preventive practices such as ensuring cleanliness of cowsheds and hygienic milking practices, detecting signs of illnesses or injuries, reminding men of scheduled practices. Regarding knowledge on animal diseases, the assessments finds that there may not be a significant difference between males and females, especially in communities with a long history of commercial dairying. Tables 10–12

indicated that women in all three of the study sites are involved in home treatment of dairy cattle and detection of animal health problems. In Nandi and Kiambu, participants of all of the FGDs concurred that women who have acquired long experience in managing dairy production enterprises (five years and over) tend to be as equally knowledgeable about dairy cattle disease as men. Male veterinarians from the two sites also confirmed this

TABLE 12
Gender roles in dairy production, marketing, and support services – Kiambu (Kiambaa, Karuri)

Men's main tasks	Role	Women's main tasks
PRODUCTION		
<ul style="list-style-type: none"> Own cattle in most cases. 	Owns dairy cattle	<ul style="list-style-type: none"> Few own (mostly widows, singles).
<ul style="list-style-type: none"> Hired males provide bulk of the labour (milking, cutting and chopping fodder, cleaning stalls, watering. Washing with acaricides) Responsible for practices such as deworming, dehorning and spraying. Supervise service providers. 	Looks after dairy cattle	<ul style="list-style-type: none"> Do much of the labour if no hired labour. Supervise and motivate hired labour. Keep records. Pay for technical services. Detect signs of sickness or injury. Wash with acaricides. Look after welfare of hired labour (food).
<ul style="list-style-type: none"> Do not milk (unless hired labour). 	Does the milking	<ul style="list-style-type: none"> Prepare for milking (warming milking water).
<ul style="list-style-type: none"> Some take to collection centres. Some collect payments. 	Sells milk	<ul style="list-style-type: none"> Decide on quantities to sell. Some take to collection centres assisted by workers or children. Sell at farmgate. Those registered in MCCs collect payments (KDFC).
<ul style="list-style-type: none"> Decide about selling and sell. 	Sells calves, heifers, cattle	<ul style="list-style-type: none"> Are consulted. Very few sell (widows) "but support from male relatives or friends so as not to be cheated".
<ul style="list-style-type: none"> Poor attendance at meetings and training. 	Attend dairy training/ meetings	<ul style="list-style-type: none"> Attend local training and meetings.
MCC BASE ACTIVITIES		
<ul style="list-style-type: none"> Male youth employed to manage the MCC's organized collection system. 	Milk transporters	<ul style="list-style-type: none"> Fewer females work as milk grading clerks.
<ul style="list-style-type: none"> Dominate management positions. Dominate roles that require more physical strength. Dominate field-based roles (extension). 	Work at MCC	<ul style="list-style-type: none"> Few work at MCC (milk clerks, agrovet clerks, SACCO managers, and subordinates).
<ul style="list-style-type: none"> Average, at 40%. 	MCC membership	<ul style="list-style-type: none"> Dominate, at 60%.
<ul style="list-style-type: none"> Dominate, 8 out of 9. 	Leadership at MCC	<ul style="list-style-type: none"> Few, 1 out of 9 (a retired cooperative development officer who also chairs the board).
<ul style="list-style-type: none"> 50% as milk distributors to Nairobi city and suburbs). 	Milk trading	<ul style="list-style-type: none"> Dominate small-scale vending at stationary locations in shopping centres. 50% as milk distributors to Nairobi city and suburbs).
SUPPORT SERVICES		
<ul style="list-style-type: none"> Dominate business ownership. Dominate as practitioners. 	Support services (agrovet, AI, paravets)	<ul style="list-style-type: none"> Few own support services business. Dominate as employed sales assistants.

Key: Low engagement

Source: The present study.

observation during FGDs and interviews. This observation is in line with the Curry *et al.* (1996) study in the now Uasin Gishu County, which also interviewed women from experienced livestock-keeping households. The female-only FGDs in Kiambu and Nandi noted that since women are the predominant managers of income from milk, they experience the immediate impacts of diseased

lactating cows, and therefore have become interested in monitoring animal health. Because of the critical timing issues in addressing animal health cases, women's membership in a dairy PO that offers animal health services on credit or heck-off payment was reported a major relief.

Common animal diseases in the sampled sites are presented in Table 14. Farmers across the three

BOX 2

An unlicensed female milk trader in Ndalú Shopping Centre – Bungoma

For 30 years, Janet has run the milk trade business outside her residential premises within Ndalú market. She has relied on a verbal contract with four dairy farmers who supply and deliver to her, on average, a total of 20 litres of milk every morning at KES45 per litre. This is a lucrative producer price given that most farmers obtain KES30–35 per litre through other channels, which she retails at an average of KES60 per litre.

When asked why she operates at such a small scale, Janet said:

[F]irst, I don't have capital; in fact, my suppliers supply me milk on credit and I pay them the following day. Even when I default, they still supply me and encourage me. I guess it's because they cannot get another alternative market outlet that offers such a price easily. Second, I cannot sell more than 20 litres per day since I cannot move around with the milk in the morning; I have to prepare my grandchildren for school, but during weekends and holidays, I send them to move around selling milk.

When asked about the benefits she accrues for engaging in the business, she observes that: (i) first she takes two cups (600 ml) of the supplied milk for her household consumption; (ii) she obtains some income easily while at home carrying out other chores, and without incurring any major costs, she makes about KES300 per day, or about KES9 000 per month, a relatively modest income; and (iii) she has managed to establish a good business relationship with dairy producers, who supply her milk even on extended credit.

Asked what she will resort to once the proposed Ndalú CBO milk chilling plant, 100 metres from her premises, opens, Janet says that other opportunities will open up.

Source: Milk trader household interview for this study.

communities are not willing to pay for clinical advisory services, which has forced animal health providers to embed the consultation services in the pricing of the drugs offered. The practice can trigger opportunistic behaviours from service providers since they feel compelled to subscribe and sell a drug in order to recover their consultation costs.

The EADD household baseline survey (2015) observes that men dominate (61 percent) on decision-making on which service providers to use for animal health services including anthelmintic treatment, vaccination, tick control practices (pour-on, dipping and spraying) and curative treatment. The survey also shows that 91 percent of farmers had sought an animal health service in the last 12 months. Vaccination and tick control were the commonly sought services; the average cost of accessing animal health services were US\$100 per year per farming household.

Other constraints to animal health services are that most services providers are paravets or animal health technicians who are poorly regulated (Makoni *et al.*, 2014) and most of them are males who are rarely equipped with skills on how to target women as clients of their services. The few female veterinarians and technicians do not find field-based opportunities attractive due to the work conditions. Yet, increasing the number of practising female veterinarians and technicians is one of the best ways to increase women farmers' access to livestock

health services (Heffernan *et al.*, 2003, as cited in Miller, 2011). In addition to the risk for women of accessing untrained technicians, private technicians are expensive, making it exceptionally hard for women farmers to afford their services. Animal health training and information and communication materials are often in technical language, or held at times and locations that do not take women's needs and circumstances into consideration.

Other constraints

Women FGDs also noted that they have little freedom or few choices in how to use income from milk as unavoidable family demands are normally pressing. They indeed implied that their ability to retain the custody of dairy income is dependent on continued good management of the income in the eyes and judgement of family members. This could imply that they experience higher scrutiny in terms of financial accountability at the household compared to other members or sources of income.

Access to credit facilities was another constraint identified by dairy producers, service providers as well as those involved in milk micro-enterprises. Interviews with female-owned dairy services businesses and milk micro-enterprises were unanimous that women's access to credit from formal financial institutions was much lower than that of men. They all reported to have relied on family

TABLE 13
Gendered analysis on herd health roles at the household level

Men's main tasks	Dairy herd health-related tasks	Women's main tasks
<ul style="list-style-type: none"> Know how to administer or carry knapsack to spray, how to mix acaricides 	Deworming and spraying	<ul style="list-style-type: none"> Women often assist in administering, preparing water and animals (e.g. by milking in time to give way for spraying). Others supervise workers who spray or deworm. Women wash cattle with acaricides in Kiambu
<ul style="list-style-type: none"> Are in dip committees. Some take cattle for dipping. 	Dipping (in Nandi)	<ul style="list-style-type: none"> Some bring cattle for dipping or are assisted by workers and children. Periodically supply water to the dip.
<ul style="list-style-type: none"> Likely to receive information early. Decide on when to vaccinate. Some bring cattle for vaccination. 	Vaccination	<ul style="list-style-type: none"> Likely to receive information late. Some bring cattle for vaccination.
<ul style="list-style-type: none"> Decide on healthcare provider to use. Contact, supervise and/or accompany the providers. Send to buy or select drugs. Administer drugs. 	Treatment/health care attention	<ul style="list-style-type: none"> Detect signs of illness or injury especially for lactating cows and calves. Remind men of scheduled health care practices. Likely to be cheated by false or less qualified paravets. Loyal to a drug they have used before even when efficacy is declining.
<ul style="list-style-type: none"> Those with long experience in dairy farming are reasonably knowledgeable and may identify the disease and symptoms by using local language or scientific language 	Knowledge on animal diseases	<ul style="list-style-type: none"> Increasingly becoming knowledgeable, depending on years in dairy farming (as farm managers).
<ul style="list-style-type: none"> Rarely clean sheds. 	Cleaning cow sheds	<ul style="list-style-type: none"> Take the lead in cleaning or ensuring that hired workers do it. Use or collect the manure for kitchen gardens.
<ul style="list-style-type: none"> Few milk in Nandi and Bungoma (women have to make the preparations for them). Mostly milk in Kiambu, but most are hired workers. 	Hygienic milking	<ul style="list-style-type: none"> Lead in ensuring hygienic milking practices are upheld, especially for those with adequate information. Prepare milking requirements (warm water) and supervise milking workers.

Source: Results of focus group discussion from this assessment.

TABLE 14
Summary of common animal diseases as observed by dairy farmers

Bungoma	Kiambu	Nandi
COMMON DISEASES		
<ul style="list-style-type: none"> East Coast Fever (ECF) Foot-and-mouth disease (FMD) Rabies Black quarter Lumpy Skin Disease (LSD) Anthrax Mastitis Anaplasmosis Trypanosomiasis (in lower parts of the county) 	<ul style="list-style-type: none"> Mastitis FMD Foot rot Milk fever Anthrax Bloat Pneumonia LDS 	<ul style="list-style-type: none"> ECF FMD Pneumonia Foot rot Mastitis LSD Black quarter Trypanosomiasis reported at the border with Tinderet and Chemase
PREVENTION AND CURATIVE MEASURES AND COSTS (IN KES)		
<ul style="list-style-type: none"> Vaccination (ECF=800–1 000/cow/for life) Vaccination (LSD=20/cow/year) Spraying=25/cow/month 	<ul style="list-style-type: none"> Vaccination (FMD=100/cow, Anthrax 20/cow, LSD 60/cow/year) Good hygiene for mastitis (cleaning sheds and cows, recommended milking practices) Deworming, spraying=20/cow/month 	<ul style="list-style-type: none"> Vaccination (ECF, 800–1 000/cow for life, FMD=50/cow/year, LSD=30/cow/year, Black quarter=50/cow/year) Dipping=60/cow/month Spraying=100/cow/month Deworming=600/cow/year

Source: Results of focus group discussions and interviews from this assessment.

and friends or their small-scale rotating savings and credit groups for capital to start up or expand their businesses. These findings concur with a study of 108 female milk micro-entrepreneurs in Kenya, which found that 81 percent of the women relied on friends and family as sources of capital for their businesses. The study further reports that this source of funding is often unreliable and is inadequate for expanding business and investing in improved technologies for value addition and ensuring health safety of milk products traded. For female dairy producers, membership in a PO that has a linkage with SACCO is helpful, especially in accessing dairy production inputs and services (Wanga *et al.*, 2009). As a result, Wanga *et al.* (2009) report that most women milk micro-business owners have tended to operate their enterprises under low-level technologies, limited information (technical, business management and marketing), and an illegal status to avoid paying substantial licensing costs. The study advocates for innovative entrepreneurial/business extension programmes that target women involved in milk micro-enterprises.

Other constraints faced by female dairy producers relate to the gendered norms around the complex concept of ownership of livestock and related resources. Even when women can afford to acquire dairy cattle through the purchase or transfer from a relative, due to the patriarchal system, all resources within a household belong to the governing head of the household, often a male. Female FGDs in this study in Bungoma and Nandi indicated that this ownership system discourages women from investing in certain physical assets to which they are likely to have a weak ownership claim, including livestock. They reported that they tended to buy less contested items such as clothing and utensils. Female dairy producers also face a disproportionate challenge in access to dairy extension services. The burden of labour and often gender-insensitive dairy extension services providers and programmes renders women's access to dairy training and information challenging.

EADD's Phase 2 proposal recognizes the risks that zoonotic diseases pose to women; it notes that women are particularly susceptible due to their role as the primary caretakers of livestock (EADD, 2013). However, it emerged from the field survey that the dairy communities had extensive experience in hygienic milk handling and safety, and that cases of food poisoning from milk and products were rare. In theory, they could be at risk from diseases transmitted through the consumption of

unpasteurized milk (such as brucellosis and tuberculosis), but this is rarely reported as a problem in Kenya where raw milk is generally boiled before consumption. Omoro *et al.* (2004) report very low apparent prevalence of zoonotic health hazards in milk from smallholder herds in central Kenya.

3.2.6 The influence of dairy development programmes

In general, the impact of donors and technical assistance has been remarkable in building the dairy sector in Kenya. Financial and technical aid has supported animal health services, adaptive research, extension, dairy training centres, the privatization of breeding and veterinary services, and strengthening of cooperatives and dairy POs (FAO, 2011; Omiti *et al.*, 2009). In all three communities, there were experiences with past and current dairy development programmes. Kiambu had the least experience with dairy development programmes; as discussed earlier, the region is considered a classic case of smallholder-dominated, commercial oriented, private sector-led dairy value chains. Bungoma received enormous support from dairy programmes, especially the Finnish Government and IFAD. The focus was to stimulate the commercialization of dairy as a promising enterprise, especially in the wake of diminishing prospects from other traditional enterprises (cotton, tobacco and maize). Dairy development programmes in Nandi have focused on transitioning the community from extensive to a more intensive and commercialized system. The programmes seem to have focused on promotion of milk production at the farm level and improvement of milk marketing systems, and at the same time aligning with the Government's national policies and strategies on livestock and rural development. Most of the programmes did not have a specific focus on the needs of the women, especially the earlier ones spanning the 1980s to 1990s, despite the emerging reports at the time that indicated that women performed 70–80 percent of the tasks in dairy farming. Also, the earlier programmes did not apply the value chain approach.

In Bungoma, the Finnish Government-funded Rural Dairy Development Programme (RDDP 1979–1989) in Western Kenya provided some important lessons to the successor Livestock Development programme (LDP 1990–2003). There was the need to: (i) focus on women (gender was referred as the 'black box' in dairy development); (ii) build capacity of and provide training

to government staff; (iii) improve cooperative development; and (iv) to improve dip management and livestock disease control, especially to curb the tsetse fly menace. Overall, the two programmes are credited for establishing the basis for smallholder dairy development in western Kenya by intensifying production in traditional dairying areas and expanding coverage into the lower potential areas. Regarding women's empowerment, an evaluation of LDP notes that although traditional attitudes on the roles of women remained widespread, the Cow from Cow Rotation Scheme (CFCRS) boosted women's ownership of dairy cows by mobilizing women groups. Some of the women's groups were met during this mission in Ndalua (Bungoma) and had merged with other 23 groups to form a dairy CBO that was at advanced stage of setting up a milk chilling plant. They have received financial and technical support from IFAD's SDCP and World Bank/Government of Kenya's Western Kenya community and flood mitigation programmes. Another impact observed is the adaptation of the CFCRS strategy by subsequent dairy development programmes, as well as the widespread introduction of the intensive zero to semi-zero grazing systems and the evolving community animal health assistants approach. It also stimulated the establishment of village 'agro-shops', demonstrating the effects of bull schemes as an efficient way of upgrading dairy breeds. In 2014, the community entered into partnership with EAAD's Phase 2 through Naitiri DFC. The partnership applies the dairy chilling hub approach to facilitate farmers' access to services for enhancing dairy productivity and milk markets while pursuing equitable participation of and benefits to men, women and youth.

In Kiambu, the National Dairy Development Project (NDDP 1979–1995) was cited during FGDs. Through a partnership between the Dutch and Kenyan Government, the NDDP promoted the labour-intensive zero-grazing model as a technology package aimed at addressing the constraints of smallholder dairy farming in Kenya, such as lack of grazing land, low productivity of dairy cows, low quality of fodder, prevalence of diseases, and lack of financial means (Muma, 1994). In Nandi, FGD participants could recall most of the recent development programmes such as the Community Empowerment and Enterprise Development through Cooperatives-CEEDCo, implemented by the Swedish Cooperative Centre (now We Effect) in 2000–2008, whose objective was strengthening the capacity of dairy coopera-

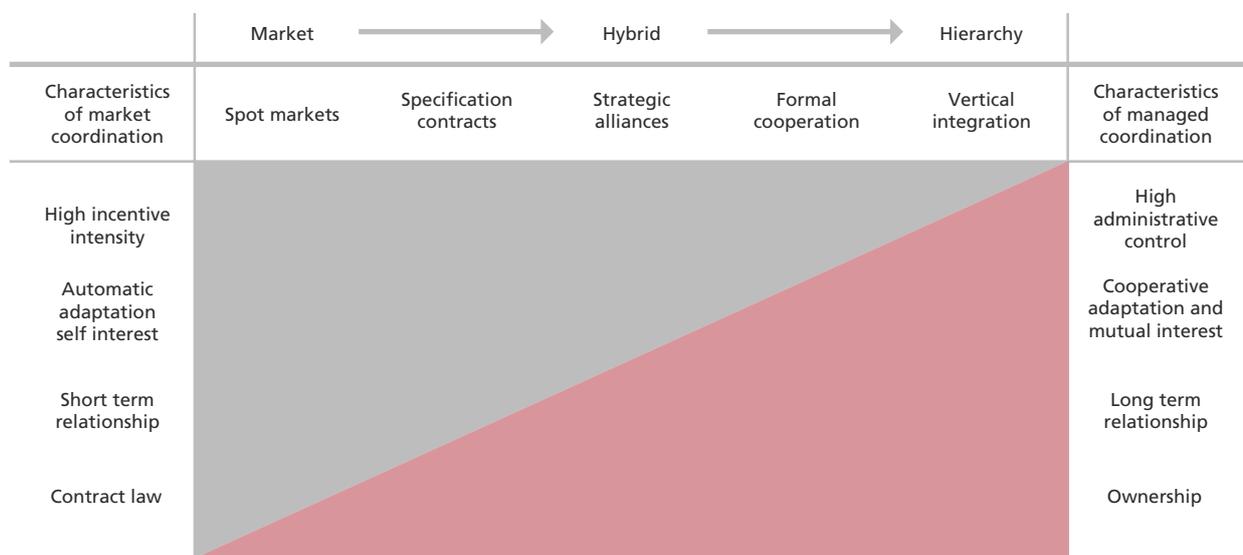
tives to provide production and marketing services, especially following the collapse of KCC. Participants recalled that CEEDCo had introduced awareness training on gender in dairy farming and cooperative leadership. The current programmes were also acknowledged: EADD, TechnoServe's Mobile Training Unit (MTU) programme, and KAVES. MTU was lauded for its unique audio-visual training vans that attract farmers' interest in more practical training and its intriguing videos on *gender in dairy*. The presence of KCC factories in Lessos and Kapsabet, and post-independent subsidized AI and animal health provision programmes were also recognized for their remarkable contribution to the dairy industry in the county.

3.3 VALUE CHAIN GOVERNANCE

The mechanisms regulating the exchange of the dairy goods and services under the studied value chains are diverse. They can be categorized into the three typical coordination/governance mechanisms advanced in transaction cost studies: spot markets, hybrids and hierarchy (Birachi, 2006). In essence, actors' relations along the three value chains depict a continuum of governance forms, shifting from markets to internal governance, and in between, a hybrid of intermediate mechanisms such as specification contracts, strategic alliances, and formal cooperation (Figure 12). Another way to look at the contractual relations is to apply Farnworth's (UN Women, 2011) two forms of value chain governance: market-driven and relational chains. Here, the characteristics of relational chain transactions dominate, while some characteristics of market-driven chain transactions are observed.

Table 15 provides an analysis of the contractual relations (governance forms) along the major links in the value chain maps, organizations influencing performance, and gender roles. Across the three chains mapped, the dairy POs are key drivers of the performance of the chains, at least at the micro level. They control over 50 percent of milk marketed in the mapped production zones and engage over 4 000 dairy producers through collective action. The performance of the POs' collective action stimulates demand for support services, which attracts complementary investments in inputs and services provision. This occurs through in-house provision by POs and/or by attracting private inputs and services providers to invest more. They are also key in influencing investments in complementary public good and services such as road improvements. For example,

FIGURE 12
A continuum of governance structures



Source: Adapted by Birachi (2006).

LDFC is pioneering a piped water project in collaboration with the relevant quasi-public water services company. Also, their ability to broker a more gainful and reliable market outlet for milk is another crucial determinant of the chains performance. NADAFa and KDFC demonstrates this promising practice through their successful strategy of diversifying milk markets; the former increased proportion of milk retailed directly to consumers by opening outlets in neighbouring milk-deficit areas, while the latter increased proportion of milk channelled through the milk dispensing technology in partnership with supermarkets. These strategies enable the POs to offer improved or sustained prices to farmers, hence motivating them to invest in milk production while in LDFC, dependence on one large milk processor (NKCC) has been crucial in stimulating milk production.

In LDFC and NADAFa, transporters of milk from the farms to MCCs are key determinants of access to milk markets for most farmers and the financial viability of the MCCs. In KDFC and to some extent LDFC, milk traders also play a key role in linking producers to the high demand markets for milk in Nairobi and suburbs, and the tea estates and neighbouring milk-deficit areas in Western Kenya. Another driver of these chains' performance are policy reforms, since most of the milk is marketed through the informal system (unpasteurized) in all the three chains mapped,

policy reforms by legitimizing these systems are likely to be beneficial to the bulk of value chain actors such as producers, traders and consumers. According to a recent policy brief (Blackmore *et al.*, 2015), the strict government approach of only formalizing the pasteurized system has not worked. It recommends lighter approaches that are more affordable and acceptable than the radical, structural changes espoused in current policies. The brief contends that this is a more promising pathway for moving the informal sector towards the long-term vision of formalization.

The oligopolistic nature of the dairy processors, with three leading processors controlling over 85 percent of total processed milk, is often cited as a challenge to growth of the sector because they dictate both producer and consumer prices. These powerful corporate players have also been accused of influencing the Government against policy reforms aimed at legitimizing the unpasteurized milk marketing system (Blackmore *et al.*, 2015). They offer milk producers low prices under tardy payment conditions to milk producers and charge high prices to consumers, thus controlling a small share in the overall milk market. This situation is exacerbated by the lack of a shared vision for the industry, an outdated and inadequate policy and regulatory framework, poor quality of inputs, and unreliable and outdated data and statistics informing sector planning (Makoni *et al.*, 2014; PPD Consultants, 2013).

TABLE 15
A summary of prevailing value chain governance mechanisms

Value chain link	Organizations/institutions involved and participation of women and men	Aspects of governance mechanisms
Production link	<p>Household/family: Much of dairy production activity is performed within a farm located within a household. Generally, women participate more in this node, following some generic division of labour, and access and control of resources and benefits. Women mostly perform dairy production activities at the homestead and are often required to carry out activities on a daily basis such as feeding, watering, milking, cleaning shed, taking care of calves, and monitoring the health of cattle. Men perform more of periodic activities such as spraying, planting/storing fodder and functions performed outside the homestead-buying drugs. Children also assist during weekends and school holidays.</p>	<ul style="list-style-type: none"> ▪ Community norms ▪ Intra-household gender relations
	<p>Inputs and services providers: Most private inputs and services providers are males. Out of the 73 agrovet stores mapped in the three chains, female-owned stores constitute only 11 percent. Paravets and AI providers are also mostly men. Dairy producer organizations (POs) also organize for in-house agrovet stores and AI services, primarily for members' ease of access. Two of the eight extension workers in two POs (LDFC and NADAFSA) that have established extension units are female. Overall, women and girls are preferred at agrovet store sales assistants.</p>	<ul style="list-style-type: none"> ▪ Market-driven ▪ PO-driven ▪ Buyer-driven ▪ Community (shared norms) ▪ Democracy (joint decision-making)
Milk transporters /traders link	<p>Farm-level milk transporters: Most milk transporters are young men; a few women have attempted to participate either directly by using donkeys and carts, or indirectly by hiring young men to operate their motorbikes. A well-distributed and coordinated network of milk transporters and accessible collection routes are key to women's access to milk markets and the financial viability of an MCC. MCCs contract the transporters, assign them routes, equip them with weighing and milk testing kits (on credit), and facilitate their payments by deducting them from the farmers' payments.</p>	<ul style="list-style-type: none"> ▪ Specification contracts ▪ Strategic alliances ▪ Formal cooperation ▪ PO-driven (hierarchy)
	<p>Milk traders: There are different types of milk traders, i.e. those who buy/aggregate at farmgate, from producers with whom they have formal or informal contracts, from MCCs, or from other smaller traders. Women and men are equally involved, although women tend to operate on a smaller scale 10–30 litres per day and less mobile compared to males. MCCs also act as milk traders when they sell raw milk direct to consumers.</p>	<ul style="list-style-type: none"> ▪ Market-driven ▪ Buyer-driven
MCCs/ chilling plants	<p>Dairy producer organizations: All source milk supply from members, the majority of whom are women (60 percent). Less than 10 percent is sourced from non-members (traders and other farmers). Market channels are diversified to processors, traders, supermarkets, hotels and individual consumers, all with written or unwritten contracts; others such as LDFC over-rely on processors (85 percent of milk). Minimal processing was reported (chilling, pasteurizing, yoghurt, fermented milk). Where there are written contracts with members to supply milk, minimum or maximum volumes are not specified: some supply all of the milk or a portion; others sometimes do not. All MCCs have invested in milk coolers and transportation trucks, others, in pasteurizers; these investments are financed either through grants, loans, member equity, retained revenue, or various combinations thereof. Although women's membership in the sampled PO represents the majority, their representation in management and leadership is very low. Women held eight out of the 37 total board positions in the four POs sampled.</p>	<ul style="list-style-type: none"> ▪ Buyer-driven ▪ Market-driven ▪ PO-driven (specification contracts, strategic alliances, formal cooperation) ▪ Intermediary-driven (all have current and past support from dairy development programmes).

Source: Results of focus group discussions and interviews from this assessment.

3.4 SCALABILITY OF DAIRY DEVELOPMENT

The fragmented nature of the dairy industry, on both production and marketing sides, is highlighted as a major challenge to growth and competitiveness. As previously mentioned, a differentiated sector development strategy has been recommended as a pathway to upscaling the development of the industry to meet domestic shifts in demand and capture export markets. Under this strategy, pro-poor-oriented government and donor programmes are urged to target subsistence-oriented farmers, while private sector-oriented programmes target commercially

oriented farms owned by dairy entrepreneurs who are willing to invest and specialize in dairy (Makoni *et al.*, 2014; KNDMP, 2010).

Current government policies advocate for a shift from self-sufficiency-oriented dairy industry to commercialized and value addition orientation for employment and wealth creation (Vision 2030; ASDS 2010–2020; Dairy Master Plan 2010–2030). There are, in principle, strong drivers in place for scaling up dairy development in Kenya when considering that average farm-level dairy yields are below potential, that milk processors are operating below capacity utilization and that there are regions conducive for dairy commer-

cialization that are underdeveloped due to lack of necessary infrastructure, and considering the projected demand for milk and products in Kenya and the region, Dairy development programmes are increasing as donor attention to the importance of livestock-based livelihood strategies to pro-poor growth intensifies. New agribusiness-focused approaches to stimulating the dairy value chain at the micro level have emerged and are now considered successful models, and many donors and development programmes are showing keen interest in adapting and replicating these approaches. These include models such as the dairy chilling hubs and collective business enterprises (CBEs), which are anchored on partnerships between dairy POs and private sector actors, and facilitated under donor-funded projects (Makoni *et al.*, 2014; PPD Consultants, 2013). Other drivers are the generation of transformative technologies with high potential of addressing some of the systemic challenges such as mechanizing fodder management and ATM technology.

These approaches, models and technologies are not, however, automatically gender-sensitive, and they pose risks of reinforcing gender inequalities and other forms of social exclusion. According to gender and livestock experts interviewed for this assessment (see Annex 2), these risks are highly probable. They observe that the institutional will and capacity to address gender equality in dairy development programmes has not yet been

secured. Even the few gender transformative programmes in the sector are largely attributed to the commitments and pressure exerted by the funding agencies. Another reason advanced is that dairy development practice is still dominated by a pool of practitioners who are more technically oriented and by “old guards” who are reluctant and/or lack the adequate capacity to integrate gender in value chain work. This is understandable and should be recognized, given that the integration of the two concepts is relatively new and adaptation of field-level-based methodologies and tools is just evolving.

A positive trend in incorporating gender and youth considerations into the most recent dairy/livestock development policies and plans in Kenya can be noted. However, shortcomings emerge from a keen review of some of the documents and observations from experts interviewed for this assessment. First, the gender and youth issues and aspects are not systematically integrated throughout the documents’ sections and analyses; rather, they tend to be presented in a sketchy, stand-alone perspective. Second, rarely are guidelines or concrete strategies and indicators proposed to support implementation and monitoring of the plans and policies.

Chapter 4

Conclusions and recommendations

This section draws main conclusions from the findings of this study and on this basis, makes key specific recommendations on interventions, approaches and strategies.

4.1 CONCLUSIONS

This study provides an in-depth gender and socio-economic analysis of the dairy value chain in Kenya. It has assessed women's and men's roles and responsibilities, needs, constraints and challenges along the sampled dairy value chains. It reveals that men and women do participate and benefit from opportunities stimulated by the dairy value chains in Kenya. The value chains analysed demonstrate that they stimulate opportunities for the rural poor to access farm and non-farm employment, subsequently providing a pathway to reducing rural poverty. However, the participation depicts gendered patterns that exhibit both horizontal and vertical segregation that disproportionately disadvantage women.

Vertical segregation refers to the findings that women are less represented than men in certain roles within a value chain link, whereas horizontal segregation refers to the observed patterns of predominance of specialized, gendered participation that dictates what women and men can or cannot engage in across the value chain nodes (FAO, 2015). According to this study, vertical segregation is manifest at several nodes. For example, at the production node, women constitute over 50 percent of members in the four dairy POs, but their representation in leadership and decision-making structures (eight out of 37 in management committees' positions) is not commensurate with their membership strength. While two POs, with three women in their committees of nine members, meet the one-third threshold, two others have only one woman each. The same applies to management positions at MCCs and chilling plant businesses run by the POs, especially MCC managers and extension workforce. Interestingly, the pattern is different in the three SACCOs run by some of

the POs in this study, which are led by female managers. At the milk traders' node, the pattern is that female traders engage at a smaller scale and have less mobility than men. At the larger dairy processors' node, this review finds less representation of women in management positions as well as in boards. A similar pattern can be nuanced at the support services function, in which females are most preferred as agroveter stores sale assistants (as hired or family labour), while men are the owners and/or managers.

Horizontal segregation is equally manifest. Women play a predominant role at the production node, taking care of cattle, milking, processing and marketing milk; men, and to some extent children, play supportive roles as family members or hired labour. Women's roles at these nodes are, to a large extent, performed daily and within the homestead, the traditional sphere for women. Milk transportation from farm to MCC is a key determinant of access to reliable milk markets, especially for women producers in poorly developed rural roads. This study finds that these opportunities are almost exclusively reserved for young male milk transporters who ride bicycles and motorcycles or drive donkey and carts, and a few who ride vans. Some of the conditions explained to deter women's involvement in this activity are: male physical strength, especially during rainy seasons; male ownership of motorbikes; and the fact that the delivery must be made in the early morning. Under the milk traders link, this study finds that though women are substantially involved, they tend to operate at a smaller scale, have limited access to improved technology and information, and are less mobile than their male counterparts, a situation attributable to access to capital, mobility and domestic responsibility given that this trade occurs at the peak of domestic chores. Even under male-owned milk trader businesses, women play a role, often standing in as managers. A review by PKF (2013) shows a high male-to-female ratio in employment at three large dairy processors. Reasons advanced are that most

jobs require heavy physical work, while others are field-based and at odd hours. Conditions considered unfavourable to women, who instead tend to compete for office-based jobs such as laboratory and office administration services. There are few female-owned dairy support businesses; instead, women are preferred as staff in agrovets stores for their marketing skills.

This study also finds intra-household dynamics related to patterns on ownership of, access to and control over dairy production resources difficult to assess in order to empirically adopt the methods used for this study. The implications of the phrase that “women manage the cows while men own the cows” are challenging to interpret.

The study also finds that various governance mechanisms ranging from spot markets and various hybrids, to PO-driven hierarchical mechanisms are applied. There is very limited documentation on the gender effects and impacts of major events shaping the history of dairy development in Kenya such as during the post-liberalization era and the collapse of the Kenya Creameries Cooperative (the sole large milk processor), among others.

Overall, these findings concur with other studies on women’s opportunities across livestock value chains. Njuki *et al.* (2011) find that their participation depends on their skills and capacities, access to capital, constraints to mobility, and ability to self-organize. Others (Rubin and Manfre, 2014) find that women’s level of participation diminishes as vertical integration occurs and markets move away from sites of production. They note that only a few women tend to be entrepreneurs beyond the production node, in transportation, processing and milk trading and in support services where there is more value added and returns are high. KIT *et al.* (2012) observe that female entrepreneurs are systematically disadvantaged; they experience low productivity, slow pace of accumulating assets, and less social capital.

4.2 RECOMMENDATIONS

These findings imply that whereas the smallholder dairy value chain in Kenya has enormous potential to reduce rural poverty by providing greater opportunities to access decent farm and non-farm employment, failure to address gender and inclusiveness concerns undermines these prospects. A similar FAO study in Afghanistan (FAO, 2015) highlights the importance of strengthening inclusive dairy value chains in reducing rural poverty, and the impacts of dairy projects on women’s empower-

ment. Other insights on how to implement more gender-inclusive value chain interventions can be drawn from Riisgard *et al.* (2010), who describe a continuum of gender-inclusive approaches and interventions such as: (i) seeking increased awareness (and monitoring) of how they may have different impacts on men and women; (ii) seeking to increase the gains of female actors in the chain or at least to ensure that no harm is produced; and (iii) addressing gender inequality at the household, in institutions and in value chain governance and making efforts to help women to achieve a better functional position along a value chain.

This section draws on these value chains analyses and the advanced insights to make the following recommendations on the best-bet interventions that can be considered in order to render the studied value chains more gender-inclusive:

- a) Target existing or emerging dairy POs as crucial actors in the value chain that provide newer, promising spaces for local dairying households and communities to transform gender norms in order to enhance equitable participation of women, men and youth in the opportunities that are offered by dairy production and marketing enterprises.
- b) Strengthen the requisite gender inclusion capacities of value chain enablers and support service providers, both public and private, especially at the local level, in order to improve the awareness and field-level skills in targeting women as clients of value chain services.
- c) Target and support value chain support service providers as beneficiaries of value chain development (not purely as private businesses) within which gender equality objectives should be integrated.
- d) Create awareness and buy-in among dairy processors on the business case of targeting female dairy producers as reliable sources of milk supply (inclusive milk procurement model).
- e) Specifically support innovative strategies for facilitating the farm-to-MCC milk transportation link, because it is key to women dairy producers’ access to reliable milk markets.

4.2.1 Target dairy producer organizations as spaces for enhancing community and household gender relations

Leleben and Lessos dairy POs (Nandi), KDFC (Kiambu) and NADAFAs as well as the upcoming Ndalu Dairy Farmers’ Association

(Bungoma) are all significant and/or potential actors in the three value chains analysed. They are the nuclei of the rapidly growing dairy business hubs. They provide the most feasible collective enterprise model for connecting smallholder farmers to dairy inputs and output markets. They are also an investment in social capital, building a ‘social infrastructure’ that, in addition to providing services to members, presents a platform for sharing information, coordinating activities, and making collective decisions. POs are a promising space for enhancing inclusiveness of these value chains. Formed by the producers, they can be seen as the backbone of these three dairy value chains. They organize the majority of the participants in the chains (smallholder producers), who also tend to be made up mostly by women. Further, they serve as intermediaries at one of the most critical links in the chain – access to dairy production enhancing support services and milk processing and markets – and as a rare link to more ‘modern’ agrifood chains. Gender-sensitive value chain development programmes that target and support dairy POs in addressing gender inequalities in membership, accessing dairy inputs and advisory services, accessing gainful milk markets and participating in employment, management and leadership present an organic recipe for inclusive value chains.

Strengthening the milk cooling network through milk satellite coolers, facilitating access to input on credit (through a check-off system), and providing continuous education and training, particularly on dairying as a family business, are some of the strategies highlighted throughout this study for enhancing gender-inclusiveness through dairy POs. Deliberate efforts to increase women’s representation and performance in the management committees (MC) and management positions should be an integral part of the capacity strengthening. These efforts are best supported by a policy commitment endorsed by the PO members in an Annual General Meeting (AGM). After EADD supported the participating dairy POs in endorsing gender equality policies and resolutions, the number of women in PO boards started to increase. However, it was realized that the close monitoring and presence of EADD facilitators during AMGs was key in recalling at the meetings the gender commitment at the time of electing PO boards. NADAFAs has three women on its board as a result this approach. Lessos had reached the one-third quota in a previous board but did not sustain the trend in the current team; this has been

attributed to the lack of EADD facilitation during the AGM. In addition to the policy commitments, there is a need to support the POs to develop concrete mechanisms. One voluntary option adapted by Mutindwa Coffee Cooperative in Tharaka Nithi County was to designate a special seat in the board to a woman, the seat rotating across the four electoral zones. To complement this strategy, women are encouraged to equally compete with men in the mainstream electoral seats. Thus, the cooperative has had at least two women on the board of five for the last five years since adopting this strategy. Nyongesa *et al.* (2016) recommend dairy development programmes to invest in understanding the gender dynamic in dairy POs through gender audits if they are to succeed in ensuring that gender considerations are taken on board by management structures.

In one of the POs, the only women member of the nine-member Management Committee also chairs the committee; she is a retired Cooperative Development Officer and therefore gained valuable skills during her professional career. The women in the boards interviewed were unanimous that being a critical mass (at least three women on the board) was far more useful than being one or two. They stated that this number gives them confidence and helps them obtain visibility at board meetings. Well-targeted training programmes for women leaders (potential and current) is another strategy to build women’s capacity. One of the two women elected to Lessos’ current board had just resigned at the time of this study, citing time constraints. Informal discussions with the EADD facilitator indicated that limited confidence and an unfavourable cultural environment for women’s leadership could be the triggers for dropping out. Issues of this kind can be mitigated through community awareness and capacity enhancement among women farmers. Most male MC members were also retired officers who had served in the public or private sector. Retirees are preferred because of their experience in leadership and management. It is therefore feasible to target and encourage the few female retirees to consider taking active roles in the POs to which they belong.

Efforts to support the POs in integrating gender inclusiveness objectives and targets in their mission and business operation strategies are prerequisites to enhancing gender-inclusiveness at the production node. In the two sites in Nandi and Bungoma, Heifer International (EADD) was running intensive community awareness training and

a follow-up programme on gender equality and women empowerment's guided by a tailored social capital mobilization model. Similarly, TechnoServe implemented an innovative Mobile Training Unit (MTU) for audio-visual training techniques. Male and female FGDs reported that the MTU's locally developed video, which depicts how the efficiency of dairy enterprise is negatively affected by poor intra-household relations, had a strong influence in triggering social change. EADD has also promoted the formulation and follow-up at the PO-level of specific gender strategies.

Women's access to labour-saving technologies and decent farm structures and tools would be instrumental in easing their burden of labour. These tools and structures include technologies to facilitate the feeding and watering of dairy herds and decent farm structures such as the milking parlour, and often ignored tools such as gumboots, solar lights and dust coats. Technologies to facilitate reproductive roles such as biogas for cooking (and perhaps lighting) and vegetable kitchen gardens were strongly highlighted by female respondents.

4.2.2 Strengthen gender and value chain capacities of enablers and services providers

Creating awareness and provide skills to value chain enablers and service providers on the two concepts of the value chain approach and gender ensure the enhancement of gender-inclusiveness. Observations from this study reveal that the intersection of these two concepts is still a relatively new area in terms of capacity and practice. To achieve better results, gender-inclusive value chains development programmes should invest in raising awareness and enhancing the skills and resources required to analyse, implement and evaluate gender-inclusiveness in targeted value chains. Private sector value chain support services providers are often (but not only) males, and both male and female professionals are inadequately equipped with the required skills to target women as clients of their services.

Programmes such as EADD and Kenya Market-led Oriented Dairy Development (KMDP-SNV) have pioneered a relatively new approach of supporting POs to embed extension services as an integral part of their core business. Under this approach, POs are supported on a graduated grant to establish an extension unit and recruit a number of dairy extension officers, depending on projected demand and level of growth of the

PO. This approach has provided an opportunity to make deliberate efforts to attract female dairy extension officers and to train the male and female extension officers both on the dairy hub approach and on how to target women as clients of dairy hub services. Since the main role of the extension units is to liaise and link the PO and dairy farmers with other public and private sector providers of extension services, it is assumed that their interactions with other providers of dairy inputs and services can be a starting point for influencing gender responsiveness.

Private sector services providers in FGDs and interviews indicated that they had not benefitted from gender and value chain development training organized by dairy development programmes. They also indicated that they had valuable observations about behaviour that was unique to female clients. AI inseminators regarded women as more truthful in honouring payments as promised, while men tended to procrastinate so as to determine if repeat services were required. Paravet and drug shop attendants noted that the female clients seemed to become more loyal to a drug that they observed to have worked well previously and tend to keep the packages in order to use them as a reference, especially when sending someone else to purchase the drug. This indicates that dairy development programmes can target private services providers for capacity development interventions so as to stimulate them to exploit the win-win prospect hypothesized in the value chain approach. Further, they can make the business case of targeting women as clients of their services. The insights gained from such linkages could provide the much needed lessons to inform formulation of gender responsive value chain development programmes.

Another opportunity is for dairy development programmes to incorporate local government officers in gender and value chain development training that they normally organize for programme staff. As noted in this assessment, although the ASDSP adopted the value chain approach and prioritized inclusiveness as a key objective, public field officers expected to roll out the programme indicated limited capacity in integrating the two concepts (the value chain and inclusiveness approaches). Another viable option is to encourage relevant institutions to host communities of practice on resources for gender and value chain development, and make these platforms inclusive of all value chain actors, and to make the resources publicly accessible. International Livestock Research Insti-

tute (ILRI) has been hosting a similar initiative dubbed the ‘agrifood chain toolkit’.⁶

Some of the enablers active in the communities mapped in the sample value chains include county level staff in departments such as livestock production, cooperative development and social services. The Government implemented ADSP programme is operating in all the three counties with dairy as a priority value chain and social inclusion as key outcome areas. However, observations from this study and a recent mid-term review for the programme identify limited capacity in value chain development and social inclusion among the implementing team. Donor-funded programmes include: SNV-KMDP and Agriterria in Kiambu; KAVES, EADD and TechnoServe in Nandi; and EADD, IFAD and ILRI in Bungoma.

4.2.3 Target services providers as beneficiaries of value chain development in a win-win approach

Dairy value chain development programmes often ignore support services providers such as agrovets, artificial inseminators and milk transporters as direct beneficiaries in value chain development. The tendency to regard dairy farmers as the only direct beneficiaries is a misconception of the value chain approach, and a missed opportunity, not only to enhance the chain’s efficiency, but also to address socio-economic challenges experienced by the other value chain actors and the inclusion of women in a broader range of activities. For example, this study found that milk transporters received minimal attention from dairy development programmes either directly or via the POs contracting them. They are least understood and supported yet they play a key role in linking farmers to milk markets, especially female producers. Programmes that facilitate closer business linkages and partnerships between POs and milk transporters stand a better chance of also stimulating gainful employment opportunities in transportation business and spurring dairy production. The involvement of women in this business was also reported to be low, yet there were signs that more women can become involved through options such as: hiring men to run the trade for them; using carts and donkeys if satellite collection centres are established to shorten distances; encouraging a critical mass of women and girls

who can ride motorcycles (positive deviants). All of the inputs and advisory services reviewed during this study are also male-dominated; therefore, programmes that incorporate initiatives to promote women’s engagement in these employment opportunities could contribute towards bridging this gap. For example, TechnoServe Kenya has long experience implementing projects aimed at stimulating women entrepreneurs in the wider agribusiness sector.

Strategies required include:

- a) Mainstream dairy development programme, such as ASDSP EADD, KAVES, KMDP, IFAD, ILRI-Accelerated Value Chain Development (AVCD) Project in order to adopt and intensify implementation of the gender-inclusive value chain approach in a broader sense as to target other actors and players in addition to milk producers. Results frameworks should include gendered indicators and targets across all the nodes in terms of participation, benefits, constraints, access and control over resources and inputs.
- b) When feasible, design and implement specific programmes that target the scaling-up of women-owned enterprises in other links such as inputs and advisory services, transportation, milk trading and small-scale processing. This assessment did not identify such programmes targeting promotion of women’s entrepreneurship in dairy-related small and microenterprises. Whereas the KMDP has embraced this approach by being purely a private sector led value chain enabler, the review for this study finds two gaps: (i) the programme does not promote the informal milk marketing channel which provides many opportunities for women to operate milk-related micro-enterprises; and (ii) the programme implementation does not have a strong focus on gender inclusion. The current Government sponsored programmes such as the Women Enterprise Fund (WEF) and Uwezo fund could provide a good opportunity. They may, however, require modifications to align with this specific scope. TechnoServe has also implemented entrepreneurial development programmes targeting young women in Kenya, although not specific to dairy or even agricultural enterprises.
- c) Linkages with pro-women micro-credit programmes for financing women’s investments in dairy-related enterprises is another

⁶ The agrifood chain toolkit is available at: <https://dgroups.org/cta/lf2m/agrifoodchaintoolkit>

opportunity. In EADD Phase 1, it was realized that although such programmes existed, the uptake of their services was low partly due to their limited outreach capacity, and women poorly prepared for using their services. Hence, dairy development programmes can play a complementary role in preparing women in terms of social capital (group formation and strengthening), information and business skills.

4.2.4 Selling the business case of gender-inclusive supply chains to milk processors

In most cases, milk processors and large buyers (supermarkets and hotels) play the lead role in these value chains. They therefore carry out a high degree of monitoring and have a strong influence over the terms of trade among their networks of milk suppliers. Raising their awareness through arguments on the business case of supporting women's participation in the milk supply chains can yield self-sustaining gender inclusiveness impacts. Leveraging on their dominant position as main innovators in the chain can provide the strategic and organizational leadership for a value chain "doing well while doing good".

Currently, empirically based information packages on the business case for large agro-processors in targeting women producers as a reliable and sustainable supply base for quality produce are lacking or minimal. It could be valuable for dairy development programmes to invest in conducting action-oriented research on these subjects. The rationale for keeping milk processors informed is similar to the strategy of broad-basing responsibility for integrating gender equality in programmes where all departments and staff are held accountable for gender aspects within their functions. In this case, once milk processors are convinced of the benefits of having a critical mass of women as milk suppliers, they can restructure their business relationships (milk procurement guidelines) and provide incentives for intermediaries (POs) that demonstrate strong gender-inclusiveness in their milk supply sourcing and overall running of the PO. They could also include gender-inclusiveness targets as part of the minimum requirements for recruiting milk supply bases (POs).

Fair trade and sustainability certification agricultural marketing (export) programmes are already leading the way in incorporating gender and social inclusion as criteria for recruiting producer groups or as part of the elements in the

traceability systems of processed products. The Bill and Melinda Gates Foundation (BMGF) has also invested in this area by commissioning a guide on improving opportunities for women in smallholder-based supply chains (Chan, 2011). According to the guide, social and moral reasons for seeking to redress gender imbalances in smallholder-based value chains are increasingly becoming clear and recognized by global food companies. The report further notes that this recognition is not just based on social responsibility objectives, but also, and most importantly, on the realization that they could also deliver commercial benefit by improving productivity gains, quality and the future viability of key smallholder enterprises. However, the present study could not establish whether such potential benefits are currently being discussed or pursued in the Kenya dairy industry.

4.2.5 Target support to the farm-to-MCC milk transport support link

As demonstrated by the two value chains in Bungoma and Nandi (Kiambu presents a different case), an increased network of milk transporters backed by more accessible milk collection routes are key strategies in improving women dairy producers' access to MCCs, and in effect, the viability of an MCC. Yet, most POs did not invest much effort or thought in this aspect, nor did the dairy development projects supporting the POs. It can be argued that, while women's contribution at the production link constitutes the backbone of the two value chains, the male-dominated milk transport services are the lifeblood of the system.

Comparing the three POs in Nandi and Bungoma, LDFC has a more well thought-out strategy on milk collection and was the only PO among the three, making a net positive profit in 2015. The manager and transporters interviewed indicated that the PO reviews the routes and periodically holds brainstorming meetings with the transporters. Compared to the others, the PO adapted innovative solutions to the challenges faced by the transporters. First, it negotiated a tripartite credit programme with a fuelling station to provide fuel to transporters on credit and deduct upfront in transporters monthly payments. The PO had also opened the membership bond at the SACCO to allow transporters to become members, and linked them to a dealer of motorcycles in Nandi Hills for access to motorcycles on credit. Such practical measures are lacking in the other POs interviewed; in fact, the neighbouring POs were performing

BOX 3**Milk transporters are key to women's access to market and MCCs financial viability**

In East Africa Dairy Development Programme (EADD) Programme phase 1 experience, the business of transporting milk for farmers proved a good employment opportunity for youth who could own a motorcycle or a donkey or cart, or both. It also emerged that the producer organization (PO) should play a proactive role in ensuring that transporters were recruited and their concerns addressed rather than letting them deal solely with individual farmers. This is because some farmers could evade paying them, which would eventually lead to a decline in milk that is subsequently delivered. Transporters were also encouraged to join the Savings and Credit Cooperatives (SACCOs) run by the POs. They would thus benefit from the financial services offered, and the programme would provide a convenient way of paying them. As it emerged during EADD phase 1, the POs' ability to proactively organize milk transportation mechanisms is key to meeting optimal capacity utilization and the overall viability of the collective milk marketing business.

Source: Mutinda, Omondi and Baltenweck (2015).

poorly financially partly because milk intake had declined and some transporters had defected to LDFC where terms were much better.

EADD experiences in Phase 1 were that most PO leaders and managers did not have in-depth understanding of the importance of this link in securing MMC's financial viability, nor even women's access to milk markets. The lack of proper strategies was associated with a decline in milk intake, especially in the initiation phases of most new MCCs (Mutinda Omondi and Baltenweck, 2015). Dairy development programmes should therefore support PO management in developing robust milk collection and transportation strategies in their business advisory.

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Annex 1

List of focus group discussion participants

Position in Dairy value chain	No. of males	No. of females	Comments
FOCUS GROUP DISCUSSION (FGD) 1 MIXED GROUP – MAPPING VALUE CHAIN, 23 SEPTEMBER 2015, NANDI (HAMAKI SHOPPING CENTRE)			
Dairy producers	2	1	Female producer has a motorbike that runs milk transport business via hired rider
Milk transporters	2	0	Transporters using motorcycles
Milk traders	2	0	Milk bars
Works in dairy processing plant	0	1	Milk bar attendant
Provides support services	1	0	Agrovet shop
Represents value chain enablers	0	1	Livestock advisory service provider
TOTAL (10)	7	3	
FGD 2 FEMALE GROUP, 23 SEPTEMBER 2015, NANDI (LESSOS DAIRY FARMERS' COOPERATIVE BOARD ROOM)			
Dairy producers		5	
Milk transporters		0	
Milk traders		2	
Works in dairy processing plant		1	Employees at Lessos Dairy Cooperatives
Provides support services		2	Agrovet shop employees
Represents value chain enablers		0	
TOTAL (10)			
FGD3 MALE GROUP, 24 SEPTEMBER 2015, NANDI (HAMAKI SHOPPING CENTRE)			
Dairy producers	3		
Milk transporters	3		Contracted by Lessos Dairy Cooperative
Milk traders	1		
Works in dairy processing plant	0		
Provides support services	1		Agrovet shop owner
Represents value chain enablers	1		Farmer trainer under KAVES
TOTAL (9)			
FGD1 MIXED GROUP – MAPPING VALUE CHAIN, 28 SEPTEMBER 2015, BUNGOMA (NAITIRI DAIRY COOPERATIVE BOARD ROOM)			
Dairy producers	2	1	
Milk transporters	2	0	Contracted under Naitiri Dairy Cooperative
Milk traders	1	1	
Works in dairy processing plant	1	0	Naitiri MCC
Provides support services	2	0	Private AI and extension staff of Naitiri Cooperative
Represents value chain enablers	2	0	Government local livestock officers
TOTAL (12)	10	2	

FGD 2 FEMALE GROUP, 28 SEPTEMBER 2015, BUNGOMA (NDALU DAIRY COMMUNITY-BASED ORGANIZATION BOARD ROOM)

Dairy producers	4	
Milk transporters	0	
Milk traders	2	Operate milk bars owner and spouse
Works in dairy processing plant	0	
Provides support services	1	Owns agrovet store
Represents value chain enablers		

TOTAL (7)**FGD 3 MALE GROUP, 29 SEPTEMBER 2015, BUNGOMA (NAITIRI DAIRY COOPERATIVE BOARD ROOM)**

Dairy producers	2	
Milk transporters	2	Contracted under Naitiri Cooperative
Milk traders	1	
Works in dairy processing plant	1	Naitiri Dairy Cooperative
Provides support services	1	Extension staff employed by the Cooperative
Represents value chain enablers	1	Local livestock officer

TOTAL (8)**FGD1 MIXED GROUP – MAPPING VALUE CHAIN, 6 OCTOBER 2015, KIAMBURU (KARURI LIVESTOCK OFFICE)**

Dairy producers	1	1	
Milk transporters	0	0	
Milk traders	2	1	
Works in dairy processing plant	1	0	Youth runs a family cottage business
Provides support services	2	1	All double in AI and as paravets
Represents value chain enablers	1	1	Local livestock officers

TOTAL (11)**FGD2 FEMALE GROUP, 6 OCTOBER 2015, KIAMBURU (KARURI LIVESTOCK OFFICE)**

Dairy producers	6	
Milk transporters	0	
Milk traders	2	
Works in dairy processing plant	0	
Provides support services	1	AI and paravets
Represents value chain enablers	2	Local livestock officers

TOTAL (11)**FGD 3 MALE GROUP, 7 OCTOBER 2015, KIAMBURU (KARURI LIVESTOCK OFFICE)**

Dairy producers	2	
Milk transporters	0	
Milk traders	1	
Works in dairy processing plant	1	Kiambaa Dairy Cooperative
Provides support services	2	AI and paravets
Represents value chain enablers	1	Local livestock officer

TOTAL (7)**OVERALL TOTAL (85) 48 37 (44 %)**

Annex 2:

List of key informants and households interviewed

Key Informants' designation	Organization
Head, Economic, Social and Cultural Rights	National Gender and Equality Commission (NGEC)
EADD Gender Coordinator	Heifer
Programme Leader	International Livestock Research Institute (ILRI)
Senior Programme Officer	International Development Research Centre (IDRC)
Senior Scientist	ILRI
Regional Director, EADD	Heifer
TechnoServe, Mobile Training Unit (MTU) Programme	TechnoServe
Gender expert	Land O'Lakes
CEO, Kenya Dairy Farmers' Federation	Kenya Dairy Farmers' Federation (KDFF)
Country Programme Manager, EADD	Kenya/Heifer
Dairy coordinator, KENAFF	
Head-Milk Procurement and Extension	New Kenya Creameries Cooperative (KCC)
East Africa Dairy Development (EADD)-Monitoring and Evaluation Officer	Heifer
Dairy Technical Director, EDT	KAVES
Livestock Production Officer – Tongaren	Bungoma County
County Dairy Coordinator	Bungoma County
Coordinator	KDB
Manager, ABS	ABS-TCM
Livestock Production Officer	Nandi County
Social Development Officer	Nandi County
County ASDSP Coordinator	Kiambu County
Sub County Veterinary Doctor – Kiambaa	Kiambu County
Head of Extension services	Kiambaa Dairy Cooperative
Manager	Kiambaa Dairy Rural SACCO
Manager	Githunguri Dairy Cooperative

Analysis of Households interviewed			
Position in value chain	Male	Female	Fieldwork site and period
Dairy farmers	1	1	Nandi: 23–25 September 2015
Milk traders	1	1	
Agrovet stores	1	1	
Milk transporters	2	0	
Dairy processing plant	2		
Dairy farmers	1	1	Bungoma: 28–30 September 2015
Milk traders	1	1	
Agrovet stores	1	1	
Milk transporters	2	0	
Dairy processing plant	1	0	
Dairy farmers	1	1	Kiambu: 6–8 October 2015
Milk traders	1	1	
Agrovet stores	1	1	
Milk transporters	0	0	
Dairy processing plant	1	0	

Note: ABS=Africa Breeders Services (ABS); EADD=East Africa Dairy Development (Programme); KAVES=Kenya Agricultural Value Chain Enterprises; IDRC=International Development Research Centre; ILRI=International Livestock Research Institute; KDF=Kenya Dairy Farmers' Federation; MTU=Mobile Training Unit; NGEC=National Gender and Equality Commission; SACCO= Savings and Credit Cooperative Society.

**Gender assessment of
dairy value chains:
evidence from Kenya**

The present study is a gender assessment of the dairy value chain in selected sites in Kenya: Kiambu, Nandi and Bungoma Counties. It relies on evidence gathered through fieldwork complemented by a review of specialized background documentation. The findings confirm that women's empowerment is vital for sustainable dairy value chain development and that projects supporting dairy production need to increase their efforts to be gender inclusive. The study provides country-specific recommendations for Kenya, which also feed into a more general knowledge base on how to develop gender-sensitive dairy value chains.

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