



# Influence pathways and economic impacts of policy change in the Kenyan dairy sector

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# Abbreviations

BDS	business development service
CGIAR	Consultative Group on International Agricultural Research
CSO	civil society organization
DANIDA	Danish International Development Agency
DFID	Department for International Development
FAO	Food and Agriculture Organization of the United Nations
ILRI	International Livestock Research Institute
IRR	Internal Rate of Return
KARI	Kenya Agricultural Research Institute
KCC	Kenya Cooperative Creameries
KDB	Kenya Dairy Board
KEBS	Kenya Bureau of Standards
KES	Kenya shilling(s)
MALDM	Ministry of Agriculture, Livestock Development and Marketing
MoLFD	Ministry of Livestock and Fisheries Development
NGO	non-governmental organization
NPV	Net Present Value
ODI	Overseas Development Institute
POR	policy-oriented research
PRSP	Poverty Reduction Strategy Paper
SDP	Smallholder Dairy Project
SPIA	Standing Panel on Impact Assessment
SSMV	small-scale milk vendor
USD	United States dollar(s)

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There are well documented concerns that there is limited policy-oriented research (POR) impact assessment activity within the Consultative Group on International Agricultural Research (CGIAR). Consequently, the CGIAR's Standing Panel on Impact Assessment (SPIA) initiated a program to provide initial funding and guidance so that CG centres could conduct assessments of the impacts of flagship POR projects. The authors wish to thank SPIA and ILRI for providing financial support to undertake this exercise.

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## Executive summary

In Kenya, informal milk markets account for approximately 86% of milk supplies to consumers and its supply-chain-related actors include small-scale producers, mobile milk traders, milk bar operators and milk transporters. The demand for milk and milk products is also on the rise in Kenya where annual per capita milk consumption is now estimated at 145 litres, which is believed to be more than five times higher than milk consumption in other countries in East Africa. Additional research and a review of secondary data have shown that dairy products constitute the largest food expenditure item in Kenyan households.

Although most milk in Kenya passes through informal market channels, previous government policies did not adequately address the concerns of the farmers, traders and consumers who make up these channels. The informal milk markets dominate because milk sold through informal markets reaches and satisfies the traditional tastes of poor consumers who pay a lower price for it and farmers receive higher prices than they do via the formal sector. The old colonial dairy policy, which essentially criminalized the activities of small-scale milk vendors (SSMVs), was largely designed to protect the interests of large-scale settler dairy producers and professed to be based on concerns about food safety and quality. Prior to a recent policy change in 2004, small-scale dairy producers and traders were often harassed as large, powerful dairy market players, linked to those in authority, sought to increase their relatively small market share. The activities of SSMVs were not recognized and they could not trade unless licensed, yet the existing regulations made no provisions for licensing or engaging them. The main regulatory body, the Kenya Dairy Board (KDB), perceived its mandate as one to stamp out small-scale marketing channels. Regulations in effect only recognized a western industrial model of processing and packaging of milk, and small-scale milk producers were required to act only as suppliers.

Efforts to revise the old Kenya dairy policy were spearheaded by the Smallholder Dairy Project (SDP), a collaboratively implemented, integrated livestock research and development project whose broad objectives were twofold. First, the initial research phase focused on identifying best-bet technologies aimed at improving livestock farming practices and livelihoods. The second phase of SDP initiated and implemented strategies to influence and enhance changes in the Kenyan dairy policy, particularly those that did not officially recognize the existence or operations of SSMVs. The revised policy would allow KDB to engage SSMVs through training and licensing as well as milk promotion. SDP officially commenced in 1997 and ceased its activities by 2005.

This study is an *ex post* assessment of the impact of the revised Kenya dairy policy. It outlines the policy change process, investigates induced behavioural changes at the levels

of field regulators and SSMVs, and estimates economic impacts on producers, SSMVs and consumers. It also provides a strategic assessment of the research and coordinating roles played by ILRI, recognizing that ILRI was only one partner in a complex project with many people and organizations involved, and estimates how much of the overall gains can be attributed to this research/coordination component.

SDP research provided evidence supporting policy and institutional reforms in the Kenyan dairy sector. Specific research evidence included (1) the large number of smallholder households which depended on dairying for their livelihoods; (2) the large proportion of the milk sector that is dominated by the informal market; and (3) the significant employment creation potential of the informal sector. In different forums that included workshops, seminars, other conferences and meetings with policymakers, SDP advocacy partners used the above-mentioned research outputs to influence policy, with the current changes significantly effected in September 2004 when subsidiary legislation was published to enable training and licensing of SSMVs.

This study found that SDP produced a significant volume of evidence that was used to influence the policy change process at various stages by different decision-makers and organizations. Although the Kenyan dairy policy document and bill have been in a parliamentary process for more than a decade, written ministerial subsidiary regulation plus KDB reorganization provides ample regulatory authority for engaging SSMVs and this significant shift in dairy regulation was traced back to September 2004. The study found significant evidence of behavioural change among regulators and SSMVs that has led to positive economic benefits across Kenya.

Results show that overall, milk marketing margins declined by 9%—equivalent to 0.54 Kenya shillings (KES) per litre (KES 65 = USD 1.00)—when the revised policy came into effect, reflecting reduced costs in the supply chain. However, this post-policy marketing margin change was only statistically significant in the Nairobi area and was not statistically different from the pre-policy change marketing margin in areas outside of the Nairobi area markets. Still, a significant number of SSMVs are now operating under licence.

Welfare benefits arising from the policy change were high, and are captured by consumers, producers, and SSMVs. A cost–benefit analysis revealed that the policy change was highly profitable, with a high positive net present value (NPV) and all costs being recouped quite quickly. In addition, the very high internal rate of return (IRR) value suggests that positive net benefits will continue to be gained by many actors in the dairy sector for years to come. However, government must devise a fairer way of assessing cess fees among producers, consumers. A process of assessing a significant portion at the level of SSMVs may lead to losses among SSMVs, in spite of the policy change.

# 1 Introduction

## 1.1 Study background

In Kenya, informal milk markets account for nearly 86% of milk supplies to consumers (Omore et al. 2004). The supply chain actors in these markets include small-scale producers, mobile milk traders, milk bar operators and milk transporters. This dominance of SSMVs in Kenya is also seen in neighbouring countries, such as Tanzania, Uganda and Rwanda, and in many other developing countries, including India, which is now the largest dairy producer in the world.

There are also indications of increasing demand for milk and dairy products in these developing countries. For example, annual per capita milk consumption in Kenya is now estimated at 145 litres<sup>1</sup> (SDP 2005) and is believed to be more than five times higher than milk consumption in other countries in East Africa. In addition, research by Argwings-Kodhek et al. (2005) and a review of secondary data by Salasya et al. (2006) determined that dairy products constitute the largest item of food expenditure by Kenyan households.

Although most milk in Kenya passes through informal market channels, previous government policies did not adequately address the concerns of the farmers, traders and consumers who operate in these channels. Milk sold through informal markets reaches and satisfies the traditional tastes of poor consumers, and farmers receive higher prices than they do via the formal sector (Omore et al. 2004). The old colonial dairy policy, which essentially criminalized the activities of SSMVs, was largely designed to protect the interests of large-scale settler dairy producers and professed to be based on concerns about food safety and quality. Prior to a recent policy change in 2004 that is the focus of this study, small-scale dairy producers and traders were often harassed as large, powerful dairy market players linked to those in authority sought to increase their relatively small market share. The activities of SSMVs were not recognized and they could not trade unless licensed, yet the existing regulations made no provisions for licensing or engaging them. The main regulatory body, KDB, also served as the main enforcement body with a perceived mandate to stamp out small-scale marketing channels. Regulations in effect only recognized a western industrial model of processing and packaging of milk, and small-scale milk producers were required to act only as suppliers.

The revised 2004 Kenya dairy policy allowed KDB to engage SSMVs through training and licensing as well as milk promotion. It was informed by the research and development

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1. This recently generated figure was obtained from sample-based surveys and groundtruthing in several locations; it is considered more accurate and is increasingly being used instead of other lower figures that are widely considered under-estimates, given that they are based on figures that were not updated.

activities of the SDP, a collaboratively implemented, integrated livestock research and development project whose broad objectives were twofold. First, the initial research phase focused on identifying best-bet technologies aimed at improving livestock farming practices and livelihoods. The second phase of SDP initiated and implemented strategies to influence and enhance changes in the Kenyan dairy policy, particularly those that did not officially recognize the existence or operations of SSMVs. Legalization of the activities of SSMVs in Kenya raised awareness about the potential benefits of legalization elsewhere in East Africa, such that in 2007 Kenya, Rwanda, Tanzania and Uganda signed a memorandum of understanding to standardize and harmonize their dairy policies.

The SDP was implemented by ILRI, the Kenya Agricultural Research Institute (KARI) and the Ministry of Livestock and Fisheries Development (MoLFD) and funded by the Department for International Development (DFID). Other key partners included Kenya Bureau of Standards (KEBS) and Ministry of Health officials, along with livestock farmers, SSMVs, milk processors and packagers from the private sector, and Action Aid, Institute of Policy Analysis and Research and SITE Enterprise Promotion from the civil society sector. Another key partner was Land o'Lakes, an international development organization whose mission includes promoting the activities of SSMVs. The project manager was an employee of MoLFD.

For SSMVs operating in local markets, milk trade channels were severely limited by non-tariff trade barriers and high transaction costs. SDP research and development activities were designed to inform a new dairy policy that engaged and recognized the activities of SSMVs and lowered market entry barriers through training and licensing. The effect of the new policy was to lower transaction costs and to reduce overall costs of marketing services, particularly to poor dairy producers and consumers.

This *ex post* assessment of the impact of the revised Kenya dairy policy outlines the policy change process, investigates induced behavioural changes at the levels of field regulators and SSMVs, and estimates economic impacts on producers, SSMVs and consumers. It also provides a strategic assessment of the research and coordinating roles played by ILRI, recognizing that ILRI was only one partner in a complex project with many people and organizations involved, and estimates how much of the overall gains can be attributed to this research/coordination component.

A number of previous research studies have quantified and evaluated the distribution of benefits deriving from POR (Lindner and Jarrett 1978; Freebairn et al. 1982; Wohlgemant 1993; Ryan 1999), but there is a dearth of information on such studies within the CGIAR. As donors continue to invest in research aimed at having policy impact through the CGIAR, there is little evidence of effectiveness of POR or indeed any impact assessments of POR by CGIAR institutions. This makes it difficult to gauge not only the net benefits of POR, but

also the respective centres' contributions to the policy change process. This evaluation of the impact of a revised Kenyan dairy policy that was an outcome of an ILRI-led dairy policy research project was commissioned by SPIA, an arm of the Science Council of the CGIAR, in an effort to contribute to this knowledge gap.

## 1.2 Objectives of the study

This study was designed to evaluate the impact of a revised Kenyan dairy policy that encouraged relevant government agencies to engage with SSMVs and, in particular, to explore and analyse the role that research/coordination played in contributing to the policy change and the net benefits to the investment in the policy research component.

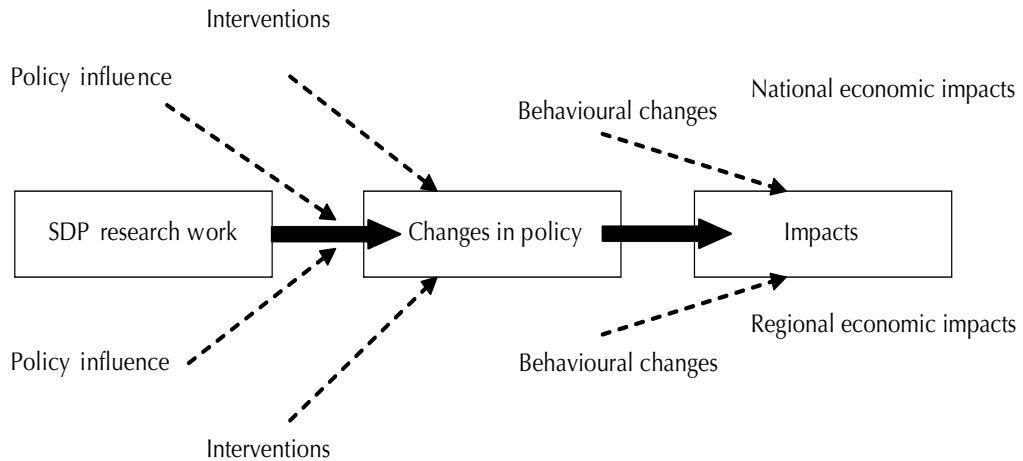
Specific objectives were to:

- Describe and better understand the policy, institutional (in the broad sense of 'rules of the game') and behavioural changes that have occurred in Kenya's dairy sector and to identify and learn lessons about how they occurred and what role the research and coordination component of SDP played.
- Quantify transaction costs and evaluate how reduced transaction costs have impacted the prices paid by consumers and those received by producers.
- Measure the overall economic benefits of the policy change to consumers, producers and SSMVs.
- Present a counterfactual situation, depicting what might have happened if SDP had not been implemented and the dairy policy had not changed.

## 1.3 Outline of study methods

The study used a combined approach to assess both the influence of the research on policy change and to estimate the economic impact of the policy change. In doing this, it described the whole pathway from research to economic impacts on ultimate beneficiaries (Figure 1). SDP's process of learning lessons is described in detail in Leksmono et al. (2006) and is therefore only summarized in this assessment.

The approach combines both demand-led and supply-led elements to analyse what influenced changes in policy and behaviour, i.e. tracking back from the policy change to explore and document the influences of SDP in Kenya. The economic impact component is supply-led in that it models the impacts of the changes in policy on farm and retail prices, as well as on the economic welfare of farmers, SSMVs, consumers and input suppliers. The list of actors follows from SDP assessments (Omore et al. 2004) which determined that the milk supply chain in the informal sector is dominated by small-scale producers, SSMVs (including milk bars) and consumers.



**Figure 1.** Pathway of research outputs to impacts.

## 1.4 Study area, data sources and sampling framework

The study benefited from the use of historical weekly urban wholesale data that had been collected for unprocessed (farm proxy) and processed (retail proxy) milk prices in Nairobi and Nakuru from August 2003 to February 2007 by the Kenya Dairy Development Project (with funding from Heifer International). As the policy and behavioural changes occurred during this time period, we were able to investigate the response of producer and consumer prices to the policy change.

Field interviews were conducted in the Nairobi area and Nakuru in August 2007 with a sample of 61 milk traders (30 from Nairobi and 31 from Nakuru) and 5 field regulators (3 from Nairobi and 2 from Nakuru). In addition, we interviewed several policymakers and SDP researchers, including a KDB Technical Services Manager, an assistant to the KDB Technical Services Manager, the Chief Executive of SITE Enterprise Promotion, a former SDP Project Manager with MoLFD and two researchers from ILRI. The field interviews were conducted by an ILRI researcher and consultant experienced in dairy sector regulation and familiar with SDP. The interviews with milk traders and field regulators were conducted between 1 and 10 August 2007. The interviews with policymakers and SDP researchers were conducted by three ILRI researchers in June and July 2007 and additional information solicited in January 2008.

The interviews focused on the policy change process as reported by policy officials and associated behavioural changes among field regulators and milk traders. Information obtained through a review of relevant grey literature was supplemented by interviews of policy officials to provide an overview of the policy change process as well as the associated timeline for this process.

Because this *ex post* impact assessment had limited time and funds available, the study was limited to Nairobi and Nakuru but included Kiambu and Thika towns on the outskirts of Nairobi. The study areas have always had KDB offices and operations. Aside from the police who were tasked under the Dairy Industry Act to act as field-level regulators, most recognized market locations where SSMVs operate have at least one field regulator from the Public Health Department and one from KDB. In addition, KDB is now spearheading training and licensing efforts in these areas, so that the impact of the new policy is more easily identified in these areas than elsewhere.

#### 1.4.1 Description of the study area

Nairobi is a high milk density area where the dairy sector is dominated by small-scale milk producers. The area has a large collection of different trader groups with some, particularly transporters and mobile traders, coming from as far as 100 km away. The Thika area supplies parts of Nairobi and Machakos and is dominated by milk bars and small-scale mobile traders. These traders supply a competitive, urban and relatively sophisticated market. Milk is collected in the morning before 0600 hours and transported by public vehicles, arriving at the market by 0900 hours. Some of the traders act as middlemen, selling their milk to other traders who then transport their consignment to the market. Women constitute a large proportion of small-scale milk traders serving the Nairobi market.

Nakuru, on the other hand, is surrounded by large-scale farmers who deliver their milk directly to processors. Small-scale milk traders are left to collect milk from as far as 40 km away from town. The area is dominated by small-scale mobile traders and milk bars. Small-scale mobile traders transport milk using bicycles and hence milk trade in this area is dominated by men.

#### 1.4.2 Sampling SSMVs

The choice of sample size for SSMVs interviewed was not based on statistical principles but on a desire to collect information from as many traders as possible given constraints of time and funds. Similarly, the choice of interviewees was not statistically random. Using a questionnaire that served more like a checklist (see Appendix 1), SSMVs from Nairobi and Nakuru were individually engaged in interviews and informal discussions. No prior appointments were made with the traders; they were interviewed as they were encountered going about routine milk marketing operations. The interviews were conducted by the ILRI researcher and consultant mentioned in Section 1.4. Inclusive of travel time, the surveys were conducted from 1 to 10 August 2007.

## 1.5 Organization of the report

The introductory section highlights the research problem, study objectives and a broad outline of the study methodologies. In Section 2, summary reviews of SDP research and advocacy activities are presented in order to offer a clearer picture of the POR inputs and outputs. Section 3 presents outlines of the pre- and post-policy change regulatory environments illustrating the policy change and influence processes. Section 4 covers policy impacts on milk prices and behavioural changes among regulators and SSMVs. In the penultimate section, we present an economic impact assessment of the new Kenyan dairy policy and the net benefits to the research and coordination component as well as a counterfactual assessment—what would have happened without SDP and the resultant SDP-inspired policy change. Finally, we present lessons learned and conclusions.

## 2 Policy-oriented research inputs and outputs in SDP

From 1988 to 1994, ILRI led an integrated research-extension-farmer collaboration project that was designed to identify and resolve problems encountered by smallholder dairy farmers in the Coastal region of Kenya. When SDP was at the conception phase, research ideas included expanding results and lessons learned such as systems for supplying milk into the highlands and greater Nairobi area (Leksmono et al. 2006). To generate research ideas and concretize objectives for a new dairy project that would be implemented by MoLFD, KARI and ILRI, the UK Overseas Development Administration (now DFID) sponsored a workshop for dairy industry stakeholders in March 1995. DFID subsequently approved funding for what would become SDP in December 1995.

SDP officially commenced in August 1997 as an integrated, collaborative research and development initiative whose purpose was to support the sustainable development of the smallholder dairy subsector in Kenya. The research phase proposed to undertake a detailed characterization of the informal milk sector, including an analysis of the policy environment and an examination of factors that hinder the competitiveness of smallholder dairy farmers. Initially, the project focused on participatory development of improved technologies and extension and training materials for farmers and traders, together with a spatial analysis of dairy systems for improved targeting. However, the focus later shifted towards supporting change in the policy and institutional environment in order to better support dairy-dependent livelihoods.

### 2.1 Research, advocacy and POR inputs in SDP

During the initial research phase of SDP (1997–2000), a rapid appraisal of dairy production systems was conducted in mid 1998 followed by an economic and structural analysis of dairying which also addressed policy and institutional issues related to dairy development in Kenya. These analyses provided dairy stakeholders with a comprehensive overview of affairs of the Kenyan dairy sector at that time, placing the project in an informed position to contribute to on-going discussions to influence changes in the Kenyan dairy policy. One of the major findings was that the informal milk sector was very important to the livelihoods of milk producers, traders and consumers.

Additional research activities in 1998 included structured household surveys in Kiambu District (close to Nairobi) and other districts in Kenya's Central Province. The general objectives were (1) to describe the existing structure of dairy production and farmer practices; (2) assess existing and future constraints and opportunities facing the dairy industry and (3)

identify the types of dairy producers who should be targeted by SDP. The last objective was particularly significant for its attempt to identify resource-poor farmers who would be assisted by the project. Furthermore, between 1999 and 2000 SDP assessed public health hazards in the informal milk marketing sector. By the time the research phase was ending in 1999, it was clear that SDP activities so far omitted important aspects such as employment and livelihoods; these were later assessed.

The project further developed the characterizations and technologies and also focused on the uptake of those technologies with extended geographical coverage and a new goal of 'contributing to sustainable improvements in the livelihoods of poor people in Kenya'. The findings from these research activities were presented at many meetings throughout SDP's lifetime. Following an in-depth review in 1999, the focus of the project changed to better address other aspects of dairy-related livelihoods, especially the outdated laws banning milk sales by SSMVs in urban areas of Kenya.

The final phase of SDP (2000–05) focused on policy-level outputs and more active engagement with policymakers. Following a 'snapshot review' in 2000 which reported favourably on SDP's progress but noted that uptake of technologies at farm level was difficult in the prevailing policy environment, it was recommended that SDP develop a strategy for the reform of dairy policy using evidence-based SDP research findings in order to increase impact. SDP drew up a strategy for influencing policy, focusing in particular on the findings concerning the informal milk market, its importance for livelihoods and ways in which perceived public health risks could be addressed. The Kenyan dairy policy at that time did not directly prohibit the uptake of any smallholder farm-level technologies. However, it made farm-level production increases and quality improvement less palatable options because the policy prohibited milk sales through the informal sector into urban areas. It was clear that the prevailing policy environment was actively discouraging the predominant section of the market, with major implications for producers, traders and consumers whose livelihoods depended on this informal sector. To tackle some of the identified informal market issues, SDP piloted the training of SSMVs in basic milk testing, hygiene and handling.

Part of SDP's policy-influencing strategy was to foster links with civil society organizations (CSOs) that could bring capacity to engage in policy advocacy in a way that the SDP implementing institutions could not. These CSOs became engaged in active advocacy in support of small-scale traders and farmers and, together with the KDB, were partners in SDP's high-level dairy policy forum held in 2004 to present the project's research results and highlight their policy implications.

DFID funded SDP to the tune of approximately USD 2.5 million from 1997 to 2005. Consultations with former SDP personnel revealed that the project's research and

development partners contributed an additional USD 2.5 million in staff time, staff resources and other in-kind contributions over the life of the project. Actual staff time in hours was difficult to quantify but SDP had a project manager appointed by MoLFD, ILRI provided the technical research team and the CSOs were very active in the advocacy phase. A steering committee was established with members from ILRI, KARI, KDB, KEBS, MoLFD and the Ministry of Health and some informal market actors.

## 2.2 POR outputs and SDP research findings

This study reviewed SDP publications and research presentations between 1997 and 2005 in order to provide a more concrete base to ascertain influence from POR outputs and research findings. The review revealed 10 SDP research reports, 38 conference presentations (including one poster), 9 extension papers (some additionally published in Kiswahili or Kikuyu), 4 journal publications, 10 policy briefs, 1 International Service for National Agricultural Research briefing paper and 1 doctoral and 2 masters theses. The documents covered several topics including farming systems and constraints; consumption, marketing and policy; production and utilization of feed resources; and institutional environment and dissemination of information. Although approximately half of all presentations were made in international forums outside of Kenya mostly by ILRI staff, it was impossible to estimate exactly how much staff time was allocated to this or any other dissemination process.

Generally, relevant SDP evidence supporting policy and institutional reform as gleaned from the above-mentioned publications and presentations includes the following facts: nearly 800 thousand smallholder households depended on dairying for their livelihoods. At least 86% of marketed milk was sold through the informal sector as raw, unpasteurized milk. By extension, the vast majority of farmers and consumers depended on this market. The informal market paid significantly higher prices to farmers and sold milk to consumers at about half the price of processed, packaged milk. SDP also approximated the number of milk hawkers at 30 thousand, the number of dairy cattle at 3 million, total milk production at 3 billion litres and annual per capita milk consumption at 100 litres per annum.

The above-mentioned statistics were widely used in Kenya and are reflected in official Government and Food and Agriculture Organization of the United Nations (FAO) statistics. However, in 2005 SDP recalculated these statistics using best available evidence. The new estimates put the number of smallholder dairy farms at 1.8 million, the number of milk hawkers at 39,650, the number of dairy cattle at 6.7 million, total annual milk production at 4 billion litres and annual per-capita milk consumption at 145 litres (SDP 2005).

In addition, SDP investigated the employment creation potential of the informal milk sector. SDP determined that the informal sector accounted for a large proportion of jobs in

dairy marketing and processing and that in the larger economy, smallholder dairy farming also supported over 350 thousand full-time wage positions including employment in milk collection, transportation, processing, and sales. These findings on employment creation attracted the interest of government agencies and people involved in designing Kenya's poverty reduction strategy paper (PRSP), some of whom, as a result, would later become strong advocates for the legalization of SSMVs.

Overall, the findings on the highly significant farmer and consumer dependence on informal milk marketing and the employment generation potential, among others, proved crucial in influencing behavioural and policy change in the Kenyan dairy sector.

Kenyan consumers boil milk before they drink it—whether they purchase it raw or pasteurized—thereby significantly reducing public health concerns. SDP research results showed that processed milk from large-scale processors showed no significant difference in quality compared with milk from unlicensed traders—both were failing to meet quality standards that were set by KEBS. SDP research determined that training of small-scale traders in testing and handling of milk and use of appropriate containers led to improvements in milk quality.

### 3 Policy influence pathway in SDP and the evolution of Kenya dairy policy environment

This section presents a review of the changes and timelines in the Kenyan dairy regulatory environment, together with the influences that were brought to bear on the policy change process. To understand the policy environment in which SSMVs operate, it is necessary to first chronicle the evolution of the dairy industry in Kenya due to successive government interventions.

To assess policy influence, this section draws heavily from findings from a recent ILRI–Overseas Development Institute (ODI) study (Leksmono et al. 2006), grey literature and unpublished SDP documents, complemented by interviews with field regulators, policymakers and researchers. These approaches captured details not only of changes in written policies but also how technical information from SDP research was used to influence policymaking. It recounts events, activities, timelines and people present at each stage.

#### 3.1 Review of the pre-policy change regulatory environment

The policy of regulating the Kenyan dairy sector dates as far back as 1925 when Kenya Cooperative Creameries (KCC) was incorporated and charged with dairy processing and marketing responsibilities. Initially KCC operated in an environment that included other big processors. However, in 1968 its status as sole processor and distributor or marketer of milk was confirmed when the government withdrew operating licenses from other processors, supposedly wanting to rationalize milk distribution.

The business of regulating milk marketing fell to KDB which came into existence as decreed by the 1958 Dairy Industry Act. Although the Act was revised in 1984, it largely remains the main regulation that guides milk marketing activities in Kenya. The functions of KDB as spelt out in the Act are (1) to organize, regulate and develop the efficient production, marketing, distribution and supply of dairy produce, having regard to the various types of dairy produce required by different classes of consumers; (2) to improve the quality of dairy produce; (3) to secure reasonable and stable prices to producers of dairy produce; (4) to promote market research in relation to dairy produce; (5) to permit the greatest possible degree of private enterprise in the production, processing and sale of dairy produce, consistent with the efficiency of the producer and the interests of other producers and consumers and (6) generally to ensure, either by itself or in association with any government department or local authority, the adoption of measures and practices designed to promote greater efficiency in the dairy industry.

The 1958 Act granted monopoly powers to KCC in purchasing, processing and marketing in scheduled areas, mainly urban markets which were the preserve of large-scale settler operations. From its establishment to the early 1970s, milk supplies to KCC by large producers alone were managed through contracts, quotas and minimum volumes. However, the 1964 Kibaki Commission recommended that contracted milk quotas be abolished and that KCC should accept milk from all producers, including SSMVs, as long as the quality was acceptable. As a result, KCC made guaranteed purchases of all milk supplied by all producers, irrespective of market demand. To accommodate these purchases, KCC needed to expand and did so extensively in the 1970s and 1980s.

Increased government expenditure on subsidized input services led to increased milk production and by 1977, smallholder milk production had overtaken large-scale production (Mbogoh and Ochuonyo 1992). KCC maintained its dominance in marketing and continued to experience rapid growth. By 1987, inefficient management led to untenable economic losses, paving the way for a government move to administer KCC under the Cooperatives Act and replace its board with a government-appointed one. In 1992, the dairy sector was liberalized with policy options that included price decontrols, liberalization of marketing, government budget rationalization, privatization and parastatal reform (Leksmono et al. 2006). That became justification for the government to restructure KCC to make it a profitable enterprise. Despite liberalization and restructuring, political interventions, inefficient management and political rent-seeking behaviour heralded the collapse of KCC as a state monopoly (monopsonist) in the 1990s. Liberalization ended the government monopoly status of KCC and encouraged private-sector participation through other large-scale processors. However, the official policy excluded participation by SSMVs except through sales to large-scale processors including the New KCC, a policy that was in prior existence. When SSMVs sold milk to consumers, especially in scheduled areas, it was considered illegal.

By the time of liberalization, KCC operated 11 collection centres and 11 processing facilities, employed 4000 people, handled 420 million litres of milk and produced 17 dairy products (MALDM 1993). However, the collapse of KCC in the lucrative, high-demand urban centres created a gap that was quickly filled by several large-scale, licensed and regulated private-sector milk processors and packers and, in some cases, by small-scale unlicensed informal milk traders.

Before 1992, KCC as the government-supported monopoly on urban milk sales had pasteurized milk sales amounting to slightly over 200 million litres (Omore et al. 2004). At the time of the most recent SDP appraisal (see Omore et al. 2004), it was estimated that the formal sector accounted for about 14% of milk sales, representing 196 million litres. Besides the New KCC, other large-scale processors in the formal milk sector in Kenya include Brookside Dairies, Spin Knit Dairies, Githunguri Dairy and Adarsh Developers.

### 3.2 Policy influence in the Kenyan dairy policy change process

In the previous section, we highlighted the timeline to the collapse of KCC as a government monopoly. As KCC gradually collapsed in a liberalized environment and its market share was taken over by other large licensed processors, a 1993 government document, the Kenya Dairy Development Policy, provided guidance on how to restructure and remain competitive. Yet, this was a policy environment that actively discouraged operations by SSMVs, even though by most accounts the 1958 Dairy Industry Act did not overtly proscribe their activities. There were speculations that the authority to regulate the informal sector derived from the Public Health Act of 1966, which specifically stated that the sale of milk products must be conducted at acceptable premises. Such confusions in applicable policy, the proliferation of SSMVs, the economic benefits of the informal dairy sector and other considerations galvanized the government to act in the policy arena. Consequently, in 1996 the government set up the Dairy Industry Act review task force whose mandate was to propose amendments to the 1958 Act to reflect the liberalized policy environment in the dairy sector. This period coincided with the inception of SDP research activities, although at that time, the activities of the task force were independent of SDP. Among others, task force membership included personnel from KCC, KDB and MoLFD. Table 1 presents dates and a summary of important events and activities in the policy change process.

Revision of the 1958 Dairy Industry Act by the review taskforce focused on (1) organization and structure of the new KDB; (2) functions, powers and duties of the new KDB; (3) management and administration of the new KDB; (4) financial aspects of the new KDB; and (5) future steps and transition issues until KDB became fully autonomous and wholly funded through payment of cess fees by milk traders.

The revised Dairy Industry Bill was available for stakeholder consultation by June 1996. This bill did not dwell on the role of SSMVs in retail markets. In the meantime, a subcommittee of the same task force was set up to revise the policy document. Although the draft bill was presented to the office of the Attorney General in 1996, critical personnel changes in the ministry delayed the reform process. By 1997, a draft of the revised policy document had also been prepared and was presented to the ministry policy committee in 1998. In 1999, the Ministry of Livestock accepted the revised policy document and in 2000, the revised draft bill. The two documents were harmonized in May 2000 and presented to the KDB and the Parliamentary Committee on Agriculture, Lands and Natural Resources in August/September 2000. In March 2001, following a request by the Parliamentary Committee, stakeholders were given another opportunity to revise the bill and policy document. The revised documents were resubmitted to the Parliamentary Committee later that year. Because 2002 was an election year, the bill and policy documents saw very little activity. In 2003, there was a new government in office and the revised bill and policy documents were resubmitted to the reconstituted Parliamentary Committee.

**Table 1.** Events and dates in Kenya's dairy policy change process

Year	Dairy policy event
1992	The government committed to restructuring and strengthening of KCC and KDB.
1993	A KDB workshop 'Promoting Kenya dairy industry to the year 2000 and beyond' was held in Naivasha in June. The Ministry of Agriculture, Livestock Development and Marketing (MALDM) published the Dairy Development Policy document.
1994	The government agreed that the Board of Directors for KDB be put in place and the Dairy Industry Act (CAP 336) be amended to reflect the liberalization of the dairy industry.
1995	MALDM put in motion the process to revise the Dairy Industry Act. Agricultural sector review carried out, emphasizing the need to revise the Act and address KCC as part of the interventions required for privatization. Stakeholder workshop held in Naivasha in May, charged to revise the Act and draft a bill; a draft Dairy Industry bill was produced in the process. MALDM, donors, processors (from KCC), Kenya National Farmers Union, cooperatives etc. attended the workshop.
	A mission to restructure and reform KDB, sponsored by the Danish International Development Agency (DANIDA), proposed that KDB be re-constituted along the lines of the traditional, democratic annual general meeting. The government accepted a report emphasizing autonomy of KDB. DANIDA also agreed to fund the completion of the revision of the Act.
1996	National stakeholders workshop convened in Embu in February to revise CAP 336, focusing on organization and structure of the new KDB; functions, powers and duties of the new KDB; management and administration of the new KDB; financial aspects of the new KDB; next steps (way forward) and the transition until KDB is fully autonomous and wholly funded by stakeholders through cess etc.
	KDB Board of Directors gazetted for the first time since 1972. Task force formed in April to consolidate the views arising from the stakeholders and other review processes.
	Assisted by consultant Prof Mutungi, the task force held another national stakeholder workshop on the draft Dairy Industry Bill (1996)—or revised CAP 336—in Naivasha in June to provide stakeholders with an opportunity to comment on and make suggestions to improve the draft Bill. A subcommittee of the task force was formed to review and revise the national dairy policy. MALDM referred the draft Bill to the Attorney General after making the amendments arising from the June stakeholder workshop. Due to critical changes in the ministry, the dairy reform process was delayed.
1997	With financial assistance from DANIDA and consulting help from Prof Mbogoh, the subcommittee of the Dairy Industry Act review task force was reconstituted to include the Ministry of Livestock, KDB, KCC, Planning Division and commercial farmers and charged with continuous review of policy. The subcommittee also reviewed the Act. Drafts of policy document were circulated to stakeholders for comment and after incorporating stakeholders' comments, a new draft policy document was presented to a stakeholder workshop held at Karen KCB Institute in November and attended by SDP Project Manager, KDB, MALDM/ILRI, KARI, university academics and non-governmental organizations (NGOs).
1998	The task force subcommittee revised the draft policy document to incorporate inputs from the November 1997 workshop and circulated the revised draft for comments in February. The consultant finalized the document after receiving and incorporating comments. The committee presented the final draft of the policy to the Permanent Secretary in March and thereafter it was presented to the Ministry Policy Committee.
1999	The ministry accepted the draft policy document in March; copies widely circulated to stakeholders.

**Table 1. Cont'd.**

Year	Dairy policy event
2000	With reconstitution of the committee, the ministry began work on the policy in March; new instructions were for the committee to harmonize the Bill and the policy document but changes in the ministry delayed the process. Harmonization of the two documents was completed in May and the harmonized document presented to the ministry, the Parliamentary Committee on Agriculture, Lands and Natural Resources and the KDB Board of Directors in August/September. The Parliamentary Committee requested that stakeholders be given another chance to contribute to the documents, citing delay in harmonization and editing of documents.
2001	A workshop on 'Assessing and managing milk-borne health risks for the benefit of consumers in Kenya' was held in February to present findings on levels of risk associated with different market channels and how to control the risks. Dairy Public Health Committee was formed as a result of the workshop and SDP invited to join. A stakeholders' consultative workshop on the harmonized dairy Bill and Policy was held at Karen KCB Institute in March and attended by the Parliamentary Committee. The Minister for Agriculture and Rural Development chaired the workshop and the Permanent Secretary moderated it. DFID funded the workshop through SDP. After the workshop, revised Bill and Policy document were resubmitted to the Parliamentary Committee.
	SDP and partners started participatory work with SSMMVs to develop training approaches and appropriate containers for milk handling. SSMMVs would later be asked to form groups and seek licensing.
2002	Election year in which there was little activity other than follow-up with the Parliamentary Committee for comments (which were not forthcoming due to elections).
2003	After the new government came into office, the Bill and Policy documents were resubmitted to the Parliamentary Committee in an attempt to revive the finalization process.
	SDP organized a workshop to develop a policy-influencing strategy and started to engage with CSOs as advocacy partners in preparation for a dairy policy forum.
2004	'Milk wars' in print and electronic media, pitting large-scale processors opposed to legalizing activities of SSMMVs against NGOs and SDP allies in favour of legalization of SSMMVs. Independent articles written by journalists in support of SSMMVs used research evidence from SDP. SDP partners also met with Ministers for Labour and Livestock providing research evidence in support of legalization of SSMMVs. SDP and partners organized a dairy policy forum in May with government ministers, members of parliament and key industry stakeholders in attendance. SDP research findings were presented to support pro-poor dairy policy reform. Policy briefs were officially launched and a video 'Unheard voices from Kenya's dairy industry' was shown. In September, subsidiary legislation/legal notices 101, 102 and 103 were gazetted, allowing KDB to develop procedures that would allow SSMMVs to operate legally.

Source: Adapted from HG Muruki/SDP/MoLFD (undated/unpublished); Leksono et al. (2006).

By 2003, the policy advocacy phase of the SDP had become very active. The new government made some changes to the KDB, but by then, such vacillations had emboldened large-scale processors who were opposed to the new bill and policy. In addition to safety and quality issues addressed in the research phase, SDP arguments in favour of engaging SSMVs included the huge impact on employment creation and poverty reduction in the era of the PRSP. Paid advertisements were placed in local newspapers touting the benefits of legalization, but these were met with rebuttals in the same media by large-scale processors, culminating, by late 2003, in what became known as the 'milk wars'. Arguments in favour of legalization which appeared in local media used research evidence (such as presented in Section 2.2) from SDP. In May 2004, SDP and partners organized a consultative dairy policy forum of stakeholders including ministers, members of parliament and other government officials, at which it was agreed in principle that the policy of engagement with SSMVs would be supported. Presentations at the forum included research findings that supported pro-poor policy reforms. In addition, SDP and partners officially launched policy briefs and screened a video entitled '*Unheard voices from Kenya's dairy industry*'.

While the bill and policy change processes continued in parliament, ministerial authority allowed the Minister for Livestock and Fisheries Development, on the advice of the KDB, to issue a set of dairy industry regulations (Legal Notices 101, 102 and 103) in September 2004. While they were all updated versions of subsections of the revised 1958 Act, the most pertinent one was Legal Notice 102, also known as the Dairy Industry (Sales by Producers) Regulations, 2004. These regulations streamlined the licence application processes and, more importantly, clearly enumerated the types of licences that were now available in the dairy sector (e.g. primary producer, processor, mini dairy, cottage industry, milk bar and cooling plant), some of which were clearly focused on activities that were compatible with small-scale informal operations. KDB officials used the impetus provided by the issuance of these regulations to engage and institute training, certification and licensing requirements for SSMVs.

Since the policy change, KDB has worked to train and certify SSMVs while licensing their milk outlets and premises which meet requirements on handling, hygiene and quality control. In addition, KDB has trained and employed the services of business development service (BDS) providers to train and certify SSMVs whose businesses would then be licensed by KDB. While progress is being made on these fronts, the number of BDS providers is still small relative to the number of SSMVs waiting to be trained, certified and licensed. Also, KDB is working with NGOs like SITE Enterprise Promotion to encourage milk consumption on the premise that quality is being greatly improved by training and licensing. KDB has started branding milk outlets and premises to improve consumer confidence and promote recognition by regulatory authorities. Evidence, though yet anecdotal, suggests that milk sales are increasing in these branded outlets and premises.

## 4 Impact of new dairy policy on enforcement and compliance

Primary information to assess the impact of the new dairy policy on enforcement and compliance and changes in general attitudes and behaviour of both regulators and SSMVs was obtained from interviews with field regulators and SSMVs. In cases where the survey respondents were asked to provide information on the periods before and after the policy changes, the actual comparison referred to the days or weeks prior to September 2004 vs. July/August 2007. Additional insights were gleaned from interviews with policymakers and researchers. The information from the interviews was supplemented with information from grey literature and the ILRI–ODI study by Leksmono et al. (2006).

### 4.1 Behavioural change among field regulators

Around late 2004, field regulators instituted some changes in enforcement activities, following specific instructions from KDB and Public Health Department officials. Previous activities were limited to policing and inspection, usually checking for licences that were never issued. Nowadays, their task is to ensure that licensed outlets and premises operated by SSMVs meet conditions on milk hygiene and testing requirements, sanitation of premises and health status of SSMVs. They also provide advice on how to meet these conditions. In addition, some regulators issue milk movement permits to mobile traders and assist the licensing process by enabling relevant paperwork required from SSMVs; these activities are accomplished through field visits, spot checks and training. The skills required to bring about these changes have mostly been obtained through formal training over the last few years.

Some of the regulators have not strictly followed the new requirements or instructions. Reasons proffered include a need to adapt to local situations, but also that some of the requirements may be too expensive for some SSMVs. It is no surprise, therefore, that they believe that most trained and licensed traders do not strictly adhere to the requirements of the new regulations. Infractions include the continued use of plastic containers instead of aluminium ones, the use of unhygienic premises, excessive adulteration and illegal handling during transportation and distribution. While some regulators have routinely helped SSMVs to gradually comply with the requirements of the new regulation, others have meted punishments such as confiscating illegal containers and products, charging SSMVs to court and, in the most extreme cases, revoking licences.

Before the new policy, violations by untrained and unlicensed SSMVs were mostly punished by arrests and subsequent court appearances; now, unlicensed and untrained SSMVs may be offered advice on how to get training and licensing. Sometimes, the shortage of regulatory

staff means that the unlicensed and untrained SSMVs may actually be left to operate. Regulators do not accept that illegal payments such as political rents were rife before or after the policy change, but they suggest that legalization of the activities of SSMVs has made such payments even less likely.

KDB officials maintain that harassment was never a part of the regulatory policy and that these actions were perpetrated by over-zealous field agents who had little or no technical supervision. The new technical personnel at KDB are aware of the employment creation opportunities in the informal dairy sector and claim to be working to enable rather than stifle the sector.

## 4.2 Behavioural change among SSMVs

To assess behavioural change among SSMVs, a survey was conducted of 61 milk traders along the purposefully selected Central and Western milk market chain areas. The areas of Nairobi (including Nairobi, Thika and Kiambu) and Nakuru were selected because they represent scheduled trading areas with KDB offices and would therefore be directly influenced by the regulations.

## 4.3 Survey results

All the interviewed milk traders owned their operations, although there were milk bar operations established by groups of SSMVs. Most (82%) of the businesses were started in 2004 or earlier, i.e. before the policy change, so most interviewed traders were familiar with the policy enforcement environment before and after the policy change.

Almost 50% of SSMVs interviewed were producer-traders, implying that their milk was sourced from their farms. The remainder were almost evenly divided among traders who were non-producers, transporter-traders and milk bar operators, with almost all their milk coming from other milk traders. Table 2 presents the distribution of SSMVs interviewed.

**Table 2.** Distribution of SSMVs interviewed in Nairobi and Nakuru

Type of business	Nairobi		Nakuru	
	% interviewed	% licensed	% interviewed	% licensed
Mobile trader (producer)	48	100	47	100
Mobile trader (non-producer)	16	100	20	67
Transporter-trader	16	100	13	100
Milk bar	20	100	20	100
Total	100		100	

Source: Survey data (2007).

Almost all respondents were familiar with the new regulations or requirements on milk handling and quality control, and they used these guidelines or regulations in the conduct of their businesses. The specific regulatory requirements mentioned include training and licensing, types of containers used and hygiene. Many SSMVs received information on milk handling and quality control from KDB and, to a lesser extent, from ILRI and other SSMVs, mostly between 2005 and 2007. This was the period when KDB actively encouraged SSMVs to obtain training and to familiarize themselves with issues related to milk handling and quality control.

It is noteworthy that the surveys were conducted in areas where KDB operates. In the survey, approximately 85% of respondents reported that they had been trained on milk handling and quality control methods. However, only half of them reported applying and receiving operating licences immediately following training, implying a lag between training and licensing. The hiatus is not unusual, given that training and certification of SSMVs by BDS and KDB usually precede licensing of premises and outlets for milk sales. In reality, all but two SSMVs who were interviewed had one form of licence or another for their operations. The most common licences reported were milk bar licences (49%), milk movement permits (44%) and mini-dairy licences (15%), as presented in Table 3.

**Table 3.** Proportion of SSMVs reporting different types of licences

Type of licence	% of Nairobi SSMVs	% of Nakuru SSMVs	% of all SSMVs
Milk bar licence	45	53	49
Mini-dairy licence	3	27	15
Milk movement permit	67	20	44
Medical/public health certificate	19	3	11
Business permit	6	3	5

Source: Survey data (2007).

The survey established that approximately 23% of all respondents had more than one operating licence. For example, a typical SSMV obtained milk movement permits which allowed milk to be transported to a licensed milk bar that is co-owned with other SSMVs. The latter issue also explains the apparently disproportionately high number of SSMVs reporting milk bar licences.

Consistent with the policy change timeline, most SSMVs were trained by KDB agents between 2005 and 2007. Nearly 90% of respondents reported that it was presently easier to obtain a license than in the period prior to 2004 when the new policy came into effect, noting that licensing is now being expedited following training and other requirements.

On average, SSMVs reported that before they were trained and licensed, they were harassed by KDB and other regulators about four times a month; the average frequency of harassment

was significantly higher in Nakuru (six times a month) than in Nairobi. Forty percent of respondents reported that they were last harassed by KDB or other regulators in 2005 or later. The most common form of harassment was by confiscation of milk, but nearly 10% of SSMVs reported bribing their way out of a potential arrest situation. Nearly all licensed SSMVs who had been in operation before the policy change reported a change in the behaviour of regulators toward them since licensing, noting that they were now allowed to operate as long as they complied significantly with all requirements. However, those whose premises and outlets were still not licensed were usually harassed by regulators, although to a lesser extent than before the policy change.

It is clear from the above that changes in behaviour among regulators and SSMVs were already underway before the legal notices were issued in September 2004, and these were reflected in changing views and opinions as a result of various pressures exerted by SDP influence.

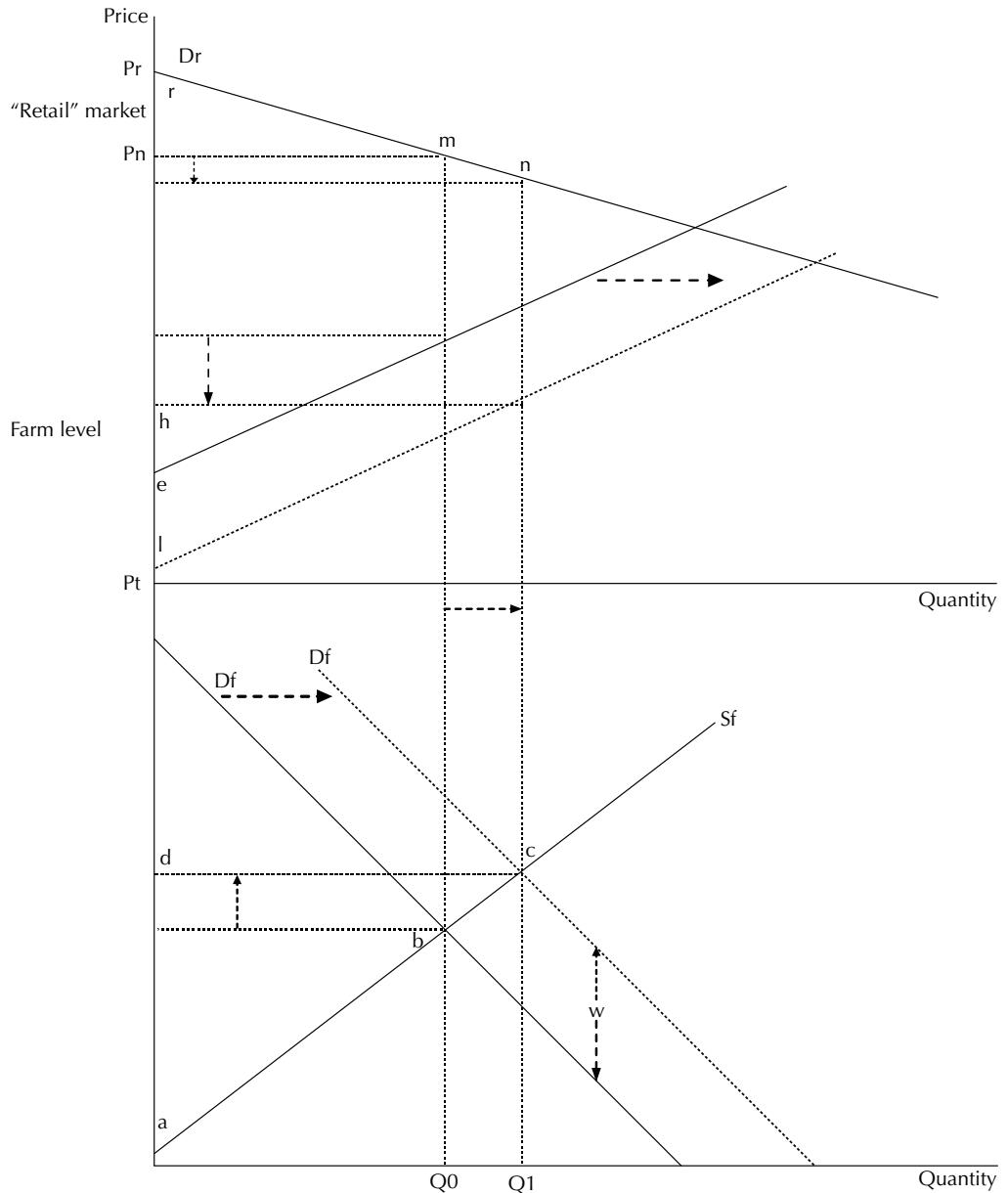
## 5 Economic impact of the new Kenyan dairy policy

The policy changes were expected to improve the welfare of producers, traders and consumers by reducing transaction costs and the retail milk price while increasing producer prices. Previously, SSMVs venturing into the retail market were likely to incur high transaction costs resulting from milk loss due to adverse police action, quality loss due to milk becoming sour and direct confiscation of milk and containers. However, those SSMVs who pay political rent may be able to avoid adverse police action as well as losses due to confiscation of milk and milk containers. Both options ultimately translated into higher consumer prices.

### 5.1 Policy impact on transaction costs: A model of equilibrium displacement

Transaction cost economics recognizes that there are costs to carrying out any exchange. These costs include information, negotiation and enforcement costs (Hobbs 1997). Certainly, several studies have shown that market participation by resource-poor smallholders is hindered by high transaction costs (Staal et al. 1997; Holloway et al. 2000). Implementation of the revised Kenya dairy policy reduced transaction costs and hence, marketing margins. Salasya et al. (2006) estimated the reduction in marketing margin at the SSMV level using the transaction cost approach; the estimate was 38% but its accuracy was questioned by some given the small sample size and the number and choice of transactions that were included in the analysis. Training and licensing also ensure the elimination of a non-tariff domestic trade barrier, leading to increased market access by small-scale milk traders. Additionally, KDB, the BDS providers and other NGO partners have actively engaged in milk promotion, although the overall effect is that consumers merely shift market preferences to licensed premises and outlets, increasing sales at those premises and outlets alone. This study investigated the distribution of gains arising from reduced transaction costs. The economic model evaluated the collective impact of the new policy through its effect on prices, quantities and overall welfare.

Several studies have used equilibrium displacement models to evaluate the distribution of gains from policy change (e.g. Freebairn et al. 1982; Wohlgenant 1993; Lusk and Anderson 2004). Consistent with the concepts and ideals implied in these studies, we proposed a model (see Figure 2) to estimate distributional changes in farm and retail prices, and changes in welfare. To better explain our model of equilibrium displacement following Freebairn et al. (1982), we extend Gardner's (1988) program effects model to include the impact of a reduction in the cost of marketing goods and services in the Kenya dairy market (see Figure 2).



**Figure 2.** Distribution of returns from implementing the new Kenyan dairy policy.

In its most simplistic form, the model assumes that the market is competitive, with linear demand and supply functions. The model also assumes that the supply of marketing goods and services is less than perfectly elastic, resulting in a normal supply curve for these goods and services. The model is appropriate because, as previously mentioned, most of the milk produced in the informal sector is sold raw and it is unlikely that aggregate economy-wide pre-policy change milk losses were highly significant given the following: (1) there was

high consumer demand for raw, unpasteurized milk, while processors who served the retail markets sold only processed milk; (2) SSMVs had the legal option of selling their milk to large licensed processors who pay less than consumers; (3) SSMVs could make political rent payments to avoid confiscation of milk and containers; (4) SSMVs could target retail markets in areas where there was little or no regulatory activity and (5) SSMVs could engage in limited production for retail market. Some of these options may also reduce losses in quality.

In Figure 2, we illustrate the impact of change in the Kenya dairy policy on welfare gains by consumers, producers and SSMVs who provide marketing goods and services. We posit a two-market scenario, a 'retail' market with demand for milk  $D_r$  and supply of marketing goods and services  $S_n$ , and a 'farm-level' market with derived demand for milk  $D_f$  and supply of milk  $S_f$ . Note that derived demand  $D_f$  is equivalent to  $D_r - S_n \forall \text{Quantity}$  where  $D_r - S_n > 0$ .

We define market margin,  $M$ , as the difference between  $D_f$  and  $D_r$  (i.e.  $M = D_r - D_f$ ); we assume that it is not constant but generally comprises a fixed portion and a portion that varies with quantity. In the pre-policy change environment,  $P_r$  is the price of milk in the retail market,  $P_n$  is the cost of supplying marketing goods and services in the retail market,  $P_f$  is the farm price for milk and  $Q_0$  is the initial milk quantity that clears the market.

To demonstrate the impact of the policy change, consider that the new policy of legalizing the activities of SSMVs after training and licensing leads to a reduction in transaction costs or market margin arising from significantly lower political rent payments and milk losses. Consequently, there is a reduction in the cost of supplying milk and milk products to the retail market. This results in a downward shift in the supply curve for marketing goods and services and, consequently, a new derived demand curve arising from an upward shift. The proportional shift in derived demand reflects a reduction in the market margin,  $M$ , by a cost,  $w$ , which is measured as the vertical difference between the  $D_f$  and  $D'_f$ . The resulting increase in quantity of milk supplied to the market, from  $Q_0$  to  $Q_r$ , is also occasioned by an increase in the number of SSMVs now supplying the retail market. The markets also see decreases in retail milk price and the cost of supplying marketing goods and services, but also an increase in milk prices received by farmers. As a result, Figure 2 shows unequivocal increases in consumer surplus by the area  $P_r mnr$  and producer surplus by the area  $P_f bcd$  whereas surplus accruing to SSMVs who supply milk and milk products to the market increases by the area  $efkl$  while losing the smaller  $P_n gfh$ . These indicate that there are cost reduction benefits accruing to the market chain actors. In the case of SSMVs, reductions in margins accruing result from political rent that is no longer paid to regulators, and milk and milk containers that are no longer confiscated. The formulae for estimating the welfare changes are provided by Freebairn et al. (1982) and Wohlgemant (1993).

Based on these, we present an analytical model following Freebairn et al. (1982). The competitive model of the post-policy change environment is presented as:

$$Q = a_0 - a_1 P^r \quad (1)$$

$$M = b_0 - w + b_1 Q \quad (2)$$

$$P^r = P^f + M \quad (3)$$

$$Q = f_0 + f_1 (P^f + x - P^i) \quad (4) \text{ and}$$

$$P^i = d_0 - y + d_1 Q, \quad (5)$$

where  $Q$  is the quantity of milk at the farm level (which clears the market at equilibrium),  $P^r$  is milk price in the retail market,  $P^f$  is milk price at the farm level,  $M$  is the retail farm price margin and  $P^i$  is the cost of non-farm input per unit farm output. In the model, cost reductions attributed to the new policy are represented as  $w$  to the SSMV. While policy change is directly related to cost reductions to the SSMV (in terms of reduced transaction costs), it is possible that indirect or secondary effects of policy change may include additional cost reductions to other actors, which we define as  $\xi$  to the farmer and  $\psi$  to the input supplier. The latter will be modelled as an additional exercise. In all cases, the overall effect is an increase in milk quantity. From the model above, equation (1) is the retail demand schedule, equation (2) is the SSMV schedule or market margin equation, equation (3) is the price link equation representing the retail farm price margin, equation (4) is the farm supply schedule and equation (5) is the input supply schedule. As previously mentioned, the market margin is not constant. Rather, it includes a fixed component and a component that varies with quantity. Algebraic solutions to the system of equations above (see Freebairn et al. (1982) for an intuitive insight into the derivations) are provided to estimate changes in surpluses to consumers, marketers, farmers and input suppliers, respectively, as:

$$\Delta C = f_1 W / H \quad (6)$$

$$\Delta SSMVS = b_1 a_1 f_1 W / H \quad (7)$$

$$\Delta R = a_1 W / H \quad (8) \text{ and}$$

$$\Delta ISS = d_1 a_1 f_1 W / H \quad (9)$$

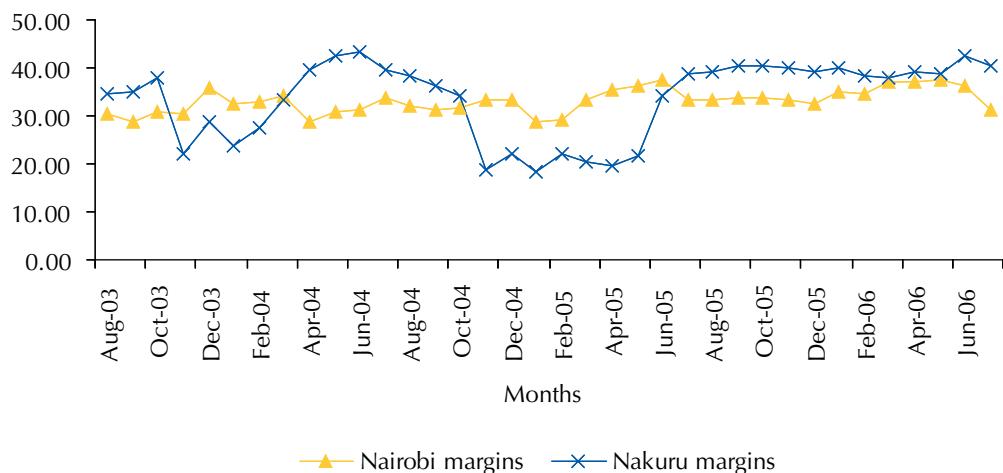
where  $W = \varrho + a_1 f_1 h^2 / 2H$  is aggregate welfare change,  $h = w + x + y$  is aggregate cost reduced by the policy change and the term  $H = (1 + a_1 b_1) \varphi_1 + (1 + f_1 d_1) \lambda_1$ . The

aggregate welfare change measures additional benefits that accrue to the economy as a result of the policy change. The parallel supply shift presented in Figure 2 represents a simplification; in reality, shifts in supply could also be convergent or divergent. The circumstances under which supply shifts can be divergent or convergent and methods for estimating the resulting benefits are well explained by Lindner and Jarrett (1978).

## 5.2 Application to Kenyan milk markets

### 5.2.1 Price response to policy change

The model in Figure 2 postulates that, at least in the short run, reduced transaction costs deriving from legalized trading after training and licensing would lead to an increase in farm price and a decrease in retail price, thus resulting in reduced market margins. In Figure 3, we present trends in market margins, measured as the difference between real urban wholesale prices (using the consumer price index and 2006 as the base year) for unprocessed milk and processed milk in Nairobi and Nakuru, to investigate evidence of this phenomenon and determine if the beginning of the phenomenon coincided with the date of the policy change. In the absence of data on retail prices for raw unpasteurized milk usually sold by SSMVs (the informal sector), we obtained prices paid for raw unpasteurized milk by large-scale milk processors (as a processing input) and the prices they received for processed, pasteurized milk usually sold in ‘high end’ markets or grocery stores. In reality, these prices would be different from actual farm gate and retail prices in informal markets which were specifically targeted by the policy change. However, the policy change may have similar effects although the magnitude of the change may differ because of inherent differences in price transmission and focus of the policy.



Source: Prices obtained from Kenya Dairy Development Project, August 2003 to July 2006.

**Figure 3.** Market margins for large-scale processors in Nairobi and Nakuru.

We obtained weekly prices for large-scale milk processors from the Kenya Dairy Development Project, but due to non-reporting for some weeks, the need for uniformity ensured that we averaged over weeks reported in a month to obtain average monthly prices. In Nairobi there appeared to be no obvious changes in market margins around the period of the policy change (September 2004) or in subsequent months. However, in Nakuru there were pronounced changes in market margins, with the decline beginning after June 2004 and hitting a low point in November 2004. The trend continued through May 2005, after which market margins increased again to previous high levels. The decline in Nakuru commenced shortly after the SDP forum held in May 2004, at which it was made clear that there would be changes to the Kenyan dairy policy to encourage and formalize the activities of SSMVs. However, it must be noted that prices of unprocessed milk in Nakuru remained virtually unchanged during this period, hence the decrease in market margin is attributed to decrease in processed milk prices. Although this aspect was not thoroughly investigated, the decline in processed milk prices in Nakuru may have been due to competition from newly (or soon to be) formalized SSMVs, who could (after September 2004) legally sell raw, unpasteurized milk in the retail market (under conditions previously outlined).

Intuitively, price changes depend on nominal demand in cases where there are no supply shocks. Nominal demand for milk in the then formal sector (large-scale processors including KCC) could not have been significantly influenced by the revised dairy policy, hence the price changes, if any, were not dramatic. Note the difference in commodity and the influence of a dedicated market: SSMVs sell raw milk at ubiquitous retail market locations, whereas large-scale processors sell processed milk to the high end market, largely in grocery stores. In addition, it is simply true that if there were any direct policy effects on milk prices, it is unlikely that price transmission mechanisms were that well developed to easily and quickly transmit the effects especially through the formal sector which served a dedicated market.

We note that results from this analysis were obtained from the formal sector and this does not necessarily reflect what is happening in the informal sector which is covered in our surveys of SSMVs. In later sections, it will emerge that significant reductions in transaction costs were achieved in some areas in the informal milk sector, following the implementation of the revised policy.

There are other policy outcomes that could have different effects on farm and retail prices. For example, theoretical constructs suggest that increased entry into the market by SSMVs would lead to an increase in milk supply and hence reduced farm prices. When milk promotion is added, retail prices increase following increased consumer demand. However, it is clear that in Kenya, promotion has not necessarily increased demand but has seen consumers shift preferences from milk sales/purchase outlets to quality-assured branded milk

bars. Anecdotal evidence of this was provided by KDB staff (personal communication, 28 June 2007):

*Milk sales in one location increased from 200 to 5000 litres per week, following branding and consumer promotion. Consumer promotion activities focus on enabling the consumer to focus on what to buy/look for and where to buy it.*

Note that a branded outlet/milk bar usually meets all other quality and certification requirements.

### 5.2.2 Policy impact and changes in market margin

The average SSMV conducts several transactions in the milk sales business. Those transactions that may not have changed with the new policy include transportation, cess, market place tax and the number of containers used. Those that may have changed with the new policy include the type of containers used, payment of illegal contingency fees or political rent, milk and container loss due to confiscation, milk preservation and quality control, and training and licensing.

Economic theory allows us to measure market margin between two points or agents in the market chain using at least two approaches; one allows for a categorization and summation of all transaction costs between the two points or agents, and the other allows us to measure market margin as the difference between the two prices at those points. It is difficult to accurately identify and account for all relevant transaction costs. Therefore, this study expressed transaction costs in terms of retail-farm price margins. Results for daily milk purchases and prices are summarized by location and trader type in Table 4. Ideally, one would use actual prices paid and received instead of using recall information as was done in this study due to the difficulty of obtaining such information.

Prices paid and received were highest at milk bars both before and after the policy change. As previously mentioned, the study used September 2004 as the policy change date and asked SSMVs to recall transactions in the immediate pre-policy change days and then compare those to similar transactions in August 2007.

In Nairobi, the highest margins accrued to non-producer mobile traders both before and after the policy change, whereas in Nakuru the highest margins accrued to producer mobile traders. When averaged over SSMVs in Nairobi, there was a KES 0.80 per litre decline in margin that may be attributed to the new policy's effect of reducing market margins. On the other hand, in Nakuru, the decline in margin attributed to the impact of the new policy was only KES 0.27 per litre, consistent with earlier findings and indicating that the new policy

appeared to have a less discernible effect on the prices of unprocessed milk in Nakuru. In Nairobi, gains in margins resulting from the new policy were highest among non-producer mobile traders, followed by milk bars and mobile transporters, reflecting the fact that producer traders have not handled retail sales activities as those that focus primarily on trading activities.

**Table 4.** Average daily prices of milk and market margins before and after the policy change

Type of business	Nairobi price (KES/litre)			Nakuru price (KES/litre)		
	Purchase	Sale	Margin	Purchase	Sale	Margin
<b>Before policy change</b>						
Mobile trader (producer)	14.27	19.53	5.26	13.00	20.77	7.77
Mobile trader (non-producer)	15.40	23.80	8.40	14.17	19.00	4.83
Transporter trader	14.43	20.57	6.14	16.50	20.00	3.50
Milk bar	18.43	24.43	6.00	17.60	23.60	6.00
Average for all SSMVs	15.35	21.48	6.13	14.42	20.85	6.42
<b>After policy change</b>						
Mobile trader (producer)	15.20	20.53	5.33	14.86	22.14	7.28
Mobile trader (non-producer)	16.60	23.60	7.00	14.50	19.50	5.00
Transporter trader	16.14	21.00	4.86	17.50	21.50	4.00
Milk bar	20.67	25.33	4.66	19.40	24.60	5.20
Average for all SSMVs	16.60	21.93	5.33	15.81	21.96	6.15
Reduction in margin attributed to policy change, for Nairobi and Nakuru			0.80			0.27
Mann–Whitney test statistics (before vs. after)	Z=1.36; p=0.087			Z=0.85; p=0.1977		
Average margin over all locations and trader types, before policy change				6.26		
Average margin over all locations and trader types, after policy change				5.72		
Overall average reduction in margin attributed to policy change				0.54		

Source: Survey data (2007).

The study used tests of statistical significance to determine whether margins significantly declined following the implementation of the new policy. A *t*-test confirmed that for the combined data (i.e. Nairobi and Nakuru) comparing margins before and after policy change, there was no statistically significant difference ( $t = 1.16$ ;  $p = 0.1256$ ). However, when Mann Whitney tests were performed for the Nairobi dataset alone, the average margin of KES 6.13/litre before policy change was found to be statistically higher than the average post-policy change margin of KES 5.33/litre, albeit only at 10% probability level ( $Z = 1.36$ ;  $p = 0.087$ ). Tests for Nakuru revealed that post-policy change margins were not statistically different from pre-policy change margins. Consequently, the study estimated separate measurements of welfare for Nairobi (using Nairobi margins and production/supply information) and economy-wide using average country-wide margins, which were not weighted because weighting would grossly underestimate resultant welfare measures.

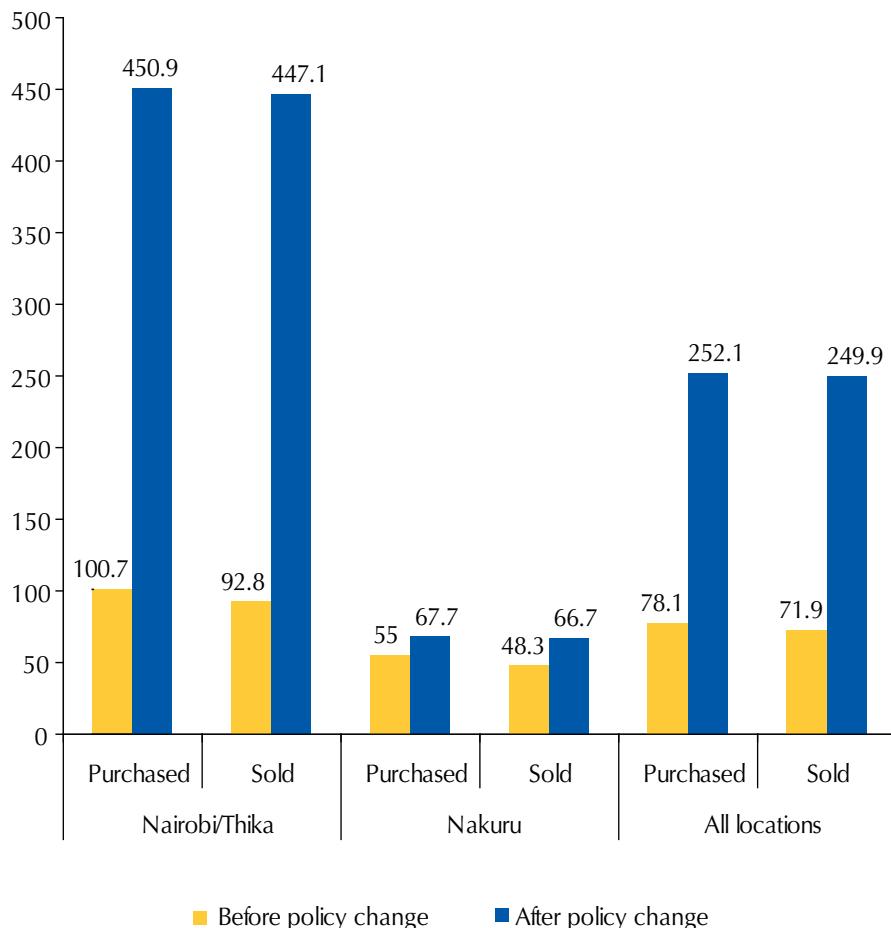
Information obtained from the above analysis of market margins in the Kenyan milk sector showed that policy-change effects on margin were more evident in Nairobi than elsewhere in the country. Policy-change institutions such as KDB and BDS providers are more likely to be visible, active and effective in Nairobi and its environs. Indeed, while training and licensing have been on-going activities within the mandates of KDB and BDS providers, the number of trainers has not increased in proportion to the increasing number of SSMVs who wish to be trained. According to KDB staff (personal communication, 28 June 2007):

*One hundred SSMVs are now being trained per week and the total number of BDS-trained SSMVs had risen to 3000. In addition, plans were underway by KDB to increase the number of BDS providers country-wide from 31 to 50.*

Averaged over all locations and SSMVs, the study found a KES 0.54 per litre reduction in margin, equivalent to approximately 9% of the pre-policy change margin. Although the overall reduction in margin (averaged over locations and SSMVs) appears small, Figure 4 shows more than a fourfold increase in quantities purchased and sold in Nairobi in the period after the policy change and more than a threefold increase over all locations. Evidently, SSMVs operate in a small margin market in which profit is realized from increased volume quick turnovers. While the decline in market margin may also have been affected over time by other factors such as fuel costs, the simplified framework applied here assumes that such cost changes are minimal and hence attributes all margin reductions to the policy change.

The increase in quantities purchased and sold by SSMVs is not unusual, given that SSMV activities in scheduled urban areas like Nairobi were previously proscribed and therefore conducted under unfavourable conditions. Allowing licensed SSMVs to operate freely in an environment with high demand for raw milk (see high annual per capita milk consumption of 145 litres in 2005) leads to increased milk supply to the retail market. In addition, approximately 45% of the SSMVs interviewed were licensed milk bar owners and daily throughput at milk bars serving an urban retail market could be much higher than, say, mobile bicycle traders. Still, the increased figures mentioned do not necessarily reflect evidence of higher market share to SSMVs; rather they reflect the ability to now conduct marketing activities freely, aided by increasing demand. While annual statistics for milk intake into the formal sector are readily available, those for the informal sector are not, hence the use of recall information. Milk intake into the formal sector in 2004 was highest in June (at 28.2 million litres); thereafter it started declining through its lowest point in October (18.7 million litres) after which it started increasing again. In 2005, average milk intake into the formal sector increased by 23% over 2004.

Quantity of milk (litres)



Source: Survey data (2007).

**Figure 4.** Average daily quantities of milk purchased and sold by SSMVs before and after the policy change.

### 5.2.3 Welfare changes attributed to policy change

We used the economic model outlined in Section 5.1 to estimate changes in surpluses that accrue to consumers, farmers, SSMVs and input suppliers, and then compared the aggregate of these changes to project costs in order to also estimate the profitability of a POR project: the SDP. In its optimal form, the model is expressed in terms of parameters of retail demand, farm supply and marketer schedules, together with cost changes resulting from policy change. In the absence of survey data typically used to estimate these schedules, we used values presented in Table 5 (and sources) to estimate the parameters for the economy-wide model. Table 6 presents the parameters used to calculate the Nairobi area welfare changes.

**Table 5.** Variables for estimating economy-wide welfare changes attributed to the new dairy policy

Variable description	Symbol	Value	Source of information
Raw milk production	$Q$	4.02 billion litres	SDP Policy Brief 10 (2005)
Retail price	$Pr$	KES 21.57/litre	Study survey (averaged over all locations and SSMV sales)
Farm price	$Pf$	KES 15.58/litre	Study survey (averaged over all locations and SSMV purchases)
Non-market input cost per unit of output	$Pn$	KES 7.06/litre	Estimated using data from Salasya et al. (2006) and updated SDP milk production data
Elasticity of milk demand at retail	$\epsilon_r$	-0.97	Salasya et al. (2006)
Elasticity of milk supply at farm	$\epsilon_f$	0.35	Salasya et al. (2006)
Elasticity of marketing services supply	$\epsilon_m$	2	Freebairn et al. (1982)
Cost reduction due to changes in transaction costs and elimination of non-tariff trade barriers	$w$	KES 0.54/litre	Study survey, decrease in retail farm price margin (comparing before and after policy change)
	$\xi$	KES 0.85/litre	Study survey, estimated at 10% of value added, i.e. $(Pf - Pn)$
	$\psi$	KES 0.71/litre	Estimated at 10% of $Pn$

**Table 6.** Variables used in estimating welfare changes attributed to the new dairy policy in the Nairobi area

Variable description	Symbol	Value	Source of information
Raw milk production	$Q$	493 million litres	Assuming supply clears the market, estimated from SDP data showing annual per capita milk consumption at 145 litres and Nairobi population at 3.4 million in 2005
Retail price	$Pr$	KES 21.70/litre	Study survey (averaged over all locations and SSMV sales)
Farm price	$Pf$	KES 15.97/litre	Study survey (averaged over all locations and SSMV purchases)
Non-market input cost per unit of output	$Pn$	KES 6.90/litre	Estimated using data from Salasya et al. (2006) and updated SDP milk production data
Elasticity of milk demand at retail	$\epsilon_r$	-0.97	Salasya et al. (2006)
Elasticity of milk supply at farm	$\epsilon_f$	0.35	Salasya et al. (2006)
Elasticity of marketing services supply	$\epsilon_m$	2	Freebairn et al. (1982)
Cost reduction due to changes in transaction costs and elimination of non-tariff trade barriers	$w$	KES 0.80/litre	Study survey, decrease in retail farm price margin (comparing before and after policy change)
	$\xi$	KES 0.91/litre	Study survey, estimated at 10% of value added, i.e. $(Pf - Pn)$
	$\psi$	KES 0.69/litre	Estimated at 10% of $Pn$

The data sources included a combination of SDP statistics, survey data and grey literature. We used SDP data for raw milk production in Kenya, updated in 2005 (SDP 2005). Farm

and retail prices were obtained from the surveys. Following Salasya et al. (2006), we used housing as a non-farm input and expressed the cost of housing obtained from that study (KES 1313 per month) per unit of raw milk produced per year. We also obtained own price elasticities of demand and supply from the same study. We found no comparable previous studies measuring elasticities of marketing services and marketing inputs, but Freebairn et al. (1982) mentioned evidence of highly elastic long-run supply curves, thus using a value of 2 or  $\infty$  for illustrative purposes. To use these elasticity measures, the usual caveat of assuming homogeneous preferences among consumers, farmers, SSMVs and input suppliers applies.

Estimates of cost reductions in the market margin due to the policy change include KES 0.54 per litre to the milk vendor, KES 0.85 to the farmer (representing 10% of the farmer's gross margin) and KES 0.71 per litre to the input supplier (corresponding to 10% of the cost of non-farm input per unit farm output). The Nairobi area model used the same information on elasticities of milk demand, farm-level milk supply and supply of marketing services as did the country-wide analysis. However, data on milk production, retail and farm-level prices, and non-farm input costs as well as cost reductions attributed to policy changes differed. In the models under consideration, aggregate gains are known to be proportional to cost reductions but elasticities have minimal effects, except in terms of distributions. Simulation results are presented in Table 7 for the economy-wide and Nairobi area models.

**Table 7.** Distribution of gains from the policy change

Change in benefits (KES $\times 10^6$ )	Scenarios			
	Cost reductions only occur at the level of the SSMV (i.e. $\xi=\psi=0$ )		Cost reductions occur at all levels	
	Economy-wide (I)	Nairobi area (II)	Economy-wide (III)	Nairobi area (IV)
Benefits to consumers	520.84	95.01	2040.48	287.09
Benefits to producers	1042.62	193.78	4084.64	585.56
Benefits to SSMVs	280.60	48.67	1099.29	147.07
Benefits to input suppliers	330.82	58.63	1296.06	177.18
Total benefits	2174.87	396.09	8520.46	1196.91
Annual expenditure on SDP (1997–2004)	40.63	40.63	40.63	40.63
Annual costs of training and licensing (2005–39)	864.00	864.00*	864.00	864.00*

\*Note that these are countrywide costs and are only being applied to the Nairobi scenario in totality for the sake of expediency.

Table 7 presents estimates of how much the dairy sector is contributing to the Kenyan economy. When the effect of the policy change is assumed to reduce transaction costs at the SSMV level alone, total benefits accruing to the sector are estimated at KES 2.17 billion per annum. There is a fourfold increase in total benefits to KES 8.52 billion per annum when the

policy change is modelled to also reduce farmer and input supplier-related costs. Clearly, more than 70% of the benefits accrue to producers and consumers, and less than 30% to SSMVs and input suppliers. As earlier observed, SSMVs and input suppliers operate in a small margin environment, and this could account for their smaller share of total benefits. Gains realized by SSMVs and input suppliers come from higher sales alone.

When cost reductions resulting from policy change occur only at the level of SSMVs, Nairobi area welfare gains account for approximately 18% of the economy-wide gains, and nearly 14% of economy-wide welfare gains when cost reductions occur at all levels. With a potential consumer base of nearly 3.4 million (or 10% of Kenya's total population), Nairobi area welfare gains are sufficiently high to justify the efforts to date on training and licensing and suggest the level of potential benefits to further investment in these activities. However, when the total costs of training and licensing (country-wide costs) are accounted for, scenario II (Nairobi area when benefits accrue only to SSMVs) is not cost-effective.

The NPV of the stream of net benefits was calculated for the economy-wide model. We assumed that research costs (USD 5 million) were equally spread over the first eight years, corresponding to the life of the project and ending with the year 2004 when the policy change was effected; total DFID funding for SDP was USD 2.5 million over an eight-year period, plus an estimated USD 2.5 million from in-kind contribution by SDP partners. Benefits were assumed to start accruing in year 2005 and, for the purpose of this analysis, to the year 2039. However, in the year when benefits start accruing, we impute additional costs of training and licensing of SSMVs (as estimated above) amounting to KES 864 million per year as follows (see ILRI, undated, for cost estimates): because the system was designed to be sustainable, costs of training and certification would be borne by SSMVs. Based on discussions with KDB officials, we estimated that 50 BDS providers (the target figure for KDB) would train approximately 160 SSMVs per week. SSMVs pay KES 1000 for training (KES 8.3 million per year). Trained SSMVs pay a one-time licence fee of KES 3500 (KES 29.12 million per year). SSMVs pay cess fees to KDB at KES 0.20 per litre (KES 803.17 million per year). The cess fee is a tax collected by the KDB, which should technically be collected at the farm level. However, because small-scale producers are not easily tracked (unlike large producers), KDB officials have routinely opted to collect cess fees at bulking and collection points, where SSMVs operate. This adds a tax burden to SSMVs. Finally, SSMVs pay other statutory costs—including municipal/council fees, commerce fees and health inspection fees—amounting to KES 2811 (KES 23.39 million per year). We use interest rates of 1.99% (real interest rate in Kenya; base year 2007), 5% and 15%, the higher rate to account for inherent risks in some projects. Results of the analysis are presented in Table 8.

**Table 8.** Cost–benefit analysis of the new policy for all scenarios

Years	Scenarios				
	I	II	III	IV	
Annual cost	1997–2004	40.63	40.63	40.63	40.63
	2005–39	864.00	864.00	864.00	864.00
Annual benefit	1997–2004	0	0	0	0
	2005–39	2174.87	396.09	8520.46	1196.91
NPV (at 1.99%)		28,288.92	–10,509.71	166,698.52	8,418.75
NPV (at 5%)		14,978.64	–5,720.72	88,821.23	3,598.29
NPV (at 15%)		3,051.03	–1,373.56	18,835.22	618.42
IRR	55%	n/a	93%	32%	

Costs and benefits in million KES.

Note: Scenario II is not profitable.

The analysis shows that even in the case where cost reductions only occur at the SSMV level, SDP costs are easily recouped, the NPV being greater than zero under all three interest rate scenarios. Logically, as interest rates increase, NPV would decline.

Under the above mentioned scenarios, the interest or discount rate would have to exceed 55% for scenario I, 92% for scenario III and 32% for scenario IV for the NPV of the policy research investment to fall below zero (also equivalent to the IRR). This project would be worthwhile until the cost of capital exceeds the IRR identified under each scenario. Under the assumptions used, scenario II is not beneficial because costs exceed benefits, although the costs are country-wide applied to a Nairobi area scenario. However, annual benefits to SSMVs from the policy change of KES 280.60 million (in Scenario I, but not in Scenario III) fall far below the estimated total annual costs of fees, training etc. of KES 864 million. Hence if a significant portion of these costs, especially cess fees, are assessed at SSMVs levels (where cost reductions only occur at SSMV levels), SSMVs would be worse off as a result of the policy change, which is contrary to what was intended by SDP and advocacy partners. This raises questions about the appropriateness of the cost-sharing arrangements in the implementation of the regulatory changes.

We re-estimated welfare benefits of the POR using new estimates of margin reduction derived by Salasya et al. (2006) who estimated margin change as 38% of the pre policy change marketing margin which, based on estimates in our study, amounts to KES 2.38 per litre. As previously explained, the model is highly sensitive to changes in cost reductions. Therefore, it is not surprising that when costs are reduced at the SSMV level alone, total benefits resulting from the margin change were estimated at KES 9.64 billion and when cost reductions occur for all actors, new total benefits are estimated at KES 16.11 billion. These large differences in welfare benefits reaffirm the need to precisely estimate marketing margin changes that are attributed to the revised policy.

### 5.3 Creating a counterfactual and attributing policy impact

POR benefits in this case study began to be realized in the ninth year following the launch of SDP (Table 8). When policymakers and researchers were asked how long it would have taken for the policy change to occur without SDP, their responses were revealing. The former SDP Project Manager stated that without the project, the following scenario would have been witnessed:

*At this time (January 2008), the SSMVs would still be in the milk business, but perhaps fewer of them [and] probably incurring higher transaction costs than before. This is because their existence is a response to milk demand, and the high transaction costs arise mainly due [to] costs of ensuring that they are not arrested and their containers and milk confiscated.*

On how long it would have taken for SSMVs to be engaged by regulatory bodies, the Project Manager said:

*Perhaps never, or until some SDP type of industry players with similar resources and capacity, or better, get involved in the Kenya dairy industry. Still, there would have been some engagement of SSMVs if there was reasonable pressure from the market for regulators to do so. It took almost SDP's lifetime to review the Kenya dairy policy and engage SSMVs despite the fact that SDP was interacting/working with most of the dairy industry regulators, many of whom served in steering/policy level committees. It would have taken approximately 20 years for SSMVs to be engaged by the regulatory bodies.*

Another respondent, a senior researcher with excellent knowledge of SDP responded thus to the questions raised above (22 January 2008):

*In my opinion, some changes would still have occurred given the strong vested interests in the dairy sector in Kenya and the debate that was raging over the issues, but the direction the changes would have taken would be uncertain and ill-informed. The changes could also have solely depended on the relative strengths of entrenched political forces vs. SSMVs. The SSMVs would have continued to be ignored or harassed for a number of years until such a time that their voices were able to counter those entrenched in the dairy industry. The impacts thereof can only be speculative. The most important contribution that SDP made was to provide the evidence, which in the end catalysed, speeded up and swayed the debate in one direction and allowing well-informed interventions to be initiated.*

The last sentence in the paragraph above was echoed by KDB, in input they provided to a dairy development document, when they were faced with similar questions on the impact of SDP (Source: Dairy policy in practice: a study of grassroots attitudes and behaviour in the Kenyan informal dairy sector).

*The key drivers in KDB policy change process are as follows:*

- *Release of credible research information by the MoLFD/KARI/ILRI Smallholder Dairy Project.*
- *Restructuring of KDB operations funded by FAO that involved staff rationalization, recruitment of qualified staff and capacity building.*
- *Engagement in collaborative projects aimed at improving small-scale milk marketing, mainly focusing on testing a quality assurance approach involving training (based on standardized training requirements) and certification of small-scale milk traders.*
- *Development of the first strategic plan with clear goals and activities.*
- *The creation of dairy regulatory forums with representatives of key stakeholders at all levels.*
- *Review of regulations within the current dairy policy framework.*
- *Engagement in the process of harmonization of regional dairy policies, regulations, training and quality assurance standards.*

These opinions and document support the notion that SDP played a pivotal role in effecting policy change. SDP accelerated a process and achieved an outcome that may have come many years later. Of course, SDP research and policy advocacy were collaboratively carried out by several institutions, including ILRI, KARI and MoLFD. Attributing the benefits of policy change in a multi-institution effort is not a marginal exercise. First, the policy change is technically still in process, both with regards to final parliamentary passage of the main regulation and implementation of current training and licensing activities as envisioned in the policy. Consequently, the problem of attribution is compounded by an outcome that is yet unclear and not easily measurable quantitatively. The CGIAR Science Council commissioned a scoping study which articulated this problem (CGIAR Science Council 2006). Second, the policymaker MoLFD was one of the major institutions involved in the process, playing a key role in advocating for policy change, hence attribution would be difficult.

Finally, to present a measure of economic impacts without SDP, we present estimates of NPV assuming that the Kenya policy review and legalization of SSVMs would have been delayed by 20 years without SDP (based on responses from SDP Project Manager) and by a more conservative estimate of 10 years, with benefit streams extrapolated through 2039. A simplified additional assumption is that there is no additional investment or benefits until the year in which legalization would occur (i.e. 2015 or 2025). The differences in NPV with and without SDP are presented in Table 9.

**Table 9.** Differences in NPV with and without SDP, for scenarios I, III and IV

Time delay	Interest rate (%)	NPV (without SDP) (KES × 10 <sup>6</sup> )	Difference in NPV (with SDP – without SDP) (KES × 10 <sup>6</sup> )
Scenario I			
10 years late	1.99	18,329.35	9959.57
	5.00	8060.72	6917.92
	15.00	787.42	2263.61
IRR	108%		
20 years late	1.99	9901.65	18,387.27
	5.00	3644.45	11,334.19
	15.00	176.07	2874.96
IRR	62%		
Scenario III			
10 years late	1.99	107,057.14	59,641.38
	5.00	47,080.65	41,740.58
	15.00	4599.13	14,236.09
IRR	128%		
20 years late	1.99	57,833.07	108,865.45
	5.00	21,286.29	67,534.94
	15.00	1028.36	17,806.86
IRR	72%		
Scenario IV			
10 years late	1.99	4654.94	3763.81
	5.00	2047.11	1551.18
	15.00	199.97	418.45
IRR	94%		
20 years late	1.99	2514.64	5904.11
	5.00	925.55	2672.74
	15.00	44.71	573.71
IRR	55%		

10 years late: legalization occurs in 2014.

20 years late: legalization occurs in 2025.

NPV continues to be positive even as legalization is postponed beyond 2004 when SDP influenced policy change (Table 9). In addition, the directly attributable impacts of SDP are also positive, as measured by the differences in outcomes with and without the project, suggesting that legalization resulting from SDP advocacy was beneficial.

The research and coordination efforts of SDP continue to contribute to the policy implementation phase, producing policy briefs, training manuals and sessions on milk handling and quality control. These research efforts have also contributed empirical evidence supporting the harmonization of dairy policy regulations across East Africa. Lessons learned in terms of ILRI's success in getting empirical evidence to inform dairy policy changes are highlighted in a study by Leksmono et al. (2006) on the role of research in pro-poor dairy

policy shift in Kenya. They include: (1) good collaboration between the SDP institutions was a key contributor to the success of SDP in achieving policy change; (2) SDP research was rigorous and by the time the advocacy phase came along, SDP had obtained a set of highly technical and pertinent research results; (3) SDP was particularly effective in achieving policy change because it started as a research and development project and (4) farmers and SSMVs were empowered by SDP to speak out on issues affecting the sector, and this was a most compelling factor in changing opinions of decision-makers at the May 2004 policy forum.

Currently, the Kenyan dairy sector is liberalized and moving ahead with plans to train and license SSMVs to become fully engaged in the formal sector. The revision of the Kenyan dairy policy to reflect engagement with SSMVs in the formal sector is still in parliamentary process. However, significant progress has been made and Kenya now leads a noteworthy regional effort to harmonize dairy policies and liberalize trade in dairy products among countries in East Africa. In neighbouring countries like Tanzania and Uganda where there have been no SDP-like activity, policy change has been carried out at a slower rate than in Kenya, hence the process of policy harmonization in the region is helping to speed it up.

## 6 Summary and conclusion

The research aimed at informing and changing dairy policy in Kenya analysed here was part of a larger, multi-partner project effort called SDP. Linking research with policy action is challenging, and it can be argued that much POR does not succeed. Thus a look backwards at just how policy processes were influenced by these research efforts is a useful learning exercise for informing future similar efforts, as are efforts to better understand and quantify, where possible, the impacts of such POR efforts.

This study built upon and benefited from a recent analysis of processes of policy change in the Kenya dairy sector, that included where and how research results informed these changes and who used them. We complemented these ‘process’ lessons with an *ex post* economic analysis of actual benefits (as best they can be estimated) and costs of the SDP policy-related efforts.

We found that SDP produced a significant volume of evidence that was used to influence the policy change process at various stages by different decision-makers and organizations. Although the Kenyan dairy policy document and bill have been in parliamentary process for more than a decade, written ministerial subsidiary regulation and KDB reorganization provide ample regulatory authority for engaging SSMVs, and this significant shift in dairy regulation was traced back to September 2004. The study found significant evidence of behavioural change among regulators and SSMVs that has led to positive economic benefits across Kenya.

The impact of the new policy on market margins appears trivial when data are pooled across locations. However, it emerged that margins in Nairobi were significantly different from margins in Nakuru. When independently assessed, it is shown that policy impacts in Nairobi led to significantly lower margins in the post policy change environment. Still, increased market quantities were observed in both Nairobi and Nakuru in the post policy change environment. Thus, SSMVs—particularly those operating in Nakuru—derive profits from quick relatively high volume turnovers and as a result, welfare benefits accruing to SSMVs increased.

Welfare benefits arising from the policy change were high, and were also captured by consumers (through lower milk prices) and producers. A cost–benefit analysis revealed that the policy change was highly profitable with a high positive NPV. In addition, the very high IRR value suggests that positive net benefits will continue to be gained by many actors in the dairy sector for years to come. However, government must devise a fairer way of distributing the cost of cess among consumers, producers, and SSMVs, rather than assessing a significant portion at the level of SSMVs.

The choice of sampling, sample size and interview approach were cursory and designed to ensure that we quickly quantified marketing margin for SSMVs, believing that there would be marginal need for statistical hypothesis testing. While we do not believe that our estimates were consequently compromised, it is now obvious that a more formalized approach would especially aid the comparison of marketing margins, before and after revision of the Kenyan dairy policy, as well as between Nairobi and Nakuru.

Future analysis could focus on significant wastage reduction and how this can be handled in the modelling exercise. For example, if SDP research leads to significant gains from reduced milk losses, merely using net change in the marketing services margin as the cost change tends to net out this effect. If the impact is significant, this framework may not be appropriate because farmers tend to lose from this type of research due to a reduction in farm gate price unless the final demand is very elastic or other costs in the supply chain are significantly reduced. This may not be the case in the current assessment because of significant payment of political rent to avoid seizures as well as significant sales activity in rural areas where enforcement was more lax.

Additional analysis could present a completely disaggregated model, with one for Nairobi and other urban areas where margins are probably significantly lessened by the revised policy, and another for rural areas where milk consumption is closer to the point of production and the smaller margins are not significantly affected by the revised policy change.

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## Appendix 1 Questionnaire for small-scale milk vendors

Section A		Background information		Type of business (code)	When was the business started (year)	Source of milk (code)	Milk sale area/point (write down)
<b>A1 Background (all respondents)</b>							
Respondent	Name	Gender (code)	Position in business (code)	Level of education (code)	[ ____ ]	[ ____ ]	[ ____ ]
	CODES						
Gender		Level of education		Type of business			Source of milk
1 = Male		1 = None		1 = Mobile trader (producer)			1 = Individual farmer
2 = Female		2 = primary		2 = Mobile trader (non-producer)			2 = Own farm
Position in business		3 = Secondary		3 = Transporter/traders			3 = Dairy co-op society
1 = Proprietor		4 = Tertiary institutions		4 = Milk-bars			4 = Private processor
2 = Employee		5 = University		5 = Others (specify) _____			5 = Self help group
3 = Others (specify) _____		6 = others (specify) _____					6 = Traders/Hawkers
							7 = Others (specify) _____

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**Section B Experiences and changes with respect to new milk handling procedures**

**B1 Familiarity with new requirements on milk handling and quality control**

1.1 Are you familiar with new regulations or requirements on milk handling and quality control? Code [ \_\_\_\_ ]

1 = YES      2 = NO

1.2 If YES, please list them

1.3 Do you currently use these new milk handling and quality control guidelines or regulations set by the government? Code [ \_\_\_\_ ]

1.4 If NO, please explain why

1.5 If you are familiar with the new guidelines or regulations, how did you obtain information on them?

1.6 When was the last time you received this information? (Approximate date: month/year) [ \_\_\_\_ ]

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## B2 Training and licensing

2.1 Have you been trained on milk handling and quality control methods? Code [\_\_\_\_\_]

1 = YES    2 = NO

2.2 If YES, where and when were you trained?

2.3 Who conducted the training?

1 = BDS provider    2 = KDB

3 = Public Health

4 = others (specify)

2.4 Were you issued with a licence after training? Code [\_\_\_\_\_]

1 = YES    2 = NO

2.5 If you were issued with a KDB licence after training, please provide approximate date when it was issued (approximate date: month/year)  
[\_\_\_\_\_]

2.6 What type of licence do you have? Code [\_\_\_\_\_]

1 = producer licence    2 = milk bar licence

5 = public health certificate    6 = single business permit

3 = milk movement permit  
7 = others (specify)

4 = medical certificate  
2.7 Is it easier to obtain a licence now than prior to 2004 when the new policy came into effect? Code [\_\_\_\_\_]

1 = YES    2 = NO

2.8 If YES, what has changed?

1 = lax administration    2 = expedited when training and other requirements are met  
3 = others (specify)

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### B3 Harassment

3.1 Please provide the following information on harassment

B3.11 How often were you harassed by KDB/MC/police before training police?	B3.12 When were you last harassed by KDB/MC/police?	B3.13 How did you cope with harassment?	B3.14 Has there been a change in the activities, actions or behaviour of KDB/MC/police towards you since you became a licensed trader? (YES/NO)	B3.15 What has noticeably changed about the actions of KDB/MC/police towards you since you became a licensed trader? (YES/NO)
_____ times/month	[_____]	[_____]	[_____]	[_____]

Coping with harassment

- 1 = Arrested and bribed my way out
- 2 = Arrested, charged and lost the milk
- 3 = Harassed and milk confiscated
- 4 = Harassed and released, but milk thrown away
- 5 = Harassed and released, but milk sold as sour milk
- 6 = Harassed and spoil milk returned to supplier
- 7 = Others (specify) \_\_\_\_\_

Changes in actions of KDB/MC/Police

- 1 = No more arrests
- 2 = No more bribes
- 3 = Milk is no longer confiscated
- 4 = Milk containers are no longer confiscated
- 5 = Operating licence easier to obtain
- 6 = KDB/Police simply gone easy on enforcement
- 7 = Others (specify) \_\_\_\_\_

3.2 If you have a milk trading licence, are you still being harassed by KDB/ MC/police? Code [\_\_\_\_\_]

- 1 = YES
- 2 = NO

3.3 If YES, why?

3.4 If you do not have a milk trading licence, are you still being harassed by KDB/ MC/police? Code [\_\_\_\_\_]

- 1 = YES
- 2 = NO

3.5 If No, why?

3.6 Are you a member of any milk traders' group? Code [\_\_\_\_\_]

- 1 = YES
- 2 = NO

3.7 If YES, what is the purpose of the group?

## Section C Information on transaction costs before and after training

Please provide information on the following transactions:

Before training/before implementing new requirements	After training/after implementing new requirements	
	Date of last training	Amount
Average quantity of milk purchased by trader per day (litres)	Average quantity of milk purchased by trader per day (litres)	
Average price per litre purchased (KES)	Average price per litre purchased (KES)	
Average quantity of milk sold by trader per day (litres)	Average quantity of milk sold by trader per day (litres)	
Average price per litre sold (KES)	Average price per litre sold (KES)	
Unsold milk: spoilt or carried over to next day	Unsold milk: spoilt or carried over to next day	
Compensation paid to customers for spoilage losses (per day)	Compensation paid to customers for spoilage losses (per day)	
Spillage losses per day (litres)	Spillage losses per day (litres)	
Transportation costs to/from buying point	Transportation costs to/from buying point	
Personal fare (KES)	Personal fare (KES)	
Milk load fare (KES)	Milk load fare (KES)	
Transportation costs to/from selling point	Transportation costs to/from selling point	
Personal fare (KES)	Personal fare (KES)	
Milk load fare (KES)	Milk load fare (KES)	
No. of plastic containers used per transaction per day	No. of metal cans used per transaction per day	
Per unit cost of plastic container (KES)	Per unit cost of metal can (KES)	
Contingency fee/bribes paid per day (KES/day)	Contingency fee/bribes paid per day (KES/day)	
Cost of milk preservation (KES/day)	Cost of milk preservation (KES/day)	
Market place tax (KES/day)	Market place tax (KES/day)	
Cost of milk quality control agents (e.g. ethanol, lactometer etc.) (KES/day)	Cost of milk quality control agents (e.g. ethanol, lactometer etc.) (KES/day)	
Amount spent on sanitation (KES/day)	Amount spent on sanitation (KES/day)	
Cost of training	Cost of training	
Cost of licensing/licensing fee	Cost of licensing/licensing fee	
Cess fees paid to KDB (KES/litre per day)	Cess fees paid to KDB (KES/litre per day)	

## Appendix 2 Questionnaire for regulators/street-level bureaucrats

Experiences and changes with respect to enforcement of new milk handling and quality control procedures obtained through training

1. Please describe your current enforcement activities with respect to milk handling and quality control requirements for milk traders? \_\_\_\_\_

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2. Have your enforcement duties/activities changed in the last five years? Code [ \_\_\_\_\_ ]  
[1 = YES; 2 = NO]

3. If YES, what were your previous enforcement activities/duties? \_\_\_\_\_

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4. **When** were you asked to start doing enforcement activities/duties differently than you previously did? \_\_\_\_\_

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5. **What** specific changes to your enforcement duties/activities were you asked to institute?

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6. **Who** gave instructions for you to start doing enforcement duties/activities differently?

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7. Have you followed these instructions strictly? Code [ \_\_\_\_\_ ] [1 = YES; 2 = NO]

8. If NO, why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. Did you undergo training on how to enforce milk handling and quality control requirements? Code [\_\_\_\_\_] [1 = YES; 2 = NO]

10. If YES, when? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

11. Have trained and licensed milk traders strictly followed the new requirements on milk handling and quality control? Code [\_\_\_\_\_] [1 = YES; 2 = NO]

12. If NO, what is the most common violation? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. What punishments have you meted to those who violate the regulations? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

14. What have you done to correct these violations? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

15. Are you currently less strict in enforcement of regulations on milk traders who are NOT YET trained and licensed than before 2004 (when regulations on engagement came into effect)? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Do you think there are (other) enforcers who used to or currently demand political rent (bribes) from milk traders? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

17. If so, has the situation changed for better or worse? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Appendix 3 Checklist for KDB officials

1. What did the 'enforcers' of the old Kenya dairy policy do before the policy change? (Describe their enforcement jobs/activities at the time).
2. What are they doing now?
3. Why did they make the changes they did?
4. Who told them to stop harassing small-scale milk vendors, stop demanding political rent or stop enforcing the old Kenyan dairy policy rules/regulations?
5. Exactly when were they told to stop harassing small-scale milk vendors, stop demanding political rent or stop enforcing the old Kenyan dairy policy rules/regulations?
6. Small-scale vendors who underwent training in hygiene and milk handling were licensed to sell milk and thus, clearly, were no longer harassed.
  - What proportion of all small-scale milk vendors do the trained vendors comprise?
  - Are the untrained small-scale milk vendors also escaping harassment now?
7. How can we be persuaded that the policy change happened because of research and not because of a government change (end of Moi government) or some other factor?
8. If possible can KBD provide data on:
  - Milk production or off-take from 2000 through 2005 or up till now?
  - Number of small-scale milk vendors?

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