



# Dairy co-operatives and policy reform in Kenya: effects of livestock service and milk market liberalisation

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Liberalisation in the dairy industry in Kenya is currently under way in several forms. The urban milk market monopoly of the Kenya Co-operative Creameries has been lifted. Clinical veterinary and artificial insemination (AI) services are no longer publicly supported in many areas. Private sector response to these reforms was expected to be greatest in the high-potential market-oriented dairy zones of Central Province, where the dairy farmers' co-operative societies play a central role in meeting the needs of dairy producers. A survey conducted by the authors measured the changes between 1990 and 1995 in milk marketing and service provision by the dairy co-operatives. Tabular and GIS analyses were used to evaluate the survey data. Dramatic changes in milk market patterns are apparent, in ways unintended by the policy reforms. Most notable has been a large increase in the role of the unregulated raw milk market. This helped increase real milk prices paid to producers by up to 50%, but also led to a steepening of the price gradient with distance from urban consumption centres. Large increases were observed in the provision of veterinary and AI services by the dairy farmers' co-operative societies, whose producer client base and credit facilities may enable them to compete effectively with the independent private sector. Market liberalisation therefore expanded the role of the raw milk market and the participation of the dairy farmers' co-operative societies in milk marketing and the provision of input services. © 1998 Elsevier Science Ltd. All rights reserved.

Keywords: East Africa, smallholder dairy, livestock services, co-operative services, market reform, GIS

## Introduction

As public sector reform and market liberalisation continue in many countries, collective organisations may in some cases compete effectively with the independent private sector in filling the service and market roles left vacant by departing public institutions. This analysis offers

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some case evidence as to the determinants of increased participation of collective organisations under market liberalisation.

As part of ongoing economic reforms, the Government of Kenya (GoK) has reduced the level of support and intervention in many of its activities within the livestock industry. These have included reducing government support for veterinary and artificial insemination (AI) services, and allowing a greater role for the private sector. In the dairy sub-sector, intervention in marketing activities was reduced in May 1992 when the monopoly for urban milk sales held by the Kenya Co-operative Creameries (KCC) was removed, permitting the entry of private milk processors.

These actions have altered the access of smallholder dairy producers to livestock services and marketing outlets, as can be seen in the changing roles of dairy co-operative societies in providing these services. Also apparent are the unintended consequences of the policy changes, in that the independent private sector, the policy target, has not taken on the role envisaged in either livestock services or milk markets.

## **Background**

Kenya has a comparatively well-developed dairy production and processing industry and is broadly self sufficient in milk and dairy products. This has been attributed in part to conducive government policies, especially those promoting smallholder<sup>1</sup> dairy production and market participation, centrally supported by the KCC's role as a guaranteed market outlet with nationally uniform pricing. Smallholder dairy production has played a major role in the economy of mixed farming in Kenya during the post-colonial era. Currently over 80% of the estimated 1500 million litres of milk produced annually in Kenya comes from smallholder dairy units (Waithaka, 1993). This contrasts with the structure of production in earlier decades, when most of the milk was derived from large-scale producers (Raikes, 1981). Smallholder dairy production is concentrated in the high potential areas of Central and Rift Valley Provinces.

Smallholder dairy farmer co-operative societies (DFCSs) have played an important role in the adoption of market-oriented dairying by smallholder farmers, by providing them with often the only reliable milk marketing outlet, and in the past mainly selling the milk to the KCC (Hopcraft and Ruigu, 1976). Other services provided by DFCSs in varying degrees are sales of feed and inputs, and veterinary and artificial insemination (AI) services. DFCSs in Central Province constitute 39% of the total number of dairy co-operatives nationally, 66% of the national active membership, and 71% of the annual milk turnover (Karlen, 1995).

Kenyan co-operative societies experience a considerable degree of government oversight and intervention.<sup>2</sup> They are registered with the Ministry of Co-operative Development (MoDC), which supervises co-operative elections and accounts, and authorises capital expenditures and policies. Those DFCSs that market milk to the KCC also face the obstacle of delayed payments for milk sales, sometimes of several months. In order to avoid some of these constraints, some less-formalised self-help groups (SHG) have emerged for the express purpose of collecting and marketing milk. These groups register with the Ministry of Culture and Social Services, and face fewer regulatory obstacles to their activities. However, they generally operate on a smaller scale, own little capital equipment, and market their milk raw and directly to insti-

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<sup>1</sup>Smallholders in highland Kenya typically keep one to two milking cows.

<sup>2</sup>In late 1997 the Co-operative Act was revised, relaxing some of the government controls on co-operatives. The consequences of this change have not yet been observed.

tutional customers such as restaurants/hotels or 'dairy bars'<sup>3</sup> and occasionally the KCC as a last resort. Consequently, they are often able to pay members more promptly than DFCSs. Other milk market outlets available to some farmers include private milk traders, who sell either raw or pasteurised bulk milk, depending on their scale of operation and target customers. Recently, several formal dairies of the Western model have emerged, which compete in retail markets directly with the KCC by selling pasteurised packaged milk. Finally, a market exists for direct sales of raw milk to individual customers near the farm unit, particularly in periurban areas.

The important role that DFCSs play in supporting smallholder dairying suggests that liberalisation in the dairy industry may pose important new challenges and opportunities for them. Further, although the independent private sector is typically the focus of privatisation efforts, in areas where co-operatives are strong the latter may need to play a continued intermediary role. The response of Kenyan DFCSs to the dairy industry liberalisation, and the consequent effects on their smallholder farmer members, has not been documented.

## Method

This study was conducted in Central Province, which ranks second only to Rift Valley Province in dairy production. The three districts of Kiambu, Thika and Murang'a in Central Province are generally suited to dairy production, with high rainfall, fertile soils, and proximity to urban markets. The three districts combined cover an area of some 4000 km<sup>2</sup>, where smallholder dairy production is combined on farm with the cultivation of coffee, tea and food crops, mainly maize, beans, potatoes, and market vegetables. Rainfall ranges from 700 to over 2500 mm annually, and altitudes from 1000 to 2600 m above msl (Jaetzold and Schmidt, 1983). Of the three districts, Kiambu is the most periurban as it borders the Nairobi urban area, and is centred only some 25 km from the city. Thika and Murang'a districts are further afield, centred approximately 50 and 80 km distant, respectively.

The study was conducted through a formal questionnaire and key informant interviews. With the help of the District staff of the Ministries of Co-operative Development (MCD) and Agriculture, Livestock Development and Marketing (MALDM), all identified DFCSs and related groups collecting and marketing milk in the three districts were surveyed. A total of 29 DFCS and one self-help group were surveyed, thirteen in Kiambu, three in Thika, fourteen in Murang'a. The data gathered included the co-operative area of service, number of registered and active members,<sup>4</sup> and changes in services rendered since 1990 in milk marketing, artificial insemination, clinical veterinary services, sale of livestock feeds and drugs, and provision of credit and loan facilities. Also obtained were figures on milk collection, prices paid to producers, and sales of milk through various marketing outlets.

The milk prices paid to members by the DFCSs were deflated using national Consumer Price Index data obtained from the Central Bureau for Statistics. An index of farm-gate milk price changes was thus created with base 1990 = 1. These price data and index were then mapped according to location of co-operative, using IDRISI GIS software (Eastman, 1997). An interpolation routine was then used to create an inferred price surface from the price point data.

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<sup>3</sup>Dairy bars are kiosks located in urban areas which retail raw or boiled liquid milk and sometimes fermented milk.

<sup>4</sup>Registered members are all DFCS shareholders, regardless. Active members include only those registered members who are currently selling milk to the DFCS.

## Dairy farmers' co-operative societies

The majority of the DFCSs are located in the tea/dairy and the coffee/dairy land use zones, as defined by Jaetzold and Schmidt (1983). The bulk of their members are smallholders who, besides keeping dairy animals, grow tea and/or coffee, crops with a history of co-operative input and output marketing, experience which aided the organisation of the DFCS. The history of co-operative development among the organisations surveyed varies. Most of the surveyed dairy co-operatives began in the early 1960s with independence, while one in Kiambu and three in Murang'a were formed since 1990.

As noted, the three districts are not similarly proximate to the Nairobi market, and so face different levels of market access and transport costs, although they share similar agro-ecological conditions. Kiambu producers and DFCSs, the closest to Nairobi, thus encounter more varied milk market opportunities, and face low costs of transport. In Murang'a, the furthest from Nairobi, by contrast, milk market opportunities are few and transport costs to the Nairobi consumer market high.

The changes (1990–95) in active DFCS membership (i.e., members delivering milk to the DFCS) in the three districts are shown in Table 1. During this period the proportion of active membership did not change markedly and ranged from 17% to 53% of registered members for the three districts. Reasons for members not delivering milk include their cow(s) being temporarily dry, sale or loss of cows and sale of milk to alternative informal outlets, where the price offered is usually higher. The numbers of active members overall, however, rose substantially during this period. This was particularly true in Murang'a, where the number of active members of DFCSs more than doubled to over 17,000 in 1995. Among Kiambu DFCSs active membership rose from 12,000 to over 15,000; while in Thika active membership fell. While not well understood, these changes in membership may be linked to the changes in prices and service availability discussed below. They are some indication of the dynamic shifts observed in the dairy sub-sector during this period, and of the continued relevance of DFCSs to dairy farmers.

## Provision of services

Although the core function of all the DFCSs is milk marketing, some of those surveyed provide other services as described above. The removal of subsidies or the withdrawal of government services has significantly influenced the variety and levels of services offered by DFCSs. The Sessional Paper of 1986 called for full cost recovery in some types of clinical veterinary services, and reductions of subsidies in others, while the increased role of private veterinary practices was encouraged (Government of Kenya, 1986). Actual privatisation of veterinary

**Table 1** Registered and active membership in dairy farmer co-operative societies in 1990 and 1995, by district

	Kiambu		Thika		Murang'a	
	1990	1995	1990	1995	1990	1995
Total registered members	33,410	40,491	7618	9781	17,400	33,479
Active members	12,249	15,359	2460	2309	7,369	17,580
Percent active	37	38	32	17	42	53
Percent change in active members, 1990–1995		25		–6		139

services was started in 1991 and was initially targeted at three main functions: tick control (through encouragement of formation of community dip committees), AI and clinical services, extending later to laboratory services. Under these reforms, the GoK agreed to withdraw veterinary services wherever a private practice was established and when the department was convinced that the area was adequately covered. In practice however, it appears that this has led to the official withdrawal of government veterinarians from high-potential areas such as Central Province, although informally many may still practice.

Before the privatisation, any DFCS providing services such as AI and clinical veterinary services competed directly with subsidised government services, and was hindered by inadequate infrastructure and capital, and lack of management experience. Consequently only a few societies, and only in Kiambu, provided AI and clinical veterinary services independently (Table 2), and those that did were often assisted by the use of GoK resources such as vehicles and personnel. The policy changes, however, have created new incentives for dairy co-operatives to take a more active role in livestock services, in the form of unsatisfied demand and new market opportunities. The societies' advantage lies in their ability to combine milk collection with other service provision, a combination which their major competitors for milk procurement, informal milk traders and private processors, cannot easily duplicate.<sup>5</sup> Typically, a farmer requests a visit by an AI or veterinary technician by submitting a note to the co-operative milk collector on the early morning collection route. The note is returned to the co-operative office with the milk, and the technician visits later in the same day. These services are usually provided on short-term credit, the charges being deducted from the farmers' month's end milk payment from the DFCS. Farmer members are charged for services on a cost-recovery basis, while non-members can obtain services for an additional fee and by paying

**Table 2** Level of livestock service provision by dairy farmer co-operative societies in 1990 and 1995, by service type and district

Service type	Kiambu		Thika		Murang'a	
	1990	1995	1990	1995	1990	1995
<i>Number of DFCSs providing service</i>						
Milk marketing	12	13	3	3	12	14
Sale of vet. drugs	7	10	0	0	2	3
Artificial insemination	1	11	0	1	0	10
Clinical vet. services	1	4	0	0	0	1
Sale of feeds	11	13	1	1	1	9
<i>Number (and percent) of active DFCS members with access to service</i>						
Milk marketing	12,249 (100)	15,359 (100)	2460 (100)	2309 (100)	7369 (100)	13,656 (100)
Sale of vet. drugs	6,363 (52)	13,695 (89)	0 (0)	0 (0)	552 (7)	2,037 (15)
Artificial insemination	3,500 (29)	14,863 (58)	0 (0)	1690 (0)	0 (0)	10,276 (75)
Clinical vet. services	3,500 (29)	8,850 (58)	0 (0)	0 (0)	0 (0)	150 (1)
Sale of feeds	11,867 (97)	15,359 (100)	900 (37)	436 (19)	278 (4)	7,749 (57)

<sup>5</sup>A few private dairy processors in Kiambu and Thika are now observed beginning to offer AI services to their supplying farmers.

cash. Co-operatives thus provide both services and credit to their members in an apparently cost-effective manner that few of their competitor milk buyers can imitate.

Some DFCSs are building on their advantage by collaborating to deliver services more cost-effectively. In both Kiambu and Murang'a, some DFCSs have jointly formed service co-operatives, registered separately with the MoCD, to provide AI and clinical veterinary services. These co-operatives hire AI technicians and veterinarians to serve the members of their constituent DFCSs, which may number three to four.

The withdrawal of government services and the apparent advantages held by DFCSs have led to an increase in the services they provide. Table 2 shows the number of DFCSs offering livestock services in 1990 and 1995, by service type. In Kiambu, closest to the urban market and the most developed dairy production area, increases occurred in all types of services, most notably in the provision of AI, which rose from one DFCS in 1990 to 11 in 1995. Similarly in Murang'a, DFCSs providing AI rose from none to 10, and those selling feed increased from one to nine. When the entry of DFCSs into new services is combined with the changes in active DFCS membership, the changes in numbers of members with access to co-operative provided services can be assessed (Table 2). Significant increases occurred in the numbers of active members with access to DFCS-provided AI services, and livestock feed sales.

The most important change occurred in the number of members with access to co-operative AI services. Over the period surveyed, this rose in Kiambu from less than 4000 to more than 14,000 members, representing 97% of all active dairy co-operative members. In Murang'a no co-operative AI services were available in 1990, but by 1995 75% of co-operative members had access to DFCS AI services (over 10,000 members). The number of active members with access to livestock feeds on credit from the DFCS in Murang'a increased from none in 1990 to some 9000 members in 1995. The number of members with access to livestock drugs on credit increased markedly in Kiambu, from about 6000 in 1990 to over 13,000 in 1995, but not in the other two Districts.

Further, it is not clear that private service providers are increasing their role in the same rapid manner. For example, a MALDM project to assist the privatisation of AI services was found to focus mainly on farmer groups and co-operatives. The Pilot Privatisation Project (PPP), carried out in Rift Valley, Central and Eastern Provinces in 1996, provided AI service training to some 70 organisations. Of those, 35 were farmer self-help groups, 28 DFCSs and only seven were private AI/vet services.

The increased participation by DFCSs in livestock services is substantial, and the public sector reforms must be seen as a primary factor in driving this change. In spite of the intended outcome of increased private participation in service provision, it is apparent that farmer groups and DFCSs may be best able to fill the service gap in the short term. Although the reforms directly affected only veterinary and AI services, the changes in the level of all types of services provided suggest that DFCS are responding to an overall climate of liberalisation as well as to specific reforms. In general the levels of new service provision are highest in those areas closest to the urban markets, namely in Kiambu. It is thus hypothesised that although the public sector livestock service reforms contributed importantly to these changes, there were also effects due to parallel liberalisation occurring in milk markets. As will be shown, those effects were strongly related to distance from the urban market centre.

## **Milk marketing**

The core function around which DFCSs have developed is the marketing of milk purchased from members. In the past the main market outlet for dairy co-operatives was the KCC, which

guaranteed the purchase of all milk supplied,<sup>6</sup> offered stable milk prices,<sup>7</sup> and possessed adequate infrastructure for reliable milk collection. The KCC was also the largest buyer, due to its officially sanctioned monopoly on urban milk sales. Only the KCC was licensed by the Kenya Dairy Board to retail milk products to ‘scheduled’ urban areas. However, sales of raw milk in rural areas were tolerated, including retail sales by dairy co-operative societies, which were relatively important for some co-operatives located near local population centres.<sup>8</sup> Table 3 shows mean proportions of milk sales by the district DFCS to different market outlets in 1990. In Kiambu at that time, about half of DFCS milk sales were to the KCC, with the remainder split between retail sales and wholesale sales to milk traders. In Thika and Murang’a, more distant from Nairobi, the KCC was the primary buyer of milk from DFCS, taking 71% and 92% of Murang’a and Thika DFCS milk, respectively.

In May 1992 the KCC’s monopoly was withdrawn and the sale of processed milk and other products was opened to other firms or societies satisfying quality control standards. The policy change resulted partially from the difficulties imposed on producers by persistent delays in payments by KCC for milk delivered, and the perception that producer prices were too low (Staal and Shapiro, 1994). The intent of this policy change was to spur the development of private dairy processors, creating a more competitive market that could raise producer prices,

**Table 3 Milk sales by dairy farmer co-operative societies to different market outlets in 1990–1995, as mean percent of total milk handled, by district**

District and market outlet	1990	1991	1992	1993	1994	1995
Kiambu annual intake (‘000 litres)	24,282	25,259	27,261	25,613	25,792	28,439
Kiambu sales outlets (%)						
Retail	29	31	42	45	50	49
KCC	49	48	35	24	23	24
Middlemen	20	19	19	26	21	21
Private processors	1	1	3	3	3	5
Thika annual intake (‘000 litres)	2,420	3,074	3,064	2,657	2,471	1,899
Thika sales outlets (%)						
Retail	8	9	9	20	41	48
KCC	92	91	91	79	58	48
Middlemen	0	0	0	1	0	0
Private processors	0	0	0	0	1	4
Murang’a annual intake (‘000 litres)	5,054	6,492	7,066	10,264	11,319	10,498
Murang’a sales outlets (%)						
Retail	29	27	25	25	29	27
KCC	71	73	74	74	70	72
Middlemen	0	0	0	0	0	0
Private processors	0	0	0	0	0	0

N.B. District totals may not sum to 100% due to losses through spillage, etc.

<sup>6</sup>Some co-operatives report, however, that occasionally the KCC rejected excess milk during the rainy season when production was at its peak.

<sup>7</sup>Although prices paid by the KCC were stable seasonally, the actual payments for milk by the KCC were often delayed, sometimes for several months.

<sup>8</sup>Retail sales by DFCSs are usually made in small bulk quantities from their own premises.

improve milk availability to consumers, and improve the efficiency of the KCC. In spite of the official intent that the policy would only affect the sale of pasteurised milk products in urban areas, the general perception among actors in dairy markets was that urban milk sales, including the sale of raw milk, were now open to all (Staal and Shapiro, 1994).

Given that perception, and the prompt payment and high prices available in informal milk channels, dairy co-operative societies moved in various degrees to expand market outlets. The more liberal environment also encouraged the entry of traders and middlemen into the raw milk market, who bought milk either directly from farmers or from the DFCSs and sold it to retailers in Nairobi. As a result, between 1990 and 1995, the relative importance of milk outlets available to the DFCSs changed, although overall volumes of milk collected showed little change. The KCC remained a major outlet for the DFCS milk, but the role for retail sales and sales to middlemen and private processors had grown. The volume of milk collection and proportions of sales by DFCSs in the three districts are presented in Table 3.

The changes in milk outlets indicate clearly the effect on market channels of dairy policy liberalisation, or more accurately the effect of the market interpretation of the liberalisation. In both Kiambu and Thika sales of milk by the DFCSs to the KCC fell sharply while direct sales rose. In Kiambu, where the effect was largest in volume terms, KCC sales fell from 48% of total milk marketed in 1990 to 23% in 1995. In Thika the percentage change in KCC sales was dramatic, falling from 92% to 48% of DFCS sales. In Murang'a, however, there was essentially no change in the proportion of KCC sales. Although the proportion varied during the period, it remained within the narrow range of 70–74% of all sales.

The overall change is thus a shift from the KCC to market outlets that directly or indirectly serve the informal market for unprocessed milk, even though historically the DFCSs have been the backbone of supply to the KCC. There are two elements of this change that should be noted. The first is that the observed market shift was from KCC sales to direct sales of raw milk to consumers, not to other dairy processors. KCC sales enter the formal market for processed milk, that part of the market targeted by the policy liberalisation. Raw milk sales, which are not regulated, were not sanctioned by the policy change. Increases in sales to private processors, the intended outcome of the policy change, occurred only marginally in Kiambu and Thika.

The second important element of the observed change is the effect of distance. The smaller effect of the liberalisation in Murang'a, in terms of relative sales to the KCC and other outlets, is apparently linked to its greater distance from the Nairobi market. The physical range of the raw milk market, which has accounted for much of the observed change, is limited by milk perishability. For liberalisation to have its desired impact in this area, the intended increase in the role of private processors may have to occur, as Murang'a may be outside of the effective range of the informal market. Private processors generally chill milk on collection; thus increasing the distance milk can be transported.

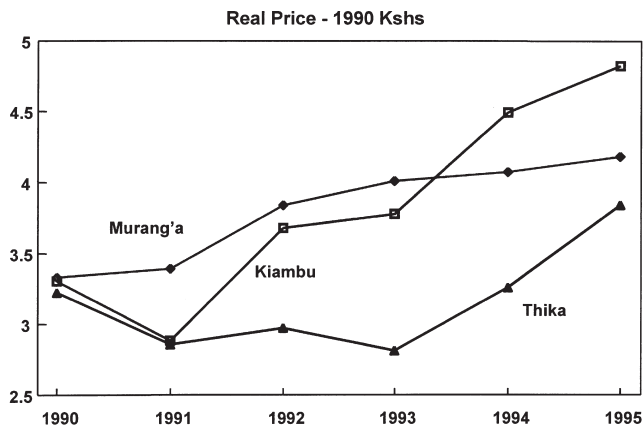
## Milk prices

The liberalisation in the milk market and consequent changes in the DFCS choice of market outlets have also led to changes in the prices paid by co-operatives to farmer members. This is because prices available on the local raw milk market are generally higher than those paid by the KCC to co-operatives (Staal and Shapiro, 1994). Similarly, Ombui *et al.* (1996) found that the percentage of local sales was one of three factors determining the prices paid by DFCS to their producers.

The average prices paid by the societies to their members over the study period rose from approximately Ksh 3 to 13, 11.50 and 11 in Kiambu, Murang'a and Thika, respectively. These prices varied greatly between DFCSs depending on the levies they withheld and the cost of services provided. Since the rate of inflation in Kenya was high during the survey period, the changes in nominal prices may not reflect real increases in milk prices or producer revenues. Real prices were calculated therefore by deflating nominal producer prices by official Consumer Price Index data. The real prices were then indexed individually by DFCS, with base 1990 = 1. The changes in real producer prices in the three districts are shown in Fig. 1.

The results show that real milk prices rose significantly during the survey period, and in particular after 1991, the start of dairy market liberalisation. In Kiambu real prices rose by nearly 50%, while in the other districts the price rises were smaller but nevertheless important. Although changes in input and factor costs faced by producers are not considered here, these real price changes can nevertheless be regarded as an indication of improvement in real producer revenues.<sup>9</sup> They also contrast markedly with reported changes in real milk prices in previous years, which fell by 25% in real terms from 1971 to 1989 (Waithaka and Nijssen, 1992).

The dramatic increase in Kiambu prices is linked closely to the district's greater participation in the raw milk market, where higher prices are available due to the proximity to the urban market.<sup>10</sup> Again, liberalisation has had the intended effect of raising producer revenues, but through the unintended mechanism of the raw milk market. Importantly, however, real milk prices also rose in Murang'a District, where, as was shown in Table 3, most sales are still to the KCC. Those changes in real milk prices are thus apparently the result of higher real prices paid by the KCC. This suggests then that the policy change has had its intended effect in at least one area, that of raising milk prices in the formal sector of the dairy industry.



**Figure 1** Changes in average real price per litre paid by dairy farmers' co-operative societies to their members (1990 Ksh), 1990–1995, by district and year

<sup>9</sup>Since no major structural or policy changes occurred in dairy input markets during this period, it is assumed that input costs rose generally at the same level as overall inflation, and so did not rise in real terms.

<sup>10</sup>The approximate costs per litre of transporting milk by self-help groups in Thika were calculated during the same period to be Ksh 0.03 per litre per kilometre (Staal *et al.*, 1997).

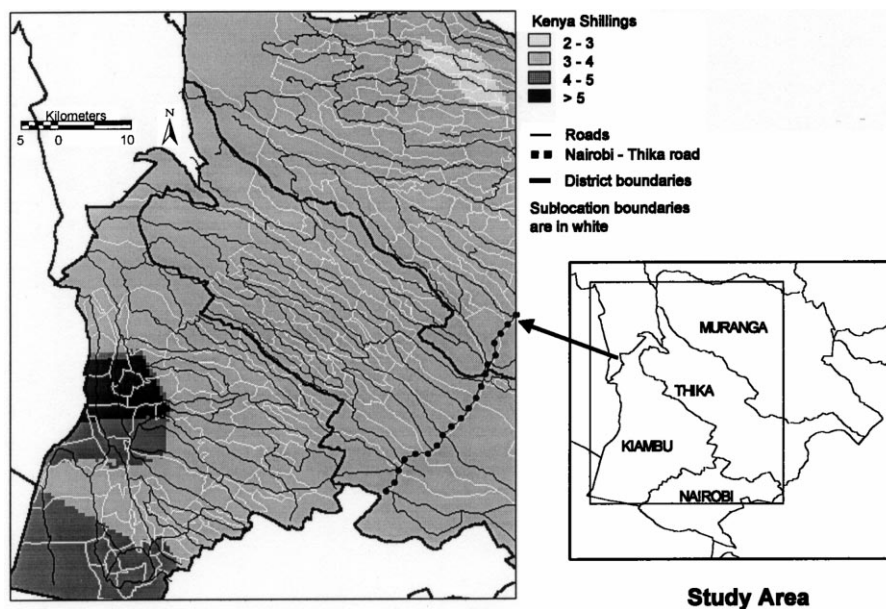
## Spatial analysis of milk prices change

In order to better evaluate the effects of DFCS location on changes in relative milk prices, Geographical Information System (GIS) tools were used to map the price data according to location of the DFCSs. These data were then geographically interpolated to yield a price surface. For comparison, this was done for nominal milk prices paid by DFCS to producers in 1990 and in 1995, and the indexed price change 1990–1995. Examining these surfaces, shown in Figs 2–4, allows some understanding of the changes in the price gradient during the period of the survey.

Figure 2 maps nominal milk prices in 1990, the main road network as well as the district boundaries. As illustrated, Nairobi is the blank area at the bottom of the map. Aside from one area in the west of Kiambu,<sup>11</sup> prices can be seen to be relatively uniform throughout the area, as indicated by the relatively homogenous shading. This was the period before the milk market liberalisation, when the KCC took in most of DFCS milk even in Kiambu, and paid a uniform price to suppliers.

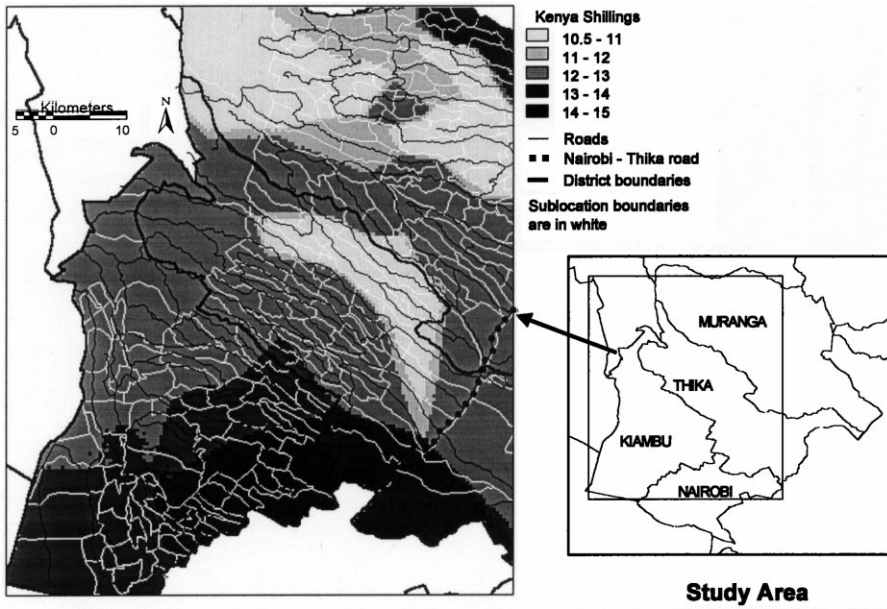
Figure 3 maps nominal milk prices in 1995, several years after the 1992 liberalisation, and reveals a different pattern, with distinct differences clearly related to distance from Nairobi. It should be noted that a major road artery, labelled the Nairobi–Thika road, runs north along the east side of the region shown, thus contributing to the areas of higher prices in the east and north.

The locational changes in prices is further emphasised in Fig. 4, showing the indexed change in real milk prices, base 1990 = 1. This mapping reveals clearly that changes in real prices

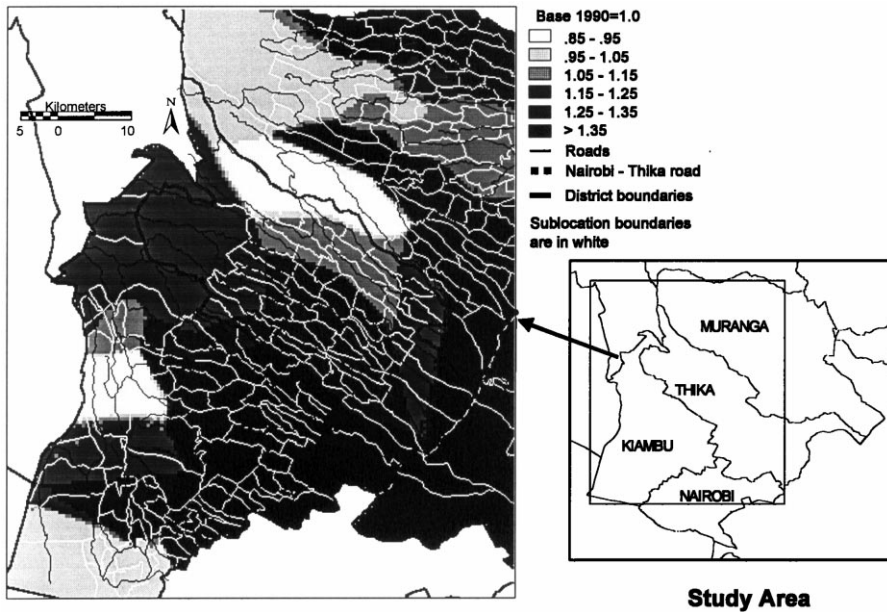


**Figure 2** Nominal milk prices paid by dairy farmers co-operative societies to their members in 1990. GIS map of interpolated price surfaces (Ksh per litre)

<sup>11</sup>One area of Kiambu reported milk prices above 5 Ksh per litre in 1990. These data were included, although they may be an anomaly.



**Figure 3** Nominal milk prices paid by dairy farmers' co-operative societies to their members in 1995. GIS map of interpolated price surfaces (Ksh per litre)



**Figure 4** Indexed changes in real milk prices paid by dairy farmers' co-operative societies to their members, 1990-1995 (base 1990 = 1). GIS map of interpolated price surface

have occurred generally in relation to proximity to the Nairobi centre. In some areas removed from the urban area, real prices can be seen to have fallen, hence not all farmers have benefited from the market changes. The liberalisation of the milk market in 1992 can thus be seen to have led to uneven changes in milk prices to the DFCS member farmers, and a steepening of the price gradient with distance from the urban centre. As was shown by changes in the DFCS outlets, however, these price changes are linked to a growth in the importance of the role of the informal market, rather than to the intended increased market participation by private dairy processors.

## **Discussion and conclusions**

The results point towards important changes in the role of dairy societies due to the impact of changes in policies affecting livestock services and milk marketing. Dairy co-operative societies have substantially increased their level of activity in livestock services to dairy farmers, to fill the gap left by reduced government involvement. The policy objective of increasing the level of provision of alternative livestock services appears therefore to be partially met. It remains to be seen, however, how these changes will affect producer welfare, and whether independent private-sector service provision will eventually play a greater role. Still to be determined are what changes are occurring to the quality and appropriateness of these services, and their costs.

The dairy policy change of 1992 has also been shown to have had some of its desired impact in milk markets and prices. This has led to shifts in market outlets for dairy co-operative societies and points to greater underlying shifts in milk markets overall. Unlike the changes in livestock services, however, these have clearly improved welfare of most producers through higher real prices and timeliness of payments. Dairy producers farther from the urban market, however, may now be receiving a lower real price for their milk.

Much of that change, however, has been due to the unintended growth in the role of the raw milk market. The reasons for this effect can be linked to traditional consumer preferences for fresh whole milk, and to continued obstacles to the growth of alternative formal milk channels.<sup>12</sup> Raw milk is the lowest-cost milk available to consumers, many of whom are apparently unwilling to pay the additional costs of processing and packaging. Research at the Kenya coast shows that preferences for buying raw milk decline very little with increases in income (Staal and Mullins, 1996). Although policy-makers have generally suppressed raw milk market development as being unacceptable for public health reasons, the continued importance and durability of these markets may require greater and more positive policy and research attention. Mechanisms may need to be found to meet the demand for fresh whole milk while meeting human health concerns in a manner which does not incur costs that consumers are unwilling to pay.

The Kenyan dairy industry provides a model which is currently being followed in some part by dairy development efforts in neighbouring African countries, particularly Uganda and Tanzania. With increased attention to the potential that smallholder dairying offers, the lessons learned in Kenya will have relevance for dairy development in these neighbouring countries and further afield. More generally, as local market reforms continue in developing nations, this case suggests that collective organisations may sometimes compete effectively with the independent private sector, due to stronger links to the producer supply base.

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<sup>12</sup>Milk is customarily boiled before consumption, greatly reducing any health risks from milk-borne diseases.

## Acknowledgements

The authors thank the officials of the Ministry of Agriculture, Livestock Development and Marketing and of the dairy co-operative societies for their help during the survey. Assistance in the GIS analysis from Russ Kruska and his team at ILRI's Systems Analysis and Impact Assessment unit is gratefully acknowledged. An earlier version of this paper was presented at the 5th KARI Scientific Conference, 14–16 October 1996, KARI Headquarters, Nairobi.

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