

Expanding an African Success Story



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access to important services, such as input supplies, veterinary services and artificial insemination. Those services have further suffered from reduced public support since the early 1990s. SDP research shows that these market factors have a larger impact on successful dairy production than access to land and fodder resource, for example. Upgrading infrastructure and services may thus benefit dairy livelihoods more than focusing attention on reducing imports of milk powder.

The rise of raw and pasteurised milk in Kenya

The practice of milk consumption in Kenya, mostly in tea, is very strong. SDP research on milk demand has found that Kenyan households in the highlands treat milk like a staple, rather than the luxury good it is regarded in other developing countries. On average, Kenyans drink 80–125 kgs of milk a year (depending on location) while in sub-Saharan Africa as a whole, including Uganda and Tanzania, people drink less than 25 kgs a year. Households in Nairobi and Nakuru spend an average of 18% of all food expenditure on milk and dairy products, second only to what they spend on grains such as maize (27%).

All Kenyan households, even the very poorest, buy milk. Even households earning less than US\$1 a day typically consume at least half a litre of milk daily. The poorest households in Ethiopia, in contrast, buy no milk or dairy products. Even when the retail price of unpasteurised 'raw' milk rises, or family income falls, Kenyan households do not change significantly the amount of raw milk they buy [based on SDP estimates of price elasticity for raw milk among the poorest households in Nairobi and Nakuru of only 0.12, and the income (expenditure) elasticity for raw milk among all households in the same cities of only 0.13.]

The picture is quite different for pasteurised, packaged milk. SDP research shows that poor households outside Nairobi, which already buy little pasteurised milk, would significantly reduce their pasteurised milk purchases if either the price rose or their incomes fell [price elasticity for pasteurised milk is 0.70; income (expenditure) elasticity for pasteurised milk 0.50]. Interestingly, most households report that they regard raw milk as better than pasteurised milk in both taste and quality. Households have increased their purchases of raw milk significantly over the last 10 years, while also increasing their purchases of pasteurised milk, both at the expense of UHT milk and milk powder, whose consumption in the country has declined dramatically. The latter may be related to the problems with Kenya Co-operative Creameries, which had made UHT milk and milk powder widely available until the mid-1990s, possibly at unrealistically low prices.

Overall, there is strong and relatively price- and income-resistant demand for raw milk in



"Consumption of milk by malnourished children enhances their physical and mental development" Pic: ILRI - Dave Elsworth

Kenya, which is 25% and 50% cheaper than pasteurised milk in urban Nairobi and urban Nakuru, respectively. Pasteurised milk is likely to increase its market share significantly only when household incomes rise, which will be dependent on real growth in the Kenyan economy.

The true impacts on public health

Studies by the SDP were some of the first to estimate the large and important role of informal raw milk markets in Kenya, estimated to comprise 85% of all milk marketed in the country. Probably less than 15% of marketed milk gets pasteurised or processed into other dairy products. The reasons for this bias towards raw milk are outlined above: poor households are generally not willing to pay the higher price for pasteurised milk, which is also generally less preferable.

The studies show that the raw milk market operates through different channels to pasteurised milk and by a variety of traders with different scales of operation. Most raw milk is not handled by traders at all. More than 50% of all milk marketed in Kenya is delivered directly by farmers to house-

holds and restaurants. As a result, small traders handle only some 25–30% of the overall milk market. Some traders are licensed, some unlicensed. Most operate from fixed premises (milk bars), while some operate as small-scale mobile traders (including 'hawkers').

Given this predominance of raw milk sales, a key area of research for SDP and its partners was to quantify the public health risks associated with different marketing channels. Milk samples were taken from a wide variety of market agents in Central Kenya and tested for adulteration and for bacterial load, including pathogenic coliform bacteria, brucellosis antigens and contamination by antibiotics. Adulteration was found to vary by season, with higher levels (up to 27% of samples) in the dry season and lower levels (as low as 4% of samples) in the wet season. Bacterial counts were found to be high in all market channels, except in rural areas where fresh milk is delivered directly from farmer to consumer.

A significant finding was that raw milk quality differed little between licensed and unlicensed traders and retailers. Some of the poorest-quality milk was found among larger-scale traders who transport milk long distances from rural to urban areas. The lack of association between licensing and milk quality may raise questions about current policies and requirements regarding licensing.

All urban households and nearly all rural households reported boiling milk before consuming it. Those rural households that did not boil milk (4%) soured the milk before consuming it. The practice of boiling milk, whether pasteurised or not, reduces health risks significantly, as all milk-borne potential disease-causing micro-organisms are destroyed by boiling.

With other partners in the dairy industry, SDP is working to improve the performance of small-scale market agents in delivering high-quality and safe milk through training, development of appropriate milk-containers and milk testing. Improving the performance of small-scale milk market agents through these activities will help bridge the quality and entrepreneurial gap that such traders must cross in order to be eventually incorporated into the formal milk market.

Dairy benefits employment and child nutrition

Significant numbers of jobs are created in the smallholder dairy sector, both on farms and in milk collection, transportation, processing and sale. SDP research shows that raw milk trading creates up to two full-time jobs for every 100 litres of milk handled on a daily basis, with monthly wages averaging Ksh 5,000. This figure is higher than that of the official minimum wage and the typical rate given to low-skilled labourers.

Research is now analysing employment generation in the formal processed milk market. As in other sectors, employment generation relies predominantly on micro- and small enterprise development, including informal markets. Enhancing dairy employment thus appears to be in line with the current national policy for employment-led economic recovery that includes engaging informal sectors and small enterprises.

Milk is an important source of protein, vitamins and minerals critical for child development. On-going research in Kenya is confirming that consumption of milk by malnourished children enhances their physical and mental development. SDP is collaborating with others to look at how dairy cow ownership benefits child nutrition. Cattle-keeping households both at the Kenya coast and in the central highlands were found to have significantly fewer children exhibiting stunting (a height-against-age indicator of long-term under-nutrition) than those households without cattle, after controlling for income and other factors.

These nutritional benefits are also provided to the urban households that buy and consume milk, whether raw and boiled, or pasteurised. The price elasticity results above suggest that if relatively high-cost pasteurised milk is the only milk made available to poor households, those households will consume less milk with potentially negative nutritional consequences for their children.

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Given enabling policies and well-functioning institutions, Kenya's successful and large dairy sub-sector will continue to grow and help drive the economic recovery of this country. Through this wide-ranging and high-quality research, the Smallholder Dairy Project is providing reliable information to support dairy smallholders, consumers, planners and the dairy industry as a whole. More information and reports of SDP research are available through the contact details given.

• Any views expressed by SDP are not necessarily those of DFID or the UK or Kenya Governments.

Raw milk trading creates up to two full-time jobs for every 100 litres of milk handled on a daily basis

Napier grass head smut disease threatens industry

Smallholder dairy farmers in Kenya produce more than 80% of all the milk marketed in the country, mainly on family farms keeping one or two cows. Most of these farmers practice 'zero-grazing' by growing a high-yielding fodder crop that they cut and carry to feed their cows confined in stalls.

Napier grass is the fodder crop of choice for Kenyan smallholders. It provides more than half the amount of feed required on some 300,000 smallholder dairy farms. In Kiambu, smallholder farmers grow Napier on an average 15% of their arable land, a proportion equal to that under maize in the same district.

In the last few years, Napier grass in Kenya has been attacked by a fungal disease called 'head smut', which is caused by *Ustilago kamerunensis*. This disease drastically reduces the amount of biomass a Napier crop yields. The low milk yields, high calf mortality and long calving intervals that are problems in Kenyan dairy are predominantly due to insufficient good-quality feed. Napier grass head smut has worsened this problem, especially in central and eastern Kenya.

The disease was initially noticed in Lari Division of Kiambu District. Since then, it has spread to most districts in

central and eastern Kenya. In Githunguri, Gatundu, Kikuyu, Limuru, Kamwani, Kiambaa, Ndia, Mukurwe-ini and Kangema divisions, the disease has reduced Napier grass yields by up to 90%. The smut appears to be spreading, with cases reported in Molo and Bahati, in the Rift Valley.

Naomi Njeri Kibunja, a small-scale dairy farmer keeping three dairy cows on a two-acre farm in Gakoe, Gatunda, Thika, says head smut disease is a serious problem in her area. "If we don't get a solution soon, dairy production in this area will collapse because we have no alternative feed for our cows. The effort being made by our research officers is the only hope we have."

When the disease was first reported, scientists at the Kenya Agricultural Research Institute (KARI), as well as farmer groups themselves, screened many varieties of Napier grass for resistance to smut. Two resistant varieties, 'Kakamega 1' and 'Kakamega 2', were identified. After evaluation on research stations and farmer fields, Kakamega 1 was bulked at the National Agricultural Research Centre (NARC), Muguga, and distributed to some 10,000 farmers, many of whom hired vehicles to collect the planting material from Muguga.

To reduce these transportation costs



A field of Kakamega 1 Napier grass, a smut-resistant variety developed by KARI

of the farmers, KARI and the Smallholder Dairy Project (SDP) are encouraging farmer groups to start bulking sites. Other groups involved in this include the focal area development committees of the National Agricultural and

Livestock Extension Programme (NAL-EP) and parent-teachers associations (PTAs).

The Gakoe Primary School PTA, in Kamwani Division, Thika, has been particularly successful at this. This PTA

voted money to start a bulking site in the school, which serves an area of 12 sq km. In just four seasons, the school has supplied about 15,000 planting canes, mainly to its 360 PTA members. Plans are under way to start selling the smut-resistant Napier planting material to farmers outside this PTA. The SDP team is encouraging other school committees and farmer groups to start their own bulking sites.

SDP is also planning to screen more varieties of Napier for resistance to the head smut disease. They will collect varieties from Kenyan farms, from ILRI's forage genebank in Ethiopia, and from the East Africa region as a whole. The material will be inoculated with fungal spores and observed for development of head smut disease. Because this procedure takes 4–5 months, the researchers are now considering employing molecular techniques to select varieties of Napier resistant to head smut.

Kakamega 1 Napier planting material is available from KARI Muguga; NALEP focal areas in Kirinyaga, Murang'a, Kiambu and Nyeri; Gakoe Primary School, Kamwani Division, Thika; and Gatondo Secondary School, Karatina.