R7321: Improving Milk Markets and Reducing Public Health Risks in Ghana and Tanzania

Brief Synopsis
Efficient and viable market mechanisms and processes which deliver safe, consumer-preferred dairy products at low cost, and which provide improve incomes for resource-poor smallholder dairy producers were identified in the present project. This was achieved through the quantification of health risks and economic performance in indigenous dairy markets, and identification of relationships with market agent practices and government policies. Indigenous dairy markets have not previously been examined in this manner.

Background
Indigenous small-scale (often referred to as informal) dairy markets dominate in developing countries, comprising over 80% of marketed milk in countries including Kenya, Tanzania and Ghana. The markets continue to operate without policy support mainly due to lack of information on the important role they play in the livelihoods of those involved and public health concerns associated with sales of un-pasteurised milk. This project worked in urban and peri-urban locations in Ghana (Accra and Kumasi) and Tanzania (Dar-es-Salaam and Mwanza). The study focused in three major areas: a) marketing, profits and economic efficiency, b) threats to public health from milk products, and c) processing of indigenous products.

Research highlights
Marketing and efficiency
In both countries, the majority of traders were women, and about ¾ were either proprietors or family members of proprietors. Many were very small-scale operators, handling less than 30 litres of milk per day. The markets displayed a wide variety of interactions. In the simplest example, milk producers sold raw milk directly to consumers, with no other intermediaries. At the other extreme as many as three intermediaries played a role between farmer and consumer. Quality control measures were very rarely used. A key finding was the recognition that proper metal milk containers associated with better hygiene were rarely used, with plastic buckets and jerry cans being preferred. Returns were highest to farmers who sold their milk directly to consumers. An important result was that there was no systematic difference in profitability between large and small market agents. Instead, unit returns differed according to volume handled, and the value added in terms of labour. For example, large wholesalers showed low unit profits, while retailers exhibited the highest unit profits in both countries, reflecting the market service and provision of refrigeration or premises at the retail level. Assemblers who travelled longer distances to collect milk also showed higher returns. Statistical analysis comparing volume of milk with profitability showed very little effect, suggesting that there are few economies of scale in milk marketing. Another key finding, although expected, was the universal lack of any formal training in milk handling, except for some cooperatives. This often resulted, as shown below, in low quality milk.

Public health
Overall, milk quality was often found to be quite low. Adulteration with water was found to have occurred in some 20% to 60% of samples varying particularly by season and site of sampling. Adulteration was highest during the dry season, when milk prices were highest and the economic incentives to add volume also highest. Bacterial counts were similarly high. Up to 67% had un-acceptable bacterial counts and these were directly associated with poor hygiene, adulteration and time elapsed since milking. The key finding from milk quality tests was that small milk market agents, often targeted by the public as being the greatest threat to public health, did not show significantly worse milk quality than other market agents. Antimicrobial drug residues were found in some 35-40% of samples in both countries. These residues, which cannot be removed by heat treatment, may pose a long-term public health threat. Policy-makers are neither aware of nor equipped to avoid this threat. Antibodies to Brucella were found in some 15% to 35% of samples in both countries. The common practice by consumers of boiling milk before consumption shields them from the microbiological health hazards. However, the observed lack of training, coupled with the lack of policy support in terms of regulation, is clearly contributing to low milk quality. Training modules were developed and implemented to address the milk quality issues, which were shown to improve after training.

Processing of indigenous products in Ghana
Initial investigation found shelf life constraints to the wagashi cheese and lack of clear knowledge on the amount of coagulant to use, which varied widely between different cheese makers. Inefficient use would further exacerbate the problem of increasing scarcity of Calatropis procera (the natural coagulant plant used) in some areas. Experiments conducted identified optimum quantities to use, which were then converted into typical local measures. Trials on the use of Xylopia aethiopica, a local plant thought to have anti-microbial properties, showed no preservative effect on the wagashi. However, trials found that brining led to significant reduction in bacterial growth. After conducting consumer taste tests, a 10% brine level was selected as effective and acceptable to consumers. These refined techniques were then incorporated into a training module and dissemination leaflet. Basic economic analysis showed that reasonable returns were available to these cheese makers, and that improved shelf life would reduce their costs and increase their market opportunities.

Uptake
The three major sets of outputs are: training and extension materials; policy impacts; and, impact on the development agenda in other countries. The extension materials have been made widely available nationally and have been the basis for building linkages internationally and using the same linkages to extend them (see below).
Linkages

The dissemination materials and reports produced have been the basis for several new initiatives and linkages. In Ghana, the findings were taken up by a new FAO project entitled: "The Training Programme for the Small-scale Dairy Sector" and related livestock sector development efforts being funded by the African Development Bank. In Tanzania, close linkages initiated at the beginning of the project with Austroproject, a local dairy development NGO (non-governmental organisation), and the national Dairy Task Force (in which the Tanzania Project Coordinator is a member) continue to ensure direct use of findings. Internationally and regionally, the training materials developed are already being promoted in various ways by FAO (Food and Agriculture Organisation) and ECAPAPA (Eastern and Central Africa Programme on Agricultural Policy Analysis) and formed the basis for a generic training manual being developed for eastern Africa. For example, FAO is contributing to the development of generic training guidelines for the eastern Africa region based on the extension materials.

Relevance to sustainable livelihoods

Market-oriented smallholder dairying in developing economies has higher returns than many traditional agricultural activities and thus offers important income opportunities for resource-poor producer households and for rural and urban poor through their participation in processing and marketing. This research provides one of the first sets of evidence that systematically address the economic and milk-borne public health issues in Africa. It has documented that important livelihoods continue to be created in such markets, thus providing comprehensive evidence for greater policy attention to the markets. The policy recommendations are aimed at bridging the gap between the regulated and unregulated dairy markets, and reducing public health risks, through targeted training of market agents coupled with licensing where appropriate.

Selected project publications


Collaborating Institutions

1. International Livestock Research Institute Nairobi, Kenya. S Staal (Project Leader), A Omore
2. University of Science and Technology, Kumasi, Ghana. E L K Osafo, G. Nurah
3. Sokoine University of Agriculture, Morogoro, Tanzania. L Kurwijila, N Mdoe
5. Natural Resources Institute, England. D Barton