

3R Kenya Project Research Brief 001

Enhancing milk quality and safety:

Towards milk quality-based milk payments in Kenya

Asaah Ndambi, Ruth Njiru, Camee van Knippenberg, Jan van der Lee, Catherine Kilelu, Margaret Ngigi, Martin Mulwa, Daniel Asher, Gloria Mbera and Wangu



Introduction

According to Kenya's Ministry of Agriculture, Livestock and Fisheries (MoALF) the dairy industry accounts for 14% of Kenya's agricultural gross domestic product (GDP) and 6-8% of the overall GDP (MoALF, 2013). Milk production has been identified as a key contributor to at least three of Kenya's Big Four strategic priorities: health, food and nutrition security, and manufacturing. Milk consumption continues to increase, with the Kenya Dairy Master Plan projecting that annual per capita consumption could reach 220 kg by 2030, from the current average of 125 kg in urban areas and less than half of that in rural areas.

Despite its strategic importance, Kenya's dairy sector remains largely unregulated, with the bulk of milk sold in its raw unprocessed form in informal markets. Farmers are paid based on the quantity of milk produced rather than on its quality. Because most consumers prefer to purchase low-cost raw milk, a major challenge for value chain projects has been to make formal sector dairying more attractive. The lack of adherence to milk quality and safety standards, which includes the use of poor quality livestock feed, non-food grade plastic containers for milking and transportation, and minimal testing and rejection at collection points, is an entrenched problem. This is further exacerbated by limited consumer awareness, processor competition for milk volumes at the expense of quality, poor milk handling practices along the chain, and minimal enforcement of milk quality and safety standards.

Consumption of poor quality and unsafe milk can pose several hazards to human health. Unsafe milk may contain food-borne pathogens that cause diseases such as brucellosis, listeriosis and tuberculosis. Moreover, antibiotic residues in milk may cause antibiotics resistance, which makes treatment of illnesses more difficult. The presence of antibiotics in milk is also a serious problem in dairy value addition. Antibiotics inhibit useful microbes in starter cultures for yogurt, cheese and other fermented dairy products, leading to huge economic losses.

Poor milk quality does not only lead to increased health risks, it also undermines the emergence of a competitive dairy value chain. To turn around the situation, some investments need to be made by all actors along the milk supply chain. This was the objective of a study exploring the private and public costs and benefits of implementing a quality-based milk payment system (QBMPs) pilot in Kenya (Ndambi et al, 2018), which is summarized in this Research Brief.

In addition to highlighting some of the costs and benefits associated with enhancing quality and safety standards across the milk supply chain, the brief addresses a number of systemic issues and challenges facing the dairy sector and concludes with a set of recommendations aimed at encouraging all actors to "do their bit" to contribute to a productive, innovative and sustainable dairy sector in Kenya.

Key messages

- To make QBMPs work, robust action is needed on many fronts to create the market conditions and incentives for a quality-based dairy value chain in Kenya.
- The KDB should ensure strict enactment, enforcement and monitoring of quality standards of milk. This needs to be a concerted effort at national and county-level in line with various policies.
- Dairy processing enterprises and cooperatives should invest in well-equipped laboratories and trained staff to ensure rigorous and regular quality control.
- There is need to expand infrastructure to ensure efficient transportation of raw milk and consistent testing of milk at delivery, bulking points and processing centers.
- Standards should be developed for dairy cooperatives and other private enterprises wishing to get into the business of milk collection and marketing.
- Strengthen dairy extension services through both government and private sector delivery to support safe and quality milk production at farm level.
- Consumer organizations need to conduct awareness raising and advocacy to strengthen demand for quality milk products.

Introduction to QBMPs

This research brief summarizes the main findings and recommendations of a study that explored the private and public costs and benefits of implementing a quality-based milk payment system (QBMPs) in Kenya (Ndambi et al, 2018). The study was based on a pilot project implemented by Nakuru-based processor Happy Cow Ltd and two of its suppliers – cooperative enterprises in Nakuru and Nyandarua counties – with support from SNV Netherlands Development Organisation.



One of the objectives of the project was to test whether paying a “quality bonus” to farmers for supplying better quality milk would result in a consistent supply of quality milk for processing, and hence trigger upgrading and quality improvements along the entire dairy value chain. It was expected that by providing sufficient capacity building support to farmers, while also investing in the requisite quality control infrastructure by cooperatives and processors, would result in gains for all actors involved, including: higher income for farmers; lower milk rejection rates at collection points; reduced processing costs; and improved access to safe and quality dairy products for end consumers.

Private and public costs and benefits of QBMPs

The costs and benefits of QBMPs are both private and public in nature. The 2018 QBMPs study analyzed the private costs and benefits for two main categories of dairy stakeholders – farmers, milk collection and bulking enterprises (hereafter simply referred to as cooperatives) and processors.

Farmers: Farmers who met at least 40% of the prescribed quality standards (Grade A and B) were awarded a bonus payment linked to the quality of milk delivered. For example, farmers supplying the highest quality (Grade A) milk would receive an additional KES 3.86/kg delivered. On average, this resulted in a net profit of KES 2.31/kg of milk after subtracting average production costs of KES 1.55/kg. The “quality dividend” for farmers selling an average of 10.71 kg of milk a day therefore amounts to approximately KES 742 in additional profit per month.

As shown in Figure 1, farmers who did not raise the quality of their milk (Grade C) achieved a net loss due to rejection of their milk or not qualifying for a bonus payment. The study results further revealed that farmers who supplied milk of fluctuating quality, ranging from Grade A to C (represented by the column “Mixed”) achieved a lower net profit of 0.27 KES/kg of milk, compared to farmers who managed to consistently supply Grade A and B milk. Other benefits of participating in the QBMPs for farmers include: access to training and support on improved dairy management, as well as milk

quality and safety requirements; and access to credit and other support provided through farmers’ groups linked to the QBMPs cooperatives and processors.

Dairy cooperative enterprises and processing companies:

For Grade A milk delivered by farmers, cooperatives incurred a cost of KES 0.56/kg of milk on average and made additional revenue of around KES 0.32 /kg, leaving them with a net loss of KES -0.24/kg. For the processor, investment costs for the QBMPs included equipping a laboratory, employing quality control personnel and acquiring software that amounted to KES 3.05/kg of milk. The processor accrued a benefit of KES 0.93/kg of milk from higher product yields and less returns on poorer quality products, leading to a net loss of KES -2.12/kg of milk. It is expected that in the long term processors will be able to recover these costs through efficiency gains along the dairy chain and increased sales of premium milk.

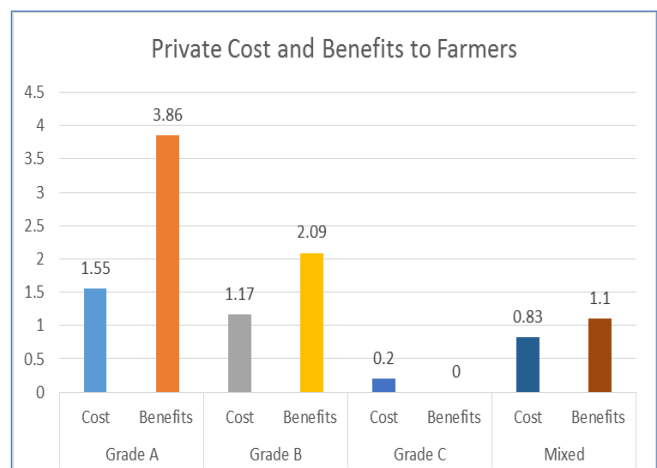
In cash terms, farmers are the greatest beneficiaries of a well-functioning QBMPs

At the moment however, the cost of implementing QBMPs outweighs the benefits, hence offering little incentive from a processor perspective.

In addition to analyzing the private benefits to value chain actors (farmers, cooperatives and processors), the study found that investing in milk quality could lead to public health benefits amounting to KES 44.1/kg for Grade A milk, KES 18.17/kg for Grade B milk and KES 9.52/kg for mixed milk. These public benefits are further discussed in the next section.

Direct and indirect health costs

The QBMPs study distinguished between direct costs associated with medical resource utilization and indirect



Grade A: Good quality milk with less than 2 million total plate count
 Grade B: Moderate quality milk with 2-10 million total plate count
 Grade C: Low quality milk with above 10 million total plate count
 Mixed: Mixture of Grades A, B and C

*Based on a classification by Happy Cow Limited

costs incurred from the reduction of work productivity as

a result of the morbidity and mortality associated with a given disease.

The equivalent of 53,093 healthy life years (DALYs) are lost annually in Kenya due to milk-related infectious diseases, this excluding losses due to use of antibiotics and other harmful preservatives like hydrogen peroxide. Considering an average lifespan of 62.13 (World Bank, 2017), this equates to an average loss of 855 full lives per year due to milk-related infectious diseases.

Investing in milk quality can result in public health benefits up to KES 44/kg of milk consumed

The total annual public health costs in Kenya linked to consuming unsafe milk were estimated at KES 436 billion with direct costs constituting the bulk of this amount. In this estimate, costs of antibiotics resistance linked to residues in milk account for approximately KES 4.3 billion KES each year. Consumption of safe milk therefore can significantly contribute to achievement of Food and Nutrition Security and Health, key pillars identified for economic growth in Kenya.

Conclusions

According to Pašić et al. (2016) quality-based milk payment systems have been successful in controlling and improving milk quality along the dairy chain by providing incentives to all players to improve the quality of milk including improved revenues for farmers. However, the cost-benefit analysis undertaken as part of the study found that under current circumstances, a QBMPS may not be financially viable. Robust action will be needed on many fronts to create the market conditions and incentives for a quality-based dairy value chain in Kenya. Such action could, additionally, help to streamline the further formalization of the dairy sector.

Although some measures have been taken, ensuring full and consistent regulation of milk quality will help to enhance a more competitive market environment and reduce the current high levels of unsafe milk. Furthermore, there is need to expand infrastructure to ensure efficient transportation of raw milk and consistent testing of milk at delivery, bulking points and processing centers. This will create the right incentives and market signals for a range of dairy stakeholders including farmers, cooperatives and processors, industry training centers and consumer bodies to invest in upgrading for quality milk production.

Recommendations

To move from the business as usual scenario of a largely unregulated milk supply chain, towards a more formalized and accountable dairy sector in Kenya, there is need to address both the supply and demand sides, through more stringent enforcement of safety and quality standards and better consumer education on the risks and impacts of drinking unsafe milk and milk products.

This calls for coherent policy development and enforcement by government agencies and other stakeholders responsible for setting standards, including ministries of Education and Training, Agriculture and Livestock Development, Health, Energy and so on. The following are some specific recommendations targeted at key stakeholders in a QBMPS.

Government and Regulatory agencies (through the Kenya Dairy Board, KDB):

- Enforce milk quality compliance to existing standards, under the framework of Kenya's Veterinary Policy 2013, which calls on county governments to oversee the enforcement of laws governing food safety and food defence. As the national regulatory authority, the KDB should ensure the strict enactment, enforcement and monitoring of quality standards through, among other activities:
 - Banning the use of non-food grade plastic cans.
 - Devising a model for regulating the sale and use of dairy inputs such as livestock feed and antibiotics.
 - Promoting public information and awareness campaigns to enhance milk quality.
 - Establishing accredited laboratories at county level to ensure consistent and continuous monitoring of milk quality.
 - Developing specific standards for dairy cooperatives and other private enterprises wishing to get into the business of milk collection and marketing. These could include standards on cleaning and cooling infrastructure, milk testing equipment, quality assurance staff, and standard operating procedures for safe milk handling.
- Explore opportunities to incentivize quality improvements by processors through tax exemptions on laboratory testing equipment and other core infrastructure required to establish quality-driven milk bulking and transportation, as espoused in the Dairy Development Policy, 2013.
- Strengthen dairy extension services to farmers by both government and private sector extension agents through inclusion of quality standards of inputs,



products and food safety in trainings, as called for in the National Agriculture Sector Extension policy.

Dairy cooperatives and processing enterprises:

- Invest in well-equipped laboratories and trained staff to ensure rigorous and regular quality control of milk delivered at all collection points.
- Reject milk that does not meet quality and safety standards.
- Provide feedback and follow up training to farmers and transporters responsible for delivering poor quality milk to prevent further losses.
- Ensure continuous training and extension, as well as credit provision to farmers, targeting improving milk quality, and facilitate farmers to acquire the necessary inputs such as aluminium cans and aflatoxin-free feeds, as well as access to veterinary services.

- Strengthen self-regulation mechanisms within processor associations and other industry networks to promote uniform quality and safety standards across the dairy sector.

Consumer organizations:

- Conduct awareness raising and advocacy campaigns at county and national levels to enhance understanding of the health impacts of unsafe milk consumption and strengthen demand for quality milk products. If consumers are made aware of the differences in quality of milk that goes through the QBMPS, they may accept a higher price for products it generates, which in turn could (partly or entirely) compensate the processor's costs.
- In collaboration with industry organizations, civil society organizations and other interested parties, jointly explore gaps in current policy and regulatory environment to enhance milk quality and safety

References

MoALF (Ministry of Agriculture, Livestock and Fisheries), 2013. The National Dairy Development Policy: State Department of Livestock, Nairobi, Kenya. <https://goo.gl/iuChny>

MoALF (Ministry of Agriculture, Livestock and Fisheries), 2013. Kenya Veterinary Policy: Towards a Competitive and Sustainable Dairy Industry for Economic Growth in the 21st Century and Beyond. Sessional Paper No 5. State Department of Livestock, Nairobi, Kenya. <https://goo.gl/G51Y31>

Ndambi, A., Njiru, R., Knippenberg, C., Lee, J., Kilelu, C., & Ngigi, M., 2018. "Private and public costs and benefits of implementing a quality-based milk payment system in Kenya: Case study of Happy Cow Ltd.

Pašić, V., Tudor Kalit, M., Salajpal, K., Samaržija, D., Havranek, J. & Kalit, S. 2016. The impact of changes in the milk payment system & season on the hygienic quality of milk. J. of Central European Agriculture, 17(3), 629–639.

World Bank. (2017). World Development Indicators. Retrieved October 2, 2017, from <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>.

3R Kenya Project

The 3R Kenya (Resilient, Robust, Reliable. — From Aid to Trade) project is a learning initiative supported under the Agriculture and Food and Nutrition Security (FNS) program of the Embassy of the Kingdom of the Netherlands. 3R Kenya seeks to generate evidence and lessons from FNS and other related programmes that support competitive, market-led models in spurring agricultural development. It focuses on the aquaculture, dairy and horticulture sectors. 3R Kenya is executed at a time when Dutch government's bilateral relations in Kenya are transitioning from a focus on Aid to Trade to enhance the development of agri-food sectors. Through evidence generation and stakeholder dialogue, 3R seeks to contribute to an understanding of effective conditions for sustainable inclusive trade for transforming resilient, robust and reliable agri-food sectors.

Acknowledgements

The 3R Kenya Project appreciates the collaboration with Kenya Market-led Dairy Program (KMDP) and SNV's Voice for Change Programme and their partner Consumer Unity and Trust Society – Kenya (CUTS), in the production of this research brief. This brief is based on the QBMPS pilot project implemented by Happy Cow Ltd in Nakuru and two of its suppliers, New Ngorika Milk Producers Ltd. and Olenguruone Dairy Cooperative Society. The project is co-financed by the KMDP of SNV-Netherlands Development Organisation with support from the Embassy of the Kingdom of the Netherlands in Nairobi.

We are grateful to Gerard Oosterwijk, Teresiah Ndungu and staff of Happy Cow Ltd and members of New Ngorika and Olenguruone for their contribution to the study.

We also acknowledge support from: Dries Liesbeth from WUR; Delia Grace and Silvia Alonso from ILRI; Sam Kariuki, John Njeru and Robert Onsare from KEMRI; Jackson Ombui, Erastus Kang'ete and John Mburu from the University of Nairobi; Anton Jansen, Judy Kithinji, Mary Nganga, Mary Njuguna and SNV team, Dirk Harting of Bles Dairies, Biofoods, Gogar Farm, KDB, KEBS, VetLab, ZDU and all medical doctors and lab technicians who were interviewed.

The brief is a summary of a more comprehensive research report available at <http://www.3r-kenya.org/wp-content/uploads/2018/05/QBMPS-Cost-Benefit-Analysis.pdf>

Contact:

Catherine Kilelu

3R Kenya Project Coordinator
E: C.Kilelu@acts-net.org
W: <http://www.3r-kenya.org>

Jan van der Lee

Senior Advisor Sustainable Livestock Systems
Wageningen Livestock Research
E: jan.vanderlee@wur.nl