Background

The Kenyan dairy subsector plays a critical socio-economic role. It is a source of nutrition and livelihood for many, generating about 4 percent of the national GDP. This dairy industry is among the largest in sub-Saharan Africa (MoALF, 2010). According to the Economic Survey (KNBS, 2016), the milk processing capacity is on steady growth of about 14.8 percent annually in the recent past. This increase is linked to growing demand for milk (7.7 percent) and dairy products such as cheese (10.7 percent) and ghee (33 percent) among the expanding urban population. It is projected that per capita consumption of milk in Kenya will grow from 110 litres to 220 by 2030 (MoALF, 2010).

The growth in demand particularly for milk has seen the entry of new retailing options for pasteurised milk even as sale of raw milk persists. While on the one hand there is an increase in milk production and market penetration of pasteurised milk; on the other, there remains challenges of non-compliance with the minimum legally set quality and safety national, regional or international standards for traded milk. This is despite efforts to create awareness and build the capacity of producers and processors over the years.

The assumption is that pasteurised milk offers more value in quality and safety as compared to raw milk and thus retails at higher cost. For processors to sustain their competitiveness in the wake of increased production and imports, they need to assure consumers of high quality and safety of the processed milk. This has enormous implications for the sustainability of the growth in market penetration of processed milk and could ultimately hamper the regional competitiveness of Kenya’s dairy industry. Besides, it poses massive health risks to consumers.

The big question thus remains: Can Kenya sustain its increasing production and retailing options while assuring consumers of quality and safety to ensure sustainable growth of the industry?

This brief summarises findings of a study on the levels of compliance of milk sold in major towns in Kenya including through the various retailing innovations, comparing pasteurised and raw milk. It then outlines recommendations on policy and practice measures to boost compliance for sustainable growth. The study was carried out in four major towns (Nairobi, Nakuru, Eldoret, and Kisumu) that represent a high concentration of milk consumption. Five retail practices were assessed: packaged milk, milk ATMs (vending machines) and milk sold in plastic, aluminium and mazzi cans (improved plastics).

Findings and Implications for the Sector

Milk quality levels

Milk quality is often indicated by the amount of protein content, which is established by the levels of solids-not-fat (SNF). While low levels of SNF is associated with the inadequate nutrition of cows (Murthy, 2014) and is a widespread syndrome related to the large population of dairy crossbreds and Friesian cattle breeds, it can also be attributed to adulteration of milk. SNF lower than the standard specifications is prevalent. Adulteration can be from addition of water to increase volumes, but could also be due to mastitis infection prevalent in lactating cows.

Key messages

- Low levels of compliance with quality and safety standards of retailed milk on all the key parameters pose health risks to consumers
- Pasteurised milk is not distinctly safer or with better quality than raw milk, thus undermining its value proposition
- The Kenya dairy industry needs re-orientation towards a quality focus to bolster competitiveness in the domestic and regional markets
- The ability of the industry to meet higher standards must necessarily involve all stakeholders in the value chain
- Low compliance with the regional and international standards hampers the regional competitiveness of Kenya’s dairy industry
- Low levels of compliance with the regulatory standards of milk in the market exposes consumers to health risks

Policy recommendations

- Promote quality-based systems to drive competitive dairy sector development
- Establish systems to provide certification of compliance and facilitate frequent monitoring of the standards
- Establish a framework for public-private partnerships to enable inclusive and coordinated formulation of a regulatory and surveillance framework
- Kenya Dairy Board (KDB) should partner with county governments to establish and capacitate decentralized surveillance system to improve compliance with regulatory standards considering regional differences that may affect milk quality
This study ascertained that most of the milk sold in major Kenyan markets contains deficient levels of SNF (less than 8.5 percent). As shown in figure 1, more than half of the sampled raw and pasteurized milk and sold through various retail practices do not meet the national standards. Prevalence of lower SNF is higher in Kisumu, Eldoret and Nakuru compared to Nairobi.

These results reveal that most of the milk sold in major towns in Kenya is of low quality. This has significant implications on market performance and competitiveness, especially regionally and internationally.

Figure 1: Samples of raw and pasteurized milk lower in solids-not-fat than is specified in national standards

While adulterated milk is rejected by processors, producers are still able to sell the rejected milk to informal milk traders who penetrate the market with poor quality and unsafe milk.

The milk pricing in Kenya is based on volumes rather than quality. This milk pricing structure - that does not reward for quality - is a massive barrier to improving milk quality. Quantity wins over quality when there are no incentives to invest in the production of better-quality and safe milk.

Microbial levels

Assessment of microbial count revealed that a significant number of samples contained unacceptable bacterial load (Figure 2). While this is less surprising for raw milk (53.3 %), it is for pasteurized milk (14.1 %). A closer looks shows the unacceptable microbial count is prevalent in unpackaged milk sold from plastic containers including the milk sold in ATMs that is assumed to be pasteurised. The highest bacterial count was detected in Kisumu town.

Unacceptable total bacterial count in milk can be attributed to poor hygiene, milk handling, adulteration with poor quality water and limited access to appropriate infrastructure for milk chilling and storage.

Figure 2: Samples of raw and pasteurized milk exceeding the allowable bacterial count by national standards

Even though huge emphasis has been placed on training farmers and milk traders in the country on milk quality and hygienic handling, this has not yet brought the desired changes in microbial quality of milk.

Presence of aflatoxin, hydrogen peroxide and antibiotics

Aflatoxin content

Aflatoxins are fungal toxins whose consumption can lead to serious health implications. Presence of unsafe levels of aflatoxin in milk can be traced to poor quality feeds that result from poor storage conditions favourable to fungal growth.

The study found aflatoxin content exceeded both national and international standards for maximum safe limits in raw milk. The high aflatoxin levels are prevalent in both pasteurized and raw milk across all retail practices. This reflects the weak quality and safety control in the dairy value chain.

Figure 3: Samples of raw and pasteurized milk exceeding maximum safe limits of aflatoxin in the codex standards

Thus, interventions to avoid aflatoxin in feed and transfer into milk must involve education of farmers, feed millers...
and feed traders in improving feed quality, handling, and storage.

Hydrogen peroxide content
Hydrogen peroxide is added to milk to prolong shelf life, especially during transportation over long distances. But the practice is prohibited in both domestic and international markets. Use of hydrogen peroxide has been a persistent issue in the Kenyan dairy sector (Omore et al. 2005).

The study found both pasteurized and raw milk tested positive for hydrogen peroxide, but pasteurized milk had 1.6 times more prevalence (Figure 4). A high percent of milk samples from all retail practices expect mazzican tested positive. Mazzican retailers generally do no bulk big volumes. Milk sold in Nairobi recorded highest incidence for about 12% of the samples.

Antibiotic residue
Both pasteurized and raw milk contain high traces of antibiotic residues, but more prevalence was recorded in pasteurized milk, in Eldoret town relative to other towns and in plastic containers relative to other retail practices (Figure 5).

Antibiotic residues in pasteurized milk is linked to the place of origin of the milk. In Eldoret, where high antibiotic prevalence was recorded, dairy production systems are pasture-based and prone to ticks; hence farmers frequently treat with antibiotics against tick-borne diseases.

Detection of antibiotic residues implies that farmers do not observe the withdrawal period after the treatment of animals, as advised. Presence of antibiotic residues in milk poses a health risk to consumers, due to the potential for progressive development of antimicrobial resistance. It can also induce allergic reactions.

Additionally, milk processors reject milk with antibiotics because it inhibits the activity of starter cultures used in fermenting milk for producing high value dairy products such as yoghurt and cheese.

**Figure 4**: Samples of raw and pasteurized milk testing positive for hydrogen peroxide

These results reflect weaknesses in the quality assurance system in the dairy value chain. The current model of quality assurance emphasizes inspection at the end-of-line product, rather than throughout the chain. A more pragmatic approach would entail engagement of all value chain actors for each to exercise responsibility for milk quality and safety.

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**Figure 5**: Samples of raw and pasteurized milk testing positive for antibiotic residues

**Which way forward?**
The Kenyan dairy industry is rapidly growing to meet domestic demand and has potential to expand into regional and international markets. However, the key challenge remains continued low levels of compliance with quality and safety standards on all the key parameters as confirmed by the study, posing health risks to consumers.

The industry is struggling to effectively enforce compliance of national standards, which are less stringent than some regional and international standards. This is despite the existence of a number of national regulations governing the industry including Dairy Industry Act, the Standards Act, the Public Health Act, the Food and Drugs Act and the Animal Diseases Act, most of which are weakly implemented. Although the Kenya Dairy Industry Regulations 2017 was developed to fill gaps and provide a coordinated regulatory framework, enforcement still remains a challenge (USAID-KCDMS, 2018).

Despite a growing diversity in milk retail innovation, these do not offer consumers’ substantive value proposition related to safety and quality. The common perception is that raw milk is more likely to be compromised than pasteurized milk.

**Weighing and testing of milk at collection point**
However, the findings reveal that pasteurized and packaged milk is no safer than raw milk although it retails at a higher price.

If processors want to be competitive, they should demonstrate to consumers’ value for their money by offering safe and quality products. The challenge of procuring quality milk compromises processors capacity to expand the manufacture of high-value and premium dairy products thus threatening their competitiveness in the current liberalized market.

Overall, there is need for interventions and investments that will reorient the Kenyan dairy industry from volume focused to a quality based system. This calls for introduction of quality-based milk payment systems (QBMPs), designed to reward quality and enhance safety compliance. Lessons from a recent pilot intervention show that introducing QBMPs need economic incentives for farmers and their organizations, processors, transporters and other value chain actors to enable the additional investments and make it sustainable (Ndambi et al., 2018).

Additionally, these systems are best introduced through multi-actor partnerships to ensure safeguarding of private investments and the public good inherent in enhanced quality and safety of the dairy sector. Such partnerships are to mobilize technology options that offer cheaper solutions to enhance safety and quality (e.g. chilling tanks, energy options, testing equipment). These should be coupled with innovative institutional arrangements along the supply chain to enhance a competitive, quality based industry. This will be driven by mutually supportive business relations, trust and ethical practice.

The differences in levels of compliance across various retail practices and between the major urban towns in Kenya point to the need for targeted approaches that pay attention to the regional context and the market channels.

This is a critical moment for the Kenyan dairy sector. Repositioning itself as competitive and sustainable industry lies in addressing quality and safety concerns. While the role of the KDB as a regulator is central to improving compliance, meaningful engagement of all, including the formal, semi-formal and dairy value chain actors is imperative.

There is need for a jointly formulated guidelines towards inclusive and coordinated efforts to uphold quality and safety in the industry. These should outline clear roles and accountability structures for private sector, national and county governments to strengthen the regulatory framework, surveillance and enforcement. The industry may consider an annual publication of milk quality status to foster the orientation towards a quality based dairy sector.

Work cited

http://www.knbs.or.ke


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.

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The brief is a summary of a more comprehensive research report available at http://www.3r-kenya.org/

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