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Value chain analysis and sanitary risks of the camel milk system supplying Nairobi city, Kenya

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ABSTRACT

The camel milk trade in Kenya has evolved significantly from a small-scale business undertaken in local villages to its current status involving a large number of different stakeholders supplying urban towns, particularly Nairobi City. Despite the evident growth pattern, the supply of camel milk to Nairobi has largely remained informal, with minimal enforcement of regulations. The aim of this study was to characterise the camel milk system supplying Nairobi and assess its governance, main challenges and the potential food safety risk practices.

A value chain analysis framework was used to carry out data collection between August 2014 and July 2015. Qualitative and quantitative data were collected through focus group discussions and key informant interviews with stakeholders operating in different nodes of the value chains.

Three milk value chains supplying Nairobi were identified and mapped: the Isiolo chain, the Kajiado chain and the camel milk processing company chain. Overall, the results indicate that 94% of the milk supplied to Nairobi city is informally traded (traded without any effective regulation), while 6% originates from a formal milk processing company. In the informal chains, milk traders (mostly women) were reported to play a pivotal role in the organisation and daily functioning of the chains. The processing company had partly integrated activities and reported exporting 5% of their products to regional and international markets.

Food safety themes identified were associated with i) lack of cold chain, ii) gaps in hygiene practices, particularly at farm and market levels, iii) consumption of raw camel milk, and iv) lack of food safety training, among other issues. Low level involvement by government agencies in enforcing stipulated food safety measures were reported in the informal chains, as these concentrate efforts in the regulation of dairy milk chains. Isiolo milk traders were identified as the dominant group, setting milk prices and providing sanctions.

The framework and findings obtained can help future research and policy makers to reach informed decision about what to regulate, where to target and importantly how to make the camel milk value chain more efficient and safer.

1. Introduction

Recent estimates suggest that more than 60% of the world's dromedary camel population is in the four East African countries: Kenya, Somalia, Sudan and Ethiopia. Kenya is the second highest producer of camel milk in the world with an approximated production of 0.94 million litres per annum (FAOSTAT, 2014), with a value projection of more than US$ 34 million (Musinga et al., 2008). Camels' unique adaptability to arid and marginalised areas (Schwartz, 1992; Khan et al., 2003) results in their milk constituting a significant proportion of the total diet intake for camel owning pastoral communities in Eastern Africa.

The camel milk trade in Kenya has evolved significantly from a small scale business undertaken in few local villages to the current

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trade involving many stakeholders in different parts of the country, and the larger East African region (Anderson et al., 2012). Despite the evident growth pattern, the subsector has largely remained informal, with minimal regulation from relevant authorities. As a result, access to markets has been challenging, with only 12% of the total milk produced marketed: 10% sold to rural consumers, and only 2% to urban markets. The remaining 88% is consumed in local households, with a significant proportion going to waste due to post harvest losses (Akweya et al., 2012). Nonetheless, with increased population growth and rural-urban migration, demand for camel milk in Nairobi has risen over the last decade (Matofari et al., 2007). Additionally, the perceived medicinal properties and associated health benefits of camel milk have acted as strong marketing tools for the product, both in Kenya and elsewhere. However, given the high level of the informal milk trade, public health issues such as the risk of milk borne zoonotic diseases are of concern (Lore et al., 2005). As such, it is crucial to understand how the camel milk value chain operates in order to assess the potential economic and food safety risks that may occur; as well as exploring how these chains can be governed, promoted and improved to make them both more successful and safer.

Despite the apparent growth and predictions of greater performance, there is little knowledge about the organisation of the camel milk value chains supplying Nairobi. A deeper understanding of the functioning of the milk supply system within the city is vital to help in designing of food safety policies. Value chain analysis (VCA) is a valuable framework for understanding temporal and spatial connectivity of people and food products and their interactions (Alarcon et al., 2017). Also, VCA provides an important framework for the identification and understanding of chain governance, challenges and structural deficiencies (Kaplinsky and Morris, 2001; Alarcon et al., 2017). The aim of this study was to characterize the camel milk system supplying Nairobi city, and assess its governance, main challenges and the potential food safety risk practices using a value chain framework.

2. Material and methods

2.1. Scoping study for identification of the value chains to investigate

A cross-sectional study of the camel milk supply system serving Nairobi's markets was carried out between August 2014 and January 2015. An initial scoping study was conducted through semi-structured interviews with officers from the Kenya Camel Association and the State Department of Livestock (Ministry of Agriculture, Livestock and Fisheries). During the interviews, participants were asked to create a preliminary mapping of the camel milk chains, through identification of the different supply chains, people involved in them and key locations (such as markets). As a result of this scoping work, the three most important chains supplying camel milk to Nairobi city were identified and visited for more detailed data collection. These were (1) the Isiolo value chain, (2) the Kajiado value chain, and (3) the Nanyuki value chain (processing company value chain).

Isiolo town (place of production for the Isiolo value chain) is located at about 300 km north of Nairobi. The town is characterised by both peri-urban and pastoral camel production systems and a thriving camel milk trade since the mid-1990s. This chain was identified as the main source of milk in the scoping study. Kajiado County (place of production of the Kajiado value chain) is located at about 150 km south of Nairobi. Since the late 2000s, the county has become an important centre of the camel milk trade, with increasing supply routes to Nairobi. Nanyuki town (place of production of the Nanyuki value chain, hereafter referred to as the processing company value chain) is located at about 200 km north of Nairobi. The chain was identified to be controlled and organized by one processing company, representing the most formal value chain. This was reported to be the only camel processing company supplying milk to Nairobi. The company was established in 2005 with the aim of processing camel milk sourced from Laikipia County and neighbouring Isiolo County.

Likewise, as result of the scoping study, Eastleigh market was identified as the hub of the camel milk trade in Nairobi city and therefore included in the study.

2.2. Data collection

Data collection was conducted across the three different value chains using the methodology described by Kaplisnky and Morris (2001) and as applied by Alarcon et al. (2017) and Carron et al. (2017). Authorisation to visit the various sites was provided by the Directorate of Veterinary Services and the County Directors of Veterinary Services in the respective study areas. With the help of various leaders in each market/chain node, the different stakeholders were identified and classified by their roles. Thereafter, for each type of stakeholder focus group discussions were organised. Discussions were conducted in the language of preference (English, Swahili or Somali) by the participants and with the use of translators.

Focus group discussions were carried out with the aim of collecting both qualitative and quantitative data on: i) structure of the chains, by showing both the origin and destination of the milk; ii) participants' roles and their interactions with other stakeholders in the chains; iii) main rules and associations existing in the chains (informal, private standards and formal); iv) product differentiation characteristics and types of economic transactions involved; v) seasonal effects (on the milk supply, quality and distribution) ; vi) main challenges of the people working in the chains; and vii) waste management and food safety management practices. Data were collected by combining two methods: i) open ended questions by prompting participants to explain the various aspects of the value chains; and ii) creation of flowcharts with participants that indicate the flow of products, roles of people involved in the flows and the quantities of products traded. In addition, camel farms, milk bulking centres and markets were visited, and practices potentially risky for food safety identified.

To complement and validate the data obtained from the focus group discussions, semi-structured interviews with key informants were conducted. These were stakeholders whose position enabled them to have a wide and deep understanding the overall organisation and functionality of the camel milk value chain in Kenya. The aim of these interviews was to obtain additional qualitative and quantitative data on value chain aspects including: i) roles of stakeholders in each chain; ii) type and quantity of products in each chain; iii) overall governance in the different chains: in particular the role of government at both county and national level; and iv) waste management and food safety risks practices. Key informants included: a) veterinary officers, b) public health officers, c) livestock production officers, d) heads of different retailers' associations, and e) non-governmental organisations within the camel milk subsector. In addition, the results from the focus group discussions were presented to these key informants to identify potential errors or misunderstanding of the results. In total eight focus group discussions and seven key informant interviews were conducted (Table 1).

All data from focus group discussions and key informant interviews were captured through digital audio recordings after signed consent from the participants was obtained.

2.3. Data analysis

By carefully listening of the audio recordings and reading of the written notes, data were collated in text documents, hereafter referred to as 'templates'. These templates represented a first analysis stage, as data and major emerging themes were organised into sections: data regarding source and destination of milk. We performed a second stage of qualitative thematic content analysis by reading carefully all the templates. Emerging themes identified were then categorised as belonging in various high order nodes such as: a) informal or formal rules, b) associations, c) interaction with different stakeholders, d) challenges