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Mapping of beef, sheep and goat food systems in Nairobi — A framework for policy making and the identification of structural vulnerabilities and deficiencies

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ABSTRACT

Nairobi is a large rapidly-growing city whose demand for beef, mutton and goat products is expected to double by 2030. The study aimed to map the Nairobi beef, sheep and goat systems structure and flows to identify deficiencies and vulnerabilities to shocks.

Cross-sectional data were collected through focus group discussions and interviews with people operating in Nairobi ruminant livestock and meat markets and in the large processing companies. Qualitative and quantitative data were obtained about the type of people, animals, products and value adding activities in the chains, and their structural, spatial and temporal interactions. Mapping analysis was done in three different dimensions: people and product profiling (interactions of people and products), geographical (routes of animals and products) and temporal mapping (seasonal fluctuations). The results obtained were used to identify structural deficiencies and vulnerability factors in the system.

Results for the beef food system showed that 44–55% of the city's beef supply flows through the 'local terminal markets', but that 54–64% of total supply is controlled by one 'meat market'. Numerous informal chains were identified, with independent livestock and meat traders playing a pivotal role in the functionality of these systems, and where most activities are conducted with inefficient quality control and under scarce and inadequate infrastructure and organisation, generating wastage and potential food safety risks in low quality meat products. Geographical and temporal analysis showed the critical areas influencing the different markets, with larger markets increasing their market share in the low season. Large processing companies, partly integrated, operate with high quality infrastructures, but with up to 60% of their beef supply depending on similar routes as the informal markets. Only these companies were involved in value addition activities, reaching high-end markets, but also dominating the distribution of popular products, such as beef sausages, to middle and low-end market. For the small ruminant food system, 73% of the low season supply flows through a single large informal market, Kiamaiko, located in an urban informal settlement. No grading is done for these animals or the meat produced. Large companies were reported to export up to 90% of their products. Lack of traceability and control of animal production was a common feature in all chains.

The mapping presented provides a framework for policy makers and institutions to understand and design improvement plans for the Nairobi ruminant food system. The structural deficiencies and vulnerabilities identified here indicate the areas of intervention needed.

1. Introduction

It is estimated that approximately two thirds of meat consumed in Kenya is beef. Nairobi city represents the major consumption centre for ruminant meat, with 14% of national consumption (Kenya Market Trust,

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2014) and an average annual beef consumption of 15.81 kg per household in 2003 (with the lowest quintile consuming 8.55 kg) and of 19.1 kg per capita in 2014 (Gamba et al., 2005; Kenya Market Trust, 2014). In addition, the average monthly household small ruminant meat consumption was estimated at 5.5 kg in 2010 (Juma et al., 2010; Kenya Market Trust, 2014). Kenya's population of 41 million people is predicted to double and reach 97.2 million in 2050, with most of the growth concentrated in urban centres such as Nairobi (You et al., 2014). The demand for beef, mutton and goat products is predicted to double by 2030 and therefore represents a major challenge to the city (Robinson and Pozzi, 2011). Consequently, food systems will need to adapt in order to manage such a rapid increase in demand (Herrero et al., 2014). Failure to do so could have implications for food security and the achievement of dietary requirements for protein and micronutrients (Randolph et al., 2007). Despite the importance of ruminant meat products for nutrition, these are currently considered a luxury commodity for the majority of Nairobi inhabitants (Gamba et al., 2005). Access to these products is increasingly more difficult for poor consumers in informal settlements, where two thirds of the Nairobi population reside (APHRC, 2014). In addition, the way the food systems are evolving indicates an increased risk of food safety and environmental issues, with a number of well-known and manageable pathogens circulating (Kariuki et al., 2013). On the other hand, the ruminant meat sector represents an important contribution to the Kenyan economy and a major source of employment in the country and its capital (Muthee, 2006). Therefore, understanding how the food system for ruminant-based food products operates is crucial to design food policies directed at both food security and food quality, including the biological and chemical safety, which in turn contribute to sustainable economic development.

Existing information on the ruminant food system at country level indicate the main nodes, routes, gross margins and constraints (Aklilu, 2002; Alexovich et al., 2012; Bergevoet and Van Engelen, 2014; Farmer, 2012; Kenya Market Trust, 2014; Muthee, 2006). Yet there is a lack of clarity on the relative importance of formal versus informal system components, on the type of supply chains deriving from the different Nairobi markets, their control and food safety risks, among other gaps. It is also critical to consider that the ruminant food system in the city is controlled by the livestock and meat markets and large processing companies (Kenya Market Trust, 2014; Muthee, 2006). We argue that the available information on the ruminant meat food systems for Nairobi is insufficient for planning and policy purposes.

Value chain analysis is a powerful approach to assess system functionality, inefficiencies and potential opportunities for policy interventions. The first important element needed in a value chain analysis is a systematic mapping approach that takes into account people, product and chain profiles, as well as the spatial and temporal dimensions and connectivity of the system, which is essential to understand its dynamics, assess structural vulnerabilities and design effective policies (Rushton, 2009; Taylor and Rushton, 2011). It provides the critical framework needed for the investigation of chain governance, upgrading, distribution of benefits and food security risks (Hellin and Meijer, 2006; Kaplinsky and Morris, 2000; Rich and Perry, 2011; Rushton, 2009). The objective of the study presented here focuses on mapping the Nairobi beef, sheep and goat food system, in order to understand the dynamics of the system and identify existing structural deficiencies and vulnerabilities. Information generated provides a guide for policy makers for the improvement of the system. It also highlights the need for research at points in the system to ensure that the people who live and work in the system and those it feeds are given opportunities to manage their livelihoods and their nutritional needs.

2. Materials and methods

A cross-sectional study of the Nairobi ruminants' terminal markets, large processing companies and meat markets was conducted between February 2013 and April 2014. The research questions (RQ) were:

- RQ0 – What are the key infrastructure in the value chains – slaughterhouses, markets, input supplies?
- RQ1 - What is the structure of the different ruminant-source products chains supplying Nairobi and associated to markets and large processing companies?
- RQ2 - What proportion of the city's red meat supply is accounted for by the different chains?
- RQ3 – Who are the people directly involved in the flow of live ruminants and their products?
- RQ4 - What are the geographical routes for the supply of ruminants used by the different markets and large processing companies?
- RQ5 - What is the temporal profile of these chains?
- RQ6 - Which system deficiencies and vulnerabilities can be derived from the current structure of the chains?

2.1. Study area and selection of participants

Through interviews with key officers from the Ministry of Livestock Development, Department of Veterinary Services the main livestock terminal markets, wholesaler meat markets and major processing companies supplying Nairobi city were identified (RQ0) (Fig. 1). Four livestock terminal markets were visited: Dagoretti (with 4 abattoirs), Kiserian (with 2 abattoirs), Njiru (with 2 abattoirs) and Kiamaiko (with 16 abattoirs). Two meat wholesale product-only markets were also visited: Shauri Moyo and City market. The three major processing companies (each possessing their own abattoir) known to operate in the Nairobi ruminant food system were also selected for this study.

The Department of Veterinary Services authorized access to the field sites and provided introductions to the veterinary and meat inspector officers. These introduced the research team to the facility owners to obtain consent to conduct the research. An initial interview with the officers and the facility owners followed to identify and classify people in each market by their operational functions. For each operational type, 5 to 12 people were selected in collaboration with the meat inspectors or a representative of the facility owners and a focus group discussion was held. The selected people reflected diversity within each operational type (e.g. size of operation, species dealing with and other factors). Translators helped to facilitate the discussions, mostly speaking Swahili, Borana or Maasai. Where possible the presence of government officers and facility managers was discouraged to create an environment where people could share their opinions freely.

Focus group discussions were complemented with semi-structured interviews to key informants, who understood overall pattern and functionality of the market or represented a particular group of people difficult to access (such as livestock transporters). Thus, key informants were the chief veterinary officer or meat inspector of a market, a representative of the facility owner(s), or managers of the large processing companies. Other key informants were identified by these initial key informants or through discussion in the focus group discussions. In total 25 focus group discussions and 21 key informant interviews were conducted (Table 1). Where available, secondary data on animal movements were also collected. In addition, individual interviews with closed questions were conducted with nineteen abattoir managers (from different abattoirs) and six traders from Shauri Moyo market to further assess abattoir and market animal flows.

2.2. Data collection

In the focus group discussions participants were asked to:

(1) Briefly describe their business and operations. (RQ1 and RQ3)
(2) Identify and describe their interaction with other stakeholders. Special emphasis was placed on understanding and differentiating the diversity of suppliers, buyers and transporters of their animals or products. (RQ1 and RQ3)