Assessment of health risks in the small ruminants value chain in Senegal

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Introduction
Livestock in Senegal contribute to the livelihoods of around 350,000 families or about 30% of the country’s households. Agro-pastoralists mainly raise cattle, sheep and goats and they participate in the meat market. Statistics from the Food and Agriculture Organization of the United Nations (FAO) indicate that Senegal has 3 million cattle, 4.8 million sheep and 4.1 million goats. Three sheep breeds are found in Senegal—the Fulani, Touabire and Djallonke. The livestock production system in urban areas such as Dakar is semi-intensive farming (mostly sheep) which is considered a prestigious activity (using improved sheep breeds by natural selection: ‘ladoun’). Secondary economic activities supplement livestock keepers’ incomes.

In rural areas such as Tambacounda, livestock production is extensive and based on large herds of cattle and/or small stock that supply the meat needs of urban markets. Whatever the region or type of farming, farmers keep animals for domestic consumption principally. Slaughtering is common during major religious events such as ‘Tabaski’ (a religious celebration at the end of Ramadan) or community events such as baptisms and weddings. Small ruminants produce milk, meat and are a source of cash for smallholders and owners of informal restaurants called ‘dibiteries’, which serve roasted meat and are run by butchers. However, the consumption of small ruminant products may expose people to health risks when low quality products are consumed. The health risks may be due to i) zoonotic diseases which can also infect humans; or ii) cross-contamination of processed meat due to poor handling practices in slaughterhouses or dibiteries.

It is, therefore, important to identify the critical points for health risks in the value chain in order to target interventions. Addressing unsafe small ruminant products and quality losses within informal markets, the Safe Food Fair Food Project carried out an integrated assessment to identify opportunities for improving food safety and reducing health risks in the small ruminant value chain in Senegal.

Study areas
Two study sites in two districts were selected. One was a rural site in Tambacounda near the border with Mali where many small ruminants are kept and an urban site in Dakar, which serves as an end market for small ruminant meat and products. Four villages were selected at each site based on their small ruminant production potential.
Tambacounda (rural site) was selected due to its proximity to Mali from where many small ruminants come, and Dakar (urban site) as the final market of small ruminant meat and products.
Methodology
A rapid integrated assessment (RIA) was conducted in 2013/14, including:

- A qualitative assessment comprising eight participatory rural appraisals (PRA) with consumers, eight PRA with producers and eight focus group discussions (FGD) with mothers of children aged 0–5 years to better understand the knowledge, attitude and practices (KAP) of value chain stakeholders on how they handle and consume small ruminants products.

- The collection of small ruminants' blood samples (n=384) for testing brucellosis and peste des petits ruminants (PPR). While PPR is not a zoonotic disease, it is a major constraint to animal production and can compromise farmers' livelihoods.

A cross-sectional study was conducted at slaughterhouses in Dakar and in two slaughter areas of Medina Street in Dakar to assess hygiene KAP and microbiological quality of fresh meat.

A second cross-sectional study was conducted in 40 dibiteries in 16 districts in Dakar to assess hygiene KAP and microbiological quality of roasted meat.

A qualitative assessment of risk was made with data obtained in slaughterhouses and dibiteries.

Results

Risks along the value chain

Overall, and specifically for the pathogens investigated, the risk to human health is low in the small ruminant value chain in Senegal. Along the value chain, the main concerns were:

- At producer level, PPR (the overall antibody-prevalence is 72%) was the main production constraint; however, this is not a zoonotic disease but a threat to livelihood economy.

- At slaughterhouses, hygiene standards were suboptimal but still within acceptable ranges. Based on the microbiological analysis of raw meat, the risk of getting food-borne illness by consuming this raw meat was low but the slaughter process should be reviewed in these abattoirs and slaughter areas to avoid bacterial contamination of raw meat.

- Our survey revealed that 95% of vendors in dibiteries carry meat using non-refrigerated vehicles; carcasses are carried in the boots of cars, which are usually dirty, and in motorcycles (5%).

- Raw meat was kept in the open (hooked and exposed to air) in 65% of the dibiteries.

- Twenty dibiteries out of 40 were classified as unsatisfactory for faecal coliforms, 18/40 as unsatisfactory for E. coli, and 20/40 as unsatisfactory for mesophilic flora.

- Meat produced in slaughterhouses and sold in dibiteries, was found to have a 50.52% chance of spreading a microbial contamination ranging from rather high to very high; and a 49.47% chance of spreading microbial contamination ranging from almost zero to low. This means that there is a one in two chance of eating grilled meat contaminated by microorganisms in dibiteries.

Issues

- In Dakar, farmers need land for farming (mostly sheep). In the rural areas of Tambacounda, livestock remains extensive and based on large herds of cattle and/or small stock that supply urban markets; farmers face problems gaining access to water for their livestock.

- Small ruminants are mostly sold for income or used for ceremonies. Only on such occasions will most households eat sheep or goat meat as beef and fish are the preferred animal source foods because they are cheaper (USD 3.3/kg for beef and USD 6.6/kg for sheep).

- The microbiological assessment in dibiteries suggested suboptimal hygienic practices among retailers, potentially exposing consumers to pathogenic bacteria.
Evidence gaps

- Though samples were found negative for brucellosis, the main zoonotic disease, further research should be carried out into the prevalence of other zoonotic pathogens, such as Q fever, toxoplasmosis and Rift Valley fever.
- More research should also be carried out on antibiotics residues in small ruminants meat and milk.
- Additional research is also needed on the cost-effectiveness of best practice training interventions for slaughterhouse and dibiteries staff in order to reduce risks.

Food safety opportunities

- Training on best practices for slaughterhouse and dibiteries staff can improve hygienic practices and minimize contamination of meat.
- Consumers are well represented in organizations such as the Association des Consommateurs du Sénégal (ASCOSEN) which works in close collaboration with the government. Such organizations could open up opportunities for consumer-driven demands for food safety.
- Improving production practices—including improving access to water for livestock especially in Tambacounda.

Peste des petits ruminants

Peste des petits ruminants (PPR) is a contagious disease affecting sheep and goats in Africa and elsewhere. It is caused by a morbillivirus, the PPR virus, and is one of the economically most important small ruminant diseases. Mortality rates can reach 50–100% in severe cases.

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