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STUDY OF *SALMONELLA* CONTAMINATION IN QUAIL SHELL EGGS SOLD IN SELECTED MARKETS OF BAMAKO

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ABSTRACT

In Mali, poultry farming constitutes one of the valuable sources of income for populations. With enormous production potential, essential conditions to achieve quality and health safety of poultry products in general, and quail eggs in particular, must be established. This study, conducted between January and May 2018, aimed to evaluate the contamination of quail eggs sold in selected markets of Bamako. It involved 104 egg samples collected from four (04) markets in Bamako. The various samples were inoculated first in a pre-enrichment medium (buffered peptone water free of indole), then into enrichment media (tetrathionate broth and Rappaport-Vassiliadis broth), followed by bacterial isolation on selective media (Salmonella-Shigella agar, MacConkey agar) and identification through biochemical tests and API strips. The work yielded an overall Salmonella prevalence of 5.76%, which varied according to sampling sites.

Keywords: Bacteriological Prevalence, Salmonella, Quail, Bamako

1 INTRODUCTION

The quail egg is an animal-origin product long known as a food of high nutritional value, easy to digest, and widely used in human dietetics. Indeed, due to its rich and varied composition, this product has expanded rapidly, making it imperative to provide good-quality eggs free from any pathogenic bacteria that could lead to often severe collective foodborne infections [5,8]. Salmonella can infect not only the eggshell but also the interior through vertical transmission within the ovaries and oviduct of poultry.

Typhoid fever kills nearly 500,000 children under 5 years old each year and affects 0.5% of the world's population. The World Health Organization (WHO) reports nearly 17 million annual cases of typhoid fever, including 600,000 deaths[1,11,6]. *Salmonella* contamination has major consequences on pathology, hygiene, and the economy—partly due to losses caused by animal and/or human pathology [4,5,8], and partly due to costs linked to *Salmonella*[8] control measures. Studies have been conducted in Mali on the prevalence of Salmonella in chicken and guinea fowl eggs. However, very few studies have been carried out on quail eggs in Mali and worldwide.

2 MATERIAL AND METHODS

2.1 Field Surveys & Study Area

The study was conducted in the urban area of Bamako. Our choice is explained by the importance of the poultry sector in this region.

2.2 Sampling & Sample Collection

Our sampling was performed randomly across 04 markets. It involved 104 egg samples collected from four (04) poultry markets in Bamako (26 eggs per market). Sampling equipment included a cooler with ice packs as a cold source during transport, a set of plastic bags for packaging, and a marker for lot identification. The eggs were placed on ice and transported to the Central Veterinary Laboratory.

2.3 Laboratory Analyses & Equipment

The equipment used is standard in bacteriology laboratories: weighing equipment, sterilization equipment, incubators, glassware, microscope, Petri dishes, etc.

2.4 Sample Preparation

Intact shell eggs were opened aseptically: after a quick rinse with water, the egg was cleaned with alcohol and the shell was opened with a sterile scalpel. The contents were collected using a sterile pipette or poured directly into a sterile container. From each egg, 5 mL was sampled, attempting to collect both yolk and albumen.

2.5 Experimental Protocol

Samples were first inoculated into liquid media (tetrathionate broth and Rappaport broth) and incubated at 37°C for 24 hours. On the second day, cultures obtained from liquid media were inoculated onto solid media (MacConkey agar and Salmonella-*Shigell*a agar). Suspect Salmonella colonies appearing on these agars were subcultured onto Tryptic Soy Agar to obtain pure cultures. Pure cultures on Tryptic Soy Agar were subcultured onto conventional identification media for biochemical testing. The API system (miniaturized biochemical strip) was also used to confirm results obtained via conventional methods.

2.6 Data Analysis

Statistical analysis was performed using SPSS version 20 software. Pearson's chi-square test at a significance threshold of p = 5% ($p < 0.05$) was used to compare variables.

3 RESULTS

The study involved analyzing 104 egg samples collected from four (04) poultry markets in Bamako. It revealed an overall bacteriological prevalence of 5.76%, which varied depending on the market. The results are detailed in Table I below.

Table 1: Prevalence of Salmonella in quail eggs across markets.

Sampling Site	Number of Samples	Negative	Positive	Prevalence (%)	p-value
Hamdallaye	26	23	3	11.5%	$p < 0.05$
Boulkassoumbougou	26	25	1	3.84%	
Kalaban Coro	26	26	0	0.00%	
Niamakoro	26	24	2	7.69%	
Total	104	98	6	5.76%	

Analysis of Table I shows that out of 104 quail eggs collected from the markets, six (06) produced positive Salmonella cultures. The highest contamination rate was observed in the Hamdallaye market (11.5%), while eggs from the Kalaban-Coro market yielded negative cultures (0%). Results indicated that *Salmonella* prevalence varied significantly across markets ($p < 0.05$).

4 DISCUSSION

Our findings are comparable to those obtained by Sidibé et al. in 2015, but lower than results reported by Sacko et al. in 2019 and Sidibé et al. in 2023[10 .14]. Quail egg contamination impacts public health because these eggs are often consumed raw for their therapeutic virtues[10,11,5].. In some of these markets, eggs are stored under poor conditions and exposed to sunlight all day. The findings of this study could be explained by improper storage conditions.

Salmonella contamination at farm levels can stem from several factors:

- **Overcrowding:** High fecal production and increased ambient room temperature, creating microenvironment conditions favorable to microbial growth.
- **Poor hygiene of premises and equipment:** Promotes the persistence of Salmonella in dust, ambient air, and nesting surfaces.
- **Feed composition:** The quality and specific composition of feed supplied directly impact egg health quality.
- Mastering hygiene within poultry buildings remains the most critical point to ensure high-quality, safe eggs.

5 CONCLUSION

The results of this study showed that quail eggs sold in Bamako markets are contaminated with *Salmonella*. However, to reduce the risk of human contamination, hygiene measures must be applied before consuming these eggs.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

Brahima SACKO coordinated the design and planning of the study, the implementation of the laboratory analyses and the writing of the article; Modibo Diakité, Chaka Traore , Kadiatou Coulibaly , and Alou Sanogo participated in the design, planning and implementation of the study; Amadou Sery participated in the statistical analysis of the data.

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