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ANALYSIS OF MICROBIAL CONTAMINATION IN BROILER CHICKEN MEAT SOLD IN TRADITIONAL MARKETS OF GORONTALO CITY

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ABSTRACT

Broiler chicken meat is a major source of animal protein, but its microbiological safety is frequently compromised by poor hygiene and sanitation in traditional markets. The purpose of this study was to analyze the level of microbial contamination in *broiler* chicken meat based on display duration at the point of sale in traditional markets in Gorontalo City, and to evaluate its compliance with the maximum microbial limits. A total of 36 breast and thigh samples were collected by purposive sampling from vendors at three selling locations (a permanent market, a daily market, and roadside stalls) between April and May 2025, at hours 0, 2, and 4 of display. The variables observed were Total Plate Count (TPC) and the presence of *Salmonella* sp., tested using the pour plate method with reference to SNI 7388:2009. Data were analyzed descriptively. Sixteen of the 36 samples (44.4%) exceeded the TPC limit of 1×10^6 CFU/g, and *Salmonella* sp. was detected in all samples, failing the requirement of negative per 25 g. TPC tended to increase with longer display time at ambient temperature at some locations, although the pattern was not uniform across locations. Contamination was presumably related to inadequately cleaned cutting tools and open, humid display counters. Based on the results, it can be concluded that *broiler* chicken meat sold in traditional markets in Gorontalo City does not yet meet national food safety standards. Improved vendor hygiene and sanitation, stricter supervision, and the construction of poultry slaughterhouses holding a Veterinary Control Number are required.

Keywords: Broiler Chicken Meat, Microbial Contamination, Total Plate Count, Salmonella, Food Safety, Traditional Market

1 INTRODUCTION

Food is a basic human need and an important factor in producing high-quality human resources [1]. The livestock subsector plays a strategic role in meeting the demand for animal protein, and fresh meat is the animal-based food most favored by the public [2]. *Broiler* chickens are particularly important in fulfilling this demand because they are inexpensive, easy to obtain, and easy to process [3]. The poultry sector contributes approximately 65% of animal protein in Indonesia [4].

Chicken meat is rich in water and protein, which makes it a good medium for microbial growth and classifies it as a perishable food. Contamination can begin at slaughter and continue through equipment, water, workers' hands, storage, and distribution [5]. Traditional markets are places with a high risk of contamination because meat is often sold without proper bedding, at open stalls without refrigeration, and under poor hygiene conditions [6];[7]. Pathogenic bacteria such as *Salmonella* can cause foodborne disease with gastrointestinal symptoms such as diarrhea.

The Indonesian National Standard (SNI) 7388:2009 sets the maximum microbial limits for fresh chicken meat, including a TPC of 1×10^6 CFU/g and negative *Salmonella* per 25 g [8]. TPC describes the total number of viable microorganisms in a product, whereas *Salmonella* is a pathogen that must not be detected in fresh chicken meat.

In Gorontalo City, *broiler* meat vendors are no longer limited to permanent and daily markets but have also spread to temporary roadside stalls, while no poultry slaughterhouse meeting the Veterinary Control Number standard is yet available. A previous study in Gorontalo City involved only one market with a limited number of samples [9], and similar studies in other regions have generally identified only the type and level of contamination without examining changes in microbial counts according to display duration. This study collected samples from several selling points across Gorontalo City at different times. The objectives were (1) to analyze the level of microbial contamination in *broiler* chicken meat based on storage duration in traditional markets and (2) to analyze the compliance of this contamination with the established maximum microbial limits.

2 MATERIAL AND METHODS

This research was conducted from 28 April to 24 May 2025 in Gorontalo City. The laboratory testing was carried out at the Public Health Laboratory, Department of Public Health, Faculty of Sports and Health Sciences, Gorontalo State University. The study used a microbiological method with a descriptive quantitative approach.

The samples were *broiler* chicken breast and thigh meat collected by purposive sampling from vendors at three selling locations: a permanent market (Market X), a daily market (Market Y), and a roadside stall (Stall Z). The locations were selected on the basis of their strategic position and visibility to consumers. At each location, two vendors were selected, and two samples (breast and thigh) were taken from each vendor at three times: when the stall started trading (hour 0), two hours later (hour 2), and four hours later (hour 4). Sampling times were 07.00, 09.00, and 11.00 WITA at Market X; 06.00, 08.00, and 10.00 WITA at Market Y and at one roadside stall; and 07.00, 09.00, and 11.00 WITA at the other roadside stall. The total number of samples was 36 (3 locations × 2 vendors × 2 meat parts × 3 times). All samples came from chickens slaughtered on the same morning before sale. Samples were placed in labeled sterile plastic bags, kept in a cool box, and transported to the laboratory. The condition of each stall (cleanliness, presence of flies, water source, and treatment of cutting tools and products) was observed directly during sampling.

For TPC, 25 g of sample was homogenized in 225 mL of Buffered Peptone Water (10^{-1} dilution) and serially diluted to 10^{-5}. One milliliter of each dilution was plated in duplicate by the pour plate method on Plate Count Agar, incubated inverted at 37 °C for 24–48 hours, and the colonies were counted with a colony counter. Results were expressed as CFU/g. For *Salmonella* sp., 25 g of sample in 225 mL of diluent was incubated (37 ± 1 °C, 18 ± 2 hours), serially diluted, and plated by the pour plate method on *Salmonella Shigella* Agar (SSA), followed by incubation at 37 °C for 24 ± 3 hours. Colonies with typical characteristics (pink with or without a black center, glossy black, or bluish green) were recorded, and results were expressed qualitatively (positive/negative per 25 g) [10].

The test results were compared with SNI 7388:2009 to classify each sample as meeting the requirement (MS) or not meeting the requirement (TMS). The data were analyzed using descriptive statistics (mean, range, and percentage) and presented in tables.

3 RESULTS AND DISCUSSION

3.1 Condition of the Selling Stalls

The conditions of the stalls observed during sampling are described below. Market X was recorded as having many flies, wet floors, and an unclean environment. Market Y was open and dusty, used tarpaulin as bedding, and its cutting tools were not cleaned promptly. At roadside Stall Z, some vendors did not cover the meat and the tables were covered with moss, while at another stall there were no flies but the cutting tools were only rinsed without soap. Rinsing water came from taps, bucket reservoirs, and wells, and some vendors reused rinse water without changing it. None of the vendors used gloves or masks, and none stored the meat in a refrigerator. The meat was only placed on open and damp display counters.

3.2 Total Plate Count (TPC)

The results of the TPC observations on *broiler* chicken meat by location, meat part, and sampling time are presented in the table below.

Table 1: Average TPC (CFU/g) of *broiler* chicken meat by location, meat part, and sampling time

Meat part	Sampling time	Market X	Market Y	Stall Z
Breast	Hour 0	1,750,000	126,500	1,135,000
Breast	Hour 2	6,950,000	395,000	670,000
Breast	Hour 4	7,050,000	176,500	61,000
Thigh	Hour 0	1,185,000	56,500	45,000
Thigh	Hour 2	8,400,000	580,000	805,000
Thigh	Hour 4	2,100,000	2,900,000	290,000

Description: Market X = permanent market; Market Y = daily market; Stall Z = roadside stall; values in bold exceed the TPC limit of 1×10^6 CFU/g (SNI 7388:2009).

Of the 36 samples, 16 (44.4%) exceeded the TPC limit of SNI 7388:2009 (1×10^6 CFU/g), while 20 samples (55.6%) met the requirement. Market X had the highest average TPC (4.6×10^6 CFU/g), with 11 of its 12 samples failing the requirement. In breast meat at Market X, TPC increased from 1.75×10^6 CFU/g at hour 0 to 7.05×10^6 CFU/g at hour 4, whereas in thigh meat it peaked at hour 2 (8.4×10^6 CFU/g). The increase was not uniform: in several combinations the value decreased at hour 4, for example in breast meat at Stall Z (from 1,135,000 to 61,000 CFU/g). This decrease was presumably related to differences in sampling day, because changing temperature and weather can affect the rate of microbial growth and contamination [11]. Bacteria can divide approximately every 30 minutes, so the longer the meat is exposed to room temperature, the higher the colony count [12]. The high TPC at Market X is consistent with the condition of its stalls, which had many flies and wet floors, so that poor sanitation presumably contributed. However, Market Y, which was also open and dusty, showed lower contamination, indicating that other factors such as the source of the meat, the cleanliness of the cutting tools, and the length of trading may also play a role. Because this study was descriptive, these relationships could not be proven statistically. These results are similar to findings in West Denpasar, where 18 of 35 samples exceeded the TPC limit [6], and are higher than those reported for the permanent market in Gorontalo City, where only one of three samples complied with SNI [9].

3.3 Salmonella sp.

All samples were positive for *Salmonella* sp. on SSA medium and therefore did not meet SNI 7388:2009, which requires negative per 25 g. *Salmonella* in chicken meat generally originates from the digestive tract of chickens and can spread through equipment, water, and vendor's hands during slaughter and sale [13]. Because the test was qualitative, comparisons among markets, meat parts, and display durations could not be made. The finding in all samples suggests that contamination was already present when the meat arrived at the market or spread widely during handling, so further research is needed to trace its source. This prevalence is much higher than that found in West Surabaya (9 of 37 samples, 24.3%) [14].

3.4 Health Implications and Limitations

The presence of *Salmonella* in all samples and the high TPC in some samples can potentially cause health problems for consumers, especially if the meat is consumed without adequate cooking or if cross-contamination occurs in the kitchen. Necessary efforts include educating vendors on hygienic handling, routine supervision by the relevant agencies, and the provision of sanitation facilities, clean water, and cold storage in markets.

This study has several limitations. Sampling at hours 0, 2, and 4 was carried out on different days, so daily variation (temperature, weather, and meat source) may have influenced the differences between times. The numbers of vendors and locations were limited, the analysis was descriptive without statistical testing, bacterial identification was based on colony morphology on selective media without biochemical confirmation, and the *Salmonella* test was qualitative. These results should be interpreted as a preliminary description and not as evidence of a cause and effect relationship.

4 CONCLUSION

The TPC of *broiler* chicken meat marketed in traditional markets in Gorontalo City tended to increase with display duration at room temperature at some locations, with a pattern that was not uniform across locations, and was

presumably influenced by hygiene and sanitation during handling and sale. Sixteen of 36 samples (44.4%) did not meet the TPC requirement of SNI 7388:2009, while 20 samples (55.6%) did. *Salmonella* sp. was detected in all samples, which therefore did not meet the requirement of negative per 25 g, and the *broiler* chicken meat sold does not yet fully meet food safety requirements.

It is recommended that vendors improve hygiene and sanitation at every stage of handling and limit the time meat is displayed at room temperature; that the relevant agencies carry out continuous supervision and guidance and build poultry slaughterhouses that meet the requirements; that consumers choose fresh meat and cook it thoroughly; and that future researchers increase the number of samples and locations, perform quantitative and confirmatory tests, and trace the sources of contamination

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

There are no conflicts of interest to disclose.

REFERENCES

[1] Rumawas, V.V., Nayoan, H. and Kumayas, N., 2021. The government's role in achieving food security in South Minahasa Regency. Jurnal Governance, 1(1), pp.1-12.

[2] Nida, L., Pisestyani, H. and Basri, C., 2020. Case study: Adulteration of beef with wild boar meat in Bogor City. Journal of Veterinary Studies, 8(2), pp.121-130. https://doi.org/10.35508/jkv.v8i2.2326

[3] Repi, T., Dogomo, S., Fahrullah, F., and Ervandi, M., 2022. Physical quality of broiler chickens in Telaga Biru District, Gorontalo Regency, Gorontalo Province. Sriwijaya Journal of Animal Science, 11(2), pp.1-11. 10.36706/JPS.11.2.2022.18694

[4] Jojo, Harianto, Nurmalina, R., and Hakim, D.B., 2021. Integration of the broiler chicken market between production centers in West Java and the Indonesian market. Food, 30(1), pp.31-44. 10.33964/jp.v30i1.526

[5] Utari, L.K., Riyanti, R.R. and Santosa, P.E., 2016. Microbiological status of broiler meat in traditional markets of Pringsewu Regency. Integrated Animal Science Journal, 4(1), pp.63-66.

[6] Apriyanti, A.A.D., Sudiarta, I.W., and Singapurwa, N.M.A.S., 2020. Analysis of microbiological contamination in broiler chicken meat sold in traditional markets in West Denpasar District. Gema Agro Journal, 25(2), pp.115-127.

[7] Surbakti, J.L., Purwosiswoyo, Putra, A. and Sinaga, K., 2023. Analysis of microbial contamination in broiler chicken meat at several traditional markets in Binjai City. Journal of Pharmaceutical and Sciences, 1(1), pp.308-314.

[8] National Standardization Agency, 2009. SNI 7388:2009: Maximum limits for microbial contamination in food. Jakarta: BSN.

[9] Denada, D., Arif, M.A.M., Indriaty, L., Halimanti, M., and Rifina, M., 2023. A case study on the quality of broiler chicken meat in permanent markets in Gorontalo City. Jamura: Journal of Tropical Livestock Science, 1(2), pp.44-49.

[10] Fatiqin, A., Riri, N., and Ike, A., 2019. Testing for Salmonella using SSA medium and E. coli using EMBA medium in food products. Indobiosains Journal, 1(1), pp.22-29. https://doi.org/10.31851/indobiosains.v1i1.2206

[11] Rini, S.R., Sugiharto, S. and Mahfudz, L.D., 2019. The effect of different rearing temperatures on the physical quality of broiler chicken meat during the finisher period. Indonesian Journal of Animal Science, 14(4), pp.387-395. https://doi.org/10.31186/jspi.id.14.4.387-395

[12] Ristanti, E.W., Sri, K., and Dian, W.H., 2017. The effect of exposure duration at room temperature on total bacteria, pH, and protein content of chicken meat in traditional markets in Semarang Regency. Agromeda Journal, 35(1), pp.50-57. https://doi.org/10.47728/ag.v35i1.192

[13] Siswantoro, D., Mubarok, R.A., Prasetyo, A.F., Hertamawati, R.T. and Kusuma, S.T., 2022. Contamination of Salmonella sp. bacteria on broiler chicken meat. Livestock journal, 13(1), pp.36-41. https://doi.org/10.30736/jt.v13i1.133

[14] Wibisono, F.J., Adhitya, Y.P.C., Mohammad, E.W., Arief, M. and Sheila, M.Y., 2022. Quality assessment (organoleptic, Eber's test) and identification of Salmonella sp. contamination in chicken meat from traditional markets in West Surabaya. Journal of Tropical Animal and Veterinary Science, 12(1), pp.99-106. https://doi.org/10.46549/jipvet.v12i1.252