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A study on broiler meat microbial quality of organised and unorganised meat sectors in and around Orathanadu taluk

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Abstract
A study on broiler meat microbial quality of Organised and Un-organised sectors was performed in and around Orathanadu Taluk. Broiler chickens were slaughtered at 6-8 weeks of age with an average production of 385 kgs of Broiler chicken meat were processed per day. To study the microbial quality, Broiler meat samples from Organized sector and Un-organised sectors were collected and tested for Total Viable Counts (TVC), Coliforms, *Staphylococcus* sp., *Streptococcus* sp., Yeast & Mould counts and *Salmonella* sp. Data obtained were statistically analyzed and the results revealed that even though the organized shops were higher in hygienic standards, samples obtained were poor in microbial quality. Moreover, *Salmonella* spp. was found in both sectors. Hence, butchers and consumers must be aware of risk associated with the poor hygienic standards and their mind set should be changed towards the production of wholesome meat and meat products.

Keywords: Broiler meat, total viable count, coliforms, *Staphylococcus* sp, *Streptococcus* sp and *Salmonella* sp

1. Introduction
Meat is an animal flesh that is eaten as food. Meat consumption varies worldwide, depending on cultural or religious preferences, as well as economic conditions. According to the analysis of the FAO the overall consumption for white meat between 1990 and 2009 has dramatically increased. Poultry meat has increased by 76.6% per kilo per capita. The number of animals slaughtered in Tamil Nadu is witnessing an increasing trend in the last 5 years with 19.53% increase in poultry slaughter since 2012-13. This has resulted in an increase of 21.7% Poultry meat production (AHD, Tamil Nadu). According to FAO (2018), global chicken meat production is 3.60 MMT/year (India Agri Stat, 2020).

Since meat is highly perishable commodity and consumers have become more concerned about conscious of quality, value for money, freshness, selective and health aspects of meat food products, microbial quality assessment of meat is highly essential. Meat is not only highly susceptible to spoilage, but also frequently implicated to the spread of food-borne illnesses. Technological developments in food processing, preservation and handling have given consumers much greater choice over the food they can buy. But, those technologies and hygienic practices developed where not properly adopted by the shop owners and butchers. In Orathanadu region, Thanjavur district Broiler chickens were slaughtered at 6-8 weeks of age with an average production of 385 kgs/ day. Hence, the present study was designed on meat microbial quality assessment for creating awareness among meat lovers, meat handlers and processors.

2. Materials and Methods
A study on Meat Microbial Quality of Organised and Un-Organised Meat sectors in and around Orathanadu taluk was carried out in the Department of Livestock Products Technology, Veterinary College and Research Institute, Orathanadu-614 625.
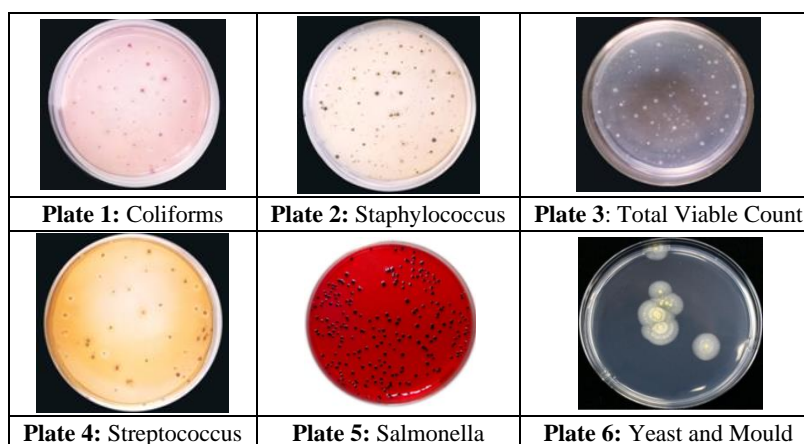
2.1 Sample collection
Broiler chicken meat were procured from the local meat shop (both sectors), packed hygienically in a food grade low density polyethylene (LDPE) bag and brought in a thermocole container with gel packs to the laboratory at the Department of Livestock Products

Technology, Veterinary College and Research Institute, Orathanadu-614 625.

2.2 Preparation of samples and media
Twenty five grams (25g) of samples were taken aseptically and homogenized with 45 ml of distilled water using a sterile pestle and mortar to detain an initial dilution of 10^{-1}.
Serial ten-fold dilution was made up to 10^{-5} in pre-sterilized tubes containing 9ml of distilled water. The sample preparation and plating were carried out under laminar flow under strict hygienic condition.

| Plate 1: Coliforms | Plate 2: Staphylococcus | Plate 3: Total Viable Count |
| Plate 4: Streptococcus | Plate 5: Salmonella | Plate 6: Yeast and Mould |

Plates 1-6: Petriplates showing the colonies of bacterial growth

2.3 Examination
Coliform count, Staphylococcus count, Total viable count, Streptococcal count, Salmonella, Yeast and mould count, and were determined by the method described by APHA, (1976 and 1984) [2, 3] to assess the meat quality.

2.4 Statistical Analysis
The data obtained were statistically analyzed using the standard procedures given by Snedecor and Cochran (1994) [11].

3. Results and Discussions
The mean±SE values of bacterial counts ($\log_{10}$ cfu/g) for broiler chicken meat of organized and un-organized sector were presented in table 1.

Table 1: Comparison between Microbial Qualities ($\log_{10}$ cfu/g) of Organized and Un-organised sector for Broiler meat samples

Parameters	Organized (mean±SE)	Un-organized (mean±SE)	't'-value
Total Viable Count (TVC)	4.76±0.04	5.11±0.06	-4.847 NS
Coliforms	1.05±0.19	2.41±0.14	-5.651 NS
Yeast & Mould	2.71±0.08	3.23±0.04	-5.942*
Staphylococcus spp.	1.54±0.27	2.78±0.02	-4.498**
Streptococcus spp.	1.93±0.08	2.83±0.04	-10.140*
Salmonella spp. (%)	40.0% Present	100.0% Present	-

NS= Non-significant ($P>0.05$), **= highly significant ($P<0.01$), *= significant ($P<0.05$).

3.1 Total viable count
The mean±SE (Table 1) of the broiler meat samples of organized and un-organized sector were 4.76±0.04 and 5.11±0.06 respectively. Such counts are usually determined because they provide the most useful general index of overall hygienic quality (Ingram & Roberts, 1976) [7]. The T-value between the organized and un-organized sectors revealed that there is no significant difference. The values were well within the limits for both the sectors viz., log7 cfu/g (Jay, 1996 and Wehr, 1978) [8, 12].

3.2 Coliforms count
Growth of coliform bacteria would occur over a temperature range of 20-44 ˚C (Buxton and Frazer., 1977) [6]. The mean±SE (Table 1) of the broiler meat samples of organized and un-organized sector were 1.05±0.19 and 2.41±0.14 respectively. The t-value between the organized and un-organized sectors revealed that there is no significant difference. The values were well within the limits for both the sectors viz., log3 cfu/g (Jay, 1996 and Wehr, 1978) [8, 12].

3.3 Yeast and Mould count:
The mean±SE (Table 1) of the broiler meat samples of organized and un-organized sector were 2.71±0.08 and 3.23±0.04 respectively. The t-value between the organized and un-organized sectors revealed significant difference for broiler meat samples. Results from unorganized sector sample revealed higher value than the acceptable limit viz., log3 cfu/g (Jay, 1996 and Wehr, 1978) [8, 12]. But, the organized sector sample values were well within the acceptable limits. This clearly demarcates the organized sector from the unorganized sector.

3.4 *Staphylococcus* count
The mean±SE (Table 1) of the broiler meat samples of organized and un-organized sector were 1.54±0.27 and 2.78±0.02 respectively. The t-value between the organized and un-organized sectors revealed highly significant difference for broiler meat samples. However, according to Bradeeba, k. and Sivakumaar, P.K. (2013) [5], the presence of *Staphylococcus sp* will cause food intoxication. Hence, occurrence of this kind of organisms was not acceptable based on consumer health aspect.

3.5 *Streptococcus* count:
The mean±SE (Table 1) of the broiler meat samples of organized and un-organized sector were 1.93±0.08 and 2.83±0.04 respectively. The t-value between the organized and un-organized sectors revealed significant difference for broiler meat samples. Since, these organisms were highly

responsible for food intoxication; presence of these organisms in food products was not acceptable. The results obtained were in accordance with Rusul *et al.* (1996) [10].

3.6 *Salmonella*:
The percentage (Table 1) of *Salmonella* spp. found in broiler meat samples of organized and un-organized sector were 40.0 and 100.0 respectively. According to Hossain, M., *et al.,* (2015) [9] presence of *Salmonella* spp. in meat required great attention as these organisms are responsible for causing harm to public health. Results revealed were positive for *salmonella sp* irrespective of the sectors which must be viewed with utmost care. Similar results were found by Adu-Gyamfi *et al.* (2009) [1], Rusul *et al.* (1996) [10] and Baumgartner *et al.* (1992) [4]. The principal source of Salmonella contaminating broiler carcass includes hands of workers, cloths, wiping cloths, tools of workers, knives, skin, eviscerating racks etc. The organisms have been isolated from 50% of the apparently normal healthy individuals (Hossain, M., *et al.,* 2015) [9].

4. Conclusion
With the data analyzed, it is clear that even though samples obtained from organized shops the hygienic standards were poor when compared to un-organized shops pertaining to *Staphylococcus sp, Streptococcus sp* and *Salmonella* sp. Meat samples and contact surface materials had higher microbial load with poor personal and work area sanitation (Zerabruk, *et al.,* 2019) [13]. Moreover, *Salmonella* spp. is found in both sectors which were not advisable on consumer point of view. Hence, butchers and consumers must be aware of risk associated with the poor hygienic standards and their mind set should be changed towards the production of wholesome meat and meat products.

5. Acknowledgement

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