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Bacterial Contaminations of Broiler Chicken Meat Marketed in Banjarbaru

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ABSTRACT

This research aims to find out how high the level of bacterial contamination found in broiler chicken meat sold at the Bauntung Market, Banjarbaru. This research used sampling method and to determine the sample using random sampling method. This research used experimental test sample. This sampling was carried out for three days at 8:00 AM and 11:00 PM. The variables observed in this study were physical observation, the number of bacteria (TPC), and the type of bacteria. The data obtained were performed a t-test (paired samples test) using a variety of SPSS (Statistical Product and Service Solution) program analysis 18. Laboratory analysis was carried out in the Microbiology Laboratory of the Faculty of Agriculture, Lambung Mangkurat University. The results obtained indicate that, there are significant differences in Sig. (2-tailed) (<0.05) between the collection times of the number of bacteria, so it can be concluded that the average level of bacterial contamination at the time of collection at 07.00 am lower than at 10:00 noon. Which is 2.13 x 109 cfu/g and 5.81 x 109 cfu/g. The whole sample taken at 07.00 am did not exceed the threshold, while taken at 10:00 noon had exceeded the threshold required by SNI. Bacterial contaminants that grow on EMBA and SSA media include *Escherichia coli, Klebsiella sp., Citrobacter, Shigella sp., Salmonella sp.,* and *Providencia*.

Keywords: broiler chickens, contamination, physical observation, types of bacteria.

1. Introduction

The increase in Indonesia's population according to the projected Statistics Indonesia by 2018 is estimated to reach 265 million. The number consisted of 133.17 million men and 131.88 million women, which is following the needs of animal origin food, especially chicken meat which also experienced an increase. Chicken meat production in Indonesia sourced from the Directorate General of Animal Husbandry and Animal Health in 2018 amounted to 3.87 million tons, with a production of 3.28 million tons of purebred chicken meat and 300.12 thousand tons of non-purebred chicken/village. Meanwhile, the consumption of chicken meat in the household in 2018 will reach 1.37 million tons. The level of consumption of broiler chicken meat from 2014 to 2019 is 3.99, 4.77, 511, 5.55, 518 and 557 kg/capita (SUSENAS, 2019).

Chicken meat is an important food ingredient in meeting the nutritional needs of the community because in every 100 g chicken meat contains 18.2 g protein, 25 g fat, 14 mg calcium, 200 mg phosphorus, and 2 mg iron and other substances that are highly needed body. Chicken meat is easy to get, cheap prices are affordable by all circles of society so that it is liked by many people and is often used as the main ingredient in food manufacturing (Hasrawati, 2017).

Bauntung Market is one of the traditional markets in Banjarbaru. This market is open every day from dawn tonight. This market was created in the 60s. In this market, people can buy necessities such as side dishes and other necessities.

Fresh meat has decreased because the damage is mainly caused by microorganisms. The speed of meat damage depends on the number of initial microbes. The more the number of initial microbes in the meat, the faster the damage. Animal food products are safe for consumption if they do not contain pathogenic microbes, which are microbes that can cause health problems in humans who consume them (Hasrawati, 2017). Chicken meat or its processed quality products must meet the requirements, one of the quality requirements for poultry products is pathogen-free microbes such as Salmonella sp. and Campylobacter sp., while Escherichia coli is not allowed to exceed the maximum limit of 1x101 cfu / g and Staphylococcus aureus maximum 1x102 cfu / g microbial contamination in chicken meat (SNI, 2009).

Microbial contamination of meat starts from the cessation of blood circulation at the time of slaughter, especially if the tools used for removing blood are not sterile and washing water is not clean. Subsequent contamination can occur through the surface of the meat during the process of cutting carcasses, storage, and distribution (Soeparno, 2011). Foodstuffs such as chicken meat can act as a substrate for the growth and breeding of pathogenic microbial species that can cause disease for humans who eat them. Symptoms that arise are characterized by abdominal pain, dizziness, vomiting, and diarrhea (Buckle et al., 2013).

Based on the risk caused by bacteria, it is necessary to research to determine the level of bacterial contamination in broiler chicken meat sold at the Bauntung Market, Banjarbaru. Information about bacterial contamination of chicken meat sold at the Banjarbaru Bauntung Market will increase public awareness in buying and consuming chicken meat. The purpose of this study was to find out how high the level of bacterial contamination in broiler chicken meat sold at the Bauntung Market, Banjarbaru. It is hoped that the results of this study can provide information about the level of bacterial contamination in broiler chicken meat sold at the Bauntung Market, Banjarbaru.

2. Materials and Methods

Materials

This research was conducted from June to August 2018, located in the Microbiology Laboratory of the Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru. Chicken meat samples used were taken from the Banjarbaru Bauntung Market. The time for chicken meat sampling at the Banjarbaru Bauntung Market is divided into 2 times, at 07.00 am and 10:00 noon.

The materials used in this study are: broiler chicken breast, sterile aquades, NaCl 0.9%, Nutrient Agar (NA) media, Eosin Methylene Blue Agar (EMBA) media, Salmonella Shigella Agar (SSA) media, Soy Trypticase media Broth (TSB), Kligers Iron Agar (MCH) media, Citrate (Simmon Citrate Agar) media, MR-VP media (Methyl Red and Voges Proskauer), SIM (Sulfide Indol Motility) media, confectionery media, violet crystals, Lugol, acetone alcohol, safranin, emersion oil, (Potassium Hydroxide) 40% KOH, alpha naphthol, methyl red and Kovac reagents.

The tools used for this research are: stationery, clear plastic, label paper, cotton, ice boxes, Petri dishes, mortars, test tubes, scales, spoons, hot plates, stirrers, tweezers, inoculation needles (ose), burners Bunsen, Erlenmeyer, incubator, oven, autoclave, pipette, tissue, slide glass, test tube rack, Durham tube, HVS paper, and microscope.

Methods

The method used in this research is sampling method to determine the sample using the random sampling method, experimental test sample. The stages of the research include the initial survey, sampling, sample testing, and research results. Chicken meat samples were taken from the Bauntung Banjarbaru Market. The determination of traders (sellers) in the Bauntung Banjarbaru Market is done intentionally with a survey of traders who cut their own. Physical observations of chicken meat samples were conducted at the Bauntung Banjarbaru Market then the samples were taken to a laboratory for examination of bacterial contamination in chicken meat.

Procedures

In this study, several things must be prepared before the research including the determination of traders (sellers) in the Banjarbaru Bauntung Market conducted intentionally with a survey of traders

who cut themselves. The number of traders used as sample objects is 8 traders. Sampling was carried out for 3 days. Broiler chicken meat samples were taken on the chest.

Research Implementation

a. Sterilization of tools and materials
   Tools made of glass can be sterilized by wrapping the tools using HVS paper, then put into the oven at 1800C. Material/media can be sterilized using an Autoclave at 1210 C for 15 minutes.
b. Sampling
   Each trader was taken as many as 2 samples, namely at 07.00 am and 10:00 at random. Then, the sample of the broiler chicken breast is wrapped in clear plastic, labeled and put in a thermos/cooler box for further delivery to the laboratory.

Data Analysis

Data analysis was performed by paired samples to compare bacterial counts at 7:00 a.m. and 10:00 p.m. The data obtained were analyzed using an analysis of variance using the SPSS (Statistical Product and Service Solution) program 18.

3. Results and Discussion

Physical Observation on Broiler Chicken Meat

The observations showed that the average physical observation at 07.00 am has a yellowish-white flesh color, a yellowish-white color of fat and evenly under the skin, has a fresh odor, elastic elasticity and no signs of bruising or other suspicious signs. Based on these observations broiler chicken meat has a physical condition that is still normal. While the average physical observation at 10:00 noon has a slightly yellowish outer white skin color, pale pink chicken breast, the texture is not mushy and smells a bit fishy. That is because the broiler chicken breast taken at 10:00 noon has begun to experience damage. By the opinion of Frazier and Westhoff (1988) in stating that meat is easily damaged by microbes. Meat damage is characterized by changes in odor and the emergence of a lot of mucus that usually occurs when the number of microbes to millions or hundreds of millions of cells or more.

Total Plate Count (TPC) on Broiler Chicken Breasts

Table 1. TPC test results on broiler chicken breast samples

Trader's sample	Time	Bacterial count (cfu/g)		
		Day 1	Day 2	Day 3
1	07.00	$9,7 \times 10^5$	$1,97 \times 10^8$	$5,6 \times 10^5$
	10.00	$3,09 \times 10^7$	$2,4 \times 10^{10}$	$9,75 \times 10^7$
2	07.00	$2,42 \times 10^6$	$1,01 \times 10^9$	$1,4 \times 10^7$
	10.00	$5,93 \times 10^7$	$1,1 \times 10^{10}$	$8,27 \times 10^7$
3	07.00	$4,87 \times 10^5$	$5,2 \times 10^4$	$1,1 \times 10^4$
	10.00	$1,06 \times 10^6$	$1,18 \times 10^7$	$9,59 \times 10^6$
4	07.00	$1,48 \times 10^7$	$1,05 \times 10^9$	$1,07 \times 10^8$
	10.00	$1,54 \times 10^9$	$1,24 \times 10^9$	$1,69 \times 10^8$
5	07.00	$2,15 \times 10^7$	$7,52 \times 10^9$	$1,97 \times 10^7$
	10.00	$5,82 \times 10^9$	$1,3 \times 10^{10}$	$5,75 \times 10^8$
6	07.00	$2,3 \times 10^{10}$	$2,74 \times 10^9$	$1,2 \times 10^{10}$
	10.00	$2,5 \times 10^{10}$	$2,13 \times 10^{10}$	$1,65 \times 10^{10}$
7	07.00	$2,43 \times 10^8$	$8,9 \times 10^6$	$8,1 \times 10^6$
	10.00	$5,49 \times 10^9$	$2,5 \times 10^7$	$1,45 \times 10^8$
8	07.00	$3,04 \times 10^9$	$8,1 \times 10^5$	$1,71 \times 10^6$
	10.00	$3,38 \times 10^9$	$2,31 \times 10^8$	$7,53 \times 10^8$
Average		$2,13 \times 10^9 \pm 5,275 \times 10^9$ (07.00 AM)		
		$5,81 \times 10^9 \pm 8,165 \times 10^9$ (10.00 AM)		

Note: Results show significantly different Sig. (2-tailed) (<0.05)

The results of observations on the total number of bacteria with the collection time at 07.00 am and 10:00 noon conducted for three days can be seen in Table 1. When compared with the maximum limit of microbial contamination according to the Indonesian National Standard (SNI) No: 7388: 2009 TPC which is equal to 1 x 106 cfu / g, (Table 1) shows that only about 25% of the total samples taken at 07.00 am do not exceed the threshold required by SNI, while the whole sample taken at 10:00 noon has exceeded the threshold required by SNI.

Sampling time can affect the level of bacterial contamination. In the afternoon the level of bacterial contamination is increasing due to bacterial growth. By the opinion of Soeparno (2011) which states that the growth of bacteria in meat is divided into four phases, namely: the adjustment phase (lag), the logarithmic phase (exponential), the stationary phase, and the death phase.

Handling of chicken meat can cause differences in the value of the total plate count and the occurrence of contamination in chicken meat. This is by the statement of Nugroho (2005) which states that contamination can come from the cleanliness of workers (people), tools and places used, as well as water for washing carcasses and washing hands that are used repeatedly where the water used has been contaminated by bacteria.

Total Plate Count (TPC) on Broiler Chicken Breasts

The results of the identification of bacterial samples of broiler chicken breast on EMBA (Eosin Methylene Blue Agar) and SSA (Salmonella Shigella Agar) media with the collection time at 07.00 am and 10:00 noon conducted for three days can be seen in Table 2 and Table 3.

Table 2. Results of bacterial identification on EMBA media

Trader's sample	Time	Identification of bacteria		
		Day 1	Day 2	Day 3
1	07.00	*Klebsiella, E. coli*	*Klebsiella*	*Klebsiella*
	10.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
2	07.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
	10.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
3	07.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
	10.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
4	07.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
	10.00	*Klebsiella*	*Klebsiella, E. coli*	*Klebsiella*
5	07.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
	10.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
6	07.00	*Klebsiella*	*Klebsiella*	*Klebsiella, E. coli*
	10.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
7	07.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
	10.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
8	07.00	*Klebsiella*	*Klebsiella*	*Klebsiella*
	10.00	*Klebsiella*	*Klebsiella*	*Klebsiella*

Based on the identification results in Table 2 shows that there are contaminants of Escherichia coli and Klebsiella sp. there are samples taken at 07.00 am and 10:00 noon grown on EMBA media. While the results of identification in Table 3, show that the presence of bacteria Shigella sp., Salmonella sp., Citrobacter, Providencia, and Klebsiella sp. samples were taken at 07.00 am and 10:00 noon were grown on SSA media

According to Suryanto et al., 2005, sanitation has a very close relationship with the number of bacteria where the lower the level of sanitation, the higher the number of bacteria. This is consistent with the opinion of Buckle et al., 1987, which states that market conditions are still modest, with poor environmental sanitation, coupled with poor marketing procedures that will support a significant increase in bacterial contamination and development.

Table 3. Results of bacterial identification on EMBA media

Trader's sample	Time	Identification of bacteria		
		Day 1	Day 2	Day 3
1	07.00	*Citrobacter*	*Klebsiella*	*Citrobacter*
	10.00	*Citrobacter*	*Klebsiella*	*Citrobacter*
2	07.00	*Citrobacter*	*Citrobacter*	*Citrobacter*
	10.00	*Citrobacter, Klebsiella*	*Citrobacter*	*Citrobacter*
3	07.00	*Klebsiella*	*Klebsiella*	*Citrobacter*
	10.00	*Citrobacter, Providensia*	*Klebsiella*	*Citrobacter*
4	07.00	*Citrobacter*	*Klebsiella*	*Citrobacter, Klebsiella*
	10.00	*Citrobacter, Klebsiella*	*Citrobacter, Klebsiella*	*Citrobacter, Klebsiella*
5	07.00	*Citrobacter*	*Citrobacter*	*Citrobacter*
	10.00	*Citrobacter, Klebsiella*	*Salmonella*	*Citrobacter, Klebsiella*
6	07.00	*Citrobacter, Klebsiella*	*Citrobacter, Providensia*	*Klebsiella*
	10.00	*Citrobacter*	*Salmonella*	*Salmonella*
7	07.00	*Citrobacter*	*Citrobacter, Klebsiella*	*Citrobacter*
	10.00	*Citrobacter, Shigella*	*Citrobacter*	*Citrobacter, Salmonella*
8	07.00	*Citrobacter, Klebsiella*	*Citrobacter, Klebsiella*	*Citrobacter*
	10.00	*Citrobacter*	*Citrobacter, Klebsiella*	*Salmonella*

4. Conclusions

Based on the results of the study it can be concluded that the average level of bacterial contamination occurs starting at 07.00 am and increases with the increase of 10:00 noon that is equal to 2.13 x 109 cfu/g and 5.81 x 109 cfu/g. Overall samples taken at 07.00 am as much as 25% did not exceed the threshold, while taken at 10:00 noon had exceeded the threshold required by SNI. Contamination of bacteria that grow on EMBA and SSA media, among others: Escherichia coli, Klebsiella sp., Citrobacter, Shigella sp., Salmonella sp., And Providencia.

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