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IDENTIFICATION OF SALMONELLA sp. IN KAMPUNG CHICKEN EGGS IN THE CENTRAL MARKET OF GORONTALO CITY

Dirgahayu Rahman[1], Laksmyn Kadir[2], Agusrianto Yusuf[3]

[1.3]Diploma (D-3) Health Analyst Study Program, Faculty of Science, Technology and Health Sciences, Bina Mandiri University Gorontalo,
[2]Department of Public Health, Faculty of Sports and Health, Gorontalo State University

Jl. Prof. DR. H. Aloei Saboe, Wongkaditi, Kabila, Bone Bolango Regency, 96128, Gorontalo, Indonesia

E-mail: [1]dirgahayurahman0212@gmail.com, 2asi_1403@gmail.com , 3agusyusuf012@gmail.com

ABSTRACT

Free-range chicken eggs are a food derived from animal origin, which are known to contain high protein. Salmonella sp. are bacteria that can grow, develop in eggs and can cause salmonellosis in the form of typhoid fever. This study aims to determine the presence of salmonella sp. Bacteria. in native chicken eggs, especially in the shells, egg whites, and egg yolks of native chickens sold at the Central Market of Gorontalo City. The method used in this research is descriptive. With the identification test by planting the sample using the growth media of Braint Heart Infusion Broth (BHIB) and Salmonella-Shigella Agar (SSA). The sample used in this study were 12 samples. The sampling technique used in this study was purposive sampling. The results showed that from 12 samples of eggs examined, 1 shell sample and 1 sample of free-range chicken egg yolk were contaminated with Salmonella sp .. Growth of Salmonella sp. Bacteria. characterized by the growth of red colonies to a black dot in the center and in the form of bacilli or red stems after gram staining.

Keywords: Chicken eggs, Salmonella sp., Gorontalo City Central Market.

PRELIMINARY

Health is the need of every human being in living his life. One of the factors that influence health is behavior. Healthy behavior and paying attention to food that is fit for consumption are ways to improve health status.

Food is a source of energy and a basic necessity for every human being, because food contains compounds that are necessary to restore and regulate processes in the body, reproduction and produce energy for the benefit of various activities in life[5].

The general content in food ingredients both of animal origin and of plant origin consists of protein, carbohydrates and fat. Protein is an important substance for the body in brain development, immunity and tissue repair. This protein is found in chicken, beef, milk and eggs [12].

Eggs are a food derived from animal origin which is converted into various

kinds of processed foods. Many people today like processed foods and beverages that contain raw eggs. Some of the processed drinks are herbal medicine and saraba. While processed food served with half-cooked eggs, for example, fried eggs. Many do not know that eating foods containing raw eggs and undercooked eggs can cause disease, because in raw eggs pathogenic bacteria are found, one of which is Salmonella sp., This is supported by research by Arisnawati (2017) that purebred chicken eggs sold in Pon Jombang market 25% contaminated with Salmonella sp bacteria [3].

Salmonella bacteria can enter in two ways, namely directly through the yolk and egg white from the ovary of the infected hen and indirectly through the pores of the egg shell. Salmonella sp. what often occurs in eggs is by means of penetration of feces through the eggshell when laid from the parent. If eggs are not stored at low temperatures, these bacteria can grow and multiply in the skin membrane, and will contaminate the contents of the eggs when the eggs are cracked.

According to Sopandi (2014) salmonellosis is a disease that occurs due to infection with salmonell sp. Bacteria. Salmonellosis in humans is typhoid and paratyphoid fever, which is caused by s.typhi, and s. paratyphi [14].

One that can affect Salmonella sp. on eggs, among others, environmental sanitation of selling these eggs. Gorontalo city central market is a shopping center open to the public, located in Kec. Kota Selatan, Kota Gorontalo, from the initial observations that have been made, the data obtained shows that there are 6 egg traders who have different descriptions. Egg traders in the Central Market of Gorontalo City are scattered and are not placed specifically but mingle with other foodstuff traders. There are several eggs that are sold in the same place as the sale of chickens. So that cross contamination is likely to occur. On the other hand, People who buy free-range chicken eggs still don't know how to distinguish eggs that are good for consumption. Besides, people also don't know how long the eggs have not been sold, what are the conditions and temperature of the storage place as long as the eggs have not been sold. Therefore, it is possible that buyers can buy eggs with bad quality just because of different conditions of selling places.

Based on the description above, the researcher is interested in conducting research on the Salmonella sp. on native chicken eggs that are sold in the central market of Gorontalo City, so that the feasibility of eggs can be found for consumption by the wider community.

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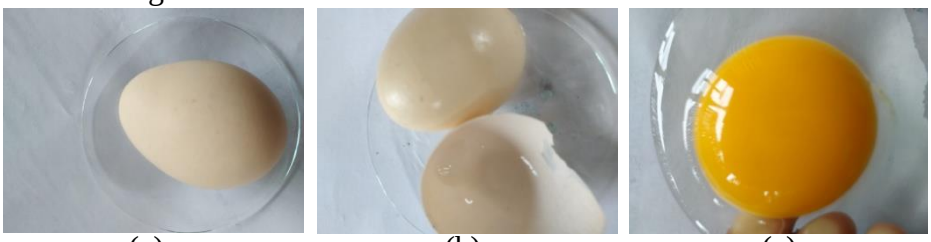
RESEARCH METHODS

The method used in this research is descriptive. The identification test was carried out by planting the sample using the growth media of Braint Heart Infusion Broth (BHIB), and Salmonella-Shigella Agar (SSA) as selective media then continued using gram staining and observed using a microscope. The sample used in this study were 12 samples taken from 6 free-range chicken egg sellers in the central market of Gorontalo city. The sampling technique used in this study was purposive sampling in which the sample was taken based on the criteria that were not cracked, not rotten and not plastered with feces.

RESEARCH RESULT

Based on the research that has been done, the sample characteristics are presented in Figure 1.



(a) (b) (c)

Figure 1. Research samples (a) free-range chicken eggs, (b) egg shell parts, (c) white and yolk parts

Table 1. Characteristics of native chicken egg shells

No. Sample	Condition Shell	Cleanliness Shell	Color Shell
1 (a)	No Crack	Clean	Brownish white
2 (a)	No Crack	Clean	White
3 (a)	No Crack	Clean	White
4 (a)	No Crack	Clean	Brownish white
5 (a)	No Crack	Clean	White
6 (a)	No Crack	Clean	White
7 (a)	No Crack	Dirty	White
8 (a)	No Crack	Clean	Brownish white
9 (a)	No Crack	Clean	White
10 (a)	No Crack	Clean	Brownish white
11 (a)	No Crack	Clean	White
12 (a)	No Crack	Clean	White

Source: Primary Data 2020

Type Code: 1 = Numberegg samples
(a) = Egg shell

Based on the table 1.The characteristics of the sample of native chicken eggshells indicate that all conditions of the eggshell are intact or not cracked, and for cleanliness 1 dirty shell of the 12 egg shells is sampled, while for color, 4 shells are brownish white while the others are white.

Table 2. Characteristics of native chicken egg whites

No. Sample	Viscosity Egg whites	White color Egg	Aroma Egg whites
1(b)	Thick	Clear	Typical Eggs
2 (b)	Thick	Clear	Typical Eggs
3 (b)	Thick	Clear	Typical Eggs
4 (b)	Thick	Clear	Typical Eggs
5 (b)	Thick	Clear	Typical Eggs

Dirgahayu Rahman[1], Laksmyn Kadir[2],
Agusrianto Yusuf[3].

6 (b)	Thick	Clear	Typical Eggs
7 (b)	Thick	Clear	Typical Eggs
8 (b)	Thick	Clear	Typical Eggs
9 (b)	Thick	Clear	Typical Eggs
10 (b)	Thick	Clear	Typical Eggs
11 (b)	Thick	Clear	Typical Eggs
12 (b)	Thick	Clear	Typical Eggs

Source: Primary Data 2020

Type Code: 1 = Numberegg samples
(b) = Egg White

Based on table 2. the characteristics of the sample of free-range chicken egg whites show that all samples have a thick texture, are clear in color and have a distinctive aroma of eggs.

Table 3. Characteristics of Village Chicken Egg Yolk

No. sample	**Viscosity Egg yolk**	**Color Egg yolk**	**Yellow Scent Egg**
1 (c)	Thick	Orange	Typical Eggs
2 (c)	Thick	Orange	Typical Eggs
3 (c)	Thick	Orange	Typical Eggs
4 (c)	Thick	Orange	Typical Eggs
5 (c)	Thick	Orange	Typical Eggs
6 (c)	Thick	Orange	Typical Eggs
7 (c)	Thick	Orange	Typical Eggs
8 (c)	Thick	Orange	Typical Eggs
9 (c)	Slightly Liquid	Orange	Typical Eggs
10 (c)	Thick	Orange	Typical Eggs
11 (c)	Thick	Orange	Typical Eggs
12 (c)	Thick	Orange	Typical Eggs

Source: Primary Data 2020

Type Code: 1 = Numberegg samples
(c) = Egg Yolk

Based on table 3. the characteristics of the sample of free-range chicken egg yolk show that of the 12 samples of egg yolk viscosity there is 1 sample that has a slightly liquid thickness. For the egg yolk color, all samples were orange, while the aroma of the egg yolk had a distinctive aroma.

1. Detection Results of Village Chicken Egg Pollutant Bacteria on Braint Heart Infusion Broth (BHIB) Media

Based on the research that has been done, the results of detection of free-range chicken eggs contaminating bacteria using Braint Heart Infusion Broth (BHIB) are presented in the following table:

Table 4.Results of Detection of Village Chicken Egg Contaminating Bacteria on Braint Heart Infusion Broth (BHIB) Media

Sample	Number of Samples Contaminated with Bacteria		Percentage	
	(+)	(-)	(+)	(-)
Egg shell	12	0	100%	0
Egg whites	7	5	58.3%	41.7%
Egg yolk	12	0	100%	0

Source: Primary Data 2020

Figure 2. Diagram of the Detection Results of Village Chicken Egg Pollutant Bacteria on Braint Heart Infusion Broth (BHIB) Media

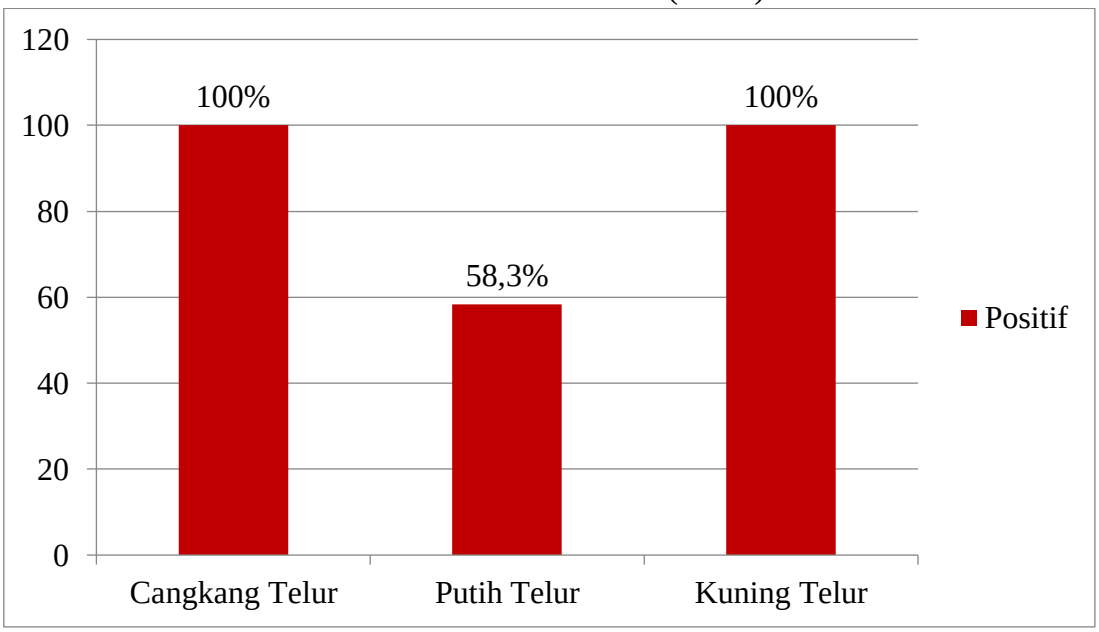


Table 4. and the bar diagram above about the detection results of the bacteria contaminating native chicken eggs on BHIB media show that all or 12 tubes of BHIB media with eggshell samples show turbidity with a positive percentage of 100%. Bacterial growth in BHIB media was indicated by the occurrence of turbidity on the media. This process aims to multiply the bacteria that are thought to be present in the sample, namely Salmonella sp. Meanwhile, BHIB tubes with egg white samples showed turbidity or positive in 7 tubes with a percentage of 58.3%, and 5 tubes showed no change in the media with a percentage of 41.7%. For BHIB media tube with egg yolk samples all or 12 tubes showed turbidity with a percentage of 100%.

2. Results of detection of Salmonella sp. Bacteria On Salmonella Shigella Agar (SSA) Media

Based on the research that has been done, the detection results of Salmonella sp. on native chicken eggs using Salmonella Shigella Agar (SSA) media is presented in the following table:

Table 5. Results of detection of Salmonella sp. On SSA Media (Salmonella Shigella Agar).

Sample	Number of Salmonella Tainted Samples		Percentage	
	(+)	(-)	(+)	(-)
Egg shell	1	11	8.3%	91.7%
Egg whites	0	12	0%	0%
Egg yolk	1	11	8.3%	91.7%

Source: Primary Data 2020

Figure 3. Diagram of Salmonella sp. On SSA Media (Salmonella Shigella Agar).

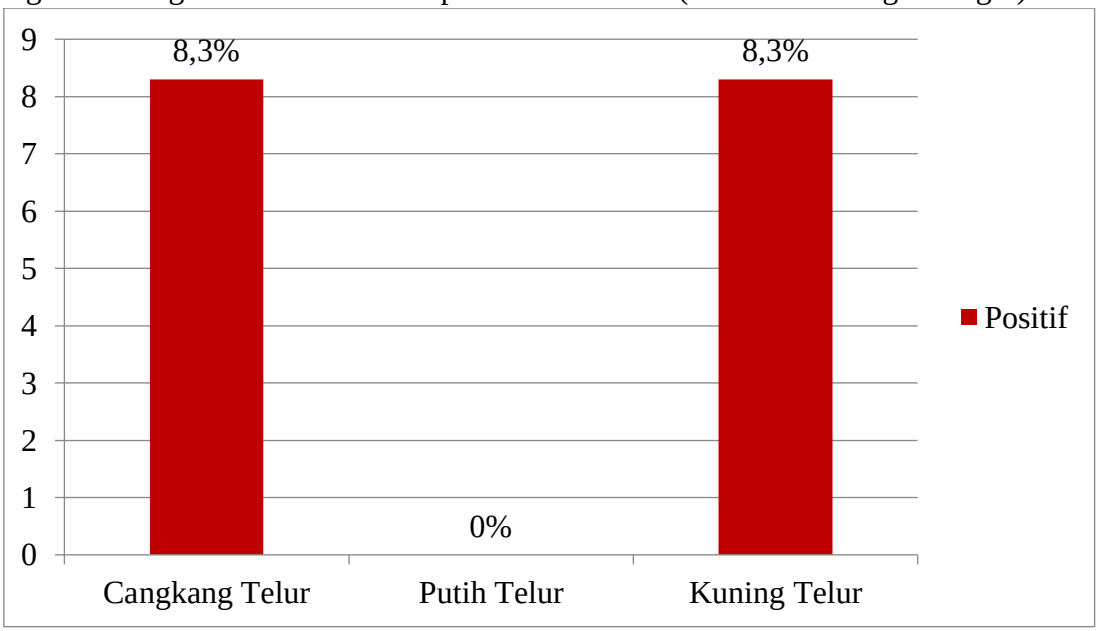


Table 5. the detection results of Salmonella sp. on SSA media showed that 1 out of 12 eggshell samples were contaminated with Salmonella sp. with a positive percentage of 8.3% and 11 other samples were not contaminated with a percentage of 91.7%. Meanwhile, the egg white sample showed that there was no growth of Salmonella sp. on SSA media or all egg whites are not contaminated with Salmonella sp. with a percentage of 100%. For egg yolk samples 1 of 12 samples contaminated with Salmonella sp. and 11 other samples were negative or not contaminated with Salmonella sp. with a frequency of 8.3% positive and 91.7% negative. Salmonella sp. Colony growth with cirri round, convex and black and give a zone yellow between colonies. This process was carried out because the SSA medium was the specific medium used in the identification of Salmonella and Shigella bacteria.

DISCUSSION

Eggs are a food ingredient that contains many beneficial substances for the body. Some of these substances are protein, carbohydrates, fat, minerals and water. Under certain circumstances the eggs can be contaminated by bacteria. Salmonella sp. are bacteria that are usually found in foods that contain high protein, one of which is eggs. These

bacteria are gram-negative bacteria in the form of bacilli with a diameter of 0.6 microns and a length of 3-4 microns. If consumed, these bacteria can cause health problems. One of the diseases that can be caused by these bacteria is typhoid fever with symptoms of fever, lack of appetite, diarrhea, nausea and vomiting [11].

Based on the results of the study, it was found that from 12 samples examined, it was found that 1 of 12 samples of free-range chicken eggshells identified 1 shell sample contaminated with Salmonella sp. Bacteria, or with a percentage of 8.3%. 1 sample of egg yolk contaminated with Salmonella sp. or with a percentage of 8.3% and 0% or no colony growth of Salmonella sp. on the egg white sample. This is influenced by the contamination of Salmonella sp. Bacteria. which comes from parent feces attached to the surface of the eggshell, besides contamination caused by poor environmental sanitation can also affect the presence of Salmonella sp. bacteria. on the shell. Contamination of egg yolks caused by brooders who are sick or infected with Salmonella sp., Poor livestock management, feed, damage to egg shells can even be influenced by environmental factors [3]. This growth is characterized by the presence of colonies on SSA media with the characteristics of a round shape, small size, convex surface and smooth edges with a black dot in the middle[6]. The results of gram staining that have been carried out using a microscope with a magnification of 400x, with a magnification of the ocular lens of 10x and the objective lens of 40x show the appearance of red bacteria in the form of rods / bacilli. Meanwhile, the influencing factors were not finding Salmonella sp. in egg white because egg white contains konalbumin, this substance is called protein which can inhibit the penetration of bacteria into the egg white. Egg white or liquid albumin inside and outside have a relatively high pH so that they are able to restrain the development of bacteria. The factors that can affect the negative results of other eggs are the natural defenses of the eggs starting from the shells that have cuticles. The cuticle is an important outer layer of the eggshell which consists of protein, this layer as the first protective layer of the egg [21].

Based on the results of the research that has been done, it is found that the native chicken eggs sold in the Central Market of Gorontalo City are not in accordance with the provisions of the Indonesian National Standard SNI No. 01-6366-2000 regarding the maximum limit of microbial contamination (Salmonella sp.) In fresh eggs, namely negative or not. may contain Salmonella sp.

In line with previous research conducted by Arisnawati (2017) states that the eggs sold at Pon Jombang Market are of poor quality, because some 50% (2 of 4 samples) of egg shells and a small proportion of 25% (1 of 4 samples) The egg yolk of broilers sold is contaminated with Salmonella sp. In another study by Wahyuningsih (2019) it was also stated that chicken eggs sold at the Wage Purwokerto Market, Banyumas Regency, identified 1 in 30 samples contaminated with Salmonella sp. Bacteria.

Positive results on 1 sample of free-range chicken egg shells were caused by contamination with Salmonella sp. which often occurs in eggs by penetration of feces through the eggshell when laid from the parent. This pollution is in the form of horizontal contamination which is the main contamination route for Salmonella sp. that occurs from the moment after the egg is laid to the consumer [10].

If eggs are not stored at low temperatures, these bacteria can grow and multiply in the skin membrane, and will contaminate the contents of the eggs when the eggs are cracked. Environmental sanitation and storage of eggs can also

affect the presence of Salmonella sp. Based on the results of research that has been carried out, Central Market conditions which have a poor level of cleanliness and simple egg storage without cooling. So that the storage time of unsold eggs is also a factor that affects the contamination of Salmonella sp. Bacteria. [10].

According to the Indonesian National Standard [SNI 3926: 2008] regarding consumption chicken eggs, eggs stored at room temperature can last a maximum of 14 days, while at temperatures 4-7 ˚C and chicken eggs can last up to 30 days [18].

In the egg white part of the study, there was no contamination with Salmonella sp. caused by the presence of antimicrobials in the egg, when ovosis the pH of the egg white layer is 7.6-7.8. But if eggs are not used for several days the pH in egg whites will increase due to the increase in CO2 content and change the pH to 9.1-9.2 while the optimum pH for growth of Salmonella sp. namely 4.1-9.0 so that it can inhibit or kill the growth of Salmonella sp. This is supported by research by Oktavera (2011). The factors that cause this are conveyed by Puspitawati (2018) in her research which states that there is no Salmonella sp. caused by the physical defenses found in the eggshell. On the eggshell there are 7000-17000 pores, The pores are used as the gas in and out, the pores have a size of 0.01-0.07 mm. In new eggs, there are cuticles that line the pores which are composed of fat and protein. In addition, the cuticle plays a role in preventing microbial penetration through the egg shell. The chemical defense by eggs is the presence of lysozyme, a substance capable of destroying bacteria. In egg white also contains ovotransferin which acts to inhibit the growth of microorganisms. The chemical defense by eggs is the presence of lysozyme, a substance capable of destroying bacteria. In egg white also contains ovotransferin which acts to inhibit the growth of microorganisms. The chemical defense by eggs is the presence of lysozyme, a substance capable of destroying bacteria. In egg white also contains ovotransferin which acts to inhibit the growth of microorganisms.

According to Pelczar and Chan (2014) Salmonella sp. in badly infected (damaged) eggs that do not produce chicks, infected eggs then die, lightly infected eggs that produce infected chicks, and survive then grow to large and may continue to excrete Salmonella sp. This contamination is called vertical contamination, bacteria from infected hens. This contamination is preceded by ingestion of bacteria through fecal contaminated food or drinking water. The bacteria then enter and multiply in the digestive tract of the chicken. Furthermore, the bacteria will penetrate the intestinal wall, causing inflammation. Magrophages found in the digestive tract are a place for bacteria to live. Then the bacteria can penetrate the mucosa, enter the lymphatic system and can penetrate the blood vessels. Furthermore, these bacteria will spread to other organs such as reproductive organs, namely the ovaries. Meanwhile, horizontal transmission begins with feces contaminated with Salmonella sp. and will stick to the surface of the eggshell and when breaking eggs in a careless manner [12].

There are several ways to prevent contamination with Salmonella sp. namely maintaining the distribution of eggs to distributors, farms, up to the hands of consumers. Besides, it also requires the application of good farm management to ensure the quality of eggs to be consumed.

Consumers can also do several ways of handling and storing eggs starting from selecting eggs, choosing eggs with clean, intact / non-cracked, smooth surface, homogeneous / unstained eggshell color,

normal shape, and odorless . Eggs should be packaged in clean plastic bags and separate from cooked food ingredients. Then for egg handling, eggs can be washed with clean water before being stored in the refrigerator / refrigerator, store eggs in a clean, ventilated place with a temperature below 15°C and humidity 75% -90%, and for cooking or processing eggs should be done completely at a minimum temperature of 85°C for a minimum of 1 minute. And avoid eating raw eggs because it allows contamination of various types of microorganisms[6].

CONCLUSION

Based on the results of the research that has been done it can be concluded that:

1. Salmonella sp. Bacteria was found. in the section of free-range chicken egg shells sold at the Central Market of Gorontalo City with a percentage of 8.1% or 1 sample of the shell section.
2. Salmonella sp. Bacteria were not found. in the white part of free-range chicken eggs sold at the Central Market of Gorontalo City.
3. Salmonella sp. Bacteria was found. in the egg yolk section of free-range chickens sold at the Central Market of Gorontalo City with a percentage of 8.1% or 1 sample of the egg yolk.

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