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ANALYSIS OF *SALMONELLA SP* CONTENT IN RAW AND HALF COOKED EGGS IN SOLONG COFFEE SHOPS, ULEE KARENG SUB-DISTRICT, ACEH BESAR IN 2023

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Abstract

Analysis of Salmonella sp content in raw and half-cooked eggs in Solong coffee shops, Ulee Kareng sub-district, Aceh Besar in 2023. Eggs in half-cooked food are processed by boiling an egg for approximately 5 minutes so that high protein is obtained from the egg. Eggs can contain dangerous food bacteria called Salmonella sp. The aim of this research is to find out about the analysis of Salmonella sp. This half-boiled egg food is sold in Solong coffee shops, Ulee Kareng sub-district, Aceh Besar. The results of the research showed that the raw egg samples were negative for containing Salmonella sp bacteria, while the half-cooked egg samples were positive for containing Salmonella sp bacteria. The content of Salmonella sp bacteria in food is expected to meet standards referring to SNI 01-6366-2000, namely negative or zero (0). The conclusion of this study shows that the bacterial content in food through existing health processing does not meet the requirements because eggs contain Salmonella sp bacteria. The previously brewed bacteria still contained bacteria after Salmonella sp. Eggs containing bacteria are thought to be caused by long storage and processing methods that do not meet standards. It is hoped that there will be a need for supervision and education to parent traders by the regional government regarding the importance of processing egg food and increasing efforts to organize food so that the food received by eggs meets consumer health requirements.

Keywords: *Half-cooked Eggs, Egg, Salmonella sp*

1. INTRODUCTION

Food is a basic need for human life, because it contains compounds needed by the body. The functions of food include growth, energy sources, maintaining and repairing damaged body tissues. The main compounds that make up food are proteins, carbohydrates, fats, vitamins and minerals (Saraswati, 2012). Sources of protein can come from vegetable protein and animal protein. One source of animal protein that is important for humans besides meat and fish is eggs. Eggs are widely consumed by the general public because they are easily available and affordable compared to meat and fish (Sarwono, 2019).

In order for food to function properly, food quality must be considered. This quality includes the availability of nutrients needed in food and the prevention of food contamination with substances that can cause health problems (Cahya et al., 2019).

Food poisoning is a phenomenon that occurs due to food contamination by harmful microbial activity in the food. This can result in various diseases such as diarrhea, allergies and even death (Hennekinne et al., 2012). Food contamination can occur at any point of production: growing, harvesting, processing, storage, shipping or preparation.

Cross-contamination-the transfer of harmful organisms from one surface to another-is often the cause. This is especially troublesome for raw ready-to-eat foods, such as salads, raw eggs or other products. Because these foods are not cooked, harmful organisms are not destroyed before eating and can cause food poisoning (Khoirunnisa et al., n.d.).

Food contamination plays a major role in the incidence of foodborne diseases or food poisoning. Sources of disease that may contaminate food can occur during the production process starting from maintenance, harvesting or slaughtering, cleaning or washing, food preparation or processing, serving and storage. In addition to this, there is now also the use of chemicals in food production, so that by itself the risk of contamination by chemicals is also not small (Usman et al., 2014).

One source of magnesium is eggs. Eggs are livestock products that make the largest contribution to achieving adequate nutrition for the community, because they contain complete nutrients and are easily digested. Therefore, eggs are an excellent food for growing children who need protein and minerals in large quantities (Handayani et al., 2017). Eggs contain various vitamins, including vitamin A, riboflavin, folic acid, vitamin B6, vitamin B12, choline, vitamin E, and are also a source of minerals. Some of the minerals contained in eggs include iron, phosphorus calcium, potassium, sodium, magnesium, copper, iodine, manganese, and zinc (Yuliandi & Hikmah, 2022).

Free-range chicken eggs are foods that are prone to microbial contamination. Some types of Salmonella are allegedly able to contaminate by penetrating the eggshell and contaminating the contents (Spitzer, 2015). Apart from being consumed directly or raw, eggs are also consumed in a semi-cooked condition, either boiled or fried. Nowadays, half-cooked eggs are popularly combined with various foods, such as bread, noodles, fried rice, burgers, potatoes, etc. The benefits of half-cooked eggs are that it helps to lose weight. The benefits of soft-boiled eggs are to help lose weight, prevent aging, as a healthy breakfast menu, help strengthen memory, richer in nutrients, help build muscle, help nourish the eyes, prevent anemia, and boost metabolism (Khoirunnisa et al., n.d.).

However, until now, controversy about raw egg consumption still occurs. Some experts say that the risk of someone consuming raw eggs is very small. However, there are also those who think that raw eggs contain bacteria that can cause poisoning and illness. In raw, or undercooked egg yolks, it is feared that they contain Salmonella germs that are harmful to health (Khoirunnisa et al., n.d.). Salmonella is one of the causes of food-borne illness. One type of Salmonella bacteria is Salmonella type which causes typhoid disease. With the benefits and risks it has the feasibility of raw or undercooked eggs to eat is still questionable (Priyono, 2020).

According to Syamsir (2010), behind the smooth appearance of eggshells, eggs are easily damaged by bacteria. The number of microbes on eggshells is around 102-107 colonies/gram (expressed as total plate numbers). Some pathogenic bacteria that may be present on eggshells are Salmonella, Campylobacter and Listeria. Of these pathogens, Salmonella is the main pathogen that contaminates eggs and processed egg products. The genus Salmonella belongs to the Enterobacteriaceae family, which are slender rod-shaped gram-negative bacteria (0.7- 1.5×2-5 μm), facultatively anaerobic, oxidase negative, and catalase positive. This is the main reason why raw or undercooked eggs are not good for consumption, because eggs contain *Salmonella sp* bacteria (Yuliandi & Hikmah, 2022).

Salmonella sp contamination in eggs can occur at high temperatures and humidity, if egg handling is not done properly, then the possibility of *Salmonella sp* can contaminate eggs (Munthe, 2021). The maximum limit of microbial contamination for fresh eggs with *Salmonella sp* residual components is negative in qualitative units (Fajar et al., 2018). Detection of *Salmonella sp* in eggs has been reported by previous researchers, in raw eggs and undercooked eggs (Usman et al., 2014) and as a mixture of herbal medicine (Chusniati et al., 2009).

Damage to eggs by bacteria occurs because bacteria enter the egg when the egg is inside or outside the mother's body. Damage to eggs by bacteria since they are inside the mother's body occurs for example the mother suffers from Salmonellosis so that the eggs contain *Salmonella sp*. While the entry of bacteria into the egg after the egg is outside the mother's body for example comes from dirt attached to the eggshell. The dirt includes feces, soil or a material that contains many destructive bacteria. These bacteria enter the egg through cracked eggshells or penetrate the shell when the thin layer of protein covering the eggshell has been damaged and small holes on the surface of the egg called pores. Damage to eggs is generally caused by bacteria entering through cracked shells or penetrating the shell when the thin layer of protein covering the eggshell has been damaged. Eggs contaminated by *Salmonella sp* bacteria are either direct contamination, namely from the mother hen to the egg embryo, or indirect contamination, namely from the pores of the egg contaminated with *Salmonella sp* or based on the length of storage of the egg (Usman et al., 2014).

Physical egg damage in the form of cracks can occur during packing, transportation, and storage at each trader. One of the traders commonly associated with eggs is coffee shop traders who sell egg menus in their dishes (Usman et al., 2014). Coffee shops are favorite places that are most often visited by people both young and old. The most favorite coffee shop visited by the community is Solong coffee shop, Ulee Kareng sub-district, Aceh Besar. The coffee shop operates from 07.00 am to 23.00 am. The coffee shop provides various types of food including fried rice, fried noodles, savory rice, half-boiled eggs or better known as poding, and various types of drinks including tea, coffee, juice, and so on.

From the results of the researcher's initial survey, the researcher saw a unique phenomenon from boiling eggs, which is a food known as half-boiled eggs. To get the half-cooked egg, the egg is cooked incompletely, namely with temperatures ranging from 80-90ºC with a time range of 5 minutes. Based on research conducted by Fitriyah (2003), that eggs should be cooked at 66ºC for 12 minutes so that the bacteria in the eggs can die completely (Usman et al., 2014).

Seeing this phenomenon, researchers are very interested in examining the presence or absence of *Salmonella sp* bacteria in eggs both before cooking and after cooking at Solong coffee shop, Ulee Kareng sub-district, Aceh Besar.

The problem identified in this study revolves around the uncertainty regarding the presence of *Salmonella sp* bacteria in soft-boiled eggs served at Solong coffee shop, situated in the Ulee Kareng sub-district of Aceh Besar. Although soft-boiled eggs are a popular food item in coffee shops, the potential risk of *Salmonella sp* contamination remains unclear within this specific establishment. Hence, the primary research objective is to ascertain the presence or absence of *Salmonella sp* bacteria in half-cooked eggs sold

at Solong coffee shop, located in Ulee Kareng sub-district, Aceh Besar, during the year 2023.

2. RESEARCH METHODS

The methodology employed in this study involves conducting a survey focused on observing vendors selling half-cooked eggs, followed by laboratory analyses to detect the presence of Salmonella bacteria in both raw and half-cooked eggs sold by vendors at Solong coffee shop in the Ulee Kareng sub-district of Aceh Besar.

3. RESULTS AND DISCUSSION

Observations were made of traders selling undercooked eggs at Solong coffee shop in Ulee Kareng sub-district, Aceh Besar, to see whether or not there was *Salmonella sp* in raw eggs and undercooked eggs by conducting laboratory tests on the eggs.

The results of the study are as follows:

Table 1. Characteristics of eggs sold at Solong coffee shop in Ulee Kareng sub-district, Aceh Besar

Duration of storage by traders	Eggshell hygiene	Skin condition	Skin color
1 day	Clean	No cracks	White

It can be seen from the samples taken by researchers that the coffee shop does not store eggs for more than a day and runs out immediately on that day.

Table 2. Steeping time of half-cooked eggs at Solong coffee shop, Ulee Kareng sub-district, Aceh Besar

Brewing time	Temperature (°C)
5 minutes	90 °C

From table 2. we can see that in the coffee shop, the seller brewed half-cooked eggs for only 5 minutes with an average temperature of 900C.

Table 3. Laboratory Examination Results on *Salmonella sp* Content in Raw and Undercooked Eggs

***Salmonella sp* content**	
Raw Eggs	Half cooked Eggs
Negative	Positive

From table 3. it is known that of the 2 samples taken at the Solong coffee shop in Ulee Kareng sub-district, Aceh Besar, it can be seen that the raw egg sample obtained negative results (no *Salmonella sp*), while the half-cooked egg sample obtained positive results (*Salmonella sp*).

These results are not in accordance with government recommendations outlined in SNI No. 01- 6366-2000 which states that the maximum limit of microbial contamination for fresh eggs with a residual component of *Salmonella sp* is negative in qualitative units (Indonesia, 2009). Good and correct handling of eggs is beneficial to prevent *Salmonella sp* contamination Storage of eggs at low temperatures is very important to prevent the growth of *Salmonella sp* contaminants in eggs (Darmayani et al., 2017).

This study used 2 eggs that were used as food ingredients for half-cooked eggs. To find out the characteristics of eggs sold in coffee shops, observations were made. Observations were made by asking the seller about the length of egg storage and by observing the physical condition of the eggs (eggshell). The results are in accordance with table 1 and table 2, so of the two eggs sampled in this study, the egg seller at the coffee shop did not store the eggs for more than a day and immediately ran out on that day. For the observation of the physical condition of the eggs (eggshell), according to table 1, the results obtained by the egg seller at the coffee shop sold eggs with clean eggshell conditions.

In addition to looking at the length of sales and the cleanliness of the eggshell, researchers also observed in terms of the color and texture of the eggshell, where a good egg to be used as a base for half-cooked eggs is white and for a good texture is one that has a smooth eggshell quality and no cracks at all. From the results of field observations, the results obtained from 2 samples of egg color are all white and all also have a smooth skin texture and do not crack completely.

According to Harianto (2002) where the results of his research state there is a relationship between physical conditions (eggshells) to the presence of *Salmonella sp* bacteria in eggs, the possibility of dirty eggshell conditions can be the cause of the entry of *Salmonella sp* bacteria into the egg. Long storage time allows bacteria that were previously few can develop into more in the egg, this is due to air conditions that are very strategic for bacteria to multiply (Harianto, 2002).

This study uses 2 eggs that are used as food ingredients for half-cooked eggs. Then observations were made of the brewing process with hot water for approximately 5 minutes. Then the results obtained in accordance with table 2, that the seller brewed half-cooked eggs for only 5 minutes with an average temperature of 900C. The reason traders do things like that is in accordance with consumer demand, namely that eggs should not be lumpy because in the opinion of many people it will damage the protein content in the egg.

This study used 2 eggs that were used as food ingredients for half-cooked eggs. The 2 eggs used as samples consisted of 1 sample of raw egg mixture that had not been brewed with hot water and 1 sample of egg mixture that had been brewed with hot water for approximately 5 minutes. The content of *Salmonella sp* bacteria in half-cooked egg food sold at Solong coffee shop, Ulee Kareng sub-district, Aceh Besar is expected to meet the standards referring to SNI 01- 6366-2000, which is negative or zero (0).

Based on the results of laboratory analysis conducted at the Banda Aceh Industrial Services Standardization and Services Center (BSPJI) on *Salmonella sp* bacteria in half-cooked egg food sold at Solong coffee shop, Ulee Kareng sub-district, Aceh Besar, from 1 sample of egg dough that has not been brewed (raw) shows negative results, while the analysis results from 1 sample of egg dough that has been brewed (half-cooked) shows positive results for *Salmonella sp*.

Most eggs are free of bacteria inside. If the ovary is infected by disease-causing bacteria, then the egg becomes infected before it is laid. The eggshell is the container of the egg itself. The cleanliness of the eggshell is very important to note, dirty eggshells can become a nest of *Salmonella sp* bacteria on the inside of the eggshell there is a thin layer called shell membranes. The entry of *Salmonella sp* bacteria into the egg if the shell membrane can be penetrated by these bacteria (Usman et al., 2014).

The presence of *Salmonella sp* bacteria in eggs used as ingredients for semi-cooked egg food processing because the eggs have been penetrated by these bacteria on the eggshell and shell membranes on dirty eggshells. The content of *Salmonella sp* bacteria in half-cooked egg food sold in Solong coffee shop, Ulee Kareng sub-district, Aceh Besar does not meet the expected health requirements based on standards that refer to SNI 01-6366-2000 which is negative, meaning that there are *Salmonella sp* bacteria in half-cooked egg food sold in Solong coffee shop, Ulee Kareng sub-district, Aceh Besar.

4. CONCLUSION

Based on the results of observations and laboratory examinations of half-cooked egg food, it was found that the coffee shop did not store eggs for more than a day and immediately ran out on that day, while for the physical condition of the eggs (eggshell), it was found that the egg seller at the coffee shop sold eggs with clean skin conditions. Observations were made of the measurement and brewing time, and the results showed that the coffee shop brewed half-cooked eggs for only 5 minutes with an average temperature of 900C. The raw egg samples were negative for *Salmonella sp* bacteria while the half-cooked egg samples were positive for *Salmonella sp* bacteria.

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