TOTAL OF MICROBIAL CONTAMINATIONS IN RICE CHICKEN EGGS SAVE IN ROOM TEMPERATURE

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ABSTRACT

Eggs are a food that is needed by the body because of the very large nutritional content in them. The number of microbes in eggs will increase with the length of storage. The purpose of this study was to determine the total amount of microbial contamination in eggs stored at room temperature.

This research is descriptive quantitative using laboratory experimental methods. Samples were taken by purposive sampling as many as 10 eggs kept at room temperature for 1 week and 2 weeks. Data is presented in tabular form and accompanied by narration.

The results showed that 2 samples of chicken eggs that exceeded the maximum limit of microbial contamination set by SNI 3929: 2009, namely (1x105 CFU / ml), namely the TAR4 code sample for 1 week storage time of 2.

Keywords: Chicken Eggs, Microbial Contamination, Room Temperature.

INTRODUCTION

The development of population and food needs around the world is growing rapidly. Food is one of the necessities needed by humans in life, both vegetable and animal food. One of the animal foods is poultry. There are many kinds of livestock in Indonesia, to meet food needs. Livestock are raised and cultivated by humans for their benefits, one of which is a food source that produces the main products in the form of meat, milk and eggs.[1].

According to the Ministry of Agriculture of the Republic of Indonesia in 2018, livestock in Indonesia has a very important meaning, because livestock has a series of roles and added value for both breeders, society and the state. The role and added value need to be developed in line with other developments by considering various related aspects. The general objectives of the field of animal husbandry and animal health maintenance in supporting development are to increase production, increase the standard of living of the community and to be able to meet the needs of foodstuffs derived from livestock for all Indonesian people in a fair, equitable and adequate manner [2].

According to research conducted by Arisnawati and Susanto (2017), livestock products also play a very important role in meeting the needs of animal protein for humans. One of the livestock products that has a high nutritional value is eggs, because they contain food substances needed by the human body such as protein with complete amino acids, fats, vitamins, minerals, and have high digestibility [3].

Eggs are one of the animal products that come from poultry and have been known as a source of high quality protein food. Eggs as a food ingredient have many advantages, for example, the high nutritional content of eggs, the price is relatively cheap when compared to other

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protein source materials. One that is of great interest to the public is chicken eggs [4].

Of the many eggs that we know, including free-range chicken eggs, purebred chicken eggs, duck / duck eggs and quail eggs. The eggs that are often consumed by the community are purebred chicken eggs, but free-range chicken eggs, duck eggs and quail eggs are also consumed by the community, especially native chicken eggs and quail eggs are often drunk raw with mushrooms [5].

Chicken eggs are food ingredients that contain high enough protein with a complete amino acid composition. In general, purebred chicken eggs are the most frequently consumed livestock food by the public. Chicken eggs contain high nutrition, and the price is relatively cheaper compared to other eggs, so that it makes chicken eggs quite attractive to consumers. However, eggs are easily damaged and decreased in quality due to the entry of bacteria into the eggs [6].

Eggs are prone to quality degradation caused by physical damage, contamination from microbes both from soil, water, air, and livestock raising areas, as well as evaporation of water and gases such as carbon dioxide, ammonia, nitrogen and hydrogen sulfide from the eggs, The longer the eggs are stored, the evaporation that occurs will make the egg weight shrink and the egg white becomes thinner [7].

Damage to eggs can also be caused by a contamination of microorganisms. In certain circumstances and the amount exceeds the limit, contamination of eggs can come from infected hen eggs and originate from outside the hen's body, for example from feces that stick to the eggshell, dust, and soil [8].

East Bulotalangi Village is one of the villages that has a chicken egg farm. According to a survey that has been conducted, the cage in the village of East Bulotalangi has poor hygiene conditions so that it can allow microbial contamination to the eggs of broilers. According to Nurjanna (2015) Contamination on eggs can be caused by sick birds, cage mats, feces, storage, sanitation and hygiene from the cage itself [9].

The presence of contamination is a material that is not desired in food which may come from the environment or a result of the food production process itself. Contamination of a microbe is contamination in food originating from microbes that can harm and endanger the health of humans who consume it. In order to maintain health, eggs consumed by the public must comply with SNI including the physical quality of eggs, namely size (weight, length and width), color (white, slightly brownish, brown), condition of egg shell (thin and thick), shape (round and oval) and eggshell hygiene) [10].

Eggs are a nutritious, high food ingredient, so eggs must meet established health standards so that they are safe for consumption by the public. According to the Indonesian National Standard SNI 3926-2008, the maximum microbial quality requirements for the total number of germs in eggs is 1 X 10^5 CFU / ml [11].

Based on the problems raised above, the authors want to examine the microbiological quality of eggs with the formulation of the title "Total Of Microbial Contaminations In Rice Chicken Eggs Save In Room Temperature".

RESEARCH METHODS

This research is a quantitative research using a descriptive research design, which describes the total microbial contamination of eggs stored for 1 and 2 weeks. The samples in this study were some of the eggs of broilers in the village of East Bulotalangi. The sampling

technique used in this study was purposive sampling. Purposive sampling technique is one of the sampling techniques in research based on the criteria set by the researcher. The sample size used in this study was 10 eggs taken from 2 broiler chicken farms in Bulotalangi Timur Village.

Procedure for examining the Total Plate Score on eggs. Eggs are cleaned with running tap water, then wiped with 70% alcohol. The tip of the egg is pointed downwards and brought closer to the mouth of the Erlenmeyer, then carefully broken with a blunt object. The contents of the eggs in the erlenmeyer are beaten with a mixer until blended (homogeneous).

ALT testing on these microbes is based on the Hastuti procedure (2015). Inserted 1 ml of egg suspension with a sterile micropipette into 9 ml of NaCl then vortexed to obtain a 10-1 dilution, in the same way a 10-2, 10-3 and 10-4 dilution series was made. Then aseptically put the Nutrient Agar warm media into the petri dish which already contains 1 ml of egg each from the dilution suspension. The petri dishes were shaken carefully to form a figure eight so that the media and sample were evenly distributed (homogeneous). Incubated at 37oC for 1x24 hours. Observed and counted the number of bacterial colonies growing on agar media with 30-300 colonies [12].

Results Interpretation:

The calculation of the number of colonies that grew was carried out after incubation for 1x24 hours, both single colonies and joined colonies were considered to be one bacterial colony. The number of bacteria that met the requirements to be counted ranged from 30-300 colonies. If the number of colonies is <30, it is considered too small (not eligible), whereas if the number of colonies is > 300 it is also considered too much (not fulfilling the requirements).

RESEARCH RESULT

Table 1. *Total Microbial Contamination in Chicken Egg Samples (CFU / ml)*

No Sample	Total microbial contamination during storage		Indonesian National Standard
	1 week	2 weeks	
TAR_1	2.5×10^4	2.4×10^3	$1x10^5$
TAR_2	3.1×10^4	$2{,}4x10^4$	
TAR_3	$2{,}3x10^4$	$2{,}6x10^4$	
TAR_4	$2{,}8x10^5$	$3{,}7x10^5$	
TAR_5	$2{,}3x\ 10^4$	$2{,}9x10^4$	

Source: Primary Data (2020)

Based on Table 1, it is found that from 10 samples examined, 2 samples were found that exceeded the maximum limit of microbial contamination set by SNI 7388: 2009 ($1x10^5$ CFU / ml), namely chicken eggs with code TAR^4 for 1 week storage time with the number of microbial contamination $2{,}8x10^5$. CFU / ml and 2 weeks storage time with the amount of microbial contamination $3{,}7x10^5$ CFU/ml.

Table 2. *Percentage of total microbial contamination in eggs*

No.	Maximum limit of microbial contamination	Result	
		Amount	Percentage
1.	Qualify	8	80%
2.	Not eligible	2	20%
	Total	10	100%

Source: Primary Data (2020)

Based on Table 2, it was found that 8 samples (80%) met the maximum limit requirements for microbial contamination and 2 samples (20%) did not meet the maximum limit requirements for microbial contamination.

DISCUSSION

Eggs are one of the animal products that come from poultry and have been known as a source of high quality protein food. Eggs as a food ingredient have many

advantages, for example, the high nutritional content of eggs, the price is relatively cheap when compared to other protein source materials. One that is of great interest to the public is chicken eggs [4]

Based on table 1, the results of the examination of total microbial contamination in chicken eggs stored at room temperature with a storage time of 1 week and 2 weeks, obtained results of microbial contamination that exceed the maximum limit of microbial contamination in chicken eggs which are marked with the TAR_4 code on 1 week storage with the amount of microbial contamination was $2,8x10^5$ and 2 weeks of storage with the number of microbial contamination was $3,7x10^5$.

Based on Table 2, the results of the percentage of total examination of microbial contamination on chicken eggs obtained 2 samples or a percentage of 20% that did not meet the maximum limit requirements and chicken eggs that met the maximum limit requirements for microbial contamination were 8 samples or with a percentage of 80%. The total plate count itself is a general indicator describing the degree of food contamination. ALT is defined as the number of colony forming units (CFU) of bacteria per gram or per milliliter of food.

Eggs that do not meet the requirements if the number of microbial contamination in eggs exceeds the maximum limit of microbial contamination in food, namely $1x10^5$ CFU / ml according to SNI 7388: 2009. As for the 8 samples that met the requirements, namely the TAR_1 code that was stored for 1 week, the amount of microbial contamination was $2,5x10^4$ and that was stored for 2 weeks with the amount of contamination $2,4x10^3$, the samples marked with the TAR_2 code with a storage time of 1 week obtained the number of contaminants Microbes $3,1x10^4$ and 2 weeks of storage with the number of microbial contamination $2,4x10^4$, the samples marked with the TAR_3 code with a storage time of 1 week obtained the number of microbial contaminants $2,3x10^4$ and in the storage sample for 2 weeks with the number of microbial contaminants $2,6x10^4$ whereas in samples marked with the TAR_5 code at 1 week of storage the results obtained were $2,3x10^4$ and samples that were stored for 2 weeks with the number of microbial contamination of $2,9x10^4$. Eggs that have been contaminated by bacteria but still meet the maximum limit of microbial contamination according to SNI 7388: 2009, can still be consumed by handling eggs properly and correctly. Good egg handling can be done by cooking the eggs until they are cooked at a temperature of 85ºC [13].

Table 1 There were differences in the increase and decrease of total microbial contamination stored for 1 week and 2 weeks. Samples marked with code TAR_1 and TAR_2 decreased at 2 weeks of storage, which may have decreased storage time due to deficiencies in the Total Plate Number (ALT) method used at the time of the study [14]. The drawback of the ALT method used is that the calculation results do not show the actual number of cells, because several adjacent cells / colonies are counted into one colony, this is one of the decreases in the total microbial contamination in TAR_1 and TAR_2 samples stored for 2 weeks, medium and the conditions at which different incubation times may produce different values when calculated, and the microbes grown must be able to grow on a solid medium and form clear colonies in order to be counted. whereas the samples marked with the TAR_3 code TAR_4 and TAR_5 increased at 2 weeks of storage. The increase in the number of contaminants occurred due to one factor, namely the length of storage for eggs [15]. Eggs have a short shelf life,

the longer the eggs are stored, the less fresh the eggs are. After 5-7 days the freshness of the eggs is not good, good eggs can be seen from the clean, intact eggshells, smooth surfaces, homogeneous skin color and odorless. An increase in microbes in TAR_4 samples stored for 1 week and 2 weeks would result in a decrease in egg quality. Therefore, egg storage plays an important role in maintaining egg quality. In storing eggs, things that need to be considered are the length and temperature of storage and the odor that is around the storage area. Eggs will change in quality along with the length of storage. The longer the storage time will result in a lot of evaporation of the liquid in the eggs and cause the air sacs to get bigger.

The factor for the occurrence of contamination in eggs is also based on the length of storage the eggs are The number of microbes in eggs will increase with the length of storage, these microbes will degrade or destroy the compounds in the eggs so that they become odorous compounds that characterize egg damage. The way to maintain egg quality is by preventing water evaporation and the release of other gases from the contents of the eggs, and preventing the entry and growth of microbes in the eggs. This can be done by adjusting the humidity and airflow velocity in the storage room. If the quality of the eggs decreases it will indicate damage to the eggs [16].

The lack of knowledge about the length of time to store eggs at room temperature causes people to tend not to pay attention to the long period of good egg storage. This is presumably because people do not know about the changes due to egg storage, such as a decrease in egg quality during storage and the best storage time for eggs at room temperature. The best quality of eggs is at the time they are laid, the longer they are stored, which results in a decrease in egg quality. The factors that cause egg damage resulting in a decrease in quality include the entry of destructive microbes, evaporation of water and gas from the eggs through the pores due to environmental influences and moldy skin due to damp storage space. Egg shells can affect the rate of deterioration in egg quality, the thicker the shell is relatively less porous and narrower, so that evaporation can be prevented and the rate of quality degradation is slower. The thickness of the eggshell is influenced by the strain of the chicken, age of the broodstock, feed, stress and disease in the parent. The internal quality of the eggs will decrease, both physiologically and bacteria. Furthermore, it was stated that the character of the internal quality of eggs during storage depends on genetic factors such as age and ambient temperature [17]

Apart from the length of storage, damage to eggs also occurs due to being left or stored in the open air beyond the time limit for freshness, cracking or breaking, experiencing hard shocks, being exposed to disease, being incubated but not being hatched or submerged in liquid for too long. Eggs can be damaged, either physical damage or damage caused by bacteria. Bacteria enter through the pores of the eggshell, either through water, air, or chicken manure [18].

The presence of microbes in food indicates the possibility of microorganisms that are enteropathogenic or toxicigenic which are harmful to health. The habit of people who consume chicken eggs raw without knowing the storage capacity of eggs which affects the microorganisms in them that can endanger health is due to the lack of public knowledge about food safety. Microorganisms that can contaminate eggs include Echerichia coli, Salmonella sp, Staphylococcus aureus which have benefits, namely they can prevent inflammation, nourish the digestive

system, and strengthen the immune system. Under certain circumstances and in numbers that exceed the limit, the microorganisms contained in these eggs can endanger the health of those who consume them. Disorders that will be caused to humans are nausea, abdominal pain, vomiting, diarrhea, bloody diarrhea, high fever, even in some cases seizures and lack of fluids or dehydration. Eggs that are consumed in the community come from chicken farms and then distributed to the community through markets and supermarkets. This will provide a sufficient time period for the harmful microorganisms to enter the eggs [19].

CONCLUSION

Based on the results of the research on total microbial contamination in eggs stored at room temperature for 1 week and 2 weeks, it can be concluded that of the 10 samples examined, it was found that 2 samples of chicken eggs did not meet the maximum limit requirements for microbial contamination on eggs because they had a number of microbial contaminants. above $1x10^5$ CFU/ml, namely the sample with the TAR_4 code that was stored for 1 week with the amount of contamination $2,8x10^5$ and the sample that was stored for 2 weeks with the amount of microbial contamination $3,7x10^5$ CFU/ml.

REFERENCE

[1] Arisnawati, Y., and A. Susanto., 2017. Identification of Salmonella sp. on Chicken Eggs (Study in Pon Jombang Market). Journal of Human Scholars, 5 (1): 33-39.
[2] Directorate General of Animal Husbandry and Animal Health. 2017. Animal Husbandry and Animal Health Statistics. Jakarta.
[3] Djaelani, M., 2016. Measurement of Air Cavity, Egg pH and Egg White Diameter, Chicken Ras (Gallus L.) After Immersion in Seaweed Solution and Stored for Time. Diponegoro University. Vol 1, No 1, August 2016, e-ISSN 2541-0083.
[4] Fardiaz, Srikandi 1992. Food Microbiology. Publisher: PT Gramedia Pustaka Utama.
[5] Food and Drug Supervisory Agency (BPOM), 2009. Determining the Maximum Limit of Microbial and Chemical Contamination in Food. Indonesia: Food and Drug Supervisory Agency.
[6] Food and Drug Supervisory Agency (BPOM), 2009. Determining the Maximum Limit of Microbial and Chemical Contamination in Food. Indonesia: Food and Drug Supervisory Agency.
[7] Hartini, S., 2016. Description of Total Plate Figures (Alt) of Germ Chicken Eggs Sold at the Inpres Market in Samarinda Seberang. Mahakam Medical Laboratory Technology Journal Volume I No. 1, May 2016, 31-40.
[8] Hastuti, SU 2015. Guidance for Microbiology Practicum. UMM Press. Poor.
[9] Jazil., Hintono., Mulyani., 2013. Decreasing Quality of Chicken Eggs with Different Intensities of Brown Shell Color During Storage. Diponegoro University. Vol. 2 No.1 - Journal of Food Technology Applications.
[10] Mangalisu, A. 2015. Ability of Fermentasilactobacillus Plantarum in Infertile Eggs with Different Incubation Times. Essay. Faculty of Animal Husbandry Hasanuddin University Makassar.
[11] Nova, Ilmia., Tintin Kurtini., Veronica W. Effect of Storage Time on Internal Quality of Chicken Eggs in the First Production Phase. Journal Vol, 2 No 2 (2014).

[12] Nurhadi, M. (2012). Veterinary Public Health. Yogyakarta: Gosyen Publishing.
[13] Nurjanna, S., 2015. Bacterial Contamination of Chicken Eggs Raised by Intensive and Free Range Maintenance Systems with Different Natural Shade Times. Essay. Faculty of Animal Husbandry Hasanuddin University Makassar.
[14] Pasaribu, N., 2017. Amount of Microbial Contamination in Chicken Eggs Sold at the Darussalam Regional Supermarket, Syiah Kuala District, Banda Aceh City. Essay. Syiah Kuala University Banda Aceh.
[15] RI Ministry of Animal Husbandry. 2018. Animal Husbandry and Animal Health Statistics. Jakarta.
[16] Sakti, MR, Mas DR, and I Gusti KS 2012. Effect of temperature and storage time of local chicken eggs on the number of Coliforms. Indonesia Medicus Veterinus. 1 (3): 394-407.
[17] Saputra, R., Septiniva., Kurtini. 2015. The Effect of Storage Time and Shell Color on Internal Quality of Chicken Eggs. Integrated Animal Husbandry Scientific Journal Vol. 3 (1): 75-80, Feb 2015.
[18] Siregar, Chairul. Erina. And Abrar. 2018. Isolation of Escherichia Coli in Quail Eggs (Coturnix-Coturnix Japonica) which failed to hatch in Garot Village Farms, Darul Imarah District, Aceh Besar. JIMVET E-ISSN: 2540-9492 March 2018, 2 (1): 161-169
[19] Yuliarti, N. (2007). Watch out! The Danger Behind Delicious Food. Yogyakarta: ANDI