THE ANALYSIS OF COLIFORM AND ESCHERICHIA COLI IN WATER SURROUNDING LAYING CHICKEN FARM

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Abstract - Water is needed in meeting human needs to carry out all its activities. Based on this, an analysis was carried out on the content of Coliform and Escherichia Coli. This study aims to (1) determine the content of Coliform and Escherichia Coli in water surrounding laying chicken farm; (2) comparing the content of Coliform and Escherichia Coli obtained with the criteria for assessing the microbiological nature of water that has been determined by the government. This research was carried out in October-December 2018 in SidenrengRappang Regency, South Sulawesi, Indonesia, and then tested for Coliform and Escherichia Coli content at the Microbiology Laboratory of the Center for Public Health Laboratory of the Ministry of Health of the Republic of Indonesia in Makassar. The results showed that the content of Coliform in water surrounding laying chicken farm was an average of 59.64 MPN /100 mL and the content of Escherichia Coli in water surrounding laying chicken farm was an average of 1.78 MPN /100 mL. Based on the results obtained, it can be concluded that the Coliform is very high because > 50 MPN /100 mL, this is based on drinking water quality standards set by the government that for the maximum 10 MPN /100 mL piped water and maximum 50 MPN/100 mL for non-piped water. For Escherichia Coli content is very high because there is a temporary value based on government regulations on drinking water quality standards, the value of Eschericia Coli must be 0 MPN/100 mL.

Keywords - Coliform, Escherichia Coli, water, laying chicken farm

I. INTRODUCTION

One of the basic daily needs of living things in this world that cannot be separated is Water. Therefore, water is very functional and plays a role in the life of living things. It is important for us as human beings to always preserve and maintain that the water we use is maintained by maintaining good water management. Water quality in general shows the quality or condition of water associated with a particular activity or need.

Water quality determines the degree of health because water can be contaminated by the presence of pathogenic microorganisms. These pathogenic microorganisms can cause infections even in very small amounts. Water can be contaminated by three types of microbes, namely viruses, bacteria and protozoa. These microorganisms are transmitted through the faecal-oral route and most arise directly or indirectly by contamination of water resources by waste or animals [1]. Furthermore [2] states that in the poultry industry, it is very important to use water with adequate physical, chemical and microbiological quality.

Water is needed in meeting human needs to carry out all their activities, so it is necessary to know how water is said to be clean in terms of quality and can be used in sufficient quantities in daily activities. In terms of quality, there are several requirements that must be met including physical quality consisting of odor, color and taste, chemical quality consisting of pH, hardness, and so on. And the biological quality in which water is free from disease-causing microorganisms.

Based on the Decree of the Minister of Health of the Republic of Indonesia Number 1405 /MENKES/SK/XI/2002 regarding Health Requirements for Office and Industrial Work Environment, there is an understanding of water that is water used for daily needs and its quality meets the requirements of water health in accordance with statutory regulations laws that apply and can be drunk if cooked [3].

Good water quality is water that is free from various kinds of harmful microorganisms [4]. The presence of bacteria in drinking water can be used as a microbiological parameter or an indicator of sanitation to water quality. The types of bacteria used as an indicator of sanitation to water quality include: the number of Total Bacterial Plate (ALTB), Coliform and Escherichia Coli (E-Coli). Coliform bacteria are bacteria as one of the most important microbiological parameters to the quality of drinking water [5].

One of the parameters in environmental monitoring of water quality is the microbiological parameters of the type of bacteria in the form of total Coliform in MPN/100 mL units. Total Coliform is one indicator of water pollution [1]. Furthermore [6] stated that the bacteria used as indicators of pollution are faecal Coliform (coli stool) and Coliform because the number of colonies must be positively correlated with the presence of pathogenic bacteria.

In addition, the bacteria present in water comes from contamination and the bacteria that do live in water

are Escherichia Coli (E-Coli). E-Coli is a bacterial parameter of drinking water quality because its presence in the water is contaminated with faeces, which may also contain other enteric pathogenic microorganisms [7].
Based on this, this study limits only looking at the content of Coliform and Escherichia Coli (E-Coli) in water surrounding laying chicken farm.

Research Purposes
Based on the foregoing, this study aims to:
1) determine the content of Coliform and E-Coli in water surrounding laying chicken farm;
2) comparing the content of Coliform and E-Coli obtained with the microbiological evaluation criteria for water set by the government.

II. DETAIL EXRIMENTAL

Methodology
This research was conducted in October-December 2018, namely water sampling conducted in 8 (eight) locations around laying chicken farms in SidenrengRappang Regency, South Sulawesi, Indonesia. The location selection is done randomly by considering the distance of the cage with the location of community settlements. Water samples are obtained by taking water directly from the clean water source of the community surrounding laying chicken farm with 2 types, namely by closed piping (installation), namely directly piping to the water tap; and with the piping (installation) open ie from the pipe to the water tap then using another plastic tap.

Whereas the Coliform and E-Coli content tests were conducted at the Microbiology Laboratory of the Center for Public Health Laboratory of the Ministry of Health of the Republic of Indonesia in Makassar using the IKM / 5.4 / 20 / BBLK-MKS method [8]. The working procedures in this study are: (1) testing the content of Coliform and E-Coli in water surrounding laying chicken farm; (2) comparing the content of Coliform and E-Coli in water surrounding laying chicken farm with criteria for assessing the microbiological properties of water (Coliform and E-Coli) for the determined water.

III. RESULT AND DISCUSSION

Water is a substance that has no color, taste and odor consisting of hydrogen and oxygen. Most of it is composed of water, as in plants cells contain more than 75% or in animal cells it contains more than 67%. From a total of 40 million cubic miles of water that is on the surface and in the ground, it turns out that no more than 0.5% (0.2 million cubic miles) can be directly used for human interests, 97% of these water sources consist over 2.5% seawater in the form of eternal snow which has just melted can be used [7].

Microbiological requirements for water quality include: do not contain germs such as dysentery, typhus, cholera, and pathogenic bacteria that cause disease. In the provision of water that is fit for consumption by the public, many cited the Minister of Health's Regulation No. 173/Men.Kes/Per/VII/1977 concerning Water Pollution from the Water Agency for Various Uses Related to Health, it is stated that the water supply must meet the quantity and quality, namely: safe and hygienic, good and suitable for drinking, available in sufficient quantities, the price is relatively cheap or affordable by most people [9].

3.1. Analysis Content of Coliform
Coliform is a commensal microorganism or as normal flora found in the digestive tract of animals and humans. Forage products derived from livestock tend to be more easily contaminated by Coliform than non-livestock origin. Likewise, water used for human and livestock needs is easily contaminated by animal / human feces that contain Coliform bacteria [5].
The number of Coliform bacteria determined as the quality standard of food or feed or drinking water in one country is different from other countries. Developed or modern countries will obviously suppress the number of bacteria to a minimum. Indonesia as a developing country has set water quality standards based on Government Regulation No. 82 of 2001 including livestock water quality standards which are categorized as Class II in terms of microbiological with the number of Colform bacteria is 5000 MPN / 100 mL [5].
The content of Coliform in water surrounding laying chicken farm in SidenrengRappang Regency, South Sulawesi, Indonesia can be seen in table 1 below:

Location	Test Results (MPN/100ml)*	Maximum Allowable Levels (MPN/100ml)**
1	9,6	Not piping water 50 Piping water 10
2	42,2	
3	63,7	
4	0,99	
5	115,3	
6	96	
7	148,3	
8	0,99	
Average	59,64	

Table 1. Test Results for Coliform Content in Water Surrounding Laying Chicken Farm
Source: * Laboratory Test Results Data, 2018.
**** [10]**

Based on table 1 above, it can be seen that the Coliform content of water surrounding laying chicken farm from 8 samples obtained Coliform test results an average of 59.64 MPN/100 mL. Based on the maximum permissible level, water surrounding laying

chicken farm in SidenrengRappang Regency, South Sulawesi, Indonesia has very high Coliform content because > 50 MPN/100 mL, this is based on clean water quality standards set by the government that for content The maximum coliform for piped water is 10 MPN/100 mL and for non-piped water a maximum of 50 MPN/100 mL [10].

This is in line with [11], stating that well water samples taken from the Karangmalang, Code and Deresan areas, respectively showed 150 MPN/100 mL, 210 MPN/100 mL and 460 MPN/100 mL. While the standard amount of Coliform in drinking water recommended by the World Health Organization (WHO) is 10 MPL/100 mL. Based on these results indicate that the content of Coliform in water is far exceeds the normal threshold set by WHO. So it is recommended that the use of water for daily consumption, especially if the water will be used for drinking or cooking, cooking in the kitchen should be boiled first.

There was a very significant difference in the number of coliform bacteria (P <0.01) at each sampling location [5]. Number of Coliform in drinking places, reservoirs and rivers respectively: 35600 MPN/100 mL, 19800 MPN/100 mL, and 11240 MPN/100 mL. The number of Coliform in each sampling location has exceeded the limit set by the government in accordance with the livestock water quality standards in terms of the Coliform amount of 5000 MPN/100 mL, because of the need for supervision and improvement of enclosure sanitation.

Almost all well water around the cows of beef cattle groups from Sleman, Bantul and KulonProgo regencies, the amount of Coliform exceeds the water quality standard for households, so the water is not suitable for domestic use [12]. The high number of coliforms can be caused by the distance between the well and the cow pen ≤ 10 meters. Making wells within berjarak 10 meters from the cowshed aims to facilitate the provision of drinking to the cows and cleaning the cage. Coliform contaminated well water due to the distance between the well with the cow pen which is too close or ≤ 10 meters, so that Coliform easily seeps through the water. Therefore, to avoid being polluted by Coliform, the distance from the well to the fine cage is more than 10 meters.

3.2 Analysis Content of Escherichia Coli

To identify microorganisms that pollute groundwater in laying hens in Southern Henan province and select sensitive drugs, this study evaluates total bacterial counts and performs bacterial biocomia tests, gene sequencing, phylogenetic tree construction, and sensitive strain screening tests. The total number of bacteria in groundwater is 3.44 x 104 CFU / mL. The microorganism that causes groundwater pollution is E-Coli, which is very sensitive to enrofloxacin. Therefore, livestock manure emissions must be considered by breeding companies, so as not to contaminate agricultural groundwater and endanger the health of livestock and poultry [13].

The content of E-Coli in water surrounding laying chicken farm in SidenrengRappang Regency, South Sulawesi, Indonesia can be seen in table 2 below:

Location	Test Results (MPN/100ml)*	Maximum Allowable Levels (MPN/100ml)**
1	0,99	0
2	1	
3	1	
4	0,9	
5	2	
6	6,3	
7	0,99	
8	0,99	
Average	1,78	

Table 2. Test Results of Escherichia Coli Content in Water Surrounding Laying Chicken Farm
Source: * Laboratory Test Results Data, 2018.
**** [10]**

Based on table 2 above, it can be seen that the E-Coli content of water surrounding laying chicken farm from 8 samples obtained E-Coli test results an average of 1.78 MPN/100 mL.Based on the maximum allowable level, water surrounding laying chicken farm in SidenrengRappang Regency, South Sulawesi, Indonesia. The content of E-Coli in water surrounding laying chicken farm is very high because there is a temporary value based on government regulations regarding drinking water quality standards , the E-Coli value must be 0 (zero) MPN/100 mL [14].

This is in line with [15] stating that 70 (seventy) samples of drinking water for poultry farms were tested to see E-Coli contamination in Qom Province in Iran. Cases of colibacillosis from positive farms were also collected and tested. The isolate was examined for serotype, detection of virulence genes by multiplex PCR and antibiotic resistance. 30 (thirty) poultry farm water samples have a positive E-Coli of 18.57%.

Furthermore, [16] stated that almost 50% of the total water samples in the farmers were positively polluted by E-Coli. E-Coli contamination is most likely derived from organic material contamination such as chicken feces. Each gram of feces can contain about 106 E-Cloi bacteria. This bacterium is very easy to live and concentrates a lot in surface water. Water sources that are too shallow, close to sources of faeces, near swah, rivers / swamps, or septic tanks, have a great risk of being contaminated with E-Coli, both in the rainy and dry seasons.

IV. CONCLUSIONS

Based on the above discussion, it is concluded that:

a. Coliform content in water surrounding laying chicken farm is very high because > 50 MPN/100 mL, this is based on water quality standards set by the government that for the maximum Coliform content for piped water is 10 MPN/100 mL and for non piped water maximum pipeline of 50 MPN/100 mL.

b. The content of Escherichia Coli in water surrounding laying chicken farm is very high because there is a temporary value based on government regulations on drinking water quality standards, the value of Eschericia Coli must be 0 (zero) MPN/100 mL.

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