Control of *Escherichia coli* with extract white onion (*Allium sativum* *linn*) and ginger (*Zingiber officinale* roscoe) on chickens carcass

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**Abstract.** The aim of this research is to examine the infection of *Escherichia coli* that given garlic and ginger extract on chicken's carcass. This research used 6 treatments and 3 replicates with experimental design: completely randomized design (CRD). Each replicate consisted of five DOC with the six treatments were (1) T0a (not infected chicken); (2) T0b (chickens infected with *Escherichia coli*); (3) T1 (chickens infected with *Escherichia coli* + tetracycline antibiotic 0.05%); (4) T2 (chickens infected with *Escherichia coli* + garlic extract 1%); (5) T3 (chickens infected with *Escherichia coli* + ginger extract 1%); (6) T4 (chickens infected with *Escherichia coli* + garlic and ginger extract 1%). 90 Cobb broilers were used in this research. The results showed that the average of final weight(g/head) 281.94; 1,324.10; 1,465.04; 1,418.66; 1,383.21; and 1,431.46 respectively; carcass weight(g/head) 893.98; 972.43; 1,043.29; 1,072.09; 1,073.66; 1,030.80 respectively; carcass percentage (%) 70; 73; 71; 76; 78; and 72 respectively; and abdominal fat (%) 7.12; 8.95; 14.45; 10.74; 15.74; 12.22 respectively. The conclusion of this research is that the treatment that consisted of garlic and ginger extract given to *Escherichia Coli* infected broilers had no effect on broiler's carcass.

1. Introductions

The advantages of broilers include rapid growth with high body weight in a relatively short time, small feed conversion, ready to be killed at a young age and produce quality soft-fibre meat. The rapid development of broilers is also a handling effort to offset the community's need for chicken meat [1].

In Indonesia, the one example of diseases that often affect to the livestock is Kolibasilosis. This is often found even as if it has become a mandatory disease in chicken farms. Chickens breeders often ask why Kolibasilosis is almost certain to be experienced during the period of raising chickens and the case is repeated every period. The occurrence of this disease is generally directly related to the choice of location and environment of the farm, especially cleanliness. In the field, kolibasilosis is directly related to drinking water sources, it is caused by the presence of *Escherichia coli* [2].

Giving garlic for broilers can provide many benefits. The content of the active compound in the bulbs of garlic can replace the function of synthetic antibiotics in the body of broilers with much better. The content of these active compounds can improve feed conversion, improve the health and productivity of broilers and can reduce the levels of fat contained in broilers. According to [3] garlic flour as much as
0.02% can stimulate broiler chicken body weight gain faster, with the achievement of feed conversion of 1.81 and followed by a decrease in the amount of feed consumption by broilers.

2. Materials and methods

2.1. Research location and time
The study was conducted at the Laboratory of Animal Biology, Department of Animal Husbandry, Faculty of Agriculture, Universitas Sumatera Utara, Jl. A. Sofyan No. 3, North Sumatra University Campus, Medan. This research lasted for 2 months from June to August 2017.

2.2. Materials
This research used 90 broilers of the DOC Strain Cobb 500 from PT. Charoen Pokphand Jaya Farm, Gumboro vaccine, vitachick, KMnO4, ND vaccine and rodalon, ingredients for ration compost consist of: corn, fish meal, rice bran, soybean meal, cacao (dicalcium), top mix, 1.3% edible oil, onion white (Allium sativum Linn), ginger (Zingiber officinale Roscoe), 96% ethanol, equates, tetracycline antibiotics, Escherichia coli isolates obtained from the collection of Centre of Medan Veterinary and Animal Health, Medan.

The tools used in this study include porcelain mortars, filters / filters, analytical scales (digital), measuring cups, Pasteur pipettes, ovens, plastic bags, syringes (split), glass objects, glass covers, tools count, label paper, markers, tissue, thermometer to find out the temperature of the cage, plastic sheeting, trial cage with a size of 50cm x 100cm x 100cm as many as 18 plot cages, feed and drink as many as 18 units of chicken, and 18 incandescent lamps (25 watts) units for lighting and heating, spray as disinfectant sprayers.

2.3. Research methods
This study used a test method, in which Escherichia coli bacteria was infected on broilers and be treated so that it can be known development of Escherichia coli bacteria to the treatment given, whether the treatment given can inhibit the growth of Escherichia coli and affect the growth of its host or no.

The research method used was a completely randomized design (CRD) consisting of 6 treatments and 3 replicates. The treatments were studied using Escherichia coli with doses ranging from 106CFU/ml. The six treatments given were: (1) T0A (not infected chicken), (2) T0B (chickens infected with Escherichia coli); (3) T1 (chickens infected with Escherichia coli + tetracycline antibiotic 0.05%); (4) T2 (chickens infected with Escherichia coli + garlic extract 1%); (5) T3 (chickens infected with Escherichia coli + ginger extract 1%); (6) T4 (chickens infected with Escherichia coli + garlic and ginger extract 1%).

The complete randomized linear design (CRD) method assumes:

\[ y_{ij} = \mu + \sigma_i + \epsilon_{ij} \]  

\( Y_{ij} \) = Response or observation value from the i-th treatment and j-th test
\( i = 1,2,3 \ldots \) = treatment
\( j = 1,2,3 \ldots \) = repetition
\( \mu \) = Common midpoint
\( \sigma_i \) = Effect of i-i treatment
\( \epsilon_{ij} \) = Effect of error (Experimental Error)

2.4. Research implementation

2.4.1. Isolation of Escherichia coli bacteria. Escherichia coli bacterial isolates were obtained from the collection of the Medan Veterinary and Animal Health Centre.
2.4.2. Making garlic extract (Allium sativum Linn) and ginger (Zingiber officinale Roscoe). The method used in this study to extract garlic (Allium sativum Linn) and ginger (Zingiber officinale Roscoe) is the maceration method. This maceration method using 96% ethanol solvent. Each of 500 grams of garlic and ginger peeled and washed first, then dried in an oven at 40°C. Then mashed to dry powder. Dry powder is soaked in 2 liters of 96% ethanol solvent for 3x24 hours. Then the filtrate is filtered off. Stirring on the maceration method was carried out 12 times for 15 minutes. Then filtering is done to separate the phytate from the pulp. The filter results are then evaporated with a rotary vacuum evaporator until thick. Garlic and ginger extracts are stored in the refrigerator at 4°C and not exposed to direct sunlight [4]. Then extracted garlic and ginger using ethanol with a concentration of 1% each.

2.4.3. Enclosure and equipment preparation. The cages used are individual cages with a size of 50cm x 100cm x 100cm as many as 18 enclosures. The cage was fumigated a week before the DOC entered the cage so that the cage was free from pests and diseases. The cage along with equipment such as feed and drinking containers are cleaned and disinfected using rodalon. Lighting is carried out with incandescent lamps (25 watts) hung in the middle of each enclosure plot.

2.4.4. Selection of livestock. Selection of broilers that will be used as research objects through several conditions as follows: poultry in a healthy, agile, not deformed seen from the shape of a straight and agile leg. Before being put into a cage, weighing is done to determine the initial body weight of each chicken, then carried out random (randomization) which aims to reduce the value of diversity. Then the chickens were put into cages of 5 birds per study unit.

2.4.5. Provision of garlic (Allium sativum Linn) and ginger (Zingiber officinale Roscoe) extracts in broilers. Garlic extract (Allium sativum Linn) and ginger (Zingiber officinale Roscoe) were given to broilers aged 14 days orally at intervals of 5 days and the dosage according to each treatment.

2.4.6. Maintenance of broilers. Randomization of the cage is done before the broilers enter the cage by arranging treatment and repetition numbers in each plot first.

Before the chickens are given treatment, weighing the initial body weight is done. Feed and drinking water are given ad-libitum. Replacement of drinking water is done in the morning and evening. Vitamins like vitachick are given according to chicken's needs. Cages, feed mats, and drinking water containers are cleaned every day in the morning. The feed is given at 08.00 WIB on an ad-libitum basis.

All treatment chickens were infected with Escherichia coli's bacteria orally on the 14th day (2 weeks) at a dose of 1 ml containing a population of 10^6 CFU / ml, except for the P0 treatment. And the administration of antibiotics in the form of garlic and ginger extract was carried out on 5 days post-infection with a dose of 1 ml. Whereas Colimas ® brand tetracycline antibiotics with a dose of 5 gr / 10 liters of drinking water or 150 mg/kg per day for 5 consecutive days, treatment is given 1 day after infection, given in drinking water.

2.5. Observed variables

2.5.1. Cut weight (g). Cut weight is the weight obtained by weighing the chicken after being fasted for 12 hours.

2.5.2. Carcass weight (g). Obtained from the results of weighing the carcass of meat with bones after separated hair and blood, head to the base of the neck, legs to the knee and internal cavity contents.

2.5.3. Percentage of the carcass (%).
Carcass Weight
Cut Weight
2.5.4. Abdominal fat (%). Obtained from the results of weighing fat found around the abdominal cavity and the ovary (g) then compared with the weight cut times 100%.

2.6. Data analysis
The data obtained were analysed using analysis of variance (ANOVA) if between treatments there was a real influence it would be continued using the Duncan Distance Test (BNJD).

3. Results and discussion

3.1. Cut weight
Cut weight was the weight obtained by weighing the chicken weight after being fasted for 12 hours. Cutting weights need to consider the quality and quantity of the rations consumed, so that good growth is obtained [5]. The following was the average weight cut of broiler chickens infected with Escherichia coli by giving garlic extract (Allium sativum Linn) and ginger (zingiber Officinale Roscoe).

| Treatments | Cut Weight (gr) | Average | S. Deviation |
|------------|----------------|---------|--------------|
|            | U1             | U2      | U3           |               |
| T0A        | 1,291.67       | 1,262.13| 1,292.03     | 1,281.94      | 17.16         |
| T0B        | 1,313.33       | 1,295.83| 1,363.13     | 1,324.10      | 34.92         |
| T1         | 1,437.57       | 1,316.90| 1,640.67     | 1,465.04      | 163.62        |
| T2         | 1,364.50       | 1,598.33| 1,293.13     | 1,418.66      | 159.64        |
| T3         | 1,520.67       | 1,374.63| 1,254.33     | 1,383.21      | 133.37        |
| T4         | 1,485.00       | 1,339.37| 1,470.00     | 1,431.46      | 80.10         |

Note: The same notation in the same column shows that the treatment does not have a significantly different effect (P ≤ 0.05).

From Table 1 above it was found that the highest average cutting weight was found in P1 (E. coli infection + antibiotic tetracycline 0.05%) with an average of 1465.04 g and the lowest in P0A treatment was 1281.94 g. This suggests that chickens infected with Escherichia coli and given 0.05% tetracycline antibiotics gave higher results compared to other treatments. The difference in value can be caused by differences in the growth of broilers during maintenance this is by the statement of [4], which states that livestock growth is influenced by factors of the nation, animal species, age, breed, ration quality, and environment.

3.2. Carcass weight
Carcass weight was the body weight of chickens that have been slaughtered after being separated by blood, feathers, head to the base of the neck, legs to the limit of the knee and internal organs except for the kidneys and lungs [4]. The following was the average weight of carcasses of broiler chickens infected with Escherichia coli by giving garlic extract (Allium sativum Linn) and ginger (Zingiber officinale Roscoe).

From Table 2 above it can be seen that the highest average weight of broilers carcasses was found in P3 as many as 1073.66 g and the lowest was in P0A treatment that is 893.98 g. This figure is 78% of the cut weight which was a normal amount of broiler chicken carcasses. This was by the statement of [6] which stated that the normal carcass weight is 60-75% of body weight. While the percentage of the carcass is the ratio between carcass weight and life weight multiplied by 100%. High and low carcass weight affected by the number of cattle slaughtered weight. Carcass weight increases with increasing body weight, but the percentage of noncarcasses such as skin, blood, small intestine, and liver decreases.
Table 2. Data on carcass weight of broilers (g / head)

| Treatments | Carcass Weight (gr) | Average | S. Deviation |
|------------|---------------------|---------|-------------|
|            | U1      | U2      | U3      |          |
| T0A        | 947.53  | 896.40  | 838.00  | 893.98   | 54.81    |
| T0B        | 951.93  | 948.13  | 1,017.23| 972.43   | 38.84    |
| T1         | 913.60  | 965.27  | 1,251.00| 1,043.29 | 181.73   |
| T2         | 974.23  | 1,162.87| 1,079.17| 1,072.09 | 94.52    |
| T3         | 1,060.90| 1,036.77| 1,123.30| 1,073.66 | 44.65    |
| T4         | 1,079.17| 975.23  | 1,038.00| 1,030.80 | 52.34    |

Carcass weight is influenced by life weight, so a large life weight will also be followed by a large carcass weight and vice versa. As stated by [7] which states that the high carcass weight is supported by the final live weight as the additional weight of life with the person concerned. The carcass weight produced is influenced by several factors, namely age, sex, slaughter weight, body weight and conformation, fat, quality and quantity of rations as well as the type of livestock kept. From the above research, it can be seen that the administration of garlic and ginger extracts to chickens infected with Escherichia coli cannot provide an increase in slaughter weight, carcass weight, and carcass percentage.

3.3. Percentage of carcass

The percentage of carcasses is the most important factor for assessing livestock production because production is closely related to life weight, where the more the weight of his life increases, the production of carcasses will increase [4]. The following was the average weight of broiler chicken carcass infected with Escherichia coli and then given garlic and ginger extract.

Table 3. Data percentage of carcasses weight of broilers (%)

| Treatments | Carcass Weight (gr) | Average | S. Deviation |
|------------|---------------------|---------|-------------|
|            | U1      | U2      | U3      |          |
| T0A        | 947.53  | 896.40  | 838.00  | 893.98   | 54.81    |
| T0B        | 951.93  | 948.13  | 1,017.23| 972.43   | 38.84    |
| T1         | 913.60  | 965.27  | 1,251.00| 1,043.29 | 181.73   |
| T2         | 974.23  | 1,162.87| 1,079.17| 1,072.09 | 94.52    |
| T3         | 1,060.90| 1,036.77| 1,123.30| 1,073.66 | 44.65    |
| T4         | 1,079.17| 975.23  | 1,038.00| 1,030.80 | 52.34    |

Note: The same notation in the same column shows that the treatment does not have a significantly different effect (P< 0.05).

From Table 3 above the percentage of the carcass was the result of the division between carcass weight and live weight times 100%. From the Table above it can be seen that the highest percentage was found in P3 namely 78% and the lowest is P0A which is 70%. This means that when viewed from the percentage of carcasses, the percentage of carcasses at P3 was the best percentage of all treatments. This happened because there was a difference in the amount between the divider (carcass weight) and the divided one (live weight). fat and innards were by-products that were not counted in the percentage of carcasses, if fat was high then the percentage of carcasses would be below.

The difference in carcass percentage between treatments can be influenced by weight, food and genetic makeup. Genetic influences as high as 30% indicate that there is a limit on the body response of broilers to the treatment given. The percentage of carcasses is influenced by the nation, age, sex, weight of life and food. The percentage of young carcasses was lower compared to older chickens and the percentage of male chickens was greater than the percentage of female chickens producing more skin and abdominal fat than males. the percentage of carcasses is an important factor for assessing livestock
production, because production is closely related to life weight, where the more the weight of his life increases, the carcass production increases [4].

3.4. Percentage of abdominal fat
The percentage of abdominal fat is the result of weighing fat found around the abdominal cavity and the ovary (g), then compared to the weight of the cut and multiplied by 100%. The following is the average percentage of abdominal fat of broiler chickens aged 6 weeks.

| Treatment | Percentage of Abdominal Fat (%) | S. Deviation |
|-----------|---------------------------------|--------------|
|           | U1  | U2  | U3  | Average |               |
| P0A       | 6.80 | 7.40 | 7.17 | 7.12    | 3.96          |
| P0B       | 8.00 | 8.78 | 10.06 | 8.95    | 3.74          |
| P1        | 16.37 | 9.54 | 17.45 | 14.45   | 3.67          |
| P2        | 6.07 | 16.54 | 9.61 | 10.74   | 3.64          |
| P3        | 17.50 | 15.49 | 14.23 | 15.74   | 2.39          |
| P4        | 10.52 | 12.83 | 13.32 | 12.22   | 1.50          |

Note: The same notation in the same column shows that the treatment has an insignificant different effect (P ≤ 0.05).

From Table 4 above it can be seen that the average percentage of abdominal fat of broiler chickens aged 6 weeks is found in T3 which was 15.47%, while the lowest percentage of abdominal fat was found in T0A treatment which was 7.12%.

The results of the diversity analysis showed that the administration of garlic and ginger extracts to broiler chickens infected with *Escherichia coli* had no significant effect (P>0.05) on the abdominal fat percentage of broiler chickens. Broiler chickens infected with *Escherichia coli* and given a solution of 1% ginger extract have a higher percentage of abdominal fat when compared to broilers that are not infected with *Escherichia coli*. This is consistent with the opinion [8] which states that the weight of abdominal fat ranges from 2% - 2.5% of the carcass weight, even reaching 5-6%.

3.5. Recapitulation of research results

| Treatments | Parameter                  | Cut Weight (g) | Carcass Weight (g) | Percentage of Carcass (%) | Abdominal Fat (%) |
|------------|----------------------------|----------------|--------------------|---------------------------|-------------------|
| T0A        |                            | 1,281.94^m     | 893.98^m           | 70^m                      | 7.12^m            |
| T0B        |                            | 1,324.10^m     | 972.43^m           | 73^m                      | 8.95^m            |
| T1         |                            | 1,465.04^m     | 1,043.29^m         | 71^m                      | 14.45^m           |
| T2         |                            | 1,418.66^m     | 1,072.09^m         | 76^m                      | 10.74^m           |
| T3         |                            | 1,383.21^m     | 1,073.66^m         | 78^m                      | 15.74^m           |
| T4         |                            | 1,431.46^m     | 1,030.80^m         | 72^m                      | 12.22^m           |

Note: The same notation in the same column shows that the treatment does not have a significantly different effect (P ≤ 0.05).

From Table 5 above the recapitulation data, P0A, P0B, P1, P2, P3, and P4 had no significant effect (P>0.05) on cutting weight, carcass weight, carcass percentage, and abdominal fat percentage. From the Table above it can be seen that the administration of garlic and ginger extracts to broilers infected with *Escherichia coli* was most effective found in P3 (*Escherichia coli* infection + 1% ginger extract), followed by P2, P0B, P4, P1, and P0A.
4. Conclusion
Based on the results of this study concluded that the administration of garlic extract (Allium sativum Linn) and ginger (Zingiber officinale Roscoe) in broilers infected with Escherichia coli could not increase cutting weight, carcass weight, carcass percentage, and abdominal fat.

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