The effect of Batak onion (*Allium chinense*) extract and powder adduction on the carcass characteristic of broiler chicken infected by *Escherichia coli*

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**Abstract.** Batak onion (*Allium chinense*) is a local plant typical of North Sumatra and have several antimicrobial compounds, so it has the potential to be used as natural antibiotics. One of the bacteria that often infects the broiler chickens is *Escherichia coli* which can reduce the carcass quality of broiler chickens. This research aimed to determine the influence of giving extract and powder of Batak Onions (*Allium chinense*) on carcass characteristics of broiler chickens infected by *Escherichia coli*. The research was using a completely randomized design with 7 treatments and 3 repetitions, and there were five broiler chicken for each repetition. The treatments were P0A: Control without infection, P0B: infected by *E. coli*, P1: P0A + Batak Onion extract, P2: P0A + Batak Onion powder, P3: P0B + Batak Onion extract, P4: P0B + Batak Onion powder and P5: P0B + Tetracycline antibiotic of 0.05%. Research results indicated that the giving of batak onion extract and powder gave a significant difference to the carcass characteristics including slaughter weight, carcass weight and carcass percentage of broiler chickens infected with *Escherichia coli*. The conclusion of this research was that the giving of Batak onion extract and powder was effective in improving the carcass characteristics of broiler chickens infected with *Escherichia coli*.

1. **Introduction**

Batak onion (*Allium chinense*) is a unique local plant of North Sumatra and enrich with antimicrobial compounds. One of the bacteria that often infects broiler chickens is *Escherichia coli* which can reduce the carcass quality of broiler chickens. The extract and powder derived from Batak onion can be used to solve this problem because it is known that the onion extract has antimicrobial activity against several bacteria including the *Escherichia coli*, as well as the fungus Candida abicans [1], so that it has the potential to be used as a natural antibiotic to inhibit and kill microbes that are rough for the productivity of broiler chickens such as *Escherichia coli*.

*Escherichia coli* often infects chickens and included as a gram-negative, non-spore-forming, rod-shaped with dimensions measuring 1.1-1.5 μm x 2.0-6.0 μm are motile with lagella peritrikus and fimbria, also can grow with or without oxygen, can survive on nutrient poor media such as flooring, water and organic surfaces bacteria [2]. In addition, it is pathogenic commensal bacteria and acts as a major cause of morbidity and mortality worldwide [3]. Moreover, antibiotics or antibiotic growth promoters (AGP) exertion have been banned in Indonesia because of the large scale use of antibiotics will cause resistance. Therefore, research related
to the giving of batak onion extract and powder on carcass characteristics of broiler chicken infected by *Escherichia coli* bacteria is needed to be conducted.

2. Materials and methods

The research was performed in August - September 2020, at the Limau Manis street, Sinembah Village, Tanjung Morawa District, Deli Serdang Regency.

2.1. Materials and equipments

This research was utilizing several equipments such as buckets, 100 ml measuring cups, lumping porsein (mortar), sieves, analytical scales, pasteur pipet, oven, plastic bags, spluits, glass objects, glass covers, label paper, markers, tissue, thermometer to find out the temperature of the cage, plastic tarpaulin, experimental cage with a size of 50 cm × 100 cm × 100 cm as many as 21 cages, 21 units of feeding and drinking chickens containers and 21 units of incandescent lamps (25 watts) for lighting and heating, sprayer as a disinfectant sprayer.

The materials used were 105 one-day-old broiler chickens (DOC), KMnO4, rodalon, vitachick, ND vaccine, Gumboro vaccine, batak onion, commercial feed, tetracycline antibiotics, 70% ethanol, aquades, *Escherichia coli* bacteria isolate obtained from the collection from Medan Veterinary and Animal Health Centre.

2.2. Research methods

This research was done using a Completely Randomized Design (CRD) 7 treatments and 3 repetitions and there were five broiler chicken for each repetition, experimentally. The treatments given were as follows: P0A : Control (not-infected), P0B : E Coli Infection, P1 : P0A + Batak Onion Extract, P2 : P0A + Batak Onion Powder, P3 : P0B + Batak Onion Extract, P4 : P0B + Batak Onion Powder, P5 : P0B + Tetracycline Antibiotic 0.05 %.

2.3. Research parameters

2.3.1. Slaughter weight (grams). Slaughter weight can be calculated by weighing the chicken weight after 12 hours fasting.

2.3.2. Carcass weight (grams). This parameter was assessed by weighing the carcass, including the meat and bones after being separated from the non-carcass

2.3.3. Carcass percentage. The carcass percentage was calculated using Equation (1).

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\text{Carcass Percentage} = \frac{\text{Carcass Weight}}{\text{Slaughter Weight}} \times 100\% \tag{1}
\]

2.4. Research implementation

2.4.1. Preparation of cages and equipment. The cage used was an individual cage with a size of 50 cm × 100 cm x 100 cm. Before one week of the entry stage of DOC to the cage, fumigation process at the cage was applied, so that it was sterilized from pests diseases. Moreover, container for feeding and drinking were sanitized and defended using rodalon. Then, the illumination was utilizing the incandescent lamp (25 watts) which hung in the centre of each cage.

2.4.2. Maintenance of broiler chickens. Samples that entered the cage were selected through randomization step, by arranging the treatment numbers and repetitions in advance on each plot. All broiler chickens were infected with *E. coli* bacteria on the 14th day with a dose of 1 ml which contain 10^6 CFU/ml population, except on P0A, P1 and P2 treatment. Antibiotic in the form of batak onion extract was given at the 5th day after infection with a dose of 1 ml and the giving of batak onion
powder was started from the beginning of maintenance. Meanwhile, the giving of tetracyclines (Colimas®) at a dose of 5 g/10 litres of water or 150 mg/kg body weight per day for 5 consecutive days, the treatment was given in the drinking water 1 day after infection. Feed and drinking water were given in a way of ad-libitum. Harvesting of broiler chickens was carried out on the 35\textsuperscript{th} day.

2.4.3. Data analysis. The data to be obtained at the time of this research will be analysed by statistical methods using Analysis of Variants (ANOVA), if there is a significant difference among the treatments, then proceed with Duncan's multiple range test (DMRT) with a significant level of 5\% to know the best treatment [4].

3. Results and discussion
In this study, there were several variables observed, i.e. carcass characteristics including slaughter weight, carcass weight and percentage. Result of the influence of giving the batak onion extract and powder to \textit{E coli}-infected broiler chickens is shown in Table 1.

| Table 1. Carcass Characteristics |
|----------------------------------|
|                                | P0A   | P0B   | P1    | P2    | P3    | P4    | P5    |
| Slaughter Weight (g)            | 1910.33\textsuperscript{bc} | 1726.67\textsuperscript{b} | 2096.67\textsuperscript{a} | 2001.67\textsuperscript{ba} | 2070.00\textsuperscript{b} | 1975.67\textsuperscript{ba} | 1975.00\textsuperscript{a} |
| Carcass Weight (g)              | 1457.67\textsuperscript{bc} | 1248.67\textsuperscript{b} | 1658.33\textsuperscript{ab} | 1556.67\textsuperscript{ab} | 1572.00\textsuperscript{b} | 1499.33\textsuperscript{b} | 1537.00\textsuperscript{b} |
| Carcass Percentage (%)          | 76.30\%\textsuperscript{ab} | 74.42\%\textsuperscript{b} | 79.10\%\textsuperscript{a} | 77.80\%\textsuperscript{ab} | 75.90\%\textsuperscript{ab} | 75.93\%\textsuperscript{ab} | 78.29\%\textsuperscript{ab} |

Note: Different superscripts on the same column show significantly different effects (P<0.05)

Slaughter weight is weight accumulated during maintenance. The effect of giving batak onion extract and powder to broiler chickens infected with \textit{Escherichia coli} showed significantly different results where the highest mean weight of slaughter was found in treatment P1 of 2096.67 g and the lowest was in treatment P0B of 1726.67 g. This was because batak onion contains anti-bacterial compounds that can inhibit and kill bacteria such as \textit{Escherichia coli}. Moreover, it also consist of compounds that can be useful for the growth and development of broiler chickens. So that the chickens that were not infected with the treatment and were given the Batak onion extract with the treatment that was infected and given the Batak onion extract had the same slaughter weight as the infected chickens and given tetracycline compared to the infected chickens without treatment. This is in accordance with the opinion of Lin et al [5], which stated that saponin compounds have antibacterial, antifungal, antipyretic effects, increase DNA and protein synthesis, and increase immunity.

Carcass weight is the weight of the body that have been slaughtered after the separated blood, feathers, heads to the extent nape of the neck, legs to limit the knee, internal organs [6]. In this research, there was a positive correlation between carcass and slaughter weight, where the results were significantly different. Moreover, the highest average of carcass weight was found in P1 of 1658.33 g and the lowest in P0B of 1248.67 g. This condition is in accordance with Sari \textit{et al} [7] which stated that the carcass and cut weight have a positive correlation, due to the relation between cut weight to the growth and development of carcass parts. In addition, in this study, the chickens that were treated using tetracycline and extract and powder of batak onion showed a higher carcass weight compared to the infected chickens without being treated using tetracycline and extract and powder of batak onion. This was because batak onions contain antibacterial, one of which is flavonoids. Retnowati [8] found that the membrane cells could be damaged by flavonoid, and it could shut down the microbial enzymes system that inhibit the bacterial growth which ultimately influence the carcass of \textit{E. coli}-
infected broiler chickens, where the broilers that were treated relatively resulted in a heavier carcass weight.

The percentage of carcass is the most important thing in assessing the performance of a meat-producing livestock, because it reflects the amount of meat produced by a livestock. In this study, the results were significantly different between treatments where the P1 treatment had the highest average carcass percentage of 79.10% and the lowest average in the P0B treatment was 74.42%, this is in line with the results of slaughter and carcass weight in this study. Wood [9] stated that the percentage of carcass is obtained from the ratio of carcass weight and slaughter weight, added by Sari et al [7], the percentage of carcass is strongly influenced by carcass weight. Therefore, in this study the results were consistent with the weight of slaughter, carcass weight and carcass percentage where the highest average in treatment P1 and the lowest on P0B which was the treatment of broiler chickens infected with Escherichia coli without any treatment.

Overall, in this study it can be seen that the provision of batak onion (Allium chinense) was able to balance the use of commercial antibiotics in the form of tetracyclines. As of it is expected that the use of antibacterials, especially from herbal plants, can replace the use of AGP (Antibiotic Growth Promoter), such as tetracyclines which can cause residue and resistance.

4. Conclusions
Adduction of batak onion extract and powder was effective in improving the carcass characteristics of broiler chickens infected with Escherichia coli.

References
[1] Naibaho F G, Bintang M and Pasaribu F H 2015 Antimicrobial Activity of Allium Chinense G. Don. Current Biochemistry 23 pp 129-38
[2] Bell C and Kyriakides A 2002 Pathogenic E. coli dalam foodborne pathogen: hazard, risk analysis and control (Cambridge (UK): woodhead Pub.)
[3] Todar K 2008 Todar’s online textbook of bacteriology (Madison: University of Wisconsin-Madison)
[4] Kusriningrum 2008 Dasar Perancangan Percobaan dan Rancangan Acak Lengkap [Basic Design of Experiments and Randomized Complete] (Surabaya: Faculty of Veterinary Medicine, Universitas Airlangga)
[5] Lin Y P, Lin L Y, Yeh H Y, Chuang C H, Tseng S W and Yen Y H 2016 Antihyperlipidemi activity of allium chinense bulbs J. Of Food & Drugs Anal, 24 pp 516-26
[6] Murtidjo B A 2003 Pedoman Beternak Ayam ras pedaging [Guidelines for raising broilers] (Yogyakarta: Kanisius)
[7] Sari T V, Sadeli A., Hanafi N D and Tafsin M 2020 Utilization complete feed fermented based waste peel cassava (Manihot esculenta Crantz) on the characteristics carcass and non-carcass of male Kacang Goat IOP Conference Series: Earth and Environmental Science 454 1 012076
[8] Retnowati Y, Bialangi N and Posangi, N W 2011 Pertumbuhan Bakteri Staphylococcus aureus Pada Media yang Diekspos Dengan Infus Daun Sambiloto (Andrographis paniculata) [Growth of Staphylococcus aureus Bacteria on Media Exposed with Sambiloto Leaf Infusion (Andrographis paniculata)] Saintek 6 2
[9] Wood J D, Enser M, Fisher A V, Nute G R, Sheard P R, Richardson R I, Hughes S I and Whittington F N 2008 Fat deposition, fatty acid composition and meat quality: A Review Meat Sci. 78 pp 343-58

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