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Physical composition of broiler carcasses fed with fermented herbal medicine in commercial rations

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Abstract

The study aimed to determine the effect of fermented herbal medicine in commercial rations on the physical composition of broiler carcasses has been carried out for 35 days, using 80 broilers. The experimental design used was a completely randomized design (CRD) consisting of 4 treatments and 4 replicates. The treatment of giving fermented herbal medicine in broiler commercial rations are: A: without fermented herbal medicine; B: 2% fermented herbal medicine; C: 4% fermented herbal medicine; and D: 6% fermented herbal medicine. The observed variables were: slaughter weight, carcass weight, carcass percentage, meat percentage, bone percentage, and subcutan fat percentage including skin. The results showed that the percentage of meat in treatment B, C, and D was significantly (P<0.05) higher than that of the control by 3.74%, 7.38%, and 5.11% respectively, and the percentage of subcutaneous fat including skin was significantly (P<0,05) lower than that of the control by 16.10%, 29.98% and 31.99% respectively. The slaughter weight, carcass weight, carcass percentage, and bone percentage were not significant different. Based on the results of this study, it can be concluded that the administration of fermented herbal medicine by 2-6% can increase the percentage of meat and decrease the percentage of subcutaneous fat including skin, but have no effect on the sloughter weight, carcass weight, carcass percentage and bone percentage of carcass broiler aged 35 days.

Keywords: Broiler; Fermented Herbal Medicine; Carcass Physical Composition; Commercial Ration

1. Introduction

Broiler is a breed of purebred chicken which is the result of crossing from chicken nations that have high productivity, especially in meat production. Broiler meat is very popular with all levels of society because it tastes good, is easy to process, and is quite affordable. This is evidenced by the level of chicken meat consumption increasing every year. According to [5], the average meat consumption of purebred chickens in 2021 reached 0.126 kg/week, this value is higher than in 2020 (0.116 kg/week) and in 2019 (0.109 kg/week). However, some people feel anxious to consume broiler meat, most of which use chemicals such as vaccines or antibiotic growth promoters (AGP) to maintain their health and spur their growth. Author [1] stated that the continuous use of antibiotics causes residues in meat that when consumed can affect consumer health such as allergies, imbalance of microorganisms in the digestive tract, and microorganism resistance to antibiotics.

One of the efforts to provide healthy and safe broiler meat from chemical residues is to maintain broiler using herbal or probiotics, such as fermented herbal medicine. This is supported by [13], that herbal medicine can be given as a feed additive to improve the performance and health of broilers. The purpose of fermentation is to extend the shelf life of

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herbal medicine and grow lactic acid bacteria, so that it has the potential to be a probiotic. According to [20], probiotics are live microbes that are used as feed supplements that provide benefits for animal and human health by maintaining a balance of microflora in the intestines.

Several studies on the use of herbal medicine and probiotics as a substitute for antibiotics have been conducted. [22], reported that the administration of fermented makarens herbal medicine in rations at the level of 2-6% was able to reduce the number of pathogenic bacteria in the broiler small intestine. The reduction of pathogenic microbes in the intestines will improve the health of intestinal villi, so that the absorption process of food substances becomes optimal, which will ultimately increase livestock productivity. This is supported by [26], that the administration of probiotic herbal medicine and herbal plants (complete probiotics) in drinking water can increase the weight and quality of broiler carcasses through the additives they contain. Author [25] reported that the administration of liquid probiotics in animal feed at a dose of 1%; 2,5%; 4%; 5,5%; and 7% with an interval twice a week for 35 days had an effect on broiler performance, with the highest body weight and the lowest FCR value at the level of 4%. Based on this information, this study needs to be carried out to determine the effect of giving fermented herbal medicine in commercial rations on the physical composition of broiler carcass.

2. Materials and Methods

2.1. Material

A total of 80 DOC broiler strains CP 707 (unsexing) were kept in 16 colony cages, with a length of 80 cm, a width of 65 cm, and a height of 45 cm. The cage is made of wood, bamboo slats and wire. The rations provided are commercial rations (CP 511 B) and fermented herbal medicine is a homemade product.

2.2. Methods

This study was carried out for 35 days using a complete randomized design (CRD) consisting of 4 treatments and 4 replicates, each replicate consisted of 5 broilers. The treatments are: A (commercial ration without fermented herbal medicine), B (commercial ration + 2% fermented herbal medicine), C (commercial ration + 4% fermented herbal medicine) and D (commercial ration + 6% fermented herbal medicine). Rations and drinking water are given ad libitum.

2.2.1. The process of making fermented herbal medicine

Fermented herbal medicine is made of several ingredients, namely: ginger, white turmeric, curcuma, brown sugar, fresh milk, pineapple, and water. Ginger, white turmeric, and curcuma are washed clean, then cut into small pieces, then added enough water and then mashed using a blender until it forms juice. Pineapples are peeled and then mashed using a blender, and brown sugar is melted by heating and then waiting until it cools. All the ingredients that have been prepared are then mixed in the barrel and tightly closed for the natural fermentation process for a month. After a month it is screened and ready to be given to broiler livestock.

2.2.2. Observed Variables

The variables observed were: slaughter weight, carcass weight, carcass percentage, and carcass physical composition which included the percentage of bones, meat, and subcutaneous fat including skin. Slaughter weight is the weight of a broiler that is weighed shortly before slaughter and has been fasted for 12 hours. The carcass weight is obtained by reducing blood, feathers, legs, head, neck and internal organs except the lungs and kidneys. The percentage of carcass, meat, bone and subcutaneous fat including skin is calculated by the formula:

$$\text{Carcass percentage (\%)} = \frac{\text{Carcass weight}}{\text{Sloughter weight}} \text{x } 100\%$$

$$\text{Meat percentage (\%)} = \frac{\text{Meat Weight}}{\text{Carcass weight}} \text{x } 100\%$$

$$\text{Bone percentage (\%)} = \frac{\text{Bone weight}}{\text{Carcass weight}} \text{x } 100\%$$

$$\text{Percentage of subcutaneous fat including skin (\%)} = \frac{Subcutaneous\ fat\ including\ skin}{\text{Carcass weight}} \text{x } 100\%$$

3. Results and discussion

Data the effect of fermented herbal medicine in commercial rations on the physical composition of broiler carcasses aged of 35 days are shown in Table 1. The data shows that the administration of fermented herbal medicine in commercial rations had a significant effect (P<0.05) on the percentage of meat and subcutaneous fat including skin, but not on the slaughter weight, carcass weight, carcass percentage, and bone percentage.

Table 1 Effect of Fermented Herbal Medicine in Commercial Rations on the Physical Composition of Broiler Carcass Aged of 35 Days

Variable	Treatment[1)]				SEM[2)]
	A	B	C	D	
Slougther weight (g)	2160.75[a]	2170.25[a]	2201.25[a]	2182.50[a]	34.01
Carcass weight(g)	1640.00[a]	1651.25[a]	1657.50[a]	1661.25[a]	54.26
Carcass percentage (%)	75.85[a]	75.98[a]	75.30[a]	76.10[a]	1.02
Meat percentage (%)	67.22[c]	69.83[b]	72.58[a]	70.84[ab]	0.76
Bone percentage (%)	18.87[a]	18.49[a]	17.68[a]	19.96[a]	0.69
Percentage of subcutaneous fat including skin (%)	13.91[a]	11.67[b]	9.74[c]	9.46[cd]	0.51

Note:1) A: Commercial rations without fermented herbal medicine (control)
B: Commercial ration + 2% fermented herbal medicine
C: Commercial ration + 4% fermented herbal medicine
D: Commercial ration + 6% fermented herbal medicine
2) SEM: Standard Error of the Treatment Means
3) Values with different letters on the same line show a significant difference (P<0.05)

3.1. Slaughter weight, carcass wight and carcass percentage

The slaughter weight of broilers in this study ranged from 2160.75 g to 2201.25 g (Table 1). The results of this study are slightly higher than those reported by [10], that the sloughter weight of a 35-day-old broiler given starbio probiotics ranged from 1832.64 g to 2168.90 g. The administration of fermented herbal medicine in commercial rations did not have a significant effect (P>0,05) on slaughter weight, but the value tended to be higher than the control (A). The highest sloughter weight was in treatment C (4% fermented herbal medicine), followed by treatment D (6% fermented herbal medicine), B (2% fermented herbal medicine) and A (without fermented herbal medicine), but statistically there was no significant difference (P>0.05). The results of this study reflect that fermented herbal medicine is enough to be given up to the level of 4% because above this level causes the slaughter weight to tend to decrease. This is suspected to be due to the presence of too many tannin compounds in the D treatment which causes inhibition of the absorption of ration proteins because tannins can bind to proteins so that they are difficult to absorb. However, when given in the right amount, tannins can maintain intestinal health because they have antibacterial properties that are able to suppress the development of pathogenic bacteria so that the absorption of food substances is optimal. This opinion is supported by [14] who state that tannins can affect the nutritional value of rations by binding minerals and forming complex compounds with proteins so as to inhibit the absorption of food substances. The slaughter weight was not significant (P>0.05) because the rations given are the same so that the energy content and ration consumption are the same. This statement is supported by [6], that the slaughter weight is influenced by the strain of the chicken, the age of the slaughter, the ration used, the gender, the ambient temperature, and others.

The carcass weight in this study ranged from 1640-1661.25 g (Table 1), with the highest value in treatment D (1661.25 g), followed by treatment C (1657.50 g), B (1651.25 g) and A (1640 g), but statistically was not significant different (P>0.05). This reflects that fermented herbal medicine tends to increase the weight of broiler carcass even though statistically it is not significantly different (P>0.05). The presence of lactic acid bacteria in fermented herbal medicine is able to maintain the health of the small intestine so that the absorption of food substances becomes better and the growth of livestock becomes better. This will have a positive impact on the weight of the carcass produced. This opinion is supported by [23], that the administration of fermented makarens herbal medicine is able to increase the height of villi in the small intestine of bali pigs as evidence that lactic acid bacteria and phytochemical compounds in fermented herbal medicine are able to maintain the health of the small intestine. The carcass weight was not significant different (P>0.05) because the sloughter weight was not significant different (P>0.05). This statement is in accordance with [7],

that the weight of the carcass is very closely related to the live weight and the body weight gain. The higher the live weight, the higher the carcass weight. The weight of the carcass produced in this study is higher than reported by [18] that the carcass weight of several broiler strains produced ranges from 1,308-1,363 g. This is suspected to be due to different strains because in this study the CP 707 strain was used, while Risnajati used the Cobb, Hubbard and Hybro strains.

The percentage of broiler carcasses in the results of this study ranged from 75.30-76.10% (Table 1), with the highest percentage in treatment D. The percentage of broiler carcasses in treatment A (control) was 75.85%, but in the treatment B (2% fermented herbal medicine) and D (6% fermented herbal medicine) was higher than A (control) by 0.17% and 0.33%, respectively, while C (4% fermented herbal medicine) was lower than A (control) by 0.73%, but statistically was not significant different (P>0.05). This is due to the fact that the weight of the carcass obtained is not significant different (P>0.05). This statement is supported by [3], that the components of carcasses that are relatively the same and proportional to the increase in body weight will produce a percentage of carcasses that are not different. The percentage of carcasses in the results of this study is quite high because the percentage of carcasses of broilers aged 5–6 weeks recommended by [17] is 65–70% of the final weight. Furthermore, [19] reported that the percentage of broiler carcasses as a result of their research ranged from 65-72%, author [10] obtained 70.50-75.10% and author [9] 71-74%. According to [8], the factors that affect the percentage of carcasses are body weight gain, feed consumption and nutrient content in feed.

3.2. Physical composition of the carcass

The physical composition of broiler carcasses generally consists of three main components, namely: meat, bones, and subcutaneous fat (including skin). The percentage of each component can vary depending on various factors such as age, breed, and maintenance method. The administration of fermented herbal medicine in the rations can increase the percentage of meat and decrease the percentage of subcutaneous fat including skin, while the percentage of bones has no significantly effect (P>0.05). The graph of the effect of fermented herbal medicine on the physical composition of broiler carcasses is shown in Figure 1.

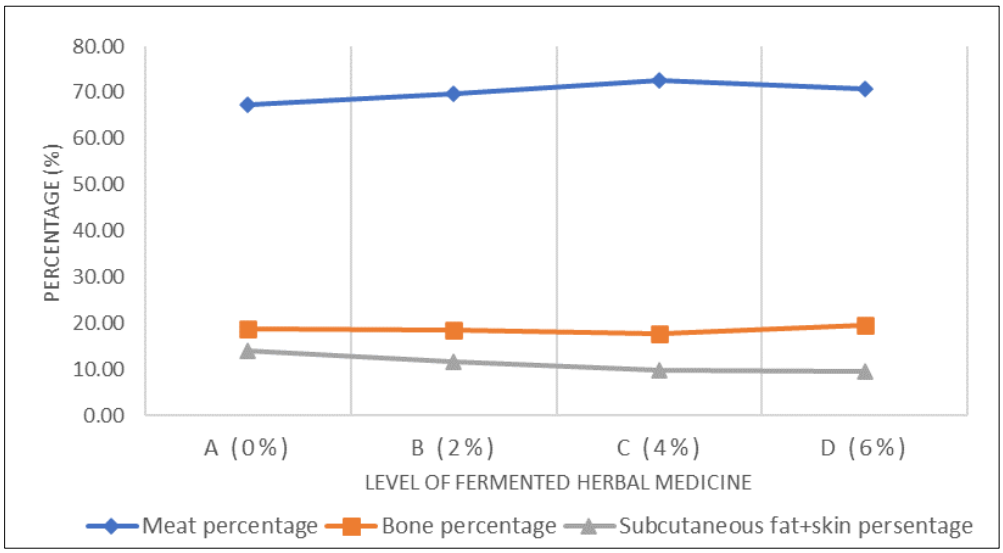

Figure 1 Graph of the physical composition of broiler carcasses fed with fermented herbal medicine in rations

The graph in Figure 1 shows that the percentage of broiler carcass meat increased up to treatment C and decreased slightly at treatment D. This shows that the best level of fermented herbal medicine is 4%. The percentage of broiler carcass meat in the results of this study ranged from 67.22% to 72.58% (Table 1). This results is almost the same as that obtained by [15] that the percentage of broiler meat as a result of the study ranged from 69.73-77.51%. The administration of fermented herbal medicine in commercial rations at the level of 2% (B), 4% (C) dan 6% (D) significantly (P<0.05) increase the percentage of boiler meat as much as by 3.74%; 7.38%, and 5.11%, respectively. The increase in the percentage of broiler meat is due to the increase in sloughter weight. This statement is in accordance with [27] that there is a positive relationship between the sloughter weight and the percentage of chicken meat or boneless. The same thing was also obtained by [15] that there was an increase in the percentage of boneless (meat) linearly with an increase in the sloughter weight of chickens. Related to fermented herbal medicine, the increase in sloughter weight and protein percentage is suspected to be caused by increased ration digestibility and small intestinal

health so that the absorption of nutrients becomes better for livestock growth. Excessive administration of herbal medicine causes the pH of the small intestine to be too acidic so that it interferes with the growth of villi and the absorption of nutrients, thus the growth of livestock is also not good. This is supported by the results of research by [23], that the administration of fermented makarens herbal medicine at a level of 6% reduces the height of the small intestinal villi and the digestibility of food substances in the ration [24].

The administration of fermented herbal medicine in commercial rations at the level of 2-6% did not have a significant effect (P>0.05) on the percentage of bones in the 35-day-old broiler carcass. Bone percentage in the results of this study ranged from 17.68-19.96% (Table 1). The results of this study is lower than that obtained by [15] that the percentage of broiler bones at different sloughter weights ranges from 25.04% to 30.27%. The percentage of broiler bone in treatment A (control) was 18.87% , while in treatment B and C lower than that the control by 2.01% and 6.31%, respectively, and in treatment D higher than the control of 5.46%, but statistically not significantly different (P>0,05). This is because the bone component is a component of the carcass which ripens early. Author [17], stated that the growth of the body that then forms a carcass consists of three main tissues, namely bone tissue that forms the skeleton, muscles that form meat and fat. Among the three tissues that grow the earliest are bones, then followed by the growth of veins as meat and fat grow last. A comparison graph of the percentage of bones given fermented herbal medicine in the ration is shown in Figure 1. That graph in Figure 1 shows that the percentage of bone decreased until the administration of 4% fermented herbal medicine (C) and increased with the administration of 6% (treatment D). This is in accordance with [15], which states that there is a negative relationship between the increase in sloughter weight and the percentage of bones. The slaughter weight in this study increased until treatment C and decreased in treatment D (Table 1).

The administration of fermented herbal medicine in commercial rations at the level of 2-6% has a significant effect (P<0.05) on the percentage of subcutaneous fat including skin in 35-day-old broiler carcasses (Table 1). The percentage of subcutaneous fat including skin in the results of this study ranged from 9.46-13.91% (Table 1). The percentage of subcutaneous fat including skin in treatment A (control) was 13.91%, while in treatment B, C and D was significantly (P<0.05) lower than that of control, respectively by 16.10%; 29.98% and 31.99%. These results showed that the higher the level of fermented herbs given, the lower the percentage of subcutaneous fat including skin in broiler carcasses (Figure 1). A good carcass is a carcass that contains a lot of meat and low-fat content [29]. The results of this study are almost the same as reported by [21] that the percentage of subcutaneous fat including skin, in free-range chickens is 9.59-11.02%.

Fat is a deposition of excess fat metabolism which is an energy reserve for chickens [28]. Fat deposition in broilers is generally stored in the form of fat in the abdominal cavity and under the skin [12]. Fat growth and storage are influenced by the composition of the ration, especially the level of energy in the ration [11]. Broilers tend to store fat when the use of energy is inefficient and for a long time. Fat accumulation will increase after broiler enters the final phase, because after the peak of body weight gain at 4 weeks of age, fat gain increases. Fat storage will be more intensive if the broiler is not moving. The decrease in the percentage of subcutaneous fat including skin is caused by lactic acid bacteria in fermented herbal medicine that producing short-chain fatty acids such as: acetate, propionate and butyrate. Propionate is an inhibitor of the lipogenesis process in the liver so that fat levels decrease [2]. Probiotics can also decrease the activity of acetyl-CoA carboxylase, an enzyme responsible for the rate of fatty acid synthesis, by producing statins as inhibitors of fat formation in the liver. Statins are substances as inhibitors of 3-hydroxy-3-methyl-glutarin CoA reductase that function as enzymes regulating the biosynthesis of fats, cholesterol, and triglycerides [4]. This result is in accordance with [16], that probiotic supplementation in the ration can reduce the amount of subcutaneous fat including the skin of the bali duck carcass.

4. Conclusion

Based on the results of this study, it can be concluded that the administration of fermented herbal medicine in commercial rations by 2-6% can increase the percentage of meat and decrease the percentage of subcutaneous fat including skin, but has no effect on sloughter weight, carcass weight, carcass percentage and bone percentage.

Compliance with ethical standards

Disclosure of conflict of interest

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

References

[1] Alipin K, Safitri R and Kartasudjana R. Probiotic and curcuma supplementation in broilers against Salmonella sp. and blood cholesterol. Veterinary Journal. 2016; 17 (4): 582-586

[2] Beylot M. Effects of inulin-type fructans on lipid metabolism in man and in animal models. The British Journal of Nutrition. 2005; 93(1): 163–168

[3] Budiansyah A. Effect of the use of golden snail meat flour silage (Pomaceae sp) in rations on the growth and carcasses of broiler chickens. J. Scientific Animal Husbandry Sciences. 2003; 6 (4): 227-234

[4] Cavallini DCU, Bedani R, Bomdespacho LQ, Vendramini RC and Rossi EA. Effects of probiotic bacteria, isoflavones and simvastatin on lipid profile and atherosclerosis in cholesterol-fed rabbits: a randomized double blind study. BioMed Central. 2009; 8:1-8

[5] Director General of Livestock and Animal Health. Livestock and Animal Health Statistics. Ministry of Agriculture, Jakarta, 2022.

[6] Etik, Anggraeni and Dihansih E. Percentage of carcasses and giblets of broiler chickens (Gallus domesticus) fed moringa leaf extract (Moringa Olifera). Journal of Animal Husbandry of the Archipelago. 2021; 7(2): 107-115

[7] Haroen U. Response of broilers given sengon leaf flour (Albizia falcataria) in ration to growth and carcass yield. Journal of Animal Science. 2003; 6(1): 34-41

[8] Ichwan. Making Broiler Chicken Feed. Angromedia Pustaka. Jakarta, 2003.

[9] Irmawati, Sandiah N, and Fitrianingsih. Sloughter weight, carcass percentage and abdominal fat broiler chicken served with broiler chicken intestines with different levels. Halu Oleo Scientific Journal of Animal Husbandry. 2020; 2(1): 46-50.

[10] Jaelani A, Gunawan A, and Syaifuddin S. Effect of the addition of starbio probiotics in the ration on slaughter weight, carcass percentage and abdominal fat percentage of broiler chickens. Ziraa"ah. 2014; 39(2): 85-94.

[11] Maryuni S. and Wibowo C H. Effect of lysine content and metabolic energy in rations containing fermented cassava on the consumption of broiler chicken rations and fat. J. I. T. Animal Agrculture. 2005; 30(1): 26-33

[12] Meliandasari D, Dwiloka B and Suprijatna E. Optimization of kayambang leaves (Salvinia molesta) for meat cholesterol reduction and improvement of essential fatty acid quality. Journal of Food Technology Applications. 2015; 4(1): 22-28

[13] Mustika IW, Khotimah H and Widiyanto A. The Effect of Herbal Medicine as Feed Additive on Broiler Performance and Health. Journal of Animal Husbandry. 2022; 19(1): 23-32.

[14] Olawoye BT, and Gbadamosi SO. Efect of diferent treatments on in vitro protein digestibility, antinutrients, antioxidant properties and mineral composition of Amaranthus viridis seed. Cogent Food & Agriculture. 2017; 3:1-14

[15] Patriani P and Hafid H. Percentage of boneless, bone, and meat-bone ratio of broiler chickens at various slaughter weights. Journal of Tropical Galung. 2019; 8(3): 190-196

[16] Ramia IK. Probiotic supplementation in low-protein rations on the weight and physical composition of the bali duck carcass. Animal Husbandry Scientific Magazine. 2000; 3(3): 82- 87

[17] Rasyaf M. Broiler Farming Business Management. PT. Gramedia Pustaka Utama, Jakarta, 1995.

[18] Risnajati R. Comparison of final weight, carcass weight and carcass percentage of various broiler strains. Animal Science. 2012; 10(1): 11-14.

[19] Salam S, Fatahilah A, Sunarti D and Isroli. Carcass weight and abdominal fat of broiler chickens fed with black cumin flour (Nigella sativa) in rations during the summer. Animal Science. 2013; 11(2): 84-90

[20] Savitha T, Alwarappan, and Sankaranarayanan. Role of Probiotic Microbes Exerting Nutritional Properties. pp. 163-184. Abstract. In D. Danasekaran and A. Sankaranarayanan. Advances to Probiotics. Academic Press, Elsevier Inc., 2021.

[21] Sukmawati NMS, Sampurna IP, Wirapartha M, Siti NW and Ardika IN. Perfomans and physical composition of native chicken carcasses treated with fermented papaya leaf juice in commercial rations. Animal Husbandry Scientific Magazine. 2015; 18(2): 164-271.

[22] Sukmawati NMS, Witariadi NM, Ardika IN and Siti NW. Effects of jamu makarens in the ration on performance and the number of pathogenic microbes in the intestines of broiler chickens. International Journal of Fauna and Biological Studies. 2022; 9(6): 21-25.

[23] Sukmawati NMS, Sumadi IK, Sriyani NLP and Lindawati SA. The effectivity of jamu makarens on reducing the number of E. coli and improving the small intestine health of bali local pigs. International Journal of Fauna and Biological Studies. 2023; 10(6): 06-10.

[24] Sukmawati NMS. Growth Performance, Meat Quality, and Microbial Viability of Gastrointestinal Tract of Local Bali Pigs Given "Jamu Makarens". Dissertation, Faculty of Animal Husbandry, Udayana University, Denpasar, 2024

[25] Susinarla L. The Use of Various Doses of Probiotics as Biosupplements with an Interval of Twice a Week in Feed on the Productivity of Broilers (Gallus domesticus). Abstract. Thesis. Airlangga University, Surabaya, 2016.

[26] Syam M. Analysis of the weight and quality of broiler chicken carcasses given probiotic herbal medicine and herbal plants through drinking water. Journal of Tropical Galung. 2015; 4(2): 74-80.

[27] Variani MA, Pagala and Hafid H. Study of the physical quality of broiler chicken meat at various slaughter weights and different commercial feeds. Journal of Tropical Technology and Animal Husbandry. 2017; 4(2): 40-48.

[28] Wahyono, R., Masnilawati, and Kartadisastra. Supply and Processing of Ruminant Animal Feed. Kanisius, Yogyakarta, 2002.

[29] Yuniastuti A, Effect of fibrous feed on chicken ration on fat and cholesterol levels of broiler meat. JITV. 2002; 9(3): 175-183.