

EFFECTS OF GIVING ASAM GELUGUR LEAF MEAL IN NON-CONVENTIONAL RATIONS ON CARCASS PERCENTAGE AND CARCASS COMPOSITION OF MALE AND FEMALE DUCKS IN GROWER PHASE

Dewi Wahyuni¹, Burhanudin Malik¹, Elis Dihansih²

¹Animal Husbandry Study Program, Faculty of Agriculture, Djuanda University

²Food Technology Master Program, Postgraduate School, Djuanda University

Corresponding author : dewiwahyuni4326@gmail.com

Abstract : Ducks are still less liked by consumers because the quality of production is still low compared to broilers. To improve this quality, additional feed can be in the form of herbs which are thought to have content for this. Asam gelugur leaves contain hydroxycitric acid and active substances that act as antioxidants. So that it is expected to improve the quality of the carcass. The purpose of this study was to examine the effect of giving asam gelugur leaf meal on the percentage and composition of male and female ducks in the grower phase. The study was conducted for 2 months in the Poultry Farm of Faculty of Agriculture, Djuanda University. The 40 grower ducks consist of male and female. Fourty male and female grower ducks were allocated into a 2 x 4 completely randomized factorial design. Factor A consisted of sexes (male and female) and factor B consisted of levels of *asam gelugur* leaf meal inclusion in rations (0, 2, 4, and 6%). five replicates were used for each treatment. The variables observed were slaughter weight, carcass weight, carcass percentage, commercial cut percentage of carcass and duck carcass composition. The results showed that there was no interaction and there was no significant difference ($P > 0.05$) from giving asam gelugur leaf meal to carcass percentage, carcass commercial cut percentage and duck carcass composition. The conclusion of this study is that giving asam gelugur leaf meal to males and females can maintain the quality of the carcass and the composition of the local duck carcass. So that can provide asam gelugur leaf meal up to a level of 6% because it does not have a negative effect on the quality of the carcass and its composition.

Key words: *hydroxycitric acid, carcass percentage, garcinia atroviridis, tannins, gender*

Wahyuni, D., Malik, B., & Dihansih, E. (2021). EFFECTS OF GIVING ASAM GELUGUR LEAF MEAL IN NON-CONVENTIONAL RATIONS ON CARCASS PERCENTAGE AND CARCASS COMPOSITION OF MALE AND FEMALE DUCKS IN GROWER PHASE. *Indonesian Journal of Applied Research (IJAR)*, 2(1), 42-49. <https://doi.org/10.30997/ijar.v2i1.87>

1. INTRODUCTION

Ducks are a type of poultry that can be developed in everyday life. Ducks can produce eggs and meat. Number of duck populations increased in 2019 by 47,783 and in 2019 as many as 48,588 (Ditjenpkh, 2020). Duck meat has problems, namely low quality meat, high fat content and sharp off odor. However, ducks have the potential to be developed and used as a source of animal protein. Carcass is the body part of the animal that has been slaughtered minus

the head, neck, legs, viscera and blood. The percentage of carcass is an indicator in measuring livestock production and is related to live weight and body weight gain (Lingga et al., 2016). The factors that affect the percentage of carcass are the energy and protein balance in the ration, the growth rate of ducks, gender and slaughter age of ducks (Dewanti et al., 2014),

Therefore, additional feed is needed which is thought to improve carcass quality. Additional feed that can be used includes herbal plants. Herbal plants that have been carried out are research on the addition of beluntas leaves (Rukmiasih & Tjakradidjarja, 2006), bay leaves (Harvianto et al., 2020), kecombrang flowers (Komara et al., 2018), betel leaves (Sale et al., 2017). This research will use asam gelugur leaves as feed additive in feed. Asam gelugur leaves are commonly found in North Sumatra. Asam gelugur contains active substances in the form of alkaloids, flavonoids, phenolic, saponins, tannins, carbohydrates and proteins as well as organic acids such as tartaric acid, citric acid, malic acid and hydroxycitric acid. Hydroxycitric acid (HCA) is the main organic acid which has anti-lipidemic and antiobesity properties. HCA is about 10-30% in *Garcinia* fruit. (Meera et al., 2013). According to Chung (2006), asam gelugur also has antioxidant properties and can reduce body weight and cholesterol. Research by (Dihansih et al., 2019) states that giving rejected ducks up to 6% does not reduce performance in rejected ducks. Based on the previous research, the addition of asam gelugur leaves meal to the grower feed of ducks is expected to improve the quality of duck carcasses so that it can increase public consumption. The purpose of this study was to examine the effect of giving asam gelugur leaf meal given to fermented non-conventional feed on the percentage and composition of local duck carcass in the grower phase.

2. METHODS

This study was conducted in 2 months in the Poultry Farm of Animal Husbandry Department, Faculty of Agriculture, Djuanda University, Bogor. Forty male and female grower local ducks were used. Experimental rations were made of fermented non-conventional feed and *asam gelugur leaf* meal. Feedstuffs used to formulate the rations included ground corn, ground rice bran, soybean cake, fishmeal, premix, DCP, and CaCO₃. Fermented non-conventional feed consisted of coconut cake, palm kernel cake, and *Aspergillus niger* fungi. The ducks were placed in battery cages equipped with feed trough and drink containers. Other equipment used in this study included plastic bags, digital balance, gas stove, oven, blender, big pans, and pails. A factorial completely randomized design with 2 factors was used. The first factor (A) was sexes (male and female) and the second factor (B) was the inclusion of *asam gelugur leaf* meal in rations (0, 2, 4, and 6%). five replicates were applied in each treatment. Treatments consisted of male ducks + 0% *asam gelugur leaf* meal (R0), male ducks + 2% *asam gelugur leaf* meal (R1), male ducks + 4% *asam gelugur leaf* meal (R2), male ducks + 6% *asam gelugur leaf* meal (R3), female ducks + 0% *asam gelugur leaf* meal (R4), female ducks + 2% *asam gelugur leaf* meal (R5), female ducks + 4% *asam gelugur leaf* meal (R6), and female ducks + 6% *asam gelugur leaf* meal (R7). The variables in this study consisted of slaughtered weight, carcass percentage, commercial cut percentage of ducks (% thigh,% breast,% back,% wing), and also carcass composition of thigh and breast parts (% meat,% skin, and% bone).

Feed fermentation process was done based on procedures developed by Supriyati *et al.* (1998). *Asam gelugur leaf* meal preparation was done by firstly separating the leaves from the midrib. The leaves were then dried under the sun for 1-2 days before they were in an oven at 62 °C for 10 minutes. Dried leaves were ground by using a blender. Rations of 100 g/head/day were given to the ducks twice a day. Treatments were given to the ducks for 6 weeks.

Before starting the study, the cages and equipment were cleaned. Then the feed adaptation process is carried out for 1 week. Feed is given 2 times a day with the amount of 100 grams / head / day. Ducks were treated for 6 weeks. At the age of 10 weeks, ducks are slaughtered according to Islamic law. Before being slaughtered, ducks are weighed to get slaughter weight, after that they are slaughtered and allowed to flow blood. Then do the hair removal manually. After that, to get the carcass weight, we weigh the carcass without the head, legs, hair, blood, offal, and neck. Then the commercial parts of the carcass are cut, namely the chest, thighs, and dorsal wings. After that, deboning or separating the meat, skin, breastbone and thighs is carried out. All data obtained were subjected to analysis variance and where statistical significance was observed, the means were compared using the Duncan test. The SPSS software package was used for all statistic all analysis.

3. RESULT AND DISCUSSION

Characteristics of meat quality in poultry can be influenced by many factors such as species and breed, environment, feed and maintenance. These factors are nation, origin, sex, weight and age at slaughtering, method of feeding, and application before and during slaughter as well as environmental factors.

Table 1 Average of slaughter Weights, Carcass weight and Carcass percentage

Parameters	Treatment Sex	Percentage of asam gelugur leaf meal				average
		0%	2%	4%	6%	
Slaughter weight (g)	Male	1038,3±132,8 ⁸	1055,0±92,60	946,67±100,1 ²	1028,3±127,7	1017,08±107,0 ^{5a}
	Female	574,67±129,5 ²	1056,67±53,6 ⁸	700,00±184,1 ⁶	745,33±333,48	768,91±253,22 ^b
	Average	806,50±279,5 ^{6a}	1055,33±67,6 ^{9b}	823,33±189,2 ^{9a}	886,83±273,92 ^{ab}	
Carcass weight (g)	Male	515,26±80,75	496,93±40,72	442,86±74,63	483,43±47,91	484,62±60,75 ^a
	Female	265,67±103,3 ⁵	536,00±39,68	336,00±135,5 ⁰	333,67±183,43	367,83±151,12 ^b
	Average	390,47±159,9 ¹	516,47±41,86	389,43±114,0 ¹	408,55±145,28	
Carcass percentage (%)	Male	49,60±4,50	47,42±6,82	47,69±12,98	47,16±2,75	47,96±6,72
	Female	44,96±9,76	50,81±3,48	46,92±8,43	43,58±4,29	46,57±6,62
	Average	47,28±7,26	49,11±5,19	47,30±9,80	45,37±3,77	

Note: Superscript letters in the same row and column show significantly different results ($P < 0.05$)

The results of the analysis of variance showed that there was no interaction between sex and the level of asam gelugur leaf meal on slaughter weight, carcass weight and carcass percentage. In the table 1, it can be seen that there is a significant difference ($P < 0,05$) in the effect of sex and level of distribution on slaughter weight. The average slaughter weight for males was higher than that of females, namely 1017.08 g and 768.91 g. In line with (Matituputty et al., 2011) that body weight growth is influenced by sex and age. The results of this study were lower than the research by (Putra et al., 2015), namely male ducks for 10 weeks of 1,354.90 g and female ducks of 1,243.44 g. The level of giving asam gelugur leaf male

significantly different results ($P < 0.05$) on the slaughter weight. Where giving 2% asam gelugur leaf meal was different from giving 0% and 4% asam gelugur leaf meal. The mean weight of cut from 0% to 6%, respectively, is 806.50 g, 1055.33 g, 823.33 g, and 886.83 g. It can be seen that giving asam gelugur leaf meal can increase the weight of 10 weeks old ducks. This is presumably because body weight gain is significantly different. The content of gelugur acids such as organic acids and phenolic compounds such as flavonoids can improve the digestive system of these ducks. Although asam gelugur leaf contain tannins, they do not have a negative impact on body weight gain.

Carcass weight is the slaughter weight that has been reduced by blood, hair, viscera, legs, head and neck. The increase in carcass weight occurs as a result of the better metabolic processes that occur in the body and the increasing number of nutrients that can be utilized by the livestock body for the continuity of various processes in the body. The higher the rate of body weight gain, the greater the final weight and carcass weight produced (Daud et al., 2020). The average carcass weight of male ducks produced a higher carcass weight of 484.62 g compared to that of females, namely 367.83 g. The mean proved to be significantly different ($P < 0.05$). This is due to the significantly different effect of cutting weight.

Based on the level of giving asam gelugur leaf meal, the results were not significantly different. The average carcass weight of male female ducks aged 10 weeks ranged from 390-516 g. As a comparison, (Herdiana et al., 2014) research on ducks aged 8 weeks produced carcass weight of 631.9-693.3g / head. Carcass weight can be influenced by various factors, including: type of livestock, age and feed. The quality of feed consumed by livestock, breeds and stress conditions at the time of slaughtering also greatly affect the quality of meat (Givens 2005; Liu & Niu 2008).

Carcass percentage is obtained from carcass weight divided by cut weight multiplied by 100%. What this means is that the percentage of carcass is one of the parameters for measuring livestock production (Lingga et al., 2016). In this study, the average percentage of male carcasses gave a value of 47.96% and females 46.57%. There was no significant difference ($P > 0.05$) to the percentage of carcass based on the factors of gender and level of administration. The average percentage of carcass from the level of administration resulted in an average of 45.37% to 49.11%. This is because the weight of the carcass follows the weight of the cut. Supported by the statement of Daud et al., (2017) that the percentage of carcass is influenced by carcass weight. The higher the cut weight, the increase in carcass weight will be followed (Putra et al., 2015). As a comparison of the percentage of Mojosari duck carcass with the addition of onion skin flour in the ration, the percentage of carcass was 53.98-56.64% (Saputra et al., 2016), research by (Sunari et al., 2001) reported that the average percentage of carcasses of Mandalung ducks aged 10 weeks was $62.5 \pm 2.3\%$. The average percentage of carcasses of local male MA ducks aged 10 weeks ranged from 54.0 to 58.84 (Purba & Ketaren, 2011) and local ducks (Cihateup) ranged from 58.07 to 58.43% (Randa et al., 2010) research by Syahrudin et al., (2015), namely 52.20 - 56.86% in local male ducks, and almost equivalent to the research of Subhan et al. (2010) which ranges from 58.27 to 60.11% and (Iriyanti et al., 2018) namely 57.14 - 59.75% in Tegal ducks.

The parts of the carcass or what are known as commercial pieces of carcass include the chest, wings, back, thighs. The table above shows that there is no interaction between sex and level of distribution on the percentage of carcass parts.

Table 2 Average commercial cuttings carcass of ducks in grower phase

Parameters	Treatment sex	Percentage of asam gelugur leaf meal				Average
		0%	2%	4%	6%	
% thigh	Male	24,98±4,35	27,36±1,03	25,91±2,16	27,87±1,40	26,53±2,50
	Female	31,97±3,49	24,26±0,95	26,12±5,09	28,87±2,98	27,80±4,23
	average	28,47±5,20	25,81±1,91	26,02±3,49	28,37±2,15	
% breast	Male	20,89±3,57	20,54±1,58	21,71±1,96	20,32±2,77	20,86±2,27
	Female	19,92±7,12	22,54±2,92	15,45±5,70	18,20±4,26	19,02±5,22
	average	20,40±5,06	21,54±2,37	18,58±5,12	19,26±3,42	
% wings	Male	21,15±1,87	20,30±1,29	21,70±2,38	19,82±1,63	20,74±1,74
	Female	19,38±1,38	22,77±3,90	22,04±1,63	19,78±1,69	20,99±2,52
	average	20,27±1,76	21,53±2,93	21,87±1,83	19,80±1,48	
% back	Male	32,97±0,93	31,80±0,36	30,67±2,78	32,33±1,64	31,94±1,69
	Female	35,62±9,48	30,58±3,06	39,06±8,51	34,91±2,83	35,04±6,53
	average	34,30±6,20	31,19±2,06	34,87±7,29	33,62±2,50	

The thigh is separated at the acetabulum, the pelvis muscles are included, while the pelvis is not involved in the thigh and at the dorsal end of the tarsometatarsus bone. The average percentage of male duck thighs was 26.53% and female ducks was 27.80%. The average percentage of thighs yields about 25.81% to 28.47%. However, the results of the analysis of variance were not significantly different ($P > 0.05$). The breast is separated at the ends of the scapula and dorsal ribs. breast weight is measured by weighing the breast after separation from the carcass. Soeparno (2005) states that breast meat can be used as a parameter of carcass quality, because breast meat is the most dominant part of the carcass and the muscles are relatively large. In this study, the sex factors and the level of giving asam gelugur leaf meal showed no significant difference ($P > 0.05$). The mean percentage of male breasts was 20.86% and female breasts 19.02%, while the mean of giving flour ranged from 18.58-21.54%.

The wings can be separated through the joints of the shoulder blades. The average percentage of male duck wings was 20.74% and 20.99% for females. The average rate of distribution ranged from 19.80% to 21.87%. However, the results of the analysis of variance were not significantly different ($P > 0.05$). The back is separated at the pelvis, the dorsal end of the scapula from the ribs and the posterior part of the neck. The average percentage of backs ranged from 31.19% to 34.87%. Where the percentage of female backs is greater than males, namely 35.04% and 31.94%. however, the analysis of variance showed the results were not significantly different ($P > 0.05$). As a comparison, the research results of (Armissaputri et al., 2013) show that 10 weeks of age Tegal ducks have a carcass percentage of 13.95%, thighs 13.26%, wings 9.89% and backs of 16.41%. The carcass components consisting of muscles, fat, skin and bones have different growth rates. In this study there was no interaction between sex and the factors of giving tamarind leaf flour. The average results of research on carcass components can be seen in Table 3.

The carcass composition of the thigh and breast did not show significantly different results in the flesh, skin and bones. The meat on the breast and thigh was in the above range compared to the bone and skin. the opinion of (Erisir, 2009) which states that the older the ducks are, the higher the percentage of the breast. Average male breast meat 42.88% and 36.49% female. Meanwhile, the increasing rate of giving ranged from 34.88% to 45.87%. It is assumed that the content of gelugur acid can improve the carcass composition, which can maximize the growth of meat.

Table 3 Means carcass composition of grower phase duck on thigh

Parameters	Treatment	Percentage of asam gelugur leaf meal				Average
	sex	0%	2%	4%	6%	
% meat	Male	56,05±0,42	55,05±3,01	55,92±2,95	50,95±4,05	54,49±3,31
	Female	52,03±9,76	52,34±3,49	44,57±14,62	51,92±3,55	50,21±8,50
	average	54,04±6,55	53,69±3,27	50,24±11,29	51,43±3,45	
% bone	Male	20,31±4,44	20,55±1,15	20,32±4,45	22,39±0,59	20,89±2,88
	Female	27,96±16,11	20,24±4,81	32,32±7,65	24,57±6,84	26,27±9,62
	average	24,13±11,36	20,39±3,13	26,32±8,70	23,48±4,50	
% skin	Male	23,63±4,72	24,39±3,41	23,76±1,63	26,65±3,74	24,61±3,29
	Female	20,06±8,60	27,41±7,31	23,10±16,69	23,50±3,53	23,50±9,14
	average	21,81±6,51	25,90±5,36	23,43±10,61	25,08±3,68	

Table 4 Means carcass composition of grower phase duck on breast

Parameters	Treatment	Percentage of asam gelugur leaf meal				Average
	sex	0%	2%	4%	6%	
% meat	Male	44,98±6,47	42,40±10,55	43,27±7,92	40,87±5,07	42,88±6,81
	Female	33,03±13,85	49,35±6,99	34,71±7,30	28,90±15,90	36,49±12,82
	average	39,00±11,67	45,87±8,86	38,99±8,27	34,88±12,43	
% bone	Male	21,10±6,00	24,02±2,42	25,10±3,00	25,23±6,02	23,68±4,34
	Female	37,25±16,77	28,28±7,60	31,70±12,50	28,68±8,67	28,98±12,47
	average	29,18±14,32	26,15±5,94	28,40±8,89	26,95±6,94	
% skin	Male	33,91±0,99	33,57±8,17	31,62±5,05	33,89±4,78	33,25±4,70
	Female	29,71±8,12	32,36±11,79	33,59±9,15	42,41±9,19	34,52±9,62
	average	31,81±5,66	32,96±9,10	32,60±6,69	38,15±8,04	

Giving asam gelugur leaf meal in rations up to a level of 6% in this study has not had a significant effect on all parameters of the chest and thighs, it is suspected that asam gelugur does not play a significant role in the digestive tract such as the stomach and small intestine, where organic acids are contained in asam gelugur does not decrease the intestinal pH so it does not suppress the number of pathogenic bacteria and reduce the number of non-pathogenic bacteria. The addition of pathogenic bacteria causes nutrient absorption in the intestine to be less than optimal. There is no significant effect on giving asam gelugur leaf meal which can also be caused by the weight of slaughter and carcass weight which does not have a significant effect, resulting in no difference in the percentage of carcass and its parts.

4. CONCLUSION

The conclusion of this study is that giving asam gelugur leaf meal to males and females can maintain the quality of the carcass and the composition of the local duck carcass. So that can provide asam gelugur leaf meal up to a level of 6% because it does not have a negative effect on the quality of the carcass and its composition.

ACKNOWLEDGEMENTS

Thank you to the DRPM of Djuanda University Bogor who has funded Higher Education Internal Grants research with contract Number: 094 / LPPM / K-VII / 2020

REFERENCES

- Armissaputri, N. K., Ismoyowati, & Mugiyono, S. (2013). PERBEDAAN BOBOT DAN PERSENTASE BAGIAN-BAGIAN KARKAS DAN NON KARKAS PADA ITIK LOKAL (*Anas Plathyrincos*) DAN ITIK MANILA (*Cairina Moschata*). *Jurnal Ilmiah Peternakan*, 1(3), 1086–1094.
- Chung C. S. 2006. Sweet and sour, the lovely gelugor. *Gardenwise Vol. 2(6): 18-19*.
- Daud, M., Yaman, M. A., Zulfan, & Asril. (2020). Effects Of Probiotic Supplementation In Rations Containing Leubiem Fish Waste (*Chanthidermis Maculatus*) On The Performance Of Local Ducks. *IOP Conference Series: Earth And Environmental Science*, 425(1). <https://doi.org/10.1088/1755-1315/425/1/012003>
- Daud, Muhammad, Fuadi, Z., & Mulyadi, M. (2017). Performan Dan Persentase Karkas Ayam Ras Petelur Jantan Pada Kepadatan Kandang Yang Berbeda. *Jurnal Agripet*, 17(1), 67–74. <https://doi.org/10.17969/Agripet.V17i1.7557>
- Dewanti, R., Sudiyono, D., Peternakan, J., & Pertanian, F. (2014). Effect Of Eggs Weight And Turning Frequency On Fertility, Hatchability And Hatching Weight Of Local Ducks. *Buletin Peternakan*, 38(1), 16–20.
- Dihansih, E., Kardaya, D., & Wahyuni, D. (2019). Performa Dan Lemak Darah Itik Afkir Yang Diberi Tepung Daun Asam Gelugur Pada Ransum Nonkonvensional Terfermentasi. *Jurnal Peternakan Nusantara*, 5(2), 105–110.
- Ditjenpkh. (2020). *Livestock And Health Statistics 2020*. <https://ditjenpkh.pertanian.go.id>
- Erisir, Z. (2009). *Effect Of Housing System Duck Carcass Yiled .Pdf* (P. 1).
- Harvianto, F. D., Anggraeni, & Sudrajat, D. (2020). DALAM AIR MINUM TERHADAP KECERNAAN NUTRIEN RANSUM DAN RETENSI NITROGEN ITIK LOKAL JANTAN THE EFFECT OF USE OF SALAM LEAF EXTRACT (*SYZYGIUM POLYANTHUM*) IN DRINKING WATER ON NUTRIENT DIGESTIBILITY AND NITROGEN RETENTION OF MALE LOCAL DUCK Pengaruh Penggun. *Jurnal Peternakan Nusantara*, 6(April).
- Herdiana, R. M., Marshal, Y., Dewanti, R., & Sudiyono, D. (2014). Effect Of Dietary Supplementation Of Soy Sauce Waste On Daily Weight Gain, Feed Conversion Ratio, Protein Efisiensi Ratio And Carcass Production Of 8 Weeks Male Local Duck. *Buletin Peternakan*, 38(3), 157–162.
- Iriyanti, N., Hartoyo, B., & Suhermiyati, S. (2018). Performance And Intestinal Profiles Of Tegal Duck Fed Ration Supplemented With Prebiotics. *Tropical Animal Science Journal*, 41(1), 15–21. <https://doi.org/10.5398/Tasj.2018.41.1.15>
- Komara, F., Nur, H., & Handarini, R. (2018). PERSENTASE KARKAS DAN POTONGAN KOMERSIAL ITIK LOKAL JANTAN YANG DIBERI LARUTAN BUNGA KECOMBRANG DALAM PAKAN. *Peternakan Nusantara*, 4(1), 51–58. <https://ojs.unida.ac.id/jpnu/article/view/1513/pdf>
- Lingga, H. F., Sulasmi, S., Armansyah, T., Aisyah, S., Ismail, I., Panjaitan, B., & Razali, R. (2016). PENGARUH PEMBERIAN EKSTRAK DAUN BANDOTAN (*Ageratum Conyzoides*) TERHADAP BERAT KARKAS DAN LEMAK ABDOMINAL AYAM BROILER (Effect Of *Ageratum Conyzoides* Leaf Extract Administration On Carcass Weight And Abdominal Fat Of Broilers). *Jurnal Medika Veterinaria*, 10(1), 23. <https://doi.org/10.21157/J.Med.Vet.V10i1.4031>
- Matituputty, P. R., Noor, R. R., Hardjosworo, P. S., & Wijaya, C. H. (2011). Performa, Persentase Karkas Dan Nilai Heterosis Itik Alabio, Cihateup Dan Hasil Persilangannya

- Pada Umur Delapan Minggu. *Jurnal Ilmu Ternak Dan Veteriner*, 16(2), 90–97.
- Meera A, Prakash SJ, Prakash SO. 2013. *Garcinia Indica* for Metabolic Syndrome-a Review. *Internastional Journal of Experimental Pharmacologi*. Vol 3, Issue 2;57-60.
- Purba M, Ketaren P. (2011). Konsumsi dan konversi Itik Lokal Jantan Umur Delapan Minggu dengan Penambahan Santoquin dan vitamin E dalam Pakan. *Jurnal Ilmu Ternak dan veteriner*.16:280-287
- Putra, A., Rukmiasih, R., & Afnan, R. (2015). Persentase Dan Kualitas Karkas Itik Cihateup-Alabio (CA) Pada Umur Pematangan Yang Berbeda. *Jurnal Ilmu Produksi Dan Teknologi Hasil Peternakan*, 3(1), 27–32. <https://doi.org/10.29244/3.1.27-32>
- Randa, S. Y., Hardjosworol, P. S., Apriyantono, A., Hutagalung, R., Faculty, A. S., Papua, W., & Faculty, S. (2010). DUCK MEAT OFF-ODOR AS AFFECTED BY DIFFERENT STRAINS AND DIETARY LIPIDS. *Jurnal Ilmu Peternakan*, 5(2), 98–103.
- Rukmiasih, & Tjakradidjarja, A. S. (2006). 21. *Upaya Menurunkan Lemak Penyebab Off-Flavor Pada Daging Itik Melalui Pemberian Tepung Daun Beluntas (Pluchea Indica-L.Less) Dalam Pakan.Pdf*.
- Sale, M., Handarini, R., & Dihansih, E. (2017). PERSENTASE BAGIAN-BAGIAN KARKAS ITIK LOKAL JANTAN YANG DIBERI LARUTAN DAUN SIRIH DALAM PAKAN THE PERCENTAGE OF CARCASS PARTS OF MEAL LOCAL DUCKS GIVEN BETEL LEAF SOLUTION INCLUDED IN RATIO MATERI DAN METODE Materi Digunakan Dalam Penelitian Ini Adalah Ini. *Jurnal Peternakan Nusantara*, 3(April), 39–46.
- Soeparno. (2005). *Ilmu dan Teknologi Daging*. Gadjah Mada University Press. Yogyakarta.
- Subhan, A., Yuwanta, T., Sidadolog, J.H.P., 2010. Pengaruh kombinasi sagu kukus (*Metroxylon spp*) dan tepung keong mas (*Pomacea spp*) sebagai pengganti jagung kuning terhadap penampilan itik jantan alabio, mojosari, dan hasil persilangannya. *Buletin Peternakan*. 34(1): 30-37.
- Saputra, Y. A., Mangisah, I., & Sukamto, B. (2016). Pengaruh Penambahan Tepung Kulit Bawang Terhadap Kecernaan Protein Kasar Pakan, Pertambahan Bobot Badan Dan Persentase Karkas Itik Mojosari. *Jurnal Ilmu-Ilmu Peternakan*, 26(1), 29–36. <https://doi.org/10.21776/Ub.Jiip.2016.026.01.5>.
- Supriyati, T. P., Hamid, H., & Sinurat, A. (1998). Fermentasi bungkil inti sawit secara substrat padat dengan menggunakan *Aspergillus niger*. *Jurnal Ilmu Ternak dan Veteriner*, 3(3), 165-170.
- Sunari, Rukmiasih, & S, P. (2001). (PERCENTAGE OF EDIBLE AND NON EDIBLE PARTS. In - *Lokakarya Nasional Unggas Air* (Pp. 202–207).
- Syahrudin, E., Herawaty, R., & Azhar Ibrahim. (2015). Effect Of Substitution Of Fermented Kapok Seed (*Ceiba Petandra*) To Soybean Meal On Production And Egg Quality From Native Laying Hens. *Journal Of Agricultural Science And Technology A*, 5(10), 833–838. <https://doi.org/10.17265/2161-6256/2015.10.006>