The Effect of *Morinda citrifolia* and *Arthrospira plattensis* Powder on the Performance and Quality of Broiler Duck Carcasses

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ABSTRAK

Kurniawan D**,** Christie CDY**.** 2020. Pengaruh pemberian tepung *Morinda citrifolia* dan *Arthrospira plattensis* terhadap kinerja dan kualitas karkas itik pedaging. JITV 25(1):40-44. DOI: http://dx.doi.org/10.14334/jitv.v25i1.2053.

Penelitian ini bertujuan mengetahui kinerja dan kualitas karkas itik pedaging yang diberi tepung Morinda citrifolia dan Arthospira platensis. Sebanyak 168 ekor itik pedaging (unsexed) yang berumur 2 minggu dengan rata-rata bobot badan 463 ± 29,38 g dan tingkat keragaman 6,35 %, dikelompokkan ke dalam 28 petak masing-masing berisi 6 ekor. Metode penelitian yang digunakan adalah uji biologis yang dirancang dengan rancangan acak lengkap (RAL) yang terdiri dari 7 perlakuan dan 4 ulangan yaitu T0 (pakan basal sebagai kontrol), T1 (pakan basal + 0,2% of Morinda citrifolia powder (MP)), T2 (pakan basal + 0,5% of Arthrospira plattensis powder (AP)) , T3 (pakan basal + 0,2% of MP+ 0,5% of AP), T4 (pakan basal + 0,4% of MP + 0,5% of AP), T5 (pakan basal + 0,2% of MP + 0,1% of AP), T6 (pakan basal 0,4% of MP + 0.1% of AP). Parameter yang diuji adalah konsumsi pakan, pertambahan bobot badan, konversi pakan, persentase karkas, lemak abdominal dan organ dalam. Data yang diperoleh dianalisa menggunakan analisa ragam ANOVA, apabila terdapat perbedaan dilanjutkan dengan uji jarak berganda Duncan's. Hasil penelitian menunjukkan bahwa perlakuan tidak berpengaruh nyata (P>0.05) terhadap konsumsi pakan, pertambahan bobot badan dan konversi pakan. Perlakuan juga tidak berpengaruh nyata (P>0.05) terhadap persentase karkas, lemak abdominal dan organ dalam. Pemberian pakan dengan tepung Morinda citrifolia dan Arthospira platensis tidak dapat meningkatkan produktifitas dan kualitas karkas itik pedaging.

Kata Kunci: Itik Pedaging, Kinerja, Kualitas Karkas

ABSTRACT

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This study was aimed to investigate performance and quality of broiler duck carcasses fed with *Morinda citrifolia* and *Arthrospira plattensis*. A total of 168 two-week-old broiler duck with an initial average body weight of 463 ± 29.38 g and a diversity of 6.35 % were randomly allotted to 7 experimental groups with 4 replications each with 6 bird per replication. Treatments were T0 (basal diet as a control), T1 (basal diet + 0.2% of *Morinda citrifolia powder* (MP)), T2 (basal diet + 0.5% of *Arthrospira plattensis powde(*AP*))* , T3 (basal diet + 0.2% of MP+ 0.5% of AP), T4 (basal diet + 0.4% of MP + 0.5% of AP), T5 (basal diet + 0.2% of MP + 0.1% of AP), T6 (basal diet 0.4% of MP + 0.1% of AP). Variables measured were feed intake, body weight gain, feed conversion ratio, carcass percentage, abdominal fat, and visceral organ. Data were analyzed for variance based on a Completely Randomize Design and continued with Duncan's multiple Range Test for differences. Result showed that the treatments did not affect (P>0.05) on feed intake, body weight gain and feed conversion ratio. The treatments also did not affect (P>0.05) carcass percentage, abdominal fat, and visceral organ. The diet did not significantly improve performance and quality of broiler duck carcasses.

Key Words: Broiler Ducks, Performance, Carcass Quality

INTRODUCTION

Some plants that are rich in bioactive compounds and have the potential as phytobiotics in livestock such as *Morinda citrifolia* and *Arthrospira platensis*. *Morinda citrifolia* contains nutritional values such as minerals, vitamin, carbohydrates, and other nutrients which directly or indirectly help in metabolizing nutrients and good for cell and tissue growth (Abou Assi et al. 2017). Broilers fed fresh *Morinda citrifolia* juice (1.5 ml/head/day) showed better production performance on body weight gain, feed conversion and

feed efficiency (Sunder et al 2011). The use of 5% *Morinda citrifolia* extract in feed showed better body weight gain, growth, and performance of egg production in quails (Sunder et al. 2015).

Arthrospira platensis contain 60-70% digestible protein with all essential amino acids, unsaturated fatty acids such as ɣ-linolenic acid, vitamins especially vitamin B12 and provitamin A and mineral especially iron and various photosynthetic pigments(Hosseini et al. 2013). The bioactive components of *Arthrospira platensis* include phycocyanin, β-carotene, ɣ-linolenic acid and phenolic compounds that make *Arthrospira platensis* has antioxidant, antimicrobial and immune-stimulant properties, thus avoiding various diseases (Sudha et al 2011). Gružauskas et al. (2004) reported that *Arthrospira platensis* improved absorption of minerals and optimize nutrient digestion processes. Feeding *Arthrospira platensis* containing diets may increase the lactobacillus population and enhance the absorbability of dietary vitamins (Mariey et al. 2012). Antimicrobial activity in *Morinda citrifolia* as a feed additive is expected to improve the condition of microflora in the digestive system of poultry, especially in the small intestine. Good microflora conditions in the small intestine improve the absorption of feed substances so that feed digestibility and production performance improved. The antioxidant activity of *Arthrospira platensis* is expected to reduce or prevent damage by the oxidation process in quality poultry products. It is necessary to study effect of *Morinda citrifolia* and *Arthrospira platensis* in feed on productivity of broiler ducks which includes feed consumption, body weight gain, feed conversion and carcass quality like carcass percentage, abdominal fat, and internal organ weight.

MATERIALS AND METHODS

Birds and dietary treatments

One hundred sixty-eight hybrid broiler ducks with an initial body weight of 463±29.38 g were used in this study. The ducks were obtained from a local breeder. Completely randomized design with 7 treatments and 4 replications, 6 ducks per replication was arranged for this study. Treatments were T0 = basal diet, T1 = T0 + 0.2% *Morinda citrifolia* powder (MP), T2 = T0 + 0.5% Arthrospira platensis powder (AP), T3 = T0 + 0.2% MP + 0.5% AP, T4 = T0 + 0.4% MP+ 0.5% AP, T5 = T0 + 0.2% MP + 1% AP, T6 = T0 + 0.4% MP + 1% AP. The *Morinda citrifolia* and *Arthrospira platensis* powder addition were in the percentage of total diet basis. Composition and nutritional content of the basal diet are presented in Table 1.

Experimental bird management

This research was started with the preparation of *Morinda citrifolia* powder, *Arthrospira platensis* powder, diet, cage, and its equipment. *Morinda citrifolia* powder was obtained from Materia Medica (Batu, East Java, Indonesia). *Arthrospira platensis* was obtained from PT. Neoalga Indonesia Makmur (Sukoharjo, Central Java, Indonesia). The hybrid ducks from a local breeder were offered dietary treatments from one day to 42 days old. The birds from 1 to 14 days old were kept in litter cage, and they were moved and kept in the colony cages. Feeds and water were provided ad libitum throughout the study period. The experiment was conducted according to the standard procedures of rearing and treating farm animals as stated in the law of the Republic of Indonesia, number 18, 2009, concerning animal husbandry and health. Bodyweight and feed intake were measured weekly. The feed conversion ratio was determined as the feed intake per weight gain. At day 42, a total of 28 ducks were slaughtered, de-feathered, and eviscerated. The internal organs were immediately taken out and weighed. The following parameters were evaluated (in %, in relation to live body weight and weight of eviscerated carcass without neck): eviscerated carcass without neck, head, and neck, quarter anterior of carcass, quarter posterior of carcass, wings with skin, breast and leg with skin, abdominal fat and visceral organ (heart, liver, gizzard, spleen, and giblet).

Statistical analysis

Data were analyzed based on a Completely Randomized Design by ANOVA. Significant differences among treatment groups were further analyzed using Duncan's multiple-range test. A significant level of $p<0.05$ was implemented.

RESULTS AND DISCUSSION

Performance

Effect of dietary *Morinda citrifolia* and its combination with *Arthrospira platensis* powder on performance of broiler ducks are presented in Table 2. The result showed that the treatments did not affect ($P>0.05$) feed intake. This may be due to iso-calorie and iso-nitrogenous dietary treatments used in this study which led to the same feed intake. Several previous studies also noted that *Morinda citrifolia* powder and *Arthrospira platensis* powder had no effect on feed intake in broiler chicken (Abd El-Hady & El-Ghalid. 2018); (Mirzaie et al. 2018).

Table 1. The composition and nutritional content of basal diet

Ingredients	Amount
Maize, (% as fed)	56.15
Soybean meal, (% as fed)	22.80
Meat Bone Meal, (% as fed)	7.20
Polished rice, (% as fed)	7.10
Lime Stone, (% as fed)	3.80
Palm Oil, (% as fed)	2.00
Premix, (% as fed)	0.50
Dicalcium Phosphate, (% as fed)	0.27
Salt, (% as fed)	0.18
Analyzed composition, % of DM#1:	
Gross Energy, (cal/g)	3428
Crude Protein, (%)	18.69
Crude Fat, (%)	2.53
Fiber, (%)	1.31
Ash, (%)	11.11
Calcium, (%)	4.73
Phosphorus, (%)	0.76

#1 Analyzed by Laboratory of Animal Nutrition and Feed Science, Blitar Distric's Livestock and Fisheries Service

A number of studies have revealed the consistent benefits of *Arthrospira platensis* on the growth performance of broiler chickens. Kaoud (2012) and (Jamil et al. 2015) reported that the addition of *Arthrospira platensis* powder to the diet improves weight gain and decreased feed conversion of broiler chickens. Based on these published data the author inferred the dietary *Arthospira platensis* on broiler ducks. The present results showed that the treatments did not give significant (P>0.05) effect on body weight, weight gain, and feed conversion ratio. This finding was similar to that of Mirzaie et al. (2018), which reported that supplementation of 1% *Arthrospira platensis* did not affect performance characteristics in broilers chickens. Sugiharto et al., (2018) reported that the period during which *S. platensis* was supplemented in broiler feed did not affect the growth performance of broilers. Irrespective of feeding duration, dietary supplementation with 1% of *S. platensis* resulted in a corresponding effect on growth performance when compared to feeding zinc bacitracin as a growth promoter to broiler. Abd El-Hady & El-Ghalid (2018) reported that *S. platensis* supplementation to broiler diet improved feed conversion ratio. The improvement of FCR as a result of *S. platensis* supplementation could be attributed to the increase in body weight accompanied with no effect in feed intake.

Carcass quality

Data on comparison of the treatments of dietary *Morinda citrifolia* and *Arthrospira platensis* powder on quality of boiler duck carcasses are shown in Table 3. There were no significant (p >0.05) different values of variables affected by treatments. This is in agreement with previous findings (Sugiharto et al. 2018) which also reported that there was no effect of dietary *Arthrospira platensis* on carcass traits of broilers chicks observed for 35 days. Several studies reported that feeding *A. platensis* increased carcass percentage of broiler chicks (Koud, 2012, Mariey et al. 2014) and Japanese quail (Jamil et al., 2015). The precise reason for these different results is not known, but the relatively similar final bodyweight may result in a similar carcass percentage of broiler among the treatment groups in the present study. This inference was supported by Mariey, et al. (2014) who suggested that carcass weight was in parallel with the live body weight of broilers. That is, the increased carcass weight

Table 2. Effect of feeding *Morinda citrifolia* and *Arthrospira platensis* powder on performance production of broiler ducks

Variables	Treatments							SEM	*p*
	T0	T1	T2	T3	T4	T5	T6		
Feed intake (g/bird)	3231	3071	3221	3148	3127	3223	2947	41.00	0.52
Live body weight (g/bird)	1429	1346	1315	1404	1390	1470	1397	21.95	0.62
Weight gain (g/bird)	982	899	854	920	936	984	936	19.30	0.60
Feed Conversion Ratio	3.29	3.42	3.77	3.42	3.34	3.27	3.15	0.07	0.38

[1)] T0 = basal diet, T1 = T0 + 0.2% *Morinda citrifolia* powder (MP), T2 = T0 + 0.5% *Arthrospira platensis* powder (AP), T3 = T0 + 0.2% MP + 0.5% AP, T4 = T0 + 0.4% MP+ 0.5% AP, T5 = T0 + 0.2% MP + 1% AP, T6 = T0 + 0.4% MP + 1% AP

Table 3. Effect of feeding *Morinda citrifolia* and *Arthrospira platensis* powder on quality of broiler duck carcasses.

Variable	Treatments							SEM	*p*
	T0	T1	T2	T3	T4	T5	T6		
Eviscerated carcass (g)	1028	860	893	1001	919	1115	948	24.94	0.07
Dressing (%)	60.51	59.11	58.96	60.57	57.37	62.13	60.32	0.70	0.72
As % of dressed carcass									
Quarter anterior (%)	27.74	26.69	27.23	27.20	27.39	27.35	27.47	0.22	0.17
Quarter posterior (%)	21.94	22.75	22.36	22.74	22.16	22.16	22.13	0.20	0.20
Breast (%)	12.00	10.73	9.99	13.75	12.14	10.80	9.40	0.58	0.82
Thigh (%)	10.32	11.04	11.00	11.29	11.14	10.66	12.00	0.35	0.96
Wing (%)	7.66	7.82	7.34	6.43	6.92	6.89	7.31	0.15	0.14
Head and neck (%)	17.09	18.40	18.12	16.52	18.12	16.15	16.97	0.42	0.77

[1)] T0 = basal diet, T1 = T0 + 0.2% *Morinda citrifolia* powder (MP), T2 = T0 + 0.5% *Arthrospira platensis* powder (AP), T3 = T0 + 0.2% MP + 0.5% AP, T4 = T0 + 0.4% MP+ 0.5% AP, T5 = T0 + 0.2% MP + 1% AP, T6 = T0 + 0.4% MP + 1% AP

Table 4. Effect of feeding *Morinda citrifolia* and *Arthrospira platensis* powder on visceral organ of broiler ducks

Item (% live BW)	Treatments							SEM	*p*
	T0	T1	T2	T3	T4	T5	T6		
Liver	2.99	2.59	3.02	2.85	3.46	2.45	2.56	0.13	0.32
Gizzard	3.14	3.70	3.07	3.21	3.24	3.07	3.12	0.08	0.52
Heart	0.47	0.55	0.57	0.50	0.51	0.54	0.60	0.01	0.62
Spleen	0.06	0.07	0.13	0.06	0.07	0.08	0.09	0.005	0.70
Giblet	6.60	6.84	6.66	6.56	7.22	6.06	6.27	0.14	0.84
Abdominal fat	1.36	0.70	0.95	1.73	1.15	1.24	0.90	0.12	0.26

[1)] T0 = basal diet, T1 = T0 + 0.2% *Morinda citrifolia* powder (MP), T2 = T0 + 0.5% *Arthrospira platensis* powder (AP), T3 = T0 + 0.2% MP + 0.5% AP, T4 = T0 + 0.4% MP+ 0.5% AP, T5 = T0 + 0.2% MP + 1% AP, T6 = T0 + 0.4% MP + 1% AP

and total edible part were attributed to the final live bodyweight of broilers and vice versa

Visceral organs

Data describing the effect of dietary *Morinda citrifolia* and *Arthrospira platensis* powder on visceral organs of broiler ducks are summarized in Table 4. No significant different effects ($p>0.05$) were found among treatments on liver, gizzard, heart, spleen, giblet and abdominal fat of broiler ducks. Nurhayati (2010) reported that using *Morinda citrifolia* powder in the ratio up to 10 percent did not significantly affect internal organ of broiler chickens. This is in agreement

with (Sugiharto et al. 2018) that feeding of *Arthrospira platensis* (1%) had no significant effect on internal organ of broiler chicks for 35 days. Total organ weight was found to be lower in bird fed with antibiotics as well as 0.05% *Moringa* fruit powder. A significant effect of herbal dietary treatment was not observed on subcutaneous fat content (neck, breast, and leg) of broiler carcass and on abdominal fat content (heart and vent) except the fat around gizzard (David et al. 2012).

CONCLUSION

The finding of the present study suggests that the dietary of *Morinda citrifolia* and *Arthrospira platensis* powder did not significantly improve performance and quality of broiler ducks carcasses.

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